Three Essays on Applied Macroeconomics

by

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Abstract

This thesis consists of three essays on applied macroeconomics that are linked by the thread of international economics. The essays cover three strands of literature: (1) the transmission mechanism of international economics shocks, (2) real exchange rate and bilateral trade balance and (3) foreign direct investment (FDI) and economic growth.

In the first essay, I use a panel vector autoregressive model, with annual data, to study the transmission of economic shocks from the United States (U.S.) to Caribbean economies. Unlike prior studies such as Canova (2005), Murray (2007) and Feldkircher and Huber (2016), this analysis includes remittance and tourism as additional channels of importance with regards to the transmission of economic shocks, alongside the traditional transmission channels in the literature. These two additional channels of transmissions are considered given their economic importance to Caribbean economies. The results suggest that shutting down the remittance and tourism channels lower the effect of a U.S. economic shock on real GDP. Further, the inclusion of these two channels unearth the measurement bias that would have been previously attributed to the traditional transmission channels. By uncovering the measurement bias, the role remittances and tourism play in the transmission process of U.S. economic shocks in a typical Caribbean economy is now highlighted, especially as it relates to designing policies aimed at tempering economic fluctuations attributed to these shocks. The results are relatively consistent at the quarterly frequency, using Jamaica as a representative case for similar Caribbean economies.

For the second essay, I investigate if evidence in favour of the J-curve phenomenon depends on a country's trade with the U.S. or their largest trading partner and, if there is any cross-country evidence of the J-curve. The empirical assessment introduces asymmetric real exchange rate effects and structural breaks in an autoregressive distributed lag (ARDL) framework, using both quarterly and annual data. The results from both the quarterly and annual analyses show that real exchange rate has significant asymmetric effect on bilateral trade balance. Further, the introduction of asymmetric real exchange effect in the ARDL model provides greater evidence supporting the J-curve phenomenon, relative to the linear model. The findings from the quarterly assessment indicate that the lower a country's cost of production relative to that of the U.S., the greater the magnitude of long-run improvement in the bilateral trade balance following a real depreciation. From the annual assessment, I find that the J-curve may also be taken as given for some countries, regardless of the measure of real exchange rate or trading partner. Unlike in the quarterly analysis, the findings indicate cross-country support for the J-curve. Further, greater cases of the J-curve from the annual assessment relative to the quarterly assessment, is attributed to the annual analysis capturing delay in the J-curve. The findings suggest that greater understanding of the real exchange rate – trade balance nexus within an asymmetric and disaggregated framework has important implications for designing bilateral trade policy.

In the final essay, using a panel of 45 Emerging Markets and Developing Economies (EMDEs), I examine if remittances, foreign aid and institutions influence FDI's effect on economic growth. I find that the positive effect of FDI on growth as well as on the growth of agriculture and manufacturing value added (VAD) diminishes as the level of institutions (democratic accountability, ethnic tensions, internal conflict, investment profile, religious tensions and socioeconomic conditions) increases. Further, the influence of a particular institution on FDI's effect at the aggregated level varies across sectors as well as income groups. The results suggest that higher remittances only enhance the marginal effect of FDI in the growth of agriculture VAD.

Additionally, FDI's effect on the growth process is independent of foreign aid and should be treated as such.

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Dedication

To my parents Beverley Harris-Hylton and Hubert Scarlett Snr. (1940 - 2014) for placing great emphasis on higher education.

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Introduction

Globally, many countries have relatively liberal financial markets and are open to trade. This open access creates an economic interdependence that provides both benefits and drawbacks for countries, depending on their stage of development, income level, geographical location, among other factors. It is in this context that the thesis comprises of three essays that are connected by the thread of international economics.

My first essay is based on a short-run model that investigates how economic shocks are transmitted from a large economy with global economic influence to a dependent Caribbean economy, when additional channels of importance are considered alongside the traditional channels and, how Caribbean policymakers can respond to the ensuing economic fluctuations. I assess the transmission of economic shocks from the U.S. to Caribbean economies using a panel vector autoregressive model in general method of moments with fixed effects, with the Hamilton (2018) method used to extract the cyclical component. In addition to the traditional transmission channels in the literature, remittance and tourism channels are also included as additional channels of importance. The findings indicate that the U.S. real GDP shocks produce relatively significant annual fluctuations in a typical Caribbean economy, and shutting down the remittance and tourism channels lower the effect on real GDP. Of all the channels examined, I find that the tourism and interest rate channels are the most active. The lower output effect is also evident at the quarterly level, within a structural VAR framework, using Jamaica as a representative case for similar Caribbean economies. While remittance, tourism and real exchange rate channels play major roles in the transmission process, again, the U.S. real GDP shock is the most dominant in the representative case. The inclusion of the tourism and remittance channels unearth the measurement bias that would have been previously attributed to the traditional transmission channels.

In the second essay, I examine the real exchange rate as a trade policy tool for economies that have an export-led economic growth strategy or those seeking to improve trade competitiveness with a bilateral trading partner. This assessment jointly explores the short-run and long-run dynamics between the real exchange rate and bilateral trade balance. This essay builds on the existing literature by testing if evidence in favour of the J-curve phenomenon is unique to a country's trade with the U.S. or their largest trading partner and, if there is any cross-country evidence of the J-curve. The empirical assessment introduces asymmetric real exchange rate effects and structural breaks in an autoregressive distributed lag (ARDL) framework. The findings show evidence of asymmetric real exchange rate effects on the bilateral trade balance, in both the short-run and long-run for most of the countries examined. Results from the quarterly analysis indicate evidence supporting the J-curve for 14 countries, of which, seven are emerging and developing countries, far more than previously identified in the literature on the U.S. The findings also indicate that the lower a country's cost of production relative to that of the U.S., the greater the magnitude of long-run improvement in the bilateral trade balance following a real exchange rate depreciation. Results from the annual assessment indicate that the J-curve may also be taken as given for some countries, regardless of the measure of real exchange rate used. The non-linear ARDL model identifies 21 cases of J-curve, six of which the linear model failed to capture. Unlike in the quarterly analysis, the findings indicate cross-country support for the J-curve. This cross-country evidence, within the non-linear ARDL framework, is only present among the euro area as well as emerging and developing group of countries bilateral trade with their largest trading partner, subject to the real exchange rate measure.

In the third essay, I examine the influence of remittances, foreign aid and institutions on the long-run relationship between FDI and economic growth, among emerging markets and developing economies. The assessment covers 45 emerging markets and developing economies, for the period 1985 to 2014. Using panel data techniques, my study finds that the positive effect of FDI on growth as well as on the growth of agriculture and manufacturing value added (VAD) diminishes as the level of institutions (democratic accountability, ethnic tensions, internal conflict, investment profile, religious tensions and socioeconomic conditions) increases. I attribute this result to FDI and institutions serving as substitutes in the growth process or institutions playing a role in protecting areas of the domestic economy from any negative externalities associated with FDI. The type of institution influencing FDI's effect at the aggregated level varies across sectors as well as income groups. The results also show that higher remittances only enhance the marginal effect of FDI in the growth of agriculture VAD. In addition, FDI's effect on economic growth and growth of sectoral VAD is independent of foreign aid.

It is my hope that the contribution from this thesis will inform policy designs on business cycles, trade balance and long-term economic growth, especially among the emerging markets and developing economies.

1. Transmission of United States Economic Shocks to Caribbean Economies: An Empirical Assessment

1.1 Introduction

The global financial crisis of 2007 re-emphasizes the importance of understanding the international transmission of economic shocks and their effect on economic fluctuations. The traditional channels of transmission in the literature cover the financial and real sectors, specifically, interest rate, inflation rate, real effective exchange rate (or exchange rate) and trade channels (Sims, 1980; Gali, 1999; Robelo, 2005; Canova, 2005; Feldkircher and Huber, 2016). Samuel and Sun (2009) and Canova and Dallari (2013) assert that the economic orientation of an economy may influence the use of additional channels that could amplify the effects on output consequent on economic shocks. The former suggests remittance, while the latter puts forward tourism as additional channels of importance given their economic importance to some economies. Canova and Dallari (2013) indicate that the inclusion of additional channels may unearth some measurement bias that could have been attributed to the traditional channels. For the ten Caribbean economies covered in this study, the ratios of tourism receipts to total exports and remittance inflows to gross domestic product over the period 1997 to 2014 averaged approximately 40.4 percent and 4.3 percent, respectively. These numbers underscore the economic importance of remittance and tourism to the Caribbean region.

The economic consequences of international economic disturbances cover the spectrum of positive to negative effects with short or long run effects. Economic shocks origination in a world leading economy (such as, the United States) can propagate globally (Feldkircher and Huber, 2016), to regional economies (Canova, 2005, Latin America) and or to a Small Island Developing State

(Murray, 2007, Jamaica). The transmission of these shocks across economic borders can be attributed to shocks common to all economies and or economic interdependence (Craigwell and Maurin, 2007).

Studies on the transmission of U.S. economic disturbances via the traditional channels are numerous. Feldkircher and Huber (2016) indicate that the transmission of U.S. economic shocks (positive supply, positive demand and contractionary monetary policy) have significant effect on global output, with monetary policy having the largest effect across all regions. The authors note that the disturbances transmit primarily via the interest rate and real effective exchange rate channels. Canova (2005) provides a similar conclusion for the Latin American economies, with the exception that the trade channel plays a significant role only on impact of a shock. He suggests that the positive comovement between the U.S. and Latin America interest rates is attributed to the U.S. monetary policy influence on world interest rate. Samuel and Sun (2009) show that although U.S. disturbances may propagate in the Caribbean economies, the U.S. monetary policy plays a minor role in the Eastern Caribbean Currency Union (ECCU) economy. An earlier study on the Caribbean economies shows that U.S. monetary policy has a greater effect on those economies under a flexible exchange rate regime relative to those with fixed exchange policies, with transmission occurring primarily via the real effective exchange rate channel (Borda, Manioc and Montauban, 2000). Samuel and Sun (2009) inclusion of the tourism channel in their assessment find that tourism is only a significant channel of transmission in one of the ECCU economies (Antigua and Barbuda).

Although this study relies on aggregate tourism and remittance inflows, I provide robust evidence, to support their inclusion as additional channels of importance in the transmission of U.S.

economic shocks, by doing a panel assessment at the annual frequency on ten Caribbean economies and then with quarterly data use Jamaica as a representative case for similar Island States. This study can be compared to Samuel and Sun (2009) for the ECCU and Canova and Dallari (2013) for the Mediterranean Basin in the general sense that they focus on the importance of the tourism channel in the transmission process. Unlike previous studies of the Caribbean that focus on the relationship between tourism or remittance inflows on domestic business cycle (McLean, 2008; Mayers and Jackman, 2011; Ghartey, 2013; Jackman, 2014), I focus on the simultaneous importance of both the tourism and remittance channels along with the traditional channels in the transmission of U.S. economic shocks and their impact on Caribbean economies economic fluctuations. With the exception of Canova and Dallari (2013) who find the tourism channel to effectively transmit external economic shocks from the source tourism market with significant output effect on the receiving economy, Robinson (2001) only suggests that external shocks are transmitted via the tourism channel. Samuel and Sun (2009) make a similar suggestion for remittance inflows, but were unable to conduct empirical analysis due to data unavailability.

Studies on the transmission mechanism have well defined measures for financial and real sectors. This is, however, not the case for tourism and remittance inflows, whose measures to a great extent depend on data availability. Tourism is defined by tourist arrivals and or tourist expenditure (Samuel and Sun, 2009; Canova and Dallari, 2013; Ghartey, 2013), while remittance inflows are measured by total funds remitted. The available remittance data is mainly at an aggregate level with few countries having a breakdown by source of origin.

The objective of this study is to investigate if tourism and remittances can serve as important channels, alongside the traditional channels, in the transmission of three U.S. economic shocks to

Caribbean economies. These three U.S. economic shocks are examined namely output, interest rate and inflation. As indicated by Canova (2005), Murray (2007) and Feldkircher and Huber (2016), U.S. output and interest rate shocks are the main shocks originating from the U.S. that is propagation to the rest of the world. A positive shock to U.S. real GDP has positive spillover effects on foreign economies output and prices (Canova, 2005; Feldkircher and Huber, 2016). For the transmission of U.S. interest rate shock, I draw on the Mundell-Fleming open economy framework which proposes how changes in the world interest rate can affect external economies, under both fixed and flexible exchange rate regimes (Fleming, 1962; Mundell, 1963). In the context of this study, an increase in U.S. interest rate, a proxy for the world interest rate, is expected to stimulate capital flows out of the Caribbean economies. The capital outflow depreciates the Caribbean economy currencies and contribute to an improvement in its net exports leading to an increase in the output and eventually increase in their interest rate. However, under a fixed exchange rate regime, the Caribbean economy's interest rates will increase in order to keep the exchange rate at its current level. The U.S. inflation shock is included in the assessment on the grounds that U.S. inflation plays a significant role in the inflation dynamics of countries over which it has a strong influence (Yang et al., 2006). I undertake the assessment in two parts. Firstly, with annual data for ten Caribbean economies over the period 1997 to 2014, I use a panel vector autoregressive model in general method of moments with fixed effects, following the Abrigo and Love (2015), to carry out the analysis. Of the ten economies, seven are under a fixed exchange rate regime. Secondly, with quarterly time series data on Jamaica, I use a structural vector autoregressive model to assess the transmission process. The use of a structural framework for the quarterly analysis provides greater control of the model, given the relatively high volatility that is inherent in data at this high frequency relative the annual frequency. The findings would assist policymakers in identifying the importance of other channels that can amplify the effects of economic shocks as they interpret these shocks in designing countercyclical policy measures. Both remittance and tourism flows are for the first time used simultaneously to examine their importance in the international transmission of U.S. shocks to the Caribbean region. I also examine the comovement between key macroeconomic variables of the U.S. and Caribbean economies conditional on U.S. economic disturbances. This is to ascertain if there exists any business cycle comovement between the U.S. and the Caribbean region.[1] As an additional contribution to the business cycle analysis, I use the Hamilton (2018) approach to extract the cyclical component of the macroeconomic variables of interest. This approach is regarded as a relatively more efficient approach than the more common Hodrick-Prescott (HP) Filter (Hodrick and Prescott, 1997).

The findings show that U.S. inflation and real GDP shocks are the two shocks having significant output effect on a typical Caribbean economy. The results show that the interest rate and the tourism channels are the most active channels for the transmission of at least two of the U.S. disturbances. On average, U.S. shocks contribute approximately 17.0 percent to the fluctuation in the macroeconomic variables. The counterfactual assessment shows that shutting down the remittance and tourism channels lower the output effect in a typical Caribbean, in response to U.S. shocks. These results are relatively consistent when emphasis is place solely on Caribbean economies under a fixed exchange rate regime. The results from the robustness exercise with Jamaica as a representative case at the quarterly frequency, show that a positive U.S. real GDP disturbance has the greatest effect across all Jamaica's variables. All channels of transmission have

[1] The inclusion of the remittance channel is timely, considering the recent proposal to amend the U.S. Electronic Funds Transfer Act. This Act will in part include a 2% fee (tax) on remittance transfers to selected countries, including those in the Caribbean (Rogers, 2017). If this proposal comes to fruition, this translates into an inflation effect on remittances flows.

significant and relatively strong responses, with remittance, tourism and the real exchange rate playing major roles. Shutting down the remittance and tourism channels lower real GDP (output) effect on average by approximately 67.0 percent, across all three U.S. shocks.

By considering the tourism and remittance channels as additional transmission channels, it not only broadens the understanding of how U.S. economic shocks are transmitted to Jamaica and other Caribbean economies, it also provides a way to eliminate any bias that may have been attributed to the traditional transmission channels. The findings of the study have important implications for Jamaica and Caribbean policymakers in mitigating or tempering their economic fluctuations in response to U.S. economic shocks. Specifically, remittance and tourism should be included in Caribbean economies international business cycle models, as their absence will result in the underestimation of the output effect in response to U.S. economic shocks.

The structure of the rest of the paper is organized as follows. Section 1.2 explores the literature on the transmission of U.S. economic shocks. Section 1.3 empirically assesses the transmission of U.S. economic shocks to a panel of Caribbean economies at the annual level. In section 1.4, I use Jamaica as representative for Island States with a similar structure to see how the results hold at a higher frequency. Section 1.5 concludes and presents policy implications of the results.

1.2 Literature Review

The study of international transmission of economic shocks have become of greater importance to policymakers as financial markets and trade evolve. Rebelo (2005) mentions monetary, demand, supply and oil as possible economic shocks that can affect key macroeconomic variables of a country. Since the work of Sims (1980), the use of vector autoregressive (VAR) method and its hybrids are commonly used to examine the transmission of economic shocks.

In assessing the transmission of U.S. economic shocks to Jamaica, Robinson (2001) uses a SVAR model to examine the effect of the cyclical components of the real exchange rate, terms of trade, domestic interest rate and U.S. real GDP on Jamaica's business cycle. Using first differenced annual data for the period 1970 to 2000, the results indicate that positive U.S. aggregate GDP shock accounts for approximately 25 percent of the variation in Jamaica's business. Murray (2007) considers a structural VAR model, with quarterly Hodrick Prescott (1997) filtered data for the period 1990 to 2005, to identify the factors that influence Jamaica's business cycle. The contemporaneous relationship follows that of Cholesky decomposition. His findings suggest that the U.S. economic shocks (in particular U.S. price increase) accounts for an average of 29 percent of the variation in Jamaica's real GDP, price and interest rate cycles. Although the responses of Jamaica's output, price and interest rate to U.S. shocks are relatively in line with expectations, the only significant impact is reflected in Jamaica's positive output response to the positive U.S. real GDP shock.

Borda, Manioc and Montauban (2000) explore the effect of U.S. monetary policy on twelve Caribbean economies using a panel VAR model framework. They find that Caribbean economies with fixed exchange rate regime are less affected by U.S. monetary shocks relative to those under a flexible exchange rate policy. The authors suggest that the exchange rate in countries with a fixed exchange rate regime acts as a buffer to the U.S. monetary shock. Using a VAR framework with annual data for period 1963 to 2007, Samuel and Sun (2009) find that the ECCU, with its fixed pegged exchange rate to the U.S. dollar, is sensitive to both temporary and permanent economic fluctuations originating from the U.S. However, the U.S. monetary policy shocks do not have a significant effect on the ECCU economies. Canova (2005) uses the structural VAR model to examine the transmission of U.S. economic shocks to eight Latin America economies. He finds that U.S. contractionary monetary policy (increase interest rate) has the largest impact on the Latin America macroeconomic variables, while positive U.S. supply and demand disturbances have small and short-lived impacts. Further, the output responses to all U.S. shocks are similar across both fixed and flexible exchange rate regimes. The author finds that the interest rate is the dominant channel via which U.S. disturbances are propagated in Latin American economies. Feldkircher and Huber (2016) assess U.S. economic disturbances at a global level using a global VAR framework. They find that U.S. supply, demand and monetary shocks affect output across all regions (Latin America, Emerging Europe, Asia and Advanced economies). However, it is the U.S. contractionary monetary shock that has the strongest impact on output which is consistent with the findings of Canova (2005).

In terms of establishing tourism as a transmission channel of importance, Robinson (2001) suggests that, in Jamaica, the transmission of positive U.S. supply shocks occur primarily via the tourism and capital flow channels, with the terms of trade measure playing a minor role. Using quarterly data for the period 1989 to 2002, Malcolm (2003) error correction model (ECM) predicts that income of source countries for tourist, in particular the United States and the United Kingdom, has a significant influence on the demand for Jamaica's tourism product. The author, however, indicates that any deviation in the tourism arrivals from the long-run trend would be short lived. Samuel and Sun (2009) in their panel VAR model of ECCU economies finds that the tourism channel does not significantly amplify disturbances originating from the U.S. Mayers and Jackman (2011), using cyclical components extracted with structural time series approach of Harvey (1989), find that economic shocks in source country market of U.S., U.K. and Canada explains approximately 25 percent of the fluctuation in the Barbados tourism cycle. The Barbados tourism cycle however, reacts with a delay to source market economic shocks, which the authors suggest policymakers should take advantage of when designing countercyclical measures. In an earlier study, Craigwell and Maurin (2005) estimate the delay of Barbados business cycle to that of the U.S. to be approximately six months. Given the economic importance of the tourism sector, Canova and Dallari (2013) suggest that failure to model the tourism channel in the destination country would result in lower output effects. This is on the basis that the indirect effect on the destination country output resulting from changes in tourist flows is not captured. In their study of the Mediterranean Basin, Canova and Dallari (2013) find that supply shocks originating from tourist source country have a significant influence on tourism flows in a destination country and, shutting down this channel has the possibility of reducing the output effects by approximately 25 percent.[2]

The importance of remittances as a significant channel for U.S. economic shocks is also examined in the literature. Clarke and Wallsten (2003) utilize a household panel data set from the 1989 and 1992 Jamaica Survey of Living Conditions to assess the relationship between hurricane damage and remittance inflows. Estimates from the panel regression model indicate that remittance inflow to Jamaica act as a form of insurance. Further, for each dollar of damage caused by a hurricane in the country, remittance inflow is expected to increase by 25 cents. Since the negative effects of natural disasters are reflected in a country's output, it would be safe to model Jamaica's real GDP cycle as an influencing factor in additional remittance inflow. Although this is the case, the value

[2] The Mediterranean Basin region consists of eleven countries where tourism-related activities account for an estimated 9.1 percent of GDP in 2010 (Canova and Dallari, 2013).

of remittance sent to a recipient can be influenced by economic conditions in the sender's country that could affect his or her income level. In terms of the broader Caribbean region, Jackman (2014) finds that annual remittances to Barbados (1970 to 2009) and Jamaica (1976 to 2009) are influenced by their respective business cycles, while that of Dominica (1976 to 2009) and Trinidad & Tobago (1975 to 2009) are affected by the U.S. business cycle.

Previous studies assessing the transmission of external disturbances to the Caribbean do not control for unobserved heterogeneity across the economies. This is an oversight with both empirical and policy implications. Feldkircher and Huber (2016) utilize trade weights to control the way each region reacts to economic shocks. Abrigo and Love (2015) propose the use of a traditional panel VAR (PVAR) model combined with fixed effects component within a generalized method of moments (GMM) framework as a remedy.

In the literature on the Caribbean, the Hodrick-Prescott Filter (1997) is the most commonly used detrending method to extract the cyclical components from a variable. As with all filtering techniques, the HP filter has its pros and cons. Some major drawbacks with the HP filter lie in its ability to generate spurious cycles, carry out over-smoothing and it is biased in large samples (Harvey and Jaeger, 1993; Hamilton, 2018). Hamilton (2018) proposes a filtering technique that is relatively more efficient than HP filter in detrending a series without the aforementioned drawbacks.

The empirical findings suggest that U.S. economic disturbances have varying degrees of effect across economies macroeconomic variables. There is also evidence to support the inclusion of tourism and remittances as amplifiers of U.S. economic shocks. For this study, I use the Hamilton approach (2018) to de-trend each series to get the cyclical component. First, I use the PVAR model of Abrigo and Love (2015) to assess the effect of U.S. economic shocks on a typical Caribbean economy at the annual level. Then I use a structural vector autoregressive model, with Hamilton (2018) detrended quarterly series, to examine the transmission of U.S. economic shocks to Jamaica to arrive at a conclusion as to the possible effect on the economy. The study imposes structural restrictions that are based on economic theory and empirical studies. Relative to the literature on Jamaica and other Caribbean economies, this study uses a different group of variables, dataset and detrending technique. In addition, the tourism and remittances transmission channels are included in both VAR models, along with the traditional channels outlined in the literature.

1.3 Selected Caribbean Economies Response to U.S. Shocks

The study begins with an assessment of ten selected Caribbean economies responses to U.S. economic shocks. Based on prior studies, I assume that economic fluctuations in Caribbean economies macroeconomic variables are mainly driven by three economic shocks (real GDP, monetary and inflation) originating from the U.S. This sample includes annual data for the period 1997 to 2014. The idea is to ascertain the behaviour of a typical Caribbean economy to U.S. economic shocks, from which inferences will be drawn to support analysis at the quarterly frequency for Jamaica, as a benchmark for other Caribbean economies.

1.3.1 Data

Data on the U.S. are gathered from the FRED economic database of the Federal Reserve Bank of St. Louis, while information for the ten (10) selected Caribbean economies (Jamaica, Trinidad & Tobago, Suriname, Barbados, Belize, Grenada, Dominica, Saint Kitts & Nevis, Saint Lucia and

Saint Vincent & the Grenadines) are from the World bank database.[3] All variables are transform to natural logarithm, with the exception of inflation, interest rate and those defined as ratios. I extract the cyclical component of all selected variables using the Hamilton (2018) detrending approach.

The three variables chosen to represent the U.S. economic block are real GDP (usy), all consumer price inflation (usinf)and the 180-day Treasury Bill yield (ustb). The U.S. real GDP, interest rate and inflation reflect the U.S.'s real GDP, monetary and inflation shocks, respectively. The Caribbean economies are selected based on data availability and ability to ensure a relatively large sample size to exploit the asymptotical properties of the estimates. The seven variables looked at cover real GDP(y), inflation(inf), interest rate (r), trade, real exchange rate (RER), tourism flows (arrive) and remittance inflows (remit). Real GDP is used as a measure of output, while the lending-deposit interest rate is a proxy for the nominal interest rate (Canova, 2005). Trade is measured by the ratio of value of real export to imports. Real exchange rate (RER) captures each Caribbean economy's international competitiveness. An increase (decrease) in the RER indicates that exports are cheaper (expensive) and imports become expensive (cheaper) thus signalling a gain (loss) in Caribbean's trade competitiveness. The selected variables are common in the literature when examining the effects of U.S. economic shocks on other economies (Canova, 2005; Craigwell and Maurin, 2005; Murray, 2007; Feldkircher and Huber, 2016).

[Table 1A.1 Here]

[3] See Table 1A.1 for additional data description.

The Hamilton (2018) detrending approach, used to extract the cyclical components, involves using ordinary least squares to regress a variable (s_t)at time $(t + h)$ on the four most recent values as of time t, with the residual $(\hat{v}_t)$ representing the cyclical component (Equations 1.1 and 1.2). When compared to the HP filter, Hamilton's approach produces cyclical component of a variable that is free from spurious dynamic relations and is more in line with the data generating process as well as eliminates spurious predictability.[4] The h period ahead corresponds to two years ahead. For the annual frequency at hand, $h = 2$. For a relatively large sample, the cyclical component is estimated using equations (1.3) and (1.4) as β_0 and β_1 converges to zero and 1, respectively. The period of assessment spans 18 years, so equations [1.3] and [1.4], are used to preserve degrees of freedom.

$$s_{t+h} = \beta_0 + \beta_1 s_t + \beta_2 s_{t-1} + \beta_3 s_{t-2} + \beta_4 s_{t-3} \tag{1.1}$$

$$\hat{v}_{t+h} = s_{t+h} - \hat{\beta}_0 - \hat{\beta}_1 s_t - \hat{\beta}_2 s_{t-1} - \hat{\beta}_3 s_{t-2} - \hat{\beta}_4 s_{t-3} \tag{1.2}$$

$$s_{t+h} = \beta_0 + \beta_1 s_t + v_{t+h} \tag{1.3}$$

$$\hat{v}_{t+h} = s_{t+h} - s_t \tag{1.4}$$

1.3.2 Caribbean Economy Stylized Facts

Using the standard deviation as a measure of volatility, with the exception of RER and inflation which are relatively as volatile, Caribbean macroeconomic variables are at least twice more volatile than their real GDP (see Table 2). Further examination of the statistics indicates that the

[4] A disadvantage of this approach is the possibility that the model may fail to make a correct prediction at *h* period ahead, in the event of cyclical factors (see Hamilton (2018) for further details).

RER of the typical Caribbean economy is not dependent on its real GDP, but more on the U.S. real GDP, given the correlation coefficients. Tourist arrivals and trade show low levels of procycliciality within the region, while the other variables display low counter-cyclicality. A comparison of a typical Caribbean economy real GDP to the U.S. shows that the average Caribbean economy real GDP is twice more volatile. The real GDP however shows signs of procyclicality with the U.S. economy, which is in line with other studies on the Caribbean such as Craigwell and Maurin (2005).

[Table 1A.2 Here]

1.3.3 Model

Before estimating the model, the study performs panel unit root test to ensure that the cyclical components of the variables derived in [1.4] are jointly stationary. This test employs the Levin, Lin and Chu (2002) panel unit root test, which tests the null hypothesis of unit root in the variable against the alternative hypothesis that there exists no unit root. The econometric analysis of the transmission of U.S. economic shocks to ten Caribbean economies employs a panel VAR model in GMM framework with fixed effects developed by Abrigo and Love (2015).[5] This approach accounts for the unobserved components across the Caribbean economies by incorporating fixed effects thereby reflecting the traditional VAR methodology that captures the unobserved heterogeneity across Caribbean economies represented by (1.5):

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[5] The system GMM estimator is designed for panels with few time periods and many cross-section, handles explanatory variables that are not strictly exogenous as well as controls for heteroscedasticity and autocorrelation within cross-section which makes the estimator more efficient (Hoeffler, 2002; Rodman, 2006).

$$Y_{it} = Y_{it-1}A_1 + Y_{it-2}A_2 + \cdots + Y_{it-p}A_t + X_{it}B + \varphi_{it} + e_{it} \quad (1.5)$$

Where, i represents the U.S. or a Caribbean country, t the year, Y for the vector of dependent variables, X the vector of exogenous variables, $\varphi_{it}$for the vectors of dependent variables specific fixed effects, $e_{it}$for the idiosyncratic errors and, matrices A and B are parameters to be estimated.

The estimators from the GMM framework produces consistent estimates with fixed time and large cross section, which results in efficiency gains when estimated as a system relative to single equation (Holtz-Eakin, Newey and Rosen, 1988). Errors of the model are assumed to be serially uncorrelated (1.6).

$$E[e_{it}] = 0, E[e'_{it}e_{it}] = \Sigma \text{ and } E[e'_{it}e_{is}] = 0 \text{ for all } t > s \quad (1.6)$$

I select the panel VAR model by choosing the optimal lag length for the VAR specification and moment condition, based on the overall coefficient of determination, which captures the proportion of the variation explained by the VAR model. The contemporaneous structure of the panel VAR is based on the Cholesky decomposition with the variables order being U.S. variables $[usy, usinf, ustb]$followed by the Caribbean variables $[y, inf, r, trade, rer, arrive, remit]$. It is understood that the result of the model is subjected to the ordering of the variables. The ordering of the variables is on the premise that there is a unidirectional relationship from U.S. variables to the Caribbean variables. Further, for both U.S. and Caribbean economies, their respective real GDP will contemporaneously affect inflation and the interest rate, while their inflation affects interest rate in the same period (Gali, 1999). Additional restrictions are real GDP having a contemporaneous effect on remittance inflows based on Clarke and Wallsten (2003) and Jackman (2014) attributing the state of the Caribbean economy as one of the factors influencing individuals remitting funds to their country of origin. The RER, influences tourism flows to the Caribbean region.

A Priori Expectations for Transmission of U.S. Shocks

The overall effect of external shocks on an economy depends on how the economy interprets the shocks and the interaction between the various channels of transmission as highlighted by Feldkircher and Huber (2016). In the context that remittances and tourism channels are considered viable channels of transmission of U.S. economic shocks, they have two expected effects (direct and indirect) on real GDP (Canova and Dallari, 2013). The direct effect relates to the effect that economic shocks has on real GDP fluctuations. While the indirect effect captures the impact, the shocks has on real GDP fluctuations via the changes in tourism and remittance flows.

For a positive U.S. real GDP shock, it is expected that U.S. prices should decrease. Thereafter, a typical Caribbean economy's term of trade should rise. Consequently, exports and real GDP should decrease and imports increase and cause the trade balance to deteriorate. Domestic prices may remain constant or decline on the premise that the RER adjusts, or if domestic demand has a greater influence on prices or production. The response of the Caribbean economy's interest rate will depend on whether the monetary policy is driven by price concerns or the level of output. However, if all the U.S. price change is not reflected in a typical Caribbean price, the RER should adjust in order to achieve equilibrium. On the basis that remittance inflows are countercyclical (Bettin et al., 2014), the decline in real GDP should precede an increase in remittance inflows to the Caribbean. Since U.S. tourists demand for the Caribbean's tourism product is influenced by price, all other things being equal, a fall in the RER is expected to negatively affect visitor arrivals.

In response to a positive U.S. interest rate shock (monetary policy tightening), the Caribbean's interest rate is expected to increase, given the U.S.'s pivotal role in the international financial market. As a result, capital will flow to the U.S. economy and have a negative effect on economic activity in the Caribbean. The movement in capital from a typical Caribbean economy should reduce the net international reserves and put pressure on the value of the currency leading to an increase in the RER. If the RER fully adjusts immediately to the shock, there should be no expected change in the Caribbean's macroeconomic variables. However, if the full adjustment in the RER occurs over time, there should be observed declines in real GDP and price (Borda, Manioc and Montauban, 2000; Canova, 2005). Visitor arrivals are expected to respond positively to movements in the RER. The transmission of the U.S. interest rate shock is in keeping with the Mundell-Fleming open economy framework.

The response of the Caribbean economy to an increase in U.S. inflation shock is expected to be opposite the U.S. positive U.S. real GDP shock. With the Caribbean economies being a price-taker given its relative small role in the goods market, domestic prices should increase as the intermediate price of goods increases. The monetary authority is expected to react with a contractionary policy (rise in its policy rate) in accordance with its mandate to maintain price stability. A positive impact is effect expected on the RER. The expected responses of the Caribbean variables to the U.S. shocks are in Table 1A.3.

1.3.4 Results

The panel unit root test shows that all detrended variables are free of unit root (Table 1A.4). A summary table of the panel VAR models is in Table 1A.4. Dummy variables are included in the models to control for structural change (Table 1A.6). All models are stable, as all modulus falls within the unit circle (Lutkepohl, 2005). This condition suggests that the panel VAR is invertible and possess an infinite order vector moving average representation (Abrigo and Love, 2015). The impulse response functions are estimated with Monte Carlo draws used to estimate the 90.0 percent confidence interval.

1.3.4.1 Dynamic Response of Caribbean Economies to U.S. Economic Shocks

Figures 1A.1.1 to 1A.1.3 summarizes the implications of a positive one standard deviation U.S. real GDP, monetary policy and inflation disturbances on a typical Caribbean economy, respectively. The U.S. real GDP and monetary shocks have short-lived effects on the Caribbean economies macroeconomic variables, as most disturbances last for a year after the shocks. However, it is only in response to the U.S. inflation and monetary shocks, that a typical Caribbean economy experience significant output effects.

A positive shock to U.S. real GDP, that is, an increase in U.S. real GDP, significantly decreases interest rate after one year and increases tourist arrivals on impact for a typical Caribbean economy. Both effects are however short-lived and minimal. While, a contractionary monetary shock (increase in U.S. interest rate) significantly reduces tourist arrivals and real output in years two and four, respectively. With the exception of tourist arrivals, the response of a Caribbean economy to a positive U.S. inflation shock is significant across all macroeconomic variables. The U.S. inflation disturbance has a persistent and significant effect up to three years on Caribbean's output, RER and interest rate. As expected, interest rate in a typical Caribbean economy increases, while output and RER decline. The effect on the other macroeconomic variables lasts for a year, with a significant rise in Caribbean inflation, and significant declines in remittances and trade.

[Figures 1A.1.1 to 1A.1.3 Here]

Overall, the interest rate and tourism channels seem to be the most dominant channels via which at least two U.S. shocks transmit to the average Caribbean economy, at the annual frequency. The inclusion of the tourism channel proves to be important for the transmission of both the U.S. real GDP and monetary shocks, while the remittance channel is significant in response to U.S. inflation shock. Of the three U.S. economic shocks assessed, only the positive U.S. inflation and monetary shocks translate into significant output effect in a typical Caribbean economy below the long-run trend. An upward shock to U.S. inflation transmits to the Caribbean economies during the importation of raw materials essential for critical domestic production. The effect is a curtailment of Caribbean's output in the short-run due to higher import price.

1.3.4.2 Importance of Tourism and Remittance Channels for transmitting U.S. Shocks

In order to study the importance of the tourism and remittance channels in the transmission process, I conduct a counterfactual assessment (Figures 1A.2.1 to 1A.2.3). This test shows that when the tourism and remittance channels are shutdown, the only significant effect on output is due to the positive U.S. real GDP shock, which produces a short-lived negative and immediate effect on Caribbean economy's real GDP. This response is however not in line with expectations, as an increase in U.S. real GDP is expected to have positive economic spillover effects on the average Caribbean economies. The lower output effect is in line with Canova and Dallari (2013) assertion that lower output effect is the outcome if, the tourism channel is not considered in an assessment for a tourist-oriented economy. By extension, lower output effect will be the outcome if the remittance and tourism channels are not included in an assessment where both variables play a critical role in the economy. This assessment captures some measurement bias that may have been previously attributed to other transmission channels (Canova and Dallari, 2013), compared to the full model when the remittance and tourism channels are active.

[Figures 1A.2.1 to 1A.2.3 Here]

In response to the U.S. positive inflation shock, significant Caribbean responses are only reflected in the inflation and RER channels, which are similar in magnitude to the model with the remittance and tourism channels opened. While the response to a contractionary U.S. monetary disturbance only results in a decline in the RER after two to three years. In the absence of the two additional channels, the RER channel is the most dominant channel for transmitting the U.S. economic shocks to the Caribbean. On the other hand, in the full model, the interest rate and tourism channels are the most active for more than one U.S. shocks.

1.3.4.3 Influence of U.S. Economic Shocks

I examine the importance of U.S. factors in explaining economic fluctuations in a typical Caribbean economy using the forecast error variance decomposition (FEVD). The FEVD looks at the average effect U.S. economic shocks have on a typical Caribbean economy macro-variables (Table 1A.7).

[Table 1A.7 Here]

For the typical Caribbean economy, U.S. economic shocks account for an average of 16.2 percent of the variation in the macroeconomic variables. The economic fluctuation is largely influenced by the U.S. inflation shock. However, shutting down the tourism and remittance channels increases the influence of U.S. economic shocks on Caribbean economies macro-variables to 25.7 percent, driven largely by the positive U.S. real GDP shock. The inclusion of the tourism and remittance channels highlight U.S. inflation shock having a greater contribution to a typical Caribbean business cycle which corroborates the result of U.S. inflation shock having a significant output effect on the Caribbean economy (see Figure 1A.1.3). The results provide evidence that the absence of these two additional channels of importance can affect policy design.

1.3.4.4 Sensitivity Analysis

The analysis so far looks at the ten selected Caribbean economies, which comprise both fixed and flexible exchange rate regimes. In an effort to ascertain the consistency of the results, I examine only the group of Caribbean economies with fixed exchange rate regime, that is, seven out of the 10 (Figures 1A.3.1 to 1A.3.3).[6] The response of this group to U.S. real GDP shock is similar to the response of the original model with all Caribbean economies, with the exception that the increase in real GDP is now significant, although small. In response to U.S. inflation shock, the only observed difference relative to the original model is the decline in interest rate on impact of the shock. This can be attributed to the monetary authorities not interpreting the rise in inflation as a significant threat and is therefore pursuing an accommodative policy to stimulate real GDP. The contractionary U.S. monetary shock has a delay but significantly small output effect, with decline occurring after four to five years. Additionally, inflation in the average Caribbean economy rise after one to two years after the shock, while interest rate decline occurs in the same period. The tourism and remittance channels show significant responses to the shocks.

[Figure 1A.3.1 to 1A.3.3]

[6] Jamaica, Trinidad & Tobago and Suriname do not have a fixed exchange rate regime.

When the two additional channels of importance are shutdown, the positive U.S. real GDP shock now has a positive effect on Caribbean economies' inflation on impact, while output and the interest rate channel show similar responses to when the additional channels are active (Figures 1A.4.1 to 1A.4.3). On the other hand, the Caribbean economies now show no significant response to U.S. inflation shock, while the U.S. contractionary monetary influence is consistent with the original model.

[Figure 1A.4.1 to 1A.4.3]

The U.S. economic shocks influence on economic fluctuation averages 17.0 percent, which is marginally above that in the original model (Table 1A.8). The influence from each U.S. shock is fairly balanced with a similar behaviour displayed when the two additional channels are shutdown.

[Table 1A.8 Here]

1.3.4.5 Examination of U.S. and Caribbean Economies Business Cycles

This section assesses the conditional impact of the three U.S. economic shocks on the average Caribbean economy business cycle. I compute separate cross-correlation function of real GDP, inflation rate and interest rate between the typical Caribbean economy and the U.S., in response to each U.S. shock. Importantly, the magnitude, direction and significance of the correlation vary with the type of shock (Table 1A.9). These correlations however differ from the unconditional correlation discussed in Section 1.3.2. I also examine the consistency of the results when focus is solely on economies under a fixed exchange rate regime (Table 1A.10).

[Tables 1A.9 and 1A.10 Here]

The findings suggest the existence of strong and significant comovement between the U.S. and Caribbean economies real GDP as well as with their respective inflation rates. There is however a significant negative relationship for interest rates. The real GDP behavior is in line with Caribbean economies benefiting from positive spillover effects and negatively impacted by inflation shock from their major trading partner. Further, the monetary policy of the typical Caribbean economy is counter cyclical to monetary policy in the U.S. and seems to be more influenced by internal factors. In the absence of the two additional channels of transmission, the positive comovement for real GDP is only significant given a positive U.S. inflation shock. Whereas, interest rate now shows positive and significant comovement only in response to U.S. real GDP shock. Inflation rate relationship remains unchanged. When focus is solely on fixed exchange rate economies, the business cycle relationship is consistent with the original model.

In order to explore the influence of the U.S. economy on the Caribbean's tourism market, the co-movement between U.S real GDP and tourism flows to the typical Caribbean economy, conditional on all three U.S. shocks is assessed. There is evidence of strong positive and significant correlation in response to all three U.S. economic shocks.[7] This procyclical behaviour is in line with the literature that indicates that the income of the source country has a positive influence on tourist arrivals in destination countries (Mayers and Jackman, 2011; Canova and Dallari, 2013; Ghartey, 2013). This is also consistent with the fixed exchange rate group of Caribbean economies.

Examination of the correlation between the Caribbean's real GDP and its remittance inflow show a relatively strong negative and significant relationship in the presence of a contractionary U.S.

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[7] The unconditional correlation between the U.S. and the Caribbean economies tourism flows are negative and low (see Table 1A.2). The correlation between the U.S. and the Caribbean economies tourist expenditure is however low and positive.

monetary policy. This countercyclical pattern supports the argument that Caribbean nationals remit funds to their home country when the economy is facing a downtown or economic crisis (Jackman, 2014). Of note, a countercyclical pattern is also evident consequent on a U.S. real GDP shock, but it is not significant.[8] The countercyclical pattern is also evident for the fixed exchange rate group of economies, in response to all three U.S. economic shocks. Of note, remittance inflow to the average Caribbean economy shows a positive and one period lag relationship with their real GDP, consequent on a positive U.S. inflation shock. This delay relationship suggests that the effect of a U.S. inflation shock is first felt by the Caribbean economy then by the Caribbean nationals in U.S. who remit funds.

1.4 Special Case: Jamaica's Response to U.S. Economic Shocks

The results from the panel VAR analysis of the ten selected Caribbean economies, at the annual frequency, suggest that economic shocks originating from the U.S. do transmit to the typical Caribbean economy and the tourism and remittance channels do serve as important transmission avenues. There is also evidence of comovements between a typical Caribbean economy and the U.S. business cycles. It is in this context, that I conduct analysis using data at a higher frequency with Jamaica serving as a representative case or benchmark for similar Island States. Jamaica best serves as a prime example because of the availability of quarterly data for all the required macro-variables over the desired time period for this study, as well as its macroeconomic variables which are relatively in line with the average of the Caribbean economies discussed in the previous section. The goal of the analysis on Jamaica is to garner information on how the economy responds to U.S.

[8] The countercyclical behavior between the Caribbean economies real GDP and remittance flows is also reflected in the stylized facts of Table 1A.2.

economic shocks and where lessons learnt could aid decision making when designing domestic policies to counter external economic shocks from their main trading partner, the U.S.

1.4.1 Data and Methodology

As in the panel VAR section of the study, I also assume that economic fluctuations in Jamaica's macroeconomic variables are driven mainly by the same three U.S economic shocks (real GDP, monetary and inflation). The selected variables capture any economic relationship that determines the economic behaviour of Jamaica's economy in response to U.S. economic developments. Given Jamaica's close geographical proximity to the U.S., a close financial and trade relationship developed over time (Murray, 2007; Kandil, 2011). According to Kandil (2011), the close proximity of Jamaica to the U.S. is a contributory factor to increased business cycle synchronization between the two economies.

1.4.1.1 Data

The assessment of the transmission of U.S. economic shocks to Jamaica utilizes quarterly data over the period March 1995 to December 2015. Information for the U.S. is from the FRED economic database of the Federal Reserve Bank of St. Louis. For Jamaica, financial data are collected from the Bank of Jamaica; real sector and remittance inflows data from the Statistical Institute of Jamaica and; tourism data from the Jamaica Tourist Board.

As with the annual study, the same group of variables are used to assess the transmission of the U.S. economic shocks with a few additions. For the U.S. block, I include real money which is a measure of real money balances used to differentiate monetary demand from other forms of real demand factors in the U.S. (Canova, 2005). As before, the U.S. real GDP, interest rate and inflation are the shocks examined. Following Canova (2005), this study also incorporates a group of control (world) variables, namely the emerging market bond (ebi), emerging market equity (eqi) and commodity price (wpi) indices, to capture continental comovement independent of the U.S. and Jamaica economies. Canova (2005) indicates that these variables should capture majority of the fluctuations arising from major developments in the world. These world variables come from Bloomberg database.[9] The variables for Jamaica are real GDP, all consumer price index inflation, 180-day Treasury Bill yield, trade, real exchange rate, tourist arrivals and remittance inflow. Real GDP is used as a measure for output for each country, while the 180-day Treasury Bill yield is a proxy for the central bank's policy interest rate because of its close relationship (Canova, 2005; Murray, 2007). Tourist arrivals, comprise stop-over and cruise ship passengers, and captures the tourism channel. All variables are seasonally adjusted and transformed with natural logarithm, with the exception of inflation, interest rate and trade variable. As in section 3, I extract the cyclical component of all selected variables using the Hamilton (2018) detrending approach. Following equations (1.1) and (1.2), $h = 8$ which is fitting for quarterly frequency to give the cyclical components in Figure 1A.5 after using (1.7) and (1.8).

$$s_{t+8} = \beta_0 + \beta_1 s_t + \beta_2 s_{t-1} + \beta_3 s_{t-2} + \beta_4 s_{t-3} \quad (1.7)$$

$$\hat{v}_{t+8} = s_{t+8} - \hat{\beta}_0 - \hat{\beta}_1 s_t - \hat{\beta}_2 s_{t-1} - \hat{\beta}_3 s_{t-2} - \hat{\beta}_4 s_{t-3} \quad (1.8)$$

[Figure 1A.5]

1.4.1.2 Jamaica Stylized Facts

I find that with the exception of inflation which is half as volatile, Jamaica's variables are very volatile relative to its real GDP as shown in Table 1A.11. Remittance inflows are four times more volatile than real GDP, while the interest rate is 1.3 times more volatile. The other variables are almost twice as volatile. Assessment of the autocorrelation functions indicate that with the exception of inflation, which has low persistence, all other Jamaican macroeconomic variables have relatively high levels of persistence. Further examination of Jamaica's statistics indicates that the real exchange rate is not dependent on Jamaica's real GDP. Remittance inflows show sign of higher procyclicality when compared to visitor arrivals, which is moderately procyclical. Inflation shows low procyclicality, while trade and the interest rate are counter-cyclical.[10]

[Table 1A.11 Here]

Comparison of the volatility of Jamaica's and the U.S.'s variables (real GDP, interest rate and inflation) show that Jamaica's real GDP is twice as volatile, while Jamaica's inflation and interest rate are three times more volatile than that of the U.S. The relatively high level of volatility for Jamaica's variables relative to that of the U.S. can be attributed to developing countries having fewer automatic stabilizers than developed countries, as well as developed countries being better able to manage their business cycles (Rand and Tarp, 2002). Additionally, the high volatility of the macroeconomic variables makes Caribbean economies more vulnerable to external economic shocks (Craigwell and Maurin, 2002).

[10] The strength of absolute correlation is $0 \leq \text{Low} \leq 0.3$, $0.3 < \text{Moderate} \leq 0.5$ and $0.5 < \text{High} \leq 1$.

1.4.1.3 Model

Before proceeding to estimating the model, the study performs the Augmented Dickey Fuller (ADF) (Dickey and Fuller, 1979) unit root test to ensure that all detrended variables used in the analysis are free of unit root. Rather than merely assuming that the unilateral relationship from the U.S. variables to Jamaica's economy holds, I use a block exogeneity test to verify the relationship as done by Canova (2005) and Murray (2007). Once the unilateral relationship is established, I estimate a VAR model and identify the structural shocks. The optimal lag length for the VAR is based on the Akaike Information Criteria (AIC), while ensuring that the model is free of autocorrelation and meets the stability condition.

In performing the estimation, the VAR model is represented as:

$$J_t = a_{11}J_{t-i} + a_{12}x_{t-1} + a_{13}w_t + u_{1t} \tag{1.9}$$

$$x_t = a_{22}x_{t-i} + a_{23}w_{t-1} + u_{2t} \tag{1.10}$$

Where 'J' represents the block of Jamaica variables, 'x' represents the block of U.S. variables and 'w' represents the world variables. The world variables are common to both country equations on the premise that they are available to capture external developments outside of Jamaica and the United States. While u_{1t} and u_{2t} are structural shocks of J and x, respectively, which are assume to be normally distributed with mean zero and constant variance, $N{\sim}[0,1]$:

$$\begin{bmatrix} u_{1t} \\ u_{2t} \end{bmatrix} \sim N\left[\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}\right] \tag{1.11}$$

Expressing equations (1.9) and (1.10) in structural VAR form gives:

$$\begin{bmatrix} 1 & a_{12} \\ 0 & 1 \end{bmatrix} \begin{bmatrix} J_t \\ x_t \end{bmatrix} = \begin{bmatrix} a_{11} & a_{12} \\ 0 & a_{22} \end{bmatrix} \begin{bmatrix} J_{t-1} \\ x_{t-1} \end{bmatrix} + \begin{bmatrix} b_{11} & 0 \\ 0 & b_{22} \end{bmatrix} \begin{bmatrix} u_{1t} \\ u_{1t} \end{bmatrix} \tag{1.12}$$

By rearranging the terms, we get the reduced form:

$$\begin{bmatrix} J_t \\ x_t \end{bmatrix} = \begin{bmatrix} \beta_{11} & \beta_{12} \\ 0 & \beta_{22} \end{bmatrix} \begin{bmatrix} J_{t-1} \\ x_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{1t} \end{bmatrix} \tag{1.13}$$

The VAR model uncovers the dynamic relationship that exists among the variables in the model. The structural VAR and the VAR are linked by the structural shock and the residuals, respectively. This provides the matrix framework were the restrictions can be imposed in the model in the form $Au = \varepsilon$, where 'A' is the invertible squared matrix that is estimated on which restrictions are imposed and the vector of the shocks is orthogonal.

A common set of identifying restrictions for the structural VAR in the literature is based on (Gali, 1999). It is further noted by Gali (1999), that the monetary variables, inflation, interest rate and money balances are not expected to have any long-run effect on real GDP. On the other hand, a U.S. real GDP shock should have some short-run effect on real GDP and any other real variables, given the slow reaction of the nominal variables in the model, while prices are expected to fall in response to a positive U.S. real GDP shock. In the short-run, real GDP, the interest rate and inflation will affect real money balances. In addition, there is no expected contemporaneous effect of real money balances, inflation and the interest rate on real GDP. It is expected that the monetary authorities take into consideration the current level of inflation and output when setting the policy rate. While output and inflation reacts to the monetary policy action with a lag. The relationship that exists between real GDP, inflation and interest rate holds for both the U.S. and Jamaica. However, given the open economy model proposed in this study, the U.S. economy will be the dominant economy with the potential to affect economic fluctuation in Jamaica's Small Island Economy as shown in equation (1.14).

$$
\begin{bmatrix}
1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
c_{2,1} & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
c_{3,1} & c_{3,2} & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
c_{4,1} & c_{4,2} & c_{4,3} & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
c_{5,1} & c_{5,2} & c_{5,3} & c_{5,4} & 1 & 0 & 0 & c_{5,8} & 0 & 0 & 0 \\
c_{6,1} & c_{6,2} & c_{6,3} & c_{6,4} & c_{6,5} & 1 & 0 & 0 & 0 & 0 & 0 \\
c_{7,1} & c_{7,2} & c_{7,3} & c_{7,4} & c_{7,5} & c_{7,6} & 1 & 0 & 0 & 0 & 0 \\
c_{8,1} & c_{8,2} & c_{8,3} & c_{8,4} & 0 & c_{8,6} & 0 & 1 & c_{7,8} & 0 & 0 \\
c_{9,1} & c_{9,2} & c_{9,3} & c_{9,4} & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\
c_{10,1} & c_{10,2} & c_{10,3} & c_{10,4} & 0 & 0 & 0 & 0 & c_{7,8} & 1 & 0 \\
c_{11,1} & c_{11,2} & c_{11,3} & c_{11,4} & c_{11,5} & 0 & 0 & 0 & 0 & 0 & 1
\end{bmatrix}
\begin{bmatrix}
u_{y*} \\ u_{\pi*} \\ u_{R*} \\ u_{m1*} \\ u_{y} \\ u_{\pi} \\ u_{R} \\ u_{trade} \\ u_{rer} \\ u_{visit} \\ u_{remit}
\end{bmatrix}
=
\begin{bmatrix}
\varepsilon_{y*} \\ \varepsilon_{\pi*} \\ \varepsilon_{R*} \\ \varepsilon_{m1*} \\ \varepsilon_{y} \\ \varepsilon_{\pi} \\ \varepsilon_{R} \\ \varepsilon_{trade} \\ \varepsilon_{rer} \\ \varepsilon_{visit} \\ \varepsilon_{remit}
\end{bmatrix}
\qquad (1.14)
$$

The restrictions imposed on the model in equation (1.14) are as follow; all U.S. variables will contemporaneously affect all Jamaica's variables. For both countries, their respective real GDP will contemporaneously affect inflation and the interest rate, while inflation will affect interest in the same period. All three U.S. variables will affect real M1 is the same period. These restrictions are in line with Gali (1999). Additional restrictions include real GDP having a contemporaneous effect on remittance inflows. Jamaica's inflation is expected to affect trade and the real effect exchange rate in the same period. Adjustments in the real exchange rate is expected to affect trade and visitor arrivals in the same period, while trade is modelled to affect Jamaica's real GDP contemporaneously. The three world variables will serve as control variables affecting the U.S. and Jamaican economies in the same period. I include a set of dummy variables in the model to account for sharp changes in Jamaica's interest rate and visitor arrivals as well as sharp changes in U.S. inflation and real M1 (Table 1A.12). The identification equation is represented in the $Au = \varepsilon$ format with c_{ij} '(i= row and j = column) representing the restrictions imposed on the contemporaneous variables in the model. In (1.14), y, π , R and m1 represents real GDP, inflation, interest rate and real M1 economic shocks, respectively. The use of '*'indicate U.S. variables. Visitor arrivals and remittance inflows are represented by visit and remit, respectively. The expected responses of Jamaica's variables to the U.S. shocks are as shown in Table 1A.3.[11]

1.4.3 Results

The ADF unit root test reveals that all filtered variables have no unit root (Table 1A.13). The results of the block exogeneity tests indicate that the block of U.S. variables Granger-cause the block of Jamaica variables at the one percent level of significance. On the other hand, the block exogeneity test for Jamaica with respect to U.S. indicates that the block of Jamaica variables does not Granger-cause the U.S. variables at the 10 percent level of significance (Table 1A.14). Based on the lag length criteria, test for autocorrelation and stability of the VAR, a lag length of 2 quarters is selected. The VAR model is stable as the modulus values of all the roots fall within the unit circle (Table 1A.15). The estimates of the SVAR models are from maximum likelihood method.

1.4.3.1 Impulse Responses to U.S. Economic Shocks

Figures 1A.6.1 to 1A.6.3 summaries the implications of a positive one standard deviation U.S. real GDP, monetary policy and inflation on Jamaica's economy, respectively. The U.S. real GDP shock produces the largest effect on Jamaica's economy with the RER, remittance and tourism channels playing dominant roles in amplifying the output effect.

[Figure 1A.6.1]

[11] The estimations are performed using the JMulTi (2004) software.

A positive U.S. real GDP shock results in a significant accumulated increase in Jamaica's real GDP, from the point of impact until the ninth quarter, above the steady state (Figure 1A.6.1). The accumulated decline in inflation is below its steady state, which is significant between the third and ninth quarters. The interest rate increases significantly in tenth to 17^{th} quarter and, coincides with the slowdown in real GDP. This could result in the monetary authority taking a policy stance to keep inflation relatively low. Importantly, the delayed reaction on the part of the monetary authority seems to indicate that the monetary authority making a decision to continue to foster an environment suitable for increased economic activity. The real exchange rate shows significant increase after a year, with an accumulated increase above the steady state by the end of the time horizon. This behaviour is indicative of the RER adjusting in order to achieve equilibrium on the premise that all the effects of the shock is not transmitted to domestic prices. The depreciation of the local currency boosts Jamaica's international competitive and contributes to the significant accumulated increase in trade after a year. Although visitor arrivals respond positively on impact to the shock, the pace jumped sharply and is significant at the same time of the significant rise in the RER. This reflects a relatively more attractive Jamaica tourism product, all other things being equal, given the depreciation of the Jamaican currency over the horizon. The accumulated positive response of the RER is significant until the end of the end of 30 quarters with increase of 61 percent above the steady state. This is in line with Malcolm (2003) conclusion that the income of U.S. is important to Jamaica's tourism. Remittances response is positive with significant impact coming after six quarters. The delay suggests that senders of remittances to Jamaica may be acting rationally by speculating on a continued depreciation of the Jamaican dollar against the U.S. Dollar. As further depreciation translates into increased spending power for recipients of remittances from the U.S. and provides additional benefits to households.

[Figure 1A.6.2 Here]

In response to a contractionary monetary policy (increase in U.S. interest rate) (Figure 1A.6.2), Jamaica's real GDP reacts with a quarter delay, but shows significant accumulated decline over the horizon. The accumulated decline is greatest in the ninth quarter and shows sign of slight a recovery thereafter. The impact on inflation is short-lived, with significant decline in the first quarter and a greater decline in the seventh to 13th quarter. Remittance inflows show a significant accumulated decline from the second to the ninth quarter. The other channels of transmission play no significant role in in the transmission of the shock. Although not playing a significant role in the transmission process and not increasing as expected, interest rate decline after a year, an indication of the monetary authority facilitating recovery in the Jamaican economy.

[Figure 1A.6.3 Here]

The one standard deviation increase in U.S. inflation (Figure 10.3) results in the expected accumulated decline in real GDP which is significant up to the 19th quarter. The accumulated decline in real GDP peaked two years after the shock, with a slight recovery afterwards. Jamaica's inflation response is relatively low and short-lived with a significant increase coming 2 to 3 quarters after the shock. The significant impact on trade is negligible and short-lived with a decline on impact and an increase in the third quarter. Remittance inflows and tourist arrivals response to the shock are low, with the negative and positive impacts lasting one and two years, respectively.

Overall, the expansion in U.S. real GPP generates positive spill-over effects on the Jamaican economy which is evident in the expansion in its real GDP. Accompanying the increase in U.S. real GDP, is the expected increase in U.S. income which means increase demand for Jamaica's tourism product and higher remittance flows to Jamaica. Although the counter response of Jamaica's interest rate to the U.S. contractionary monetary policy is not significant, the behaviour seems to reflect the Bank of Jamaica reacting more to domestic economic conditions in an optimistic but cautious manner. As the Bank would be taking an accommodative policy stance by gradually lowering its policy rate, all other things being, in an attempt to foster a macroeconomic environment that can stimulate demand in a weak economy.

1.4.3.2 Relative Importance of U.S. Shocks

In examining the importance of U.S. factors in explaining fluctuation in Jamaica's macroeconomic variables, the forecast error variance decomposition is employed. An overview of the variance decomposition looks at the average effect U.S. economic shocks have on Jamaica's variables (Table 1A.16). Together, the U.S. and world variables account for a significant portion of the variation in Jamaica's macroeconomic variables. The U.S. economic shocks account for an average of 30.8 percent of the variation across all Jamaica's variables. In particular, U.S. real GDP shock has the main influence on domestic variables, with US monetary shock having a notable influence on real GDP and the U.S. inflation shock having some effect on trade. This differs from Murray's (2007) assessment of Jamaica, in that, his study identifies U.S. price shock as having the major influence on real GDP, interest rate and price with average contribution of approximately 12.6 percent. Whereas, the influence from the other two U.S. shocks are relatively low. The difference between the results of my study and that of Murray (2007) can be attributed to the different detrending technique, composition of variables, empirical approach and sample period utilized. In addition, my study includes a group of variables that captures the state of the world economy independent of the United States and Jamaica. The inclusion of the world variables highlights the need for Jamaica to monitor the effect of shocks from its other major trading partners.

[Table 1A.16 Here]

1.4.3.3 U.S. and Jamaica's Business Cycles

This section assesses the conditional impact of the U.S. shocks on Jamaica's business cycle, in a similar manner to Section 3.3.5. Table 1A.17 shows the cross-correlation results for the impulse response functions of selected macro-variables consequent on each U.S. economic shock.

[Table 1A.17 Here]

A shock to U.S. real GDP generates positive comovements between U.S. and Jamaican real GDP, with significant point contemporaneous correlation estimate of 0.76. The contemporaneous effect on inflation is 0.43 and significant, while the relationship for interest rate is not significant. The contemporaneous correlation of real GDP and inflation for both economies, in response to U.S. monetary shock, are significant with point estimates 0.78 and -0.54, respectively. For the U.S. inflation shock, the correlation between inflation for the U.S. and Jamaica is positive and significant at 0.5, while the correlation for real GDP is negative and significant at 0.59. Overall, the U.S. real GDP and monetary shocks generate relatively large comovement in real GDP, but negative comovement in response to U.S. inflation shock.

The conditional correlation between Jamaica's real GDP and remittance inflows show that the contemporaneous correlation is positive and significant with point estimates of 0.81, consequent on U.S. monetary and inflation shocks.[12] As appreciation in the U.S. currency means greater spending power for the recipients, and extra remittance flows to Jamaica should assist in restoring the purchasing power of remittance recipients. The relationship conditional on real GDP shock is negative but not significant. This finding counters Jackman's (2014) assertion of a countercyclical relationship between Caribbean economies' real GDP and remittance inflows. For the conditional correlation between U.S. real GDP and visitor arrivals in Jamaica, there is a positive and significant relationship with point estimates of 0.86 and 0.54 in response to U.S. real GDP and monetary shocks, respectively. Thus, emphasizing the significant influence of the income of the source country on Jamaica's tourism sector.

1.4.3.4 Importance of Remittances and Tourism to Transmit U.S. Shocks

The assessment shows that both tourism and remittance inflows play important roles in the transmission of external economic shocks through Jamaica's economy. Shutting down these two channels show that, with the exception of the inflation response to a U.S. monetary shock, all other significant responses are short-lived to the respective shocks. In response to a U.S. real GDP shock, real GDP significantly increases on impact (Figure 1A.6.1), but this is short-lived. There are no significant interest rate, RER or inflation perturbations. The U.S. monetary shock results in a significant negative effect on real GDP and inflation (Figure 1A.6.2). This effect on real GDP is significant in the third to ninth quarter, with the accumulated decline being highest in the seventh quarter. The accumulated decline in inflation from the shock is significant after a year of the shock and dies out in year three. An increase in U.S. inflation significantly decreases Jamaica's real GDP

[12] This strong procyclical behviour is also reflected in Jamaica's stylized facts in Table 1A.11.

in the third quarter and trade on impact, but both effects last only for a quarter. Significant increases are reflected in inflation in the third quarter and RER in the eight quarter.

[Figures 1A.6.1 to 1A.6.3 Here]

The absence of both channels from the examination of the transmission of U.S. shocks results in a lower effect on Jamaica's real GDP relative to the original model when the tourism and remittance channels are active. For the U.S. real GDP shock, the real GDP response at the 5th quarter (the last quarter of significance) is lower than that of the full model, which translates into a lower real GDP effect of approximately 46 percent at the comparable quarter (Figure 1A.6.1). In response to the U.S. monetary shock, real GDP fell in the 8th quarter, marking a lower output effect of approximately 54 percent (Figure 1A.6.2). The response of real GDP to inflation shock in the counterfactual model is negligible when compared to the contraction in the original model as shown in Figure 1A.6.3. On average, shutting down the remittance and tourism channels lower the effect on Jamaica's real GDP by approximately 67 percent, conditional on all three U.S. shocks. This behavior is consistent with idea that both tourism and remittance play a critical role in Jamaica in term of foreign exchange earnings and the latter as support to households for consumption purpose. This conclusion is relatively in line with Canova and Dallari (2013) proposition that the absence of the tourism channel in an assessment of the transmission of positive output shock from source country to a destination country is likely to lower output effect of the home country.

Shutting down these two additional channels results in greater fluctuations attributed to domestic factors (Table 1A.16). Notwithstanding these results, the U.S. real GDP shock remains the dominant U.S. shock influencing fluctuations in Jamaica's economy, which is in line with Robinson (2001). The results from the cross-correlation matrix show that the comovement of real

GDP of both countries is still strong and significant consequent on the U.S real GDP and monetary shocks, although of a lower magnitude (Table 1A.17). In response to U.S. monetary shock, the comovemment between the U.S. and Jamaica's interest rates, in the counterfactual model is negative and significant, relative to an insignificant relationship in the full model. Further, the comovement between inflation in both countries are now insignificant relative to the significant value in the full model.

1.5 Conclusion

The paper assesses the transmission of three U.S. economic shocks (real GDP, monetary and inflation) from the U.S. to a typical Caribbean economy. In addition to traditional transmission channels, the tourism and remittance channels are included as additional channels of importance. A panel vector autoregressive model is estimated with the Hamilton (2018) approach used to extract the cyclical component from annual data spanning the 1997 to 2014 period. By conducting a counterfactual assessment, I am able to identify the importance of the remittance and tourism channels in the transmission of the U.S. economic shocks by making comparisons between the pattern and magnitude of the impulse response functions and FEVDs. A robustness exercise is undertaken at the quarterly frequency, for the period 1995 to 2015, using Jamaica's economy as a representative case for Island States with a similar structure to see how the results hold. This study is limited in the sense that I only have access to aggregate data on tourism and remittance flows to the Caribbean economies, and only quarterly information on these variables for Jamaica for the period of assessment.

At the annual level, U.S. inflation and real GDP shocks create significant output effect on a typical Caribbean economy. However, all three U.S. shocks play a significant role on the real GDP of the typical Caribbean under a fixed exchange rate regime. The results show that the interest rate and the tourism channels are the most active channels for the transmission of at least two of the U.S. disturbances. Specifically, the interest rate channel is active in the transmission of both U.S. real GDP and inflation shocks, while the tourism channel is significant in response to the U.S. real GDP and monetary shocks. On average, U.S. shocks contribute approximately 17.0 percent to the fluctuation in the macroeconomic variables. The counterfactual assessment shows that shutting down the remittance and tourism channels lower the output effect in a typical Caribbean, in response to U.S. shocks. This result is relatively consistent when emphasis is place solely on Caribbean economies under a fixed exchange rate regime.

The results from the robustness exercise with Jamaica as a representative case at the quarterly frequency, show that a positive U.S. real GDP disturbance has the greatest effect across all Jamaica's variables. The response of Jamaica's real GDP to a positive U.S. real GDP shock is a significant and have a positive impact up to the ninth quarter. All channels of transmission have significant and relatively strong responses, with remittance, tourism and the real exchange rate playing major roles. Shutting down the remittance and tourism channels lower real GDP (output) effect on average by approximately 67.0 percent, across all three U.S. shocks. Their absence also makes the transmission via the other channels weaker and any significant responses are short-lived. Further, the average fluctuation in the macroeconomic variables attributed to U.S. shocks is lower by 6.3 percent on average, when the remittance and tourism channels are not active.

The conditional comovements between the U.S. and a typical Caribbean real GDP, in response to all three U.S. economic shocks, are strong and significant. Absence of the two additional channels weakens these relationships, in particular, in response to the U.S. real GDP and monetary shocks.

The relationship between the U.S. real GDP and tourist arrivals is significant and positive, in response to all U.S. shocks. The relationship between the real GDP and remittance inflows for a typical Caribbean economy is only significant in response to the U.S. monetary shock, with the correlation coefficient being negative. The business cycle relationship is for the most part qualitatively consistent with that of the fixed exchange rate group of Caribbean economies and with the robustness exercise for Jamaica.

By considering the tourism and remittance as additional transmission channels, it not only broadens the understanding of how U.S. economic shocks are transmitted to Jamaica and other Caribbean economies, it also provides a way to eliminate any bias that may have been attributed to the traditional transmission channels. The findings of the study have important implications for Jamaica and Caribbean policymakers in mitigating or tempering their economic fluctuations in response to U.S. economic shocks. That is, the remittance and tourism channels should be included in Caribbean economies international business cycle models as their absence will result in the underestimation of the output effect in response to U.S. economic shocks. This is in the context of the notably output effect and fluctuations in macroeconomic variables arising from economic disturbances originating from the United States, when the tourism and remittance channels are included in the framework. Notwithstanding the two additional channels, the responses of Jamaica (flexible exchange rate regime) in the quarterly analysis and the seven fixed exchange rate group of economies from the annual assessment to the U.S. interest rate shock is relatively consistent with the prediction of the Mundell-Fleming open economy model. Additionally, continuous monitoring of the international economic condition should position policymakers in a typical Caribbean economy to better isolate economic shocks specific to the U.S. from other parts of the world, in order to formulate the best policy prescription to stabilize the domestic economy in the face of external pressures. Caribbean policymakers should encourage the Diaspora in the U.S. to remit funds for investment purposes, while the tourism sector should increase the reinvestment of tourism earnings. This is in the context of the integral role of both remittances and tourism to the Caribbean economy in terms of foreign exchange flows, balance of payment support and household income as well as in the transmission of U.S. economic shocks.

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Appendix 1

Table 1A.1 Description of Variables

Variables	Measure	Definition	Source
U.S.			
U.S. Real GDP	GDP at constant prices		Fred database
U.S. Inflation	Change in the all consumer price index		Fred database
U.S. Interest Rate	6-Month Treasury Bill:		Fred database
Caribbean			
Real GDP	GDP per capita (constant LCU)		World Bank database
Inflation	Inflation, consumer prices (annual %)	Inflation as measured by the consumer price index	World Bank database
Interest Rate	Ratio of lending-deposit interest rate	Lending rate is the bank rate that usually meets the short- and medium-term financing needs of the private sector. Deposit interest rate is the rate paid by commercial or similar banks for demand, time, or savings deposits.	World Bank database
Trade	Export – Import ratio	Exports of goods and services (constant LCU). Imports of goods and services (constant LCU).	World Bank database
Real Exchange Rate	(Exchange rate *U.S. CPI) divided by Caribbean country CPI	Official exchange rate (LCU per US$, period average).	Author's calculation
Tourist Arrivals	International tourism, number of arrivals	International inbound tourists (overnight visitors) are the number of tourists who travel to a country other than that in which they have their usual residence.	World Bank database
Remittance Inflow	Personal remittances, received (% of GDP)	Personal remittances comprise personal transfers and	World Bank database

		compensation of employees.	
Tourism Expenditure	International tourism, receipts (current US$)	International tourism receipts are expenditures by international inbound visitors, including payments to national carriers for international transport.	World Bank database

Table 1A.2 Business Cycle Statistics for Panel of Caribbean Economies

Variables	std(i)/std(y)	$\rho_{x,y}$	Variables	std(i)/std(USy)	$\rho_{x,usy}$
			U.S. Real GDP	1.0	1.0
Real GDP	1.0	1.0	Real GDP	1.8	0.4
Inflation	1.7	-0.1	Inflation	3.0	0.5
Lend-dep	11.2	-0.1	Interest Rate	20.2	-0.2
Trade	2.9	0.1	Trade	5.3	0.1
Rer	1.1	0.0	Rer	1.9	0.2
Arrive	2.6	0.3	Arrive	4.6	0.4
Remit	20.6	-0.1	Remit	37.2	-0.1
Tourist Expenditure	4.4	0.2	Tourist expenditure	7.9	0.2

Notes:
Std(i) represents the standard deviation of a variable that is not real GDP.
std(y) represents the standard deviation of Caribbean real GDP.
std(usy) represents the standard deviation of U.S. real GDP.
$\rho_{x,y}$ – cross-correlation between Caribbean variables and its real GDP.
$\rho_{x,usy}$ – cross-correlation between Caribbean variables and U.S. real GDP.

Table 1A.3 Expected Response of Macroeconomic Variables to U.S. Economic Shocks on Impact

U.S. Shocks	Real GDP	Inflation	Interest Rate	Trade	RER	Visitor Arrivals	Remittance
Real GDP	↑	↓	↓	↑	↑	↑	↓
Monetary	↓	↓	↑	–	↓	↓	–
Inflation	↓	↑	↑	↓	↓	↓	–

Note: ↑ (increase), ↓(decrease) and – (any direction).

Table 1A.4 Caribbean Economies Panel Unit Root Test Result

Variables	Test Statistics	Lags	Order of Integration
Real GDP	-4.2***	3	I(0)
Inflation rate	-7.1***	3	I(0)
Interest rate	-4.9***	3	I(0)
Trade	-7.0***	3	I(0)
Rer	-3.6***	1	I(0)
Visitor Arrivals	-5.5***	3	I(0)
Real remittance inflows	-8.4***	0	I(0)

Notes: All test performed with constant only. *** indicates significance of Test Statistics at 1% level, ** significance at 5% and * significance at 10%. I(0) indicates that variable is integrated at level, so there is no need to difference. Automatic lag length selection is based on AIC.

Table 1A.5. Panel VAR Final Models

	Lags	Dummy Variables	Stable
All Caribbean Economies			
• Main Model	1	U.S. Real GDP Remittance flow	Yes
• Counter-factual	2	U.S. Real GDP	Yes
Fixed Exchange Rate Economies			
• Main Model	1	None	Yes
• Counter-factual	1	None	Yes

Notes: Only statistically significant dummy variables are left in the final model based on the vector autoregressive model stability test. The main model comprises the traditional channels of transmission along with remittances and tourism.

Table 1A.6. Dummy Variables Included in the Panel VAR Model

Countries	Variable	Dummy Variables
United States	Real GDP	2008-2014
Barbados	Remittance inflows	2005-2014
Belize	Remittance inflows	2006-2014
Grenada	Remittance inflows	2000-2014
Jamaica	Remittance inflows	2003-2014
St. Kitts & Nevis	Remittance inflows	2010-2014
St. Lucia	Remittance inflows	2000-2014
St. Vincent & Grenadines	Remittance inflows	2005-2014
Suriname	Remittance inflows	2004-2014
Dominica	Remittance inflows	2004-2014

Notes: The dummy variables are created by identifying the presence of one structural break in the data. The dummy variable is given a value of one for the period above and value of zero otherwise.

Table 1A.7. Caribbean Economy - Average Forecast Error Variance Decomposition showing Relative Contribution of U.S. Economic Shocks (%)

	Y	π	R	Trade	RER	Visit	Remit	Average
Shocks								
US	23.5	5.3	23.6	9.2	25.1	16.5	10.5	16.2
Caribbean	76.5	94.7	76.4	91.8	74.9	83.5	89.5	83.8
			Counterfactual					
US	16.4	35.6	19.0	10.2	47.1			25.7
Caribbean	83.6	64.4	81.0	89.8	52.9			74.6

Note: The averages are of the forecast error variance decomposition over a 5-year horizon.

Table 1A.8. Caribbean Economies with Fixed Exchange Rate - Average Forecast Error Variance Decomposition showing Relative Contribution of U.S. Economic Shocks (%)

	Y	π	R	Trade	RER	Visit	Remit	Average
Shocks								
US	12.8	31.1	15.0	7.4	12.8	21.7	7.6	17.0
Caribbean	87.2	68.9	85.0	92.6	87.2	78.3	92.4	83.0
			Counterfactual					
US	15.4	39.1	17.8	9.2	11.3			18.6
Caribbean	84.6	60.9	82.1	90.8	88.7			81.4

Note: The averages are of the forecast error variance decomposition over a 5-year horizon.

Table 1A.9. Cross-correlations of Caribbean Economies Macroeconomic Variables in Responses to U.S. Economic Shocks

Panel A

	Economic Shocks								
	Real GDP			Monetary			Inflation		
Variables	-1	0	1	-1	0	1	-1	0	1
Real GDP	0.33	0.57*	0.77*	0.57*	0.90*	0.92*	0.55*	0.88*	0.78*
Interest Rate	-0.21	-0.45	-0.73*	-0.05	-0.54*	-0.74*	-0.27	-0.58*	-0.82*
Inflation	0.13	0.92*	-0.20	-0.36	0.49	-0.04	-0.21	0.98*	-0.33

Counterfactual

	Real GDP			Monetary			Inflation		
Real GDP	-0.44	0.09	-0.02	-0.54*	0.31	0.80*	-0.42	0.88*	0.06
Interest Rate	0.86*	0.64*	-0.19	0.74*	0.08	-0.77*	0.28	-0.25	-0.92*
Inflation	-0.26	0.83*	-0.08	0.11	0.30	0.06	-0.28	0.97*	-0.26

Notes: Table shows cross-correlation$(x_t, J_{t+i}), i = -1,0,1$ where x_t represent the U.S. variable and J_t represents the Caribbean variable. Cross-correlation are on the actual (not accumulated) impulse response function. A * indicates that the 95% band does not include zero.

Panel B

	Real GDP			Monetary			Inflation		
Variables	-1	0	1	-1	0	1	-1	0	1
CaribY-Remit	-0.45	-0.23	0.08	-0.34	-0.60*	-0.46	0.71*	0.34	0.10
USY -Visit	0.40	0.75*	-0.03	0.93*	0.72*	0.34	0.40	0.67*	-0.15

Notes: Table shows cross-correlation between Caribbean's real GDP(CaribY$_t$) and remittance inflow (Remit$_{t+i}$) were i= -1, 0, 1. USY-Visit shows the cross-correlation between U.S. real GDP(time t) and visitor arrivals ($t+i$), where i= -1, 0, 1. Cross-correlation is of the actual (not accumulated) impulse response function. * indicates that the 95% band does not include zero.

Table 1A.10. Cross-Correlations of Caribbean Economies with Fixed Exchange Rate Macroeconomic Variables in Responses to U.S. Economic Shocks

Panel A

	Economic Shocks								
	Real GDP			Monetary			Inflation		
Variables	-1	0	1	-1	0	1	-1	0	1
Real GDP	0.39	0.83*	0.88*	0.61*	0.96*	082*	0.05	0.82*	0.60*
Interest Rate	-0.48	-0.89*	-0.73*	0.10	-0.27	-0.78*	0.42	-0.23	-0.30
Inflation	0.32	0.87*	0.68*	-0.10	0.81*	0.47	-0.10	0.97*	-0.02

Counterfactual

	Real GDP			Monetary			Inflation		
Real GDP	0.43	0.88*	0.76*	0.57*	0.92*	0.85*	0.27	0.85*	0.73*
Interest Rate	-0.47	-0.89*	-0.75*	0.14	-0.25	-0.76*	0.36	-0.22	-0.28
Inflation	0.31	0.88*	0.64*	-0.03	0.76*	0.53*	-0.11	0.96*	0.02

Notes: Table shows cross-correlation$(x_t, J_{t+1}), i = -1,0,1$ where x_t represent the U.S. variable and J_t represents the Caribbean variable. Cross-correlation is based on the actual (not accumulated) impulse response function. A * indicates that the 95% band does not include zero.

Panel B

	Real GDP			Monetary			Inflation		
Variables	-1	0	1	-1	0	1	-1	0	1
CaribY-Remit	0.23	-0.20	-0.66*	-0.50	-0.80*	-0.51*	-0.15	-0.90*	-0.61*
USY -Visit	0.52*	0.88*	0.10	0.76*	0.84*	0.62*	0.43	0.95*	0.28

Notes: Table in Panel B shows cross-correlation between Caribbean's real GDP (Y_t) and remittance inflows (R_{t+i}) where *i*= -1, 0, 1. $'USY - Visit'$ shows the cross-correlation between U.S. real GDP (time t) and visitor arrivals (t-i), where $i = -1, 0, 1$. Cross-correlation is of the actual (not accumulated) impulse response function. A * indicates that the 95% band does not include zero.

Table 1A.11. Jamaica and U.S. Stylized Facts

	Standard Deviation (%)	std(i)/std(y)	Autocorrelation	Cross-correlation*
U.S.				
Real GDP	2.29	1.00	0.89	
Inflation	0.55	0.24	0.21	0.20
Interest Rate	1.67	0.73	0.89	0.55
Real M1	8.21	3.59	0.84	-0.45
Jamaica				
Real GDP	3.51	1.00	0.76	
Interest Rate	4.38	1.25	0.81	-0.09
Inflation	1.64	0.47	0.25	0.11
Trade	6.23	1.77	0.73	-0.23
RER	7.26	2.07	0.91	0.00
Visitor Arrivals	8.30	2.36	0.79	0.48
Remittance Inflow	14.00	3.98	0.85	0.63

Note: * indicates cross-correlation with variable and real GDP for the respective country

Table 1A.12. Dummy Variables for the SVAR Model

Country	Variable	Dummy Variables	
United States	Inflation	[a]2008Q4-2009Q2:	Impulse and Interactive
	Real M1	[b]2008Q3-2015Q4:	Shift Dummy
Jamaica	Interest Rate	[c]2003Q3, 2008:	Impulse and Interactive
	Tourist Arrivals	[d]2001Q3-Q4, 2008Q1-Q4:	Impulse and Interactive

Notes:

[a]Reflects the persistent fall in prices and weak demand following the effects of the financial crisis.
[b]Reflects quantitative easing measures undertaking by the U.S. Federal Reserve
[c]Strong policy action on the part of the Central Bank to strong the sharp depreciation in the Jamaican Dollar against the U.S. Policy action after the 2007 global financial crisis.
[d]Tourism suffered fallout after the September 11, 2001 bombing in the U.S. and the falloff in tourism demand after the financial crisis.

Table 1A.13. Augmented Dickey Fuller Unit Root Test Results for Cyclical Component of each quarterly variables

Variables	Test Statistics	Lags	Order of Integration
Emerging Market Bond Index	-3.41**	3	I(0)
Commodity Price Index	-4.531***	1	I(0)
Emerging Market Equity Index	-2.29**	3	I(0)
U.S. Real GDP	-3.347**	2	I(0)
U.S. Interest Rate	-4.600***	3	I(0)
U.S. Inflation	-7.307***	1	I(0)
U.S. Real M1	-3.259**	1	I(0)
Jamaica			
Real GDP	-4.003***	5	I(0)
Interest Rate	-6.162***	2	I(0)
Inflation	-7.084***	1	I(0)
Trade	-5.182***	3	I(0)
Real Exchange Rate	-5.859***	1	I(0)
Visitor Arrivals	-4.514***	5	I(0)
Real Remittance Inflow	-4.1306***	0	I(0)

Notes: All test performed with constant only. *** indicates significance of Test Statistics at 1% level, ** significance at 5% and * significance at 10%. I(0) indicates that variable is integrated at level. So, there is no need to difference. The AIC criterion is used to select the lag levels.

Table 1A.14. Block Exogeneity Test Results

US Block to Jamaica Block

TEST FOR GRANGER-CAUSALITY:
H0: "U.S. Block of variables" do not Granger-cause "Jamaica Block of Variables"

Test statistic l = 1.7574
pval-F(l; 56, 451) = 0.0011

TEST FOR INSTANTANEOUS CAUSALITY:
H0: No instantaneous causality between " U.S. Block of variables " and "Jamaica Block of Variables"

Test statistic: c = 78.2749
pval-Chi(c; 28) = 0.0000

Jamaica Block to U.S. Block

TEST FOR GRANGER-CAUSALITY:
H0: "Jamaica Block of Variables" do not Granger-cause " U.S. Block of Variables"

Test statistic l = 1.2457
pval-F(l; 56, 451) = 0.1193

TEST FOR INSTANTANEOUS CAUSALITY:
H0: No instantaneous causality between "Jamaica Block of Variables" and " U.S. Block of Variables"

Test statistic: c = 78.2749
pval-Chi(c; 28) = 0.0000

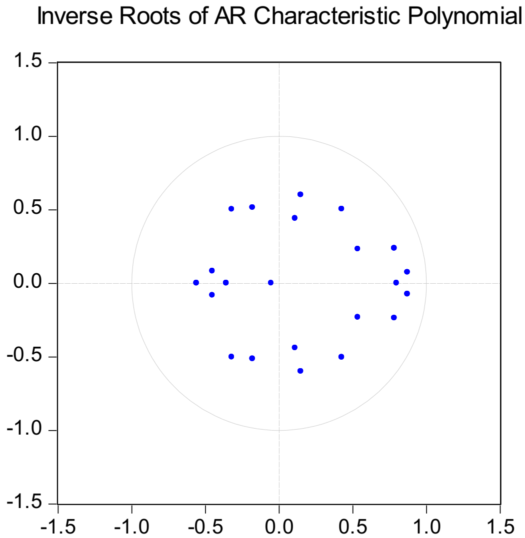
Note: H0 represents the null hypothesis. Prob-Chi is the associated probability value for the Chi-Square statistics.

Table 1A.15. VAR Diagnostic Test Results

Original Model	Counterfactual VAR without Remittance and Tourism

Original Model

- Stability Test



- VAR Residual Serial Correlation LM Tests

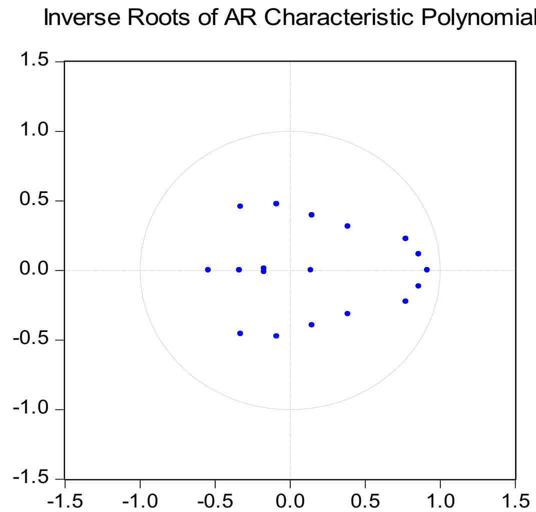
Null Hypothesis: no serial correlation at lag order h
Sample: 1995Q1 2015Q4
Included observations: 71

Lags	LM-Stat	Prob
1	151.6390	0.0310
2	145.8444	0.0616
3	125.4760	0.3718

Probs from chi-square with 121 df.

Counterfactual VAR without Remittance and Tourism

- Stability Test



- VAR Residual Serial Correlation LM Tests

Null Hypothesis: no serial correlation at lag order h
Sample: 1995Q1 2015Q4
Included observations: 71

Lags	LM-Stat	Prob
1	123.6835	0.0016
2	102.5005	0.0536
3	67.80246	0.8522

Probs from chi-square with 81 df.

Table 1A.16. Average Forecast Error Variance Decomposition showing Relative Contribution of U.S. Economic Shocks

	Y	π	R	Trade	RER	Visit	Remit	Average
Shocks								
World variables	43.2	67.8	60.3	47.3	39.3	39.2	50.6	49.7
US	38.3	13.8	17.5	32.0	35.6	48.8	29.8	30.8
Jamaica	18.5	18.4	22.2	20.7	25.1	12.0	19.6	19.5
			Counterfactual					
World variables	20.3	50.8	47.1	47.7	33.3			39.8
US	36.8	18.0	14.4	29.6	23.6			24.5
Jamaica	42.9	31.2	38.5	22.8	43.1			35.7

Note: The averages are calculated based on the forecast error variance decomposition over a 12 quarter horizon.

Table 1A.17. Cross-Correlations of Jamaica Macroeconomic Variables in Responses to U.S. Economic Shocks

	Economic Shocks								
Panel A	Real GDP			Monetary			Inflation		
Variables	-1	0	1	-1	0	1	-1	0	1
Real GDP	0.64*	0.76*	0.48*	0.8*	0.78*	0.80*	-0.69*	-0.59*	-0.39*
Interest Rate	-0.12	0.00	0.18	-0.22	-0.28	-0.25	-0.24	-0.28	-0.55*
Inflation	-0.11	0.43*	-0.58*	-0.13	-0.54*	0.13	-0.16	0.51*	-0.05

Counterfactual

	Real GDP			Monetary			Inflation		
Real GDP	0.38*	0.52*	-0.13	0.89*	0.72*	0.58*	-0.46*	-0.30	-0.03
Interest Rate	0.66*	0.77*	0.81*	-0.27	-039*	-0.45*	0.13	-0.04	-0.26
Inflation	0.61*	-0.40*	-0.32	0.52*	-0.72	0.06	-0.15	0.63*	0.15

Notes: Table in Panel A shows cross-correlation$(x_t, J_{t-1}), i = -1,0,1$ where x_t represent the U.S. variable and J_t represents the Jamaica variable. Cross-correlation is based on the actual (not accumulated) impulse response function. A * indicates that the 95% band does not include zero.

Panel B	Real GDP			Monetary			Inflation		
Variables	-1	0	1	-1	0	1	-1	0	1
JamY-Remit	0.21	-0.31	-0.02	0.64*	0.81*	0.82*	0.81*	0.81*	0.78*
USY -Visit	0.75*	0.86*	0.94*	0.53*	0.54*	0.68*	0.63*	0.04	-0.25

Notes: Table in Panel B shows cross-correlation between Jamaica's real GDP($JamY_t$) and remittance inflow ($Remit_{t-i}$) were i= -1, 0, 1. USY-Visit shows the cross-correlation between U.S. real GDP(time t) and visitor arrivals (t-i), where i= -1, 0, 1. Cross-correlation is of the actual (not accumulated) impulse response function. A * indicates that the 95% band does not include zero.

Figure 1A.1.1. Response of Caribbean Economy to Positive U.S. Real GDP Shock

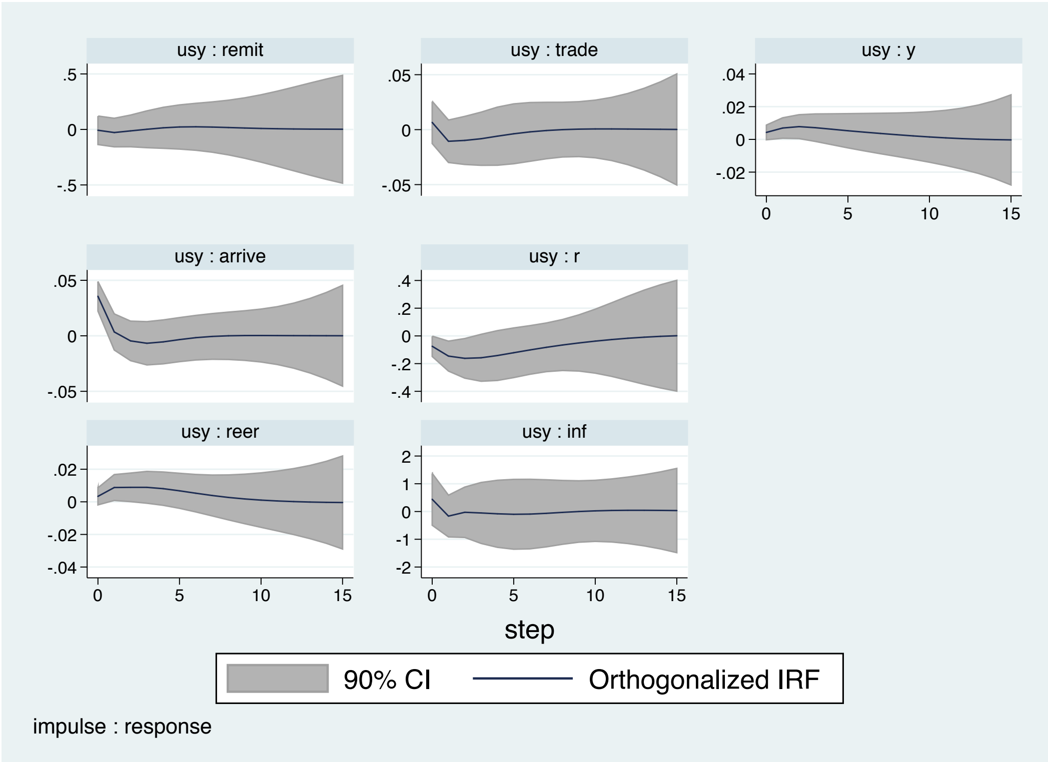


Figure 1A.1.2. Response of Caribbean Economy to Positive U.S. Inflation Shock

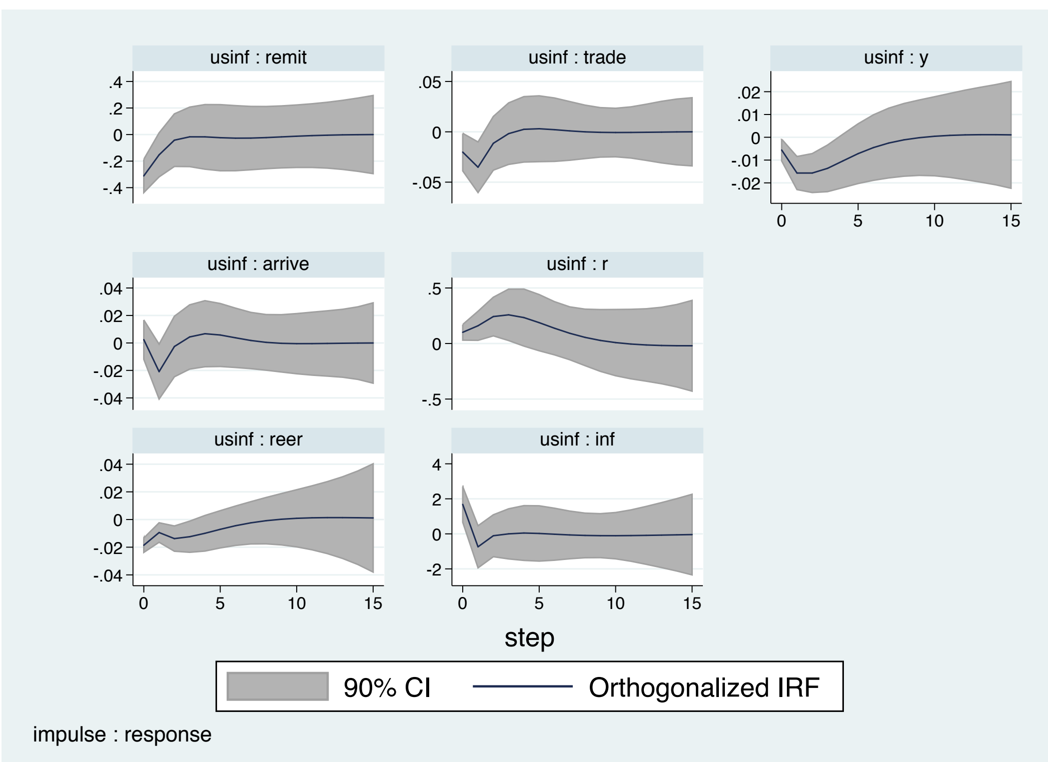


Figure 1A.1.3. Response of Caribbean Economy to Positive U.S. Interest Rate Shock

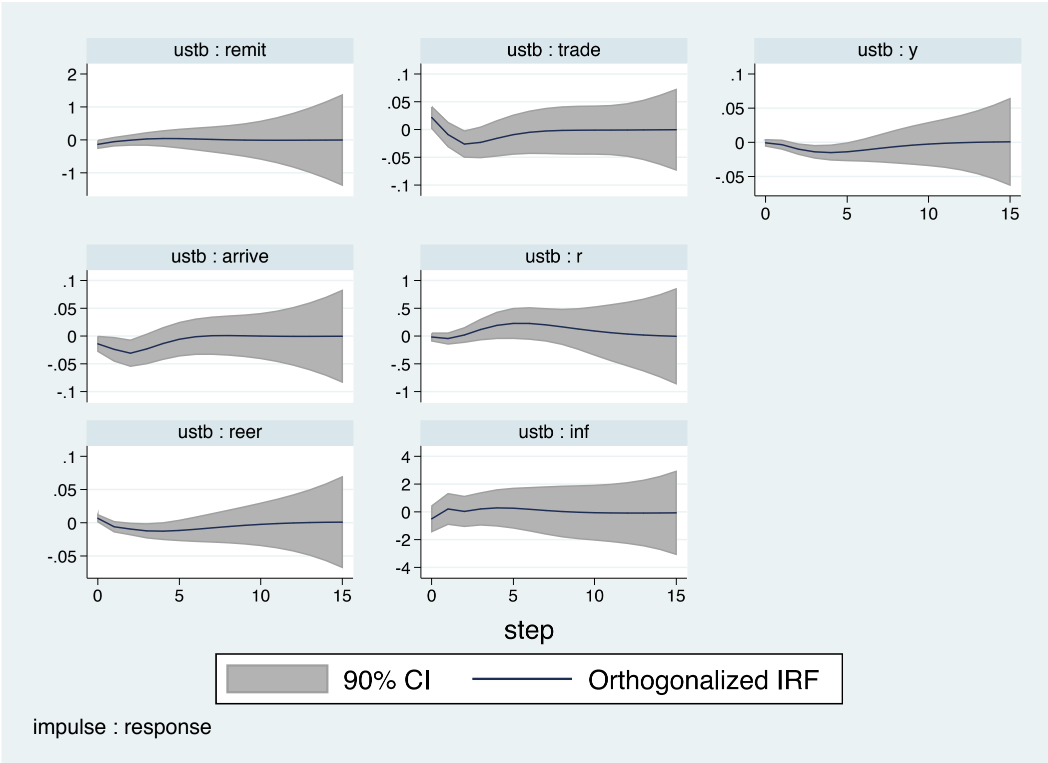


Figure 1A.2.1. Counterfactual - Response of Caribbean Economy to Positive U.S. Real GDP Shock

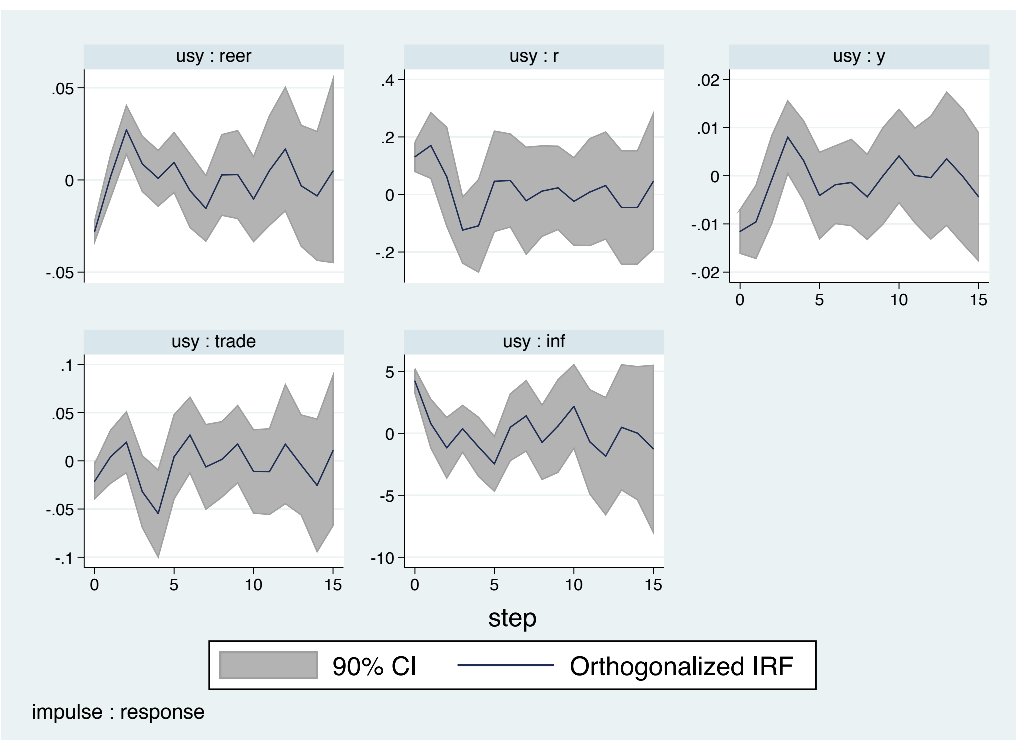


Figure 1A.2.2. Counterfactual - Response of Caribbean Economy to Positive U.S. Inflation Rate Shock

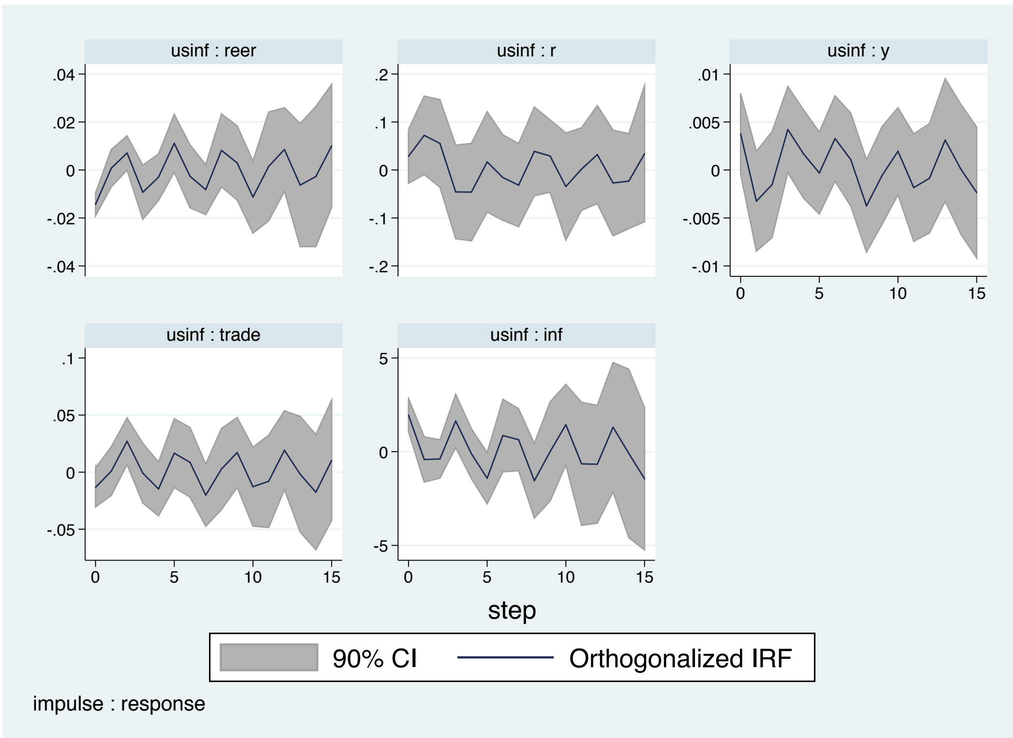


Figure 1A.2.3. Counterfactual - Response of Caribbean Economy to Positive U.S. Interest Rate Shock

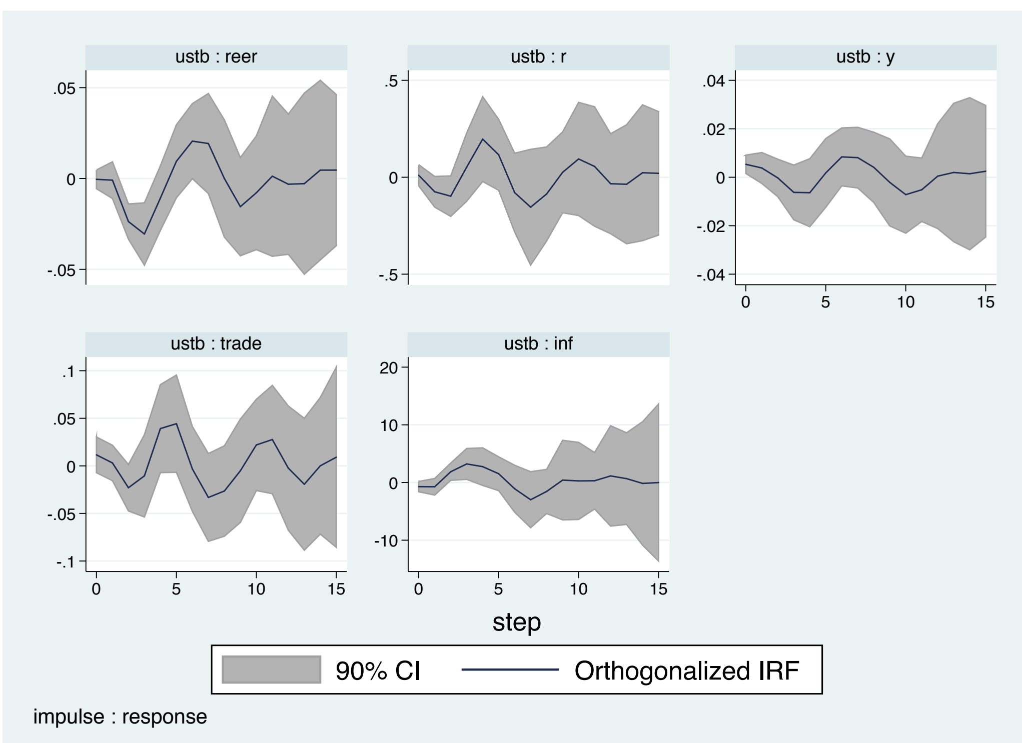


Figure 1A.3.1. Response of Fixed Exchange Rate Caribbean Economy to Positive U.S. Real GDP Shock

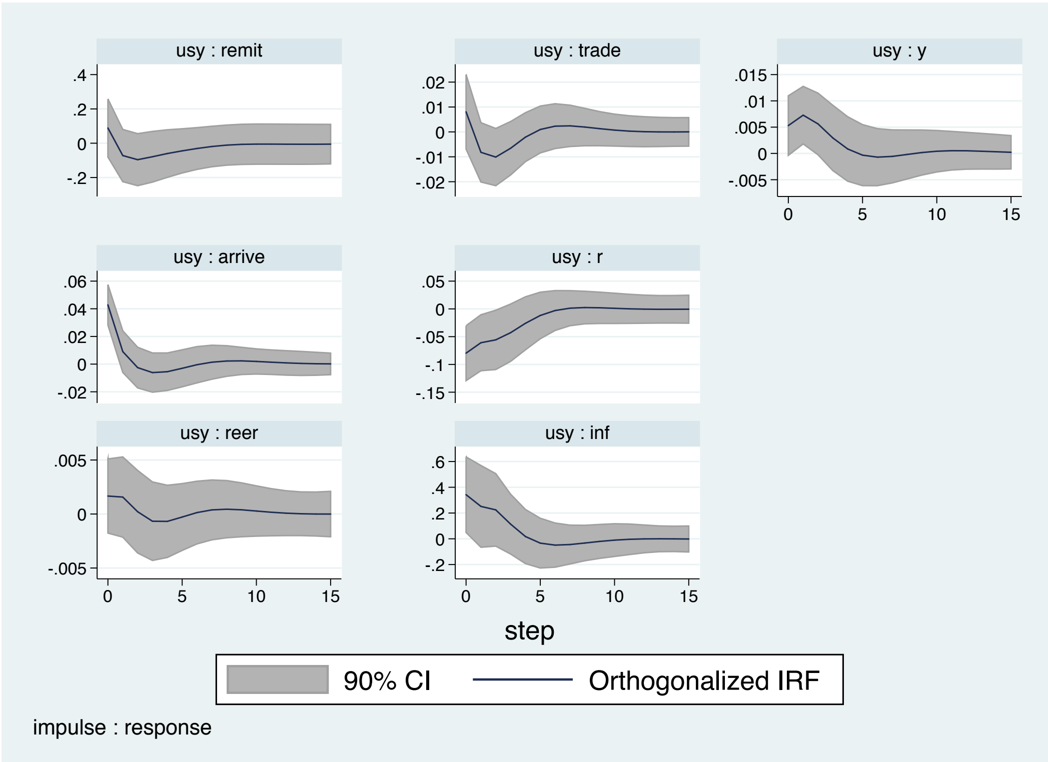


Figure 1A.3.2. Response of Fixed Exchange Rate Caribbean Economy to Positive U.S. Inflation Rate Shock

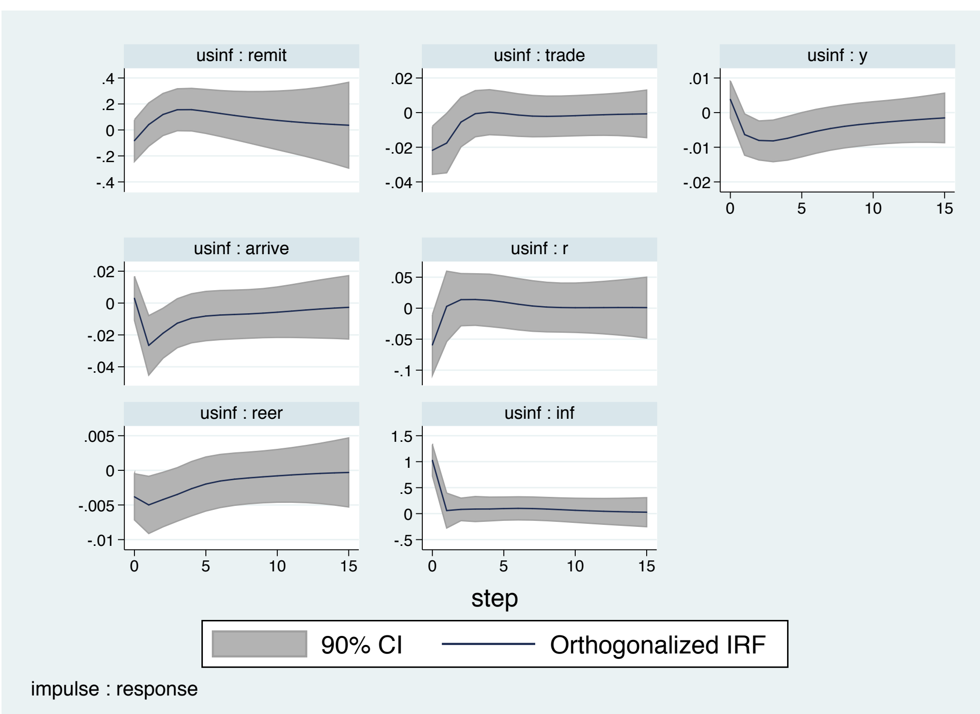


Figure 1A.3.3. Response of Fixed Exchange Rate Caribbean Economy to Positive U.S. Interest Rate Shock

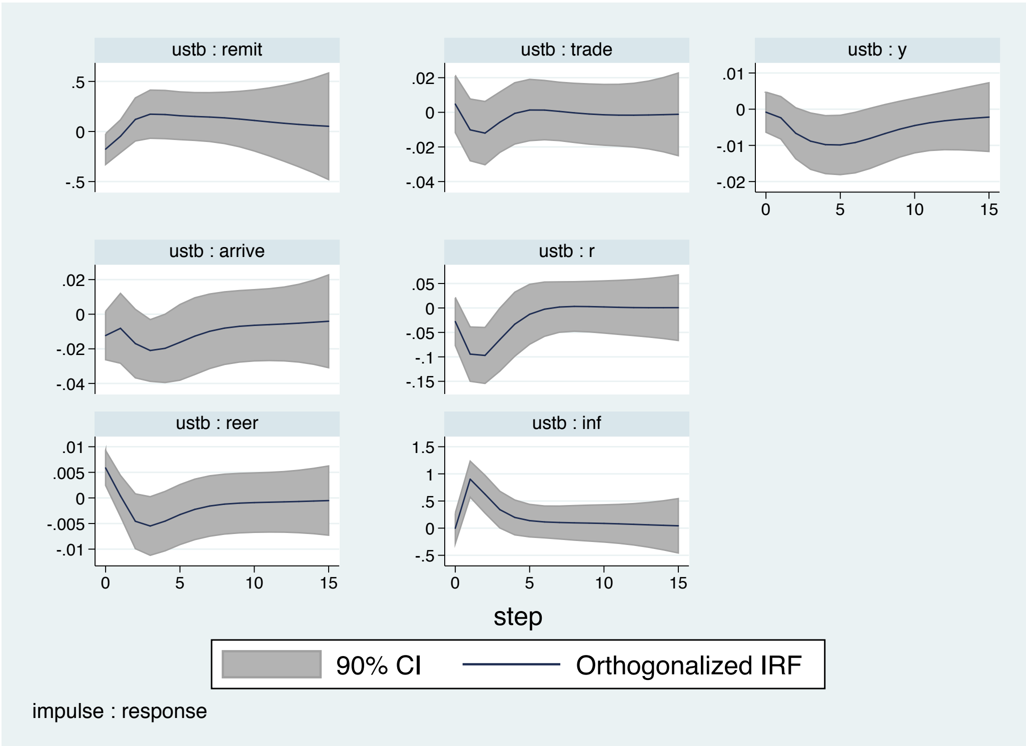


Figure 1A.4.1. Counterfactual Response of Fixed Exchange Rate Caribbean Economy to Positive U.S. Real GDP Shock

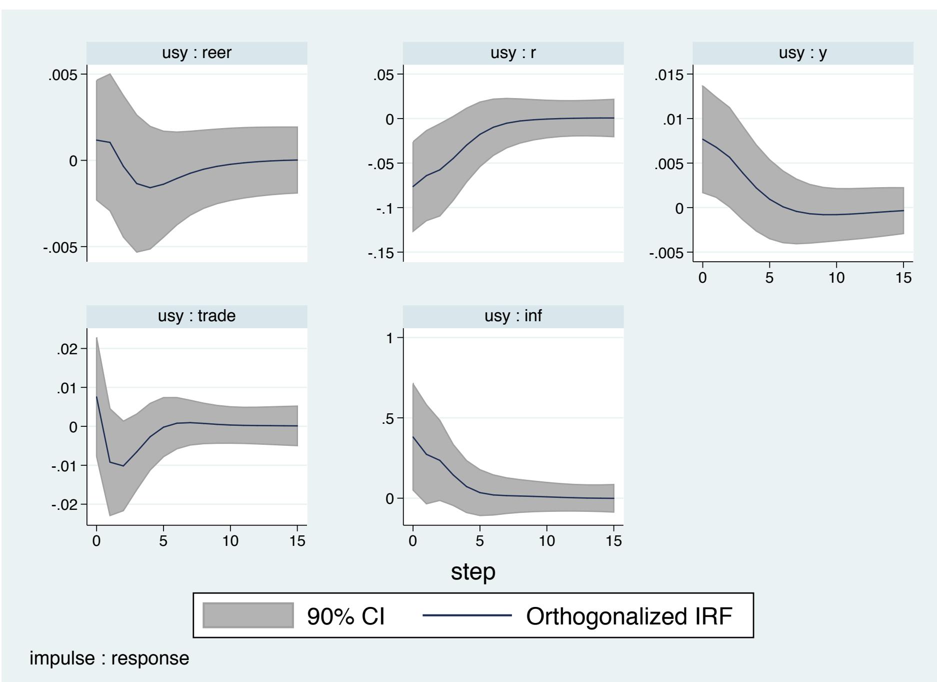


Figure 1A.4.2. Counterfactual - Response of Fixed Exchange Rate Caribbean Economy to Positive U.S. Inflation Rate Shock

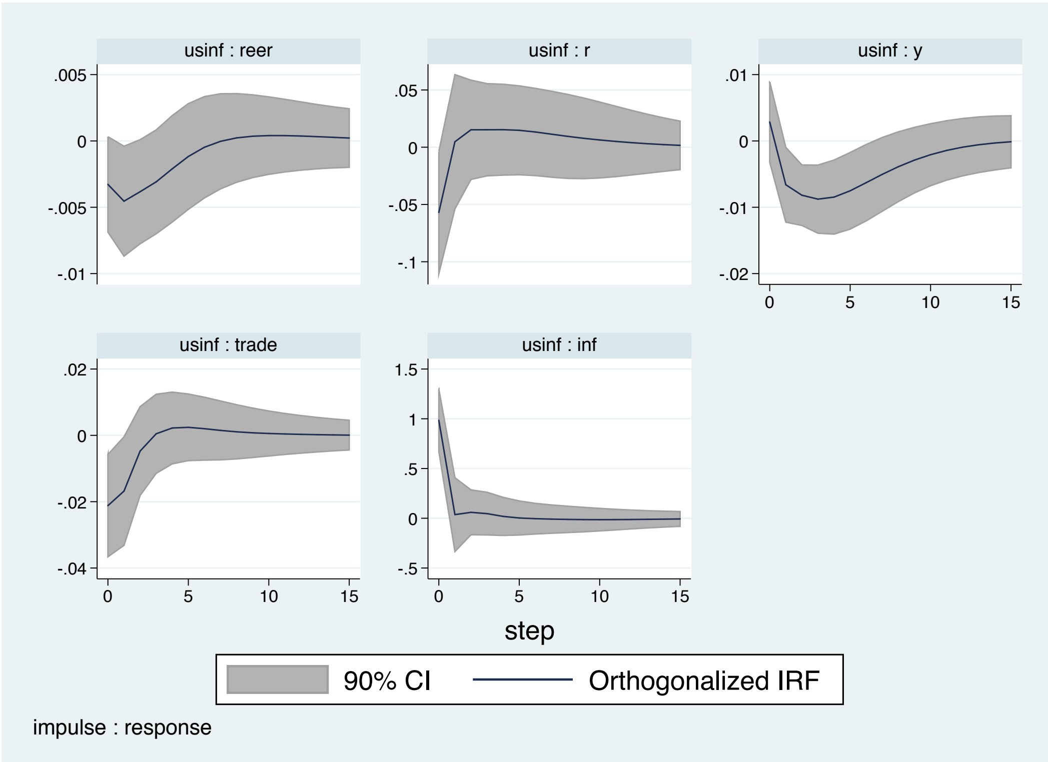


Figure 1A.4.3. Counterfactual - Response of Fixed Exchange Rate Caribbean Economy to Positive U.S. Interest Rate Shock

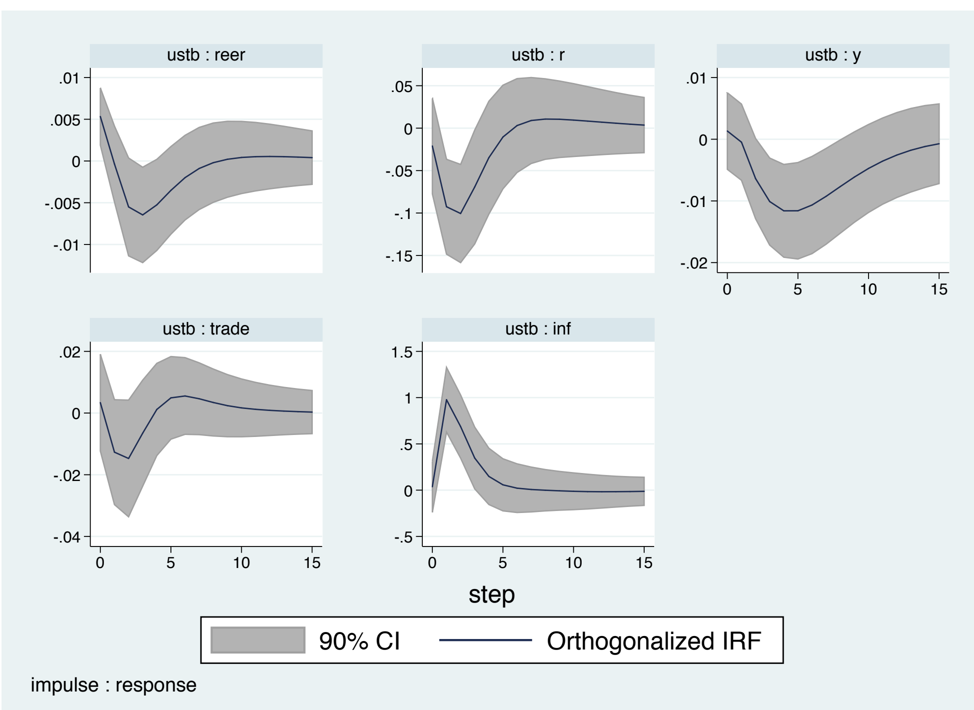


Figure 1A.5.1. Extracted Cyclical Component of Jamaica, U.S. and World Macro-Variables

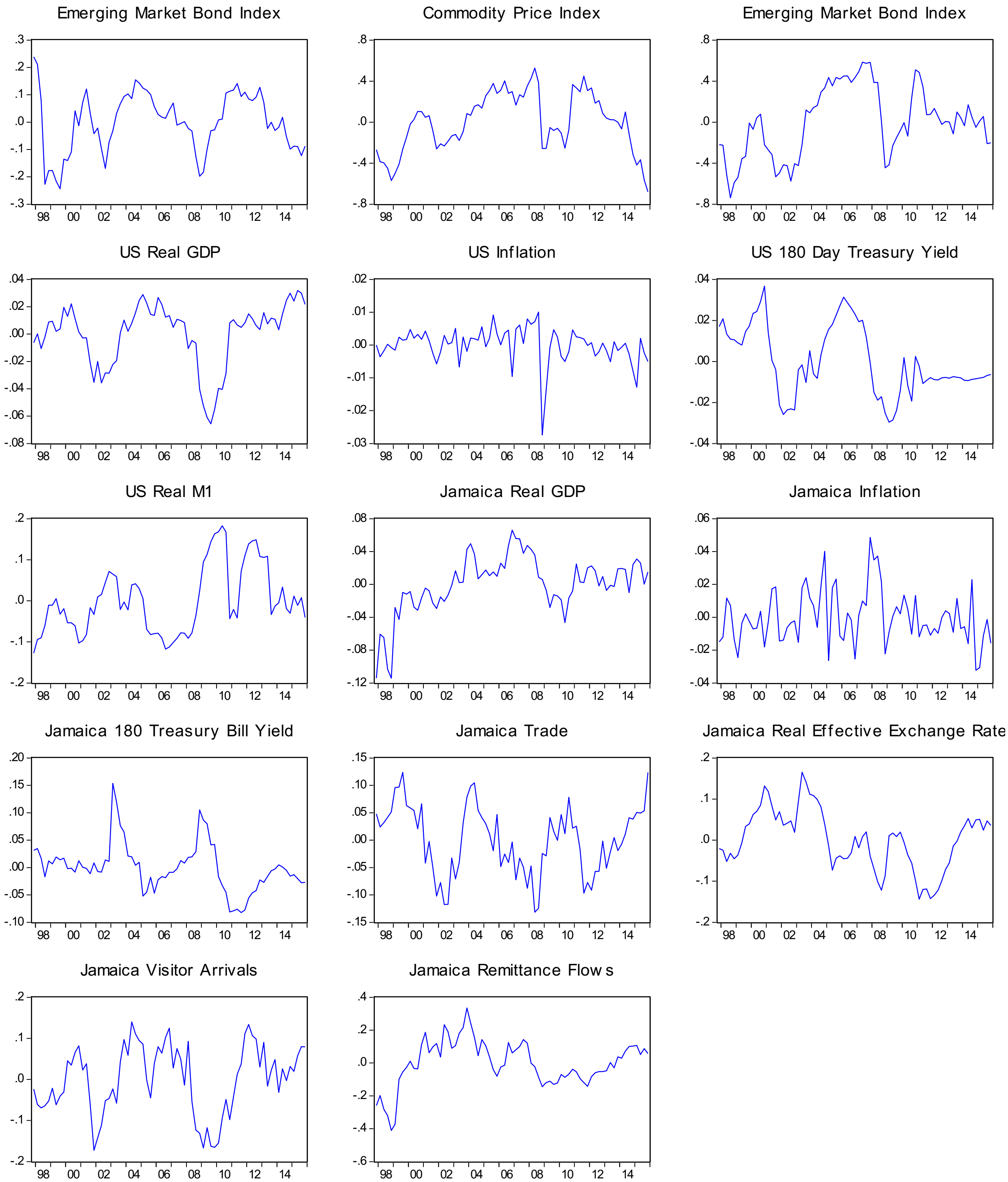
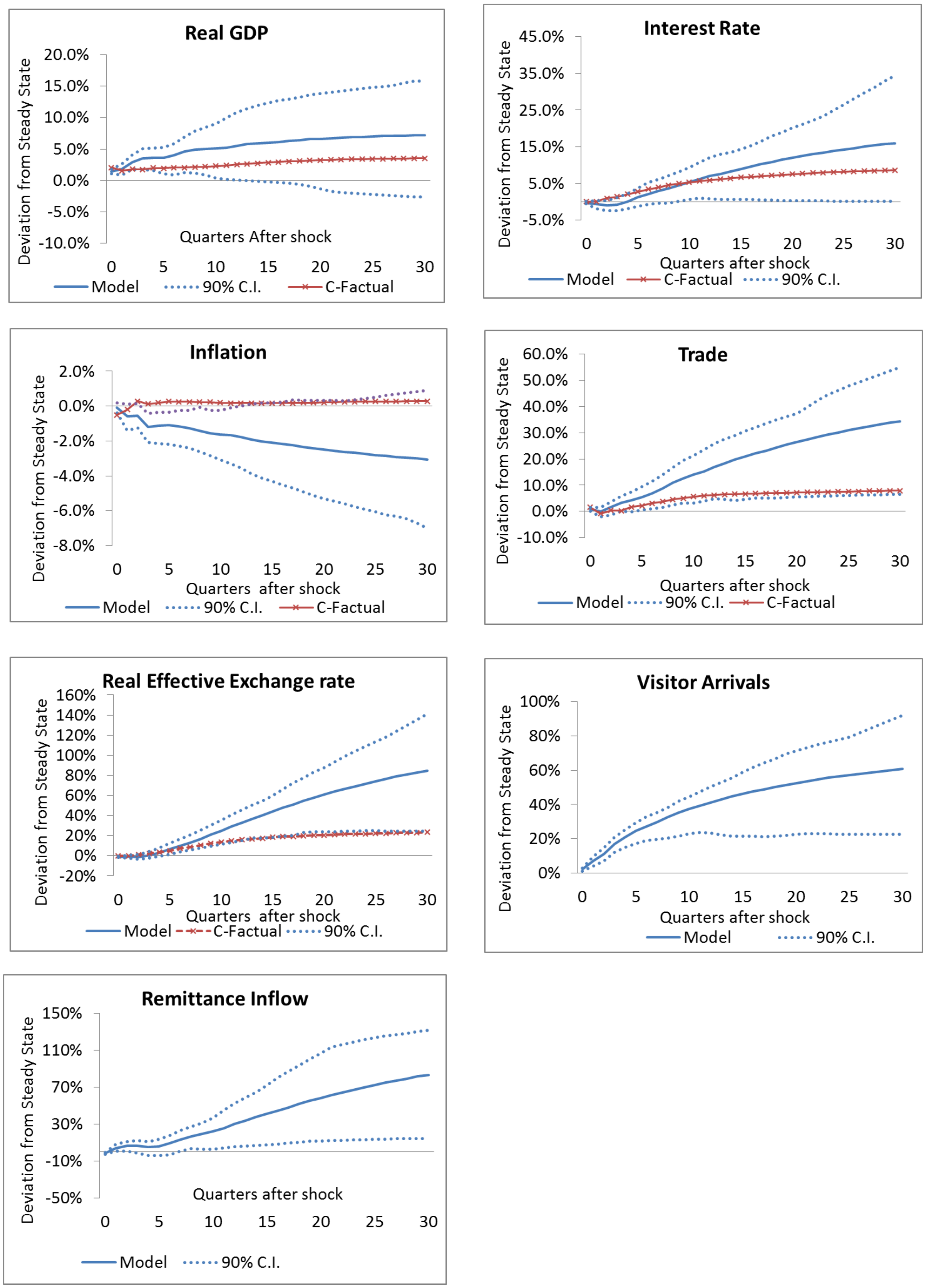


Figure 1A.6.1. Jamaica's Accumulated Response to Positive U.S. Real GDP Structural One S.D. Shock



Note: For stationary VARs, the accumulated responses should asymptote to some (non-zero) constant.

Figure 1A.6.2. Jamaica's Accumulated Response to Positive U.S. Monetary Structural One S.D. Shock

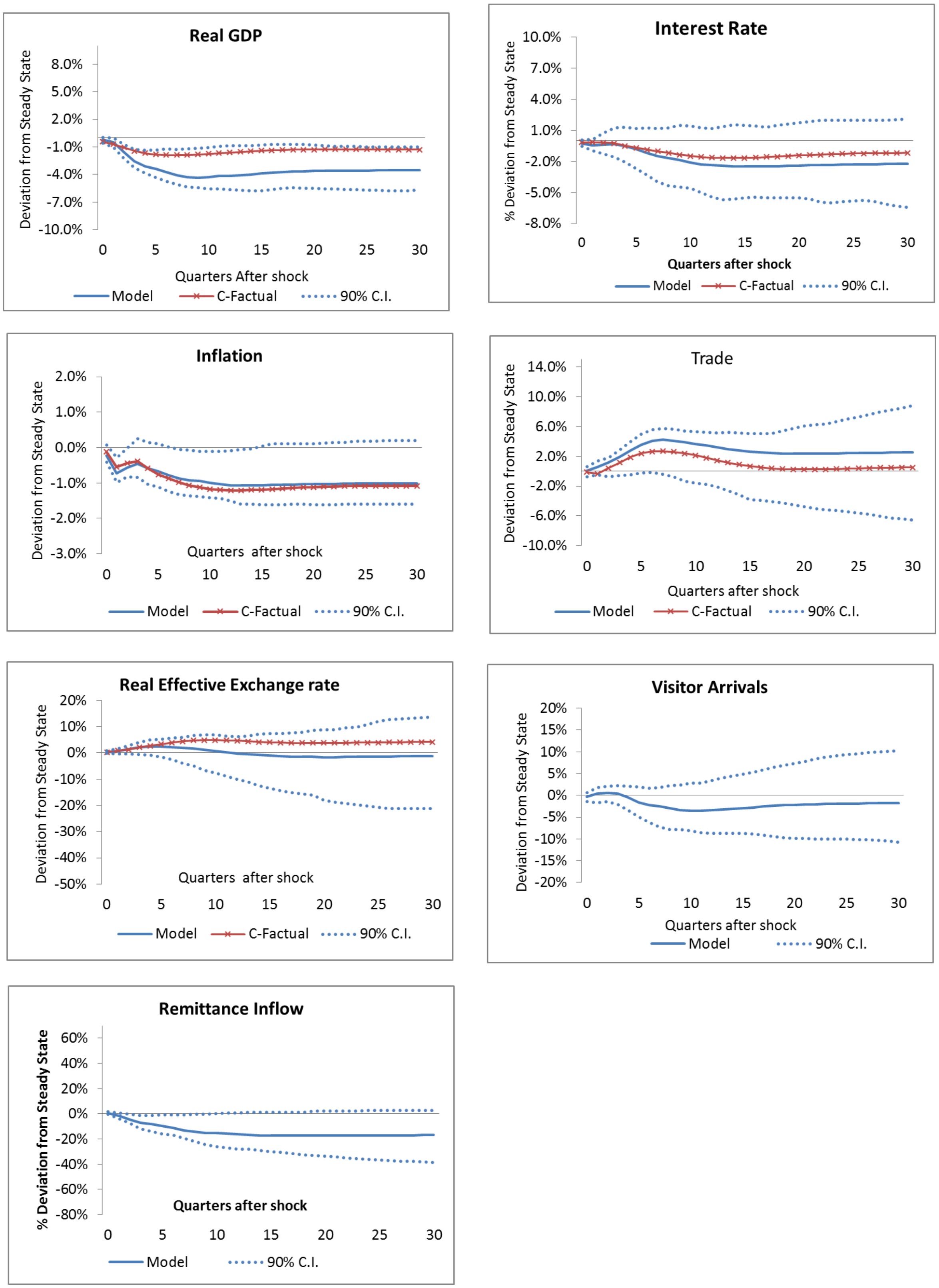
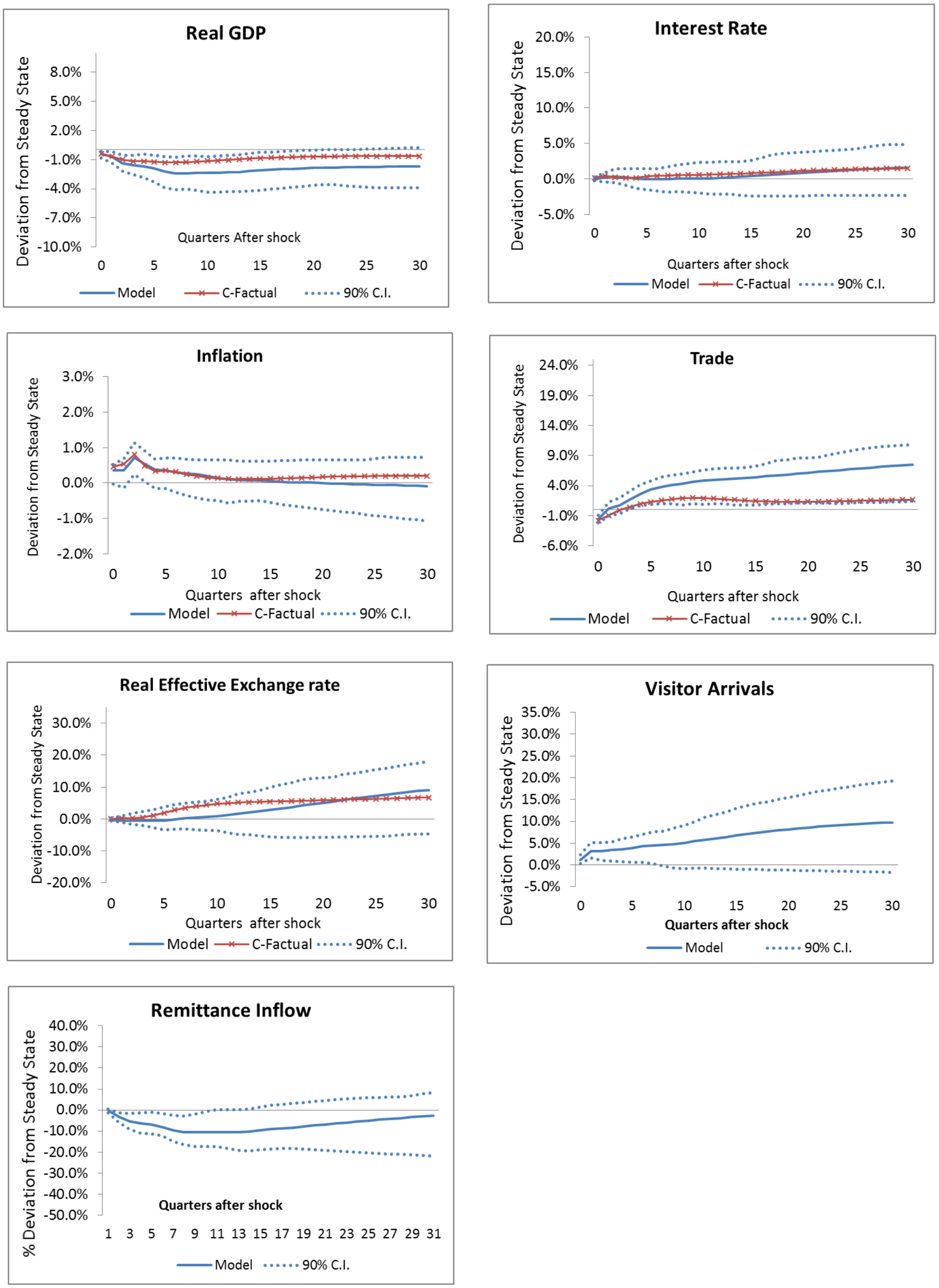


Figure 1A.6.3. Jamaica's Accumulated Response to Positive U.S. Inflation Structural One S.D. Shock



2. J-curve and Bilateral Trade: An Asymmetric Analysis

2.1 Introduction

Exchange rate plays a critical role in a country's trade, economic growth and economic development. In particular, the use of devaluation as one of the macroeconomic tools by policymakers to boost their international competiveness (Jelassia et al., 2017). The J-curve theory, developed by Magee (1973), posits that when a country's currency depreciates, its trade balance should worsen in the short-run because demand is inelastic, but improves in the long-run as quantity adjusts. This elasticity approach has been extensively examined empirically over the years and is the most popular approach used to examine the real exchange rate and trade balance relationship, when compared to the other approaches (Hacker and Hatemi-J, 2004).[13]

For the J-curve, Magee (1973) presents three phases of adjustment emanating from devaluation or depreciation of a country's currency relative to its trading partner. The first phase relates to the impact of the exchange rate on trade contracts signed prior to depreciation. In this case, the trade balance is expected to deteriorate largely if the share of import contracts is greater than that of the export contracts denominated in the foreign trading partner's currency. The second phase is termed the exchange rate pass-through stage. This is where those contracts entered into after the depreciation experience an increase in import price of goods and a fall in the price of exports, resulting in a worsening of the trade balance. During this phase, demand tends to be inelastic due to the delay in consumer reaction as well as the lag in renegotiating trade contracts. For the third phase, quantity adjustments take place where import demand decreases and demand for exports

[13] The author indicates that the elasticity approach can be indirectly utilized to assess the alternative elasticity methods by evaluating the short and long run coefficients.

increase leading to an improvement in the trade balance, above the level prior to the depreciation. These three phases give the shape of a flattened letter ‘J’, hence the ‘J-curve’.

Previous studies assessing the validity of the J-curve theory provide mixed results hence the evidence is inconclusive. For example, empirical assessments find no evidence in favour of the J-curve theory (Rose and Yellen, 1989; Jelassia et al., 2017), while others find favourable results (Bahmani-Oskooee and Kutan, 2009; Bahmani-Oskooee and Fariditavana, 2016; Nusair, 2017). The results vary with the functional form (linear or non-linear), measure of real exchange rate, aggregate or disaggregated trade data, as well as how the J-curve is defined. The need to introduce non-linearity and structural breaks in the assessment lies in the asymmetric effect of the real exchange rate on a country’s trade balance (Bahmani-Oskooee and Fariditavana, 2015, 2016) and to improve the model (Kyophilavong et al., 2013), respectively. The inclusion of asymmetric real exchange rate effect in the analysis is attributed to prices being rigid downward (Bussiere, 2013). In addition, the literature finds greater cases of J-curve in a non-linear framework relative to a linear setup.

The objective of this study is to find out if evidence of the J-curve in an asymmetric analysis with structural breaks is unique to a country’s trade with the U.S. or their largest trading partner and if, there is any support for the J-curve in a cross-country analysis. The analysis does not include countries under a fixed exchange rate regime and such the findings cannot be extended to them. My contribution to the literature on real bilateral exchange rate and bilateral trade is on these three fronts. First, I perform a rigorous and comprehensive quarterly assessment of the J-curve using bilateral trade data over the period 1993 to 2017 for 44 of U.S. bilateral trading partners by introducing asymmetric real exchange rate effects and structural breaks in an ARDL model. To the best of my knowledge, this represents the largest country sample analysis that covers a diverse set of countries across the Euro Area, advanced non-Euro Area and, emerging markets and developing countries. The number of countries in this assessment is more than twice the number covered in prior studies (for example in Bahmani-Oskooee and Ratha, 2004).

Second, using annual data on 26 countries for the period 1970 to 2016 within the said ARDL framework, I investigate if evidence of the J-curve is unique to bilateral trade with the U.S. or a country's largest trading partner, subject to two measures of real bilateral exchange rate as well as terms-of-trade. Prior studies of this kind focus solely on a measure of real bilateral exchange rate based on the consumer price index but, I incorporate a measure based on the producer price index. The use of the annual data allows my model to capture any delay in the J-curve that may not be captured in a quarterly analysis were the optimum lag length in the model is at most two years.

Third, I investigate using both quarterly and annual data if there is any cross-country evidence of the J-curve by applying the pooled mean group form of the ARDL model. Previous studies failed to identify any cross-country support for the J-curve. I focus on bilateral trade with the U.S. because of its importance as a world economic leader and global influencer as well as the mixed findings present in prior studies. The overall assessment is important for trade policy, in particular for economies that have an export-led economic growth strategy or those seeking to improve trade competitiveness.

The findings show evidence of asymmetric real exchange rate effects on the bilateral trade balance, in both the short-run and long-run for most of the countries. Results from the quarterly analysis indicate evidence supporting the J-curve for 14 countries, seven of which are among the emerging and developing countries, far more than previously identified in the literature on U.S. The findings also indicate that the lower a country's cost of production relative to that of the U.S., the greater the magnitude of long-run improvement in the bilateral trade balance following a real depreciation. Results from the annual assessment indicate that the J-curve may also be taken as given for some countries, regardless of the measure of real exchange rate. The non-linear ARDL model identifies 21 cases of J-curve, six of which the linear model failed to capture. Unlike in the quarterly analysis, the findings indicate cross-country support for the J-curve. This cross-country evidence, within the non-linear ARDL framework, is only present among the euro area and emerging & developing group of countries bilateral trade with their largest trading partner, subject to the real exchange rate measure. The cross-country linear ARDL identifies J-curve only among the emerging and developing countries for producer price index real bilateral exchange rate measure. The findings highlight the importance of understanding the real exchange rate – trade nexus, within an asymmetric and disaggregated framework, when designing bilateral trade policy.

The remainder of this paper is organized as follows. Section 2.2 is the theoretical framework of the J-curve, while Section 2.3 presents the literature review. Section 2.4 describes the data & methodology and, Section 2.5 presents the results. Section 2.6 provides the discussion and Section 2.7 concludes and offers policy implications.

2.2 Theoretical Framework

The J-curve theory hinges on the assumptions surrounding the short-run deterioration in the trade balance (Rose and Yellen, 1989). Any weakness in the J-curve assumption may lead to a limited or drawn out effect on the trade balance, even if there is significant depreciation in the exchange rate (Mahdavi and Sohrabian, 1993). Miles (1979) suggests that failure to find sufficient evidence for the J-curve can be attributed to not accounting for the effects of monetary and fiscal policies.

Other factors contributing to the lack of support for the J-curve include aggregation bias, measure of exchange rate, model specification and delay in the J-curve.

Aggregation bias is introduced into the modelling framework when each country's trade flows are grouped with the rest of the world (Bahmani-Oskooee and Kanitpong, 2017). This implicitly assumes that a country's aggregated trade flow is equivalent to its bilateral trade data. Further bias is present when the real effective exchange rate is used instead of the real bilateral exchange rate. A drawback in doing so, is that studies assume depreciation of a country's exchange rate against its trading partner implies that it will likewise depreciate against other currencies. Rose and Yellen (1985) and Bahmani-Oskooee and Brooks (1999) suggest that the use of effective exchange rate (weighted exchange rate) may alter the exchange rate-trade balance relationship and produce misleading results.[14] For model specification, some studies assume a linear relationship between the exchange rate and trade balance (Bahmani-Oskooee and Fariditavana, 2015).[15] Di Mauro et al. (2017) suggest that incorporating the distribution of country based productivity and its asymmetry in an exchange rate-export macro-analysis has the advantage of amplifying the response of exports to exchange rate changes as observed at the firm-level. While Rosensweig and Koch (1988) and Wassink and Carbaugh (1989) on the other hand indicate that delay in the J-curve pattern tends to occur when there is a weak pass through of a currency devaluation to its import price.

To examine the behaviour of variables over time, a number of approaches are used, the most common ones are Engle-Granger (1987) cointegration test, Johansen (1991) cointegration test,

[14] Rose and Yellen (1989) suggest that studies using aggregated trade data should use a measure of exchange rate for the rest of the world in order to produce results free of measurement bias.

[15] Chen and Devereux (1994) intertemporal model point to asymmetries between the current account and changes in the relative export and import prices.

Stock and Watson (1993) dynamic ordinary least squares and Pesaran et al. (2001) ARDL approach. However, the ARDL approach is regarded as an improvement on past cointegration approaches as it is free from spurious results because it does not discriminate against the order of integration of the variables being zero or one (Pesaran et al., 2001), when jointly examining the short-run and long-run dynamics. To capture exchange rate asymmetry in the exchange rate - trade balance relationship, the Shin et al. (2014) approach is used. Their non-linear approach is an augmented version of Pesaran et al. (2001) linear ARDL model that introduces non-linearity to the adjustment process by uniquely separating depreciation and appreciation of the exchange rate using the partial summation technique. This is critical as the response of trade balance to a depreciation versus appreciation may not be symmetric.

2.3 Literature Review

The study of the J-curve theory covers numerous countries and regions, but is skewed towards developed economies. These studies build on the work of Magee (1973) and use the framework of Bahmani-Oskooee (1985) and Rosen and Yellen (1989) where the trade balance is determined by the real exchange rate and income (domestic and foreign).[16] However, studies prior to 2015, assumed exchange rate symmetry in the exchange rate and trade balance relationship, whereas more recent works incorporate and test the validity exchange rate asymmetry (Bahmani-Oskooee and Fariditavana, 2015; Nusair, 2017). Overall, the empirical study of the J-curve can be grouped into those using either aggregate or bilateral data (trade and exchange rate), with subsets of linear or non-linear specification in the adjustment process. Employing any combination is likely to

[16] Jelassi et al. (2017) find that using trade openness as an explanatory variable is not significant and affects the estimates of the other explanatory variables of the model.

produce varied results. Support for the J-curve based on a linear specification and aggregated data are few. However, I find greater evidence when asymmetry is introduced into the framework along with bilateral trade data.

For my focus on the U.S., it is worth noting that there are a number of studies that examine the J-curve theory for the U.S. or for the U.S. and its bilateral trading partners. In an early study, Rose and Yellen (1989) use the Engle-Granger cointegration analysis, with quarterly data for the period 1960 to 1985, to test the J-curve hypothesis between the U.S. and the rest of the G7 nations.[17] The authors find no empirical evidence to support the J-curve hypothesis, as depreciation of the real bilateral exchange has no short-run deterioration nor the expected long-run improvement in merchandise trade balance (bilateral or aggregated). Using a linear ARDL model with quarterly data over the period 1973 to 1996 for disaggregated trade data and the real bilateral exchange rate, Bahmani-Oskooee and Brooks (1999) find no evidence for the J-curve in the strict sense of an expected pattern of deterioration in the trade balance after a depreciation followed by a period of improvement all occurring in the short-run. Their results however fit a more relaxed definition of the J-curve, that is, following a depreciation, the deterioration in the trade balance in the short-run is more prolonged followed by improvement in the trade balance over the long-run. This definition favours J-curve for France, Italy, Japan and Germany. In a later study, Bahmani-Oskooee and Ratha (2004) uses a similar linear approach to test the J-curve dynamics of 18 U.S. bilateral trading partners for the period 1975 to 2000 and find support for the J-curve for 10 of the selected countries.

[17] The G7 nations consist of Canada, France, Germany, Italy, Japan, United Kingdom and the United States.

To demonstrate the advantage of introducing nonlinearity in U.S studies, Bahmani-Oskooee and Fariditavana (2015) apply both linear and non-linear ARDL models using aggregated data for Canada, U.S., China and Japan. When the linear model is used, the authors only find support for the J-curve in the case of the U.S. The evidence increased to both the U.S. and China when the non-linear ARDL model is applied. In a later study, Bahmani-Oskooee and Fariditavana (2016) use a non-linear ARDL model to find greater evidence in favour of the J-curve, relative to a linear model, in assessing the U.S. quarterly bilateral trade with its G7 counterparts over the period 1971 to 2013. Results for the J-curve using a linear model was supportive only for Canada, France and Germany, while the non-linear model favoured all countries except Japan. Contrary to the other studies, Bahmani-Oskooee and Halicioglu's (2017) examination of Turkey-U.S. bilateral trade, over the 1980-2014 period, find no evidence of a J-curve, no asymmetry, nor real exchange rate having the expected significant long-run positive effect on bilateral trade balance.

There is also evidence that nonlinear models provide greater support for the J-curve for other countries and their trade. Bahmani-Oskooee et al. (2016) find this to be true when analyzing Mexico's bilateral trade relationship with 13 of its trading partners, using quarterly data for the 1980 to 2014 period. The non-linear ARDL model identified a J-curve in 10 cases versus the linear model with six cases. Of note, the U.S. was identified in both models. Nusair (2017) uses both linear and non-linear ARDL models with quarterly aggregated data largely spanning 1994 to 2015 to test the J-curve theory on 16 European transition economies. The author finds evidence in favour of a J-curve for 12 out of 16 economies only when non-linearity is incorporated. Further, the long-run effect on the trade balance is greater in response to a depreciation relative to an appreciation. Using both ARDL models, Bahmani-Oskooee and Kanitpong (2017) test the J-curve for seven Asian economies with quarterly data largely for 1980-2016. The authors find evidence of asymmetry in both the short-run and long-run effects of the exchange rate on the trade balance for seven Asian countries. However, the evidence only supports the J-curve in the short-run for Japan and Malaysia. The authors indicate that the lack of greater support for the J-curve could be hampered by aggregation bias and could be improved with bilateral trade data.

This study adds to the vast strand of literature on real bilateral exchange rate and bilateral trade by empirically investigating if countries take the J-curve theory as given. Specifically, whether or not countries trade with the U.S. or its largest trading partner as well as if there exists any cross-country support for the J-curve, subject to different measures of real exchange rate and terms of trade index, within an ARDL model that accounts for asymmetric exchange rate effects and structural breaks.

2.4 Data & Methodology

To examine the relationship between the real exchange rate and bilateral trade balance, I use the approach of Rose and Yellen (1989). This approach is deemed appropriate as it uses a linear functional form, where the trade balance is a function of the real exchange rate, domestic demand and external demand. In the literature, these explanatory variables have great influence on a country's trade balance. The study is undertaken in two parts. The first, uses quarterly bilateral trade data for 44 countries and the U.S., for the period 1993 to 2017. The second part uses annual bilateral trade data over period 1970 to 2016, for 26 countries that trade with the U.S. and their largest trading partner, subject to two measures of real exchange rate as well as terms-of-trade. The empirical assessment introduces asymmetric real exchange rate effects and structural breaks in an ARDL framework. Information for each country is primarily collected from the International Monetary Fund database (Direction of trade statistics and International Financial Statistics). In cases where data are unavailable, a complete series is sourced from the Organization for Economic

Co-operation and Development database (OECD) or the Central Banks (Trinidad & Tobago and Jamaica for measure of income). The countries under assessment are selected based on data availability.[18]

2.4.1 Data

The bilateral trade balance (TB) is defined as the ratio of the value of goods exported by each country to its trading partner, to the value of goods imported from the said trading partner. This measure of trade balance is a ratio that is unit free and as such is not affected by whether exports and imports are in nominal or real terms (Bahmani-Oskooee and Brooks, 1999). An increase in the 'TB' measure means an improvement in a country's trade position with the U.S. The real bilateral exchange rate (RER) is defined as the average bilateral exchange rate per unit of the U.S. dollar multiplied by the U.S. consumer price index divided by the trading country consumer price index. An increase in the real exchange rate indicates a depreciation of the country's currency against that of the U.S., signaling an improvement in its trade competiveness. Income (Y) for each country is proxied by the industrial production index (IPI).[19] Other studies use varied measures of income, however, due to data limitation and missing information, the IPI is used.

2.4.2 Methodology

I use the empirical works of Bahmani-Oskooee and Brooks (1999), Shin et al. (2014), and Bahmani-Oskooee and Fariditavana (2016) which are common throughout the literature, to model

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[18] The OECD data is comparable to that from the International Money Fund database.
[19] Other studies proxied income by real GDP (Kyophilavong, Shahbaz and Uddin, 2013) and index of real GDP (Bahmani-Oskooee and Fariditavana, 2016). For Jamaica, electricity generation index (base year=2010) is used as a proxy for industrial production index.

the J-curve theory throughout this research. The trade balance model in the natural logarithm form is shown in (2.1).

$$tb_t = c + b_1 y \quad + b_2 y^* + b_3 rer + \varepsilon_t \tag{2.1}$$

Where t represents time, c is the constant, b_i is the elasticity measure, ε_t is the random error term and '*' represents U.S. variable. Based on economic theory, it is expected that $b_1 < 0$, an increase in domestic (U.S. bilateral trading partner) income will lead to an increase their importation from the U.S., while $b_2 > 0$ indicating an increase in exports to the U.S. because of the higher external demand. The expected coefficient on the real exchange rate variable, b_3, is a positive value. That is, a weakening of a country's currency against the U.S. dollar makes its exports relatively cheaper and improves its trade balance with the U.S (vice-versa).

I test the J-curve hypothesis with the introduction of non-linearity, as with prior studies, given the stronger support for the hypothesis when used with this functional form. I also include structural breaks to the framework. To incorporate the asymmetry effects of the real exchange rate on the bilateral trade balance, I follow the nonlinear approach of Shin et al. (20 14). This approach is used by Bahmani-Oskooee and Fariditavana (2015, 2016) and later by others. The non-linear framework is an augmentation of the Pesaran et al. (2001) bound testing approach to cointegration, where a selected variable initially thought to be symmetric is altered to being asymmetric in both the short-run and long-run. Based on the literature, I expect the real exchange rate to display asymmetric effect on the bilateral trade balance.

2.4.2.1 ARDL Model

The autoregressive distributed lag model of Pesaran, Shin and Smith (2001), is a linear framework that simultaneously tests both short-run and long-run relationships. An advantage of this approach is that it does not discriminate whether the variables of interest are integrated of order zero or one. The ARDL specification minimizes the endogeneity problems and all variables are modelled endogenously (Nkoro and Uko, 2016). Incorporating the trade model of (2.1) into the ARDL framework gives (2.2):

$$\Delta tb_t = a_0 + \sum_{i=1}^{j} a_{1i}\Delta tb_{t-i} + \sum_{i=0}^{p} a_{2i}\Delta y_{t-i} + \sum_{i=0}^{k} a_{3i}\Delta y^*_{t-i} + \sum_{i=0}^{m} a_{4i}\Delta rer_{t-i} + \rho_1 tb_{t-1} + \theta_1 y^*_{t-1} + \theta_2 y_{t-1} + \theta_3 rer_{t-1} + u_t \tag{2.2}$$

In (2.2), Δ represents the change of the variable with the accompanying coefficients capturing the short-run elasticity. The error correction portion of the model is represented by ρ_1, which when negative and statistically significant indicates long-run relationship among the level variables of the model (Banerjee et al., 1998). The long-run elasticity is captured by the coefficient (θ_i) on the lagged level variables normalized on ρ_1, that is ${-\theta_i}/{\rho_1}$.

Apart from using the t-test to examine the long-run relationship, the bounds t-test and F-test are recommended. The critical values for both bounds tests are obtained for cases where the independent variables are either I(0), all I(1) or both I(0) and I(1). The t-bounds test is a recommended alternative to the standard t-statistics which only examines if the coefficient on the lagged dependent variable is negative and statistically significant. The t-bounds test uses the critical values based on the order of integration of the regressors (Narayan, 2005). That is, if the t-statistics on the coefficient of the lagged dependent variable is less than the associated I(1) (upper) and I(0) (lower) critical value bounds (Table 2B.1) for the null hypotheses, then the null hypothesis for no cointegration is rejected. The F-bounds test tests the joint significance of the coefficients normalized on the lagged dependent variable. That is, $\theta_1 = \theta_2 = \theta_3 = 0$. The long-run hypotheses are assessed with the standard Wald or F-statistics. The F-test distribution depends on the order of integration of the variables, sample size, the number of independent variables and whether the model has an intercept or trend (Pesaran et al., 2001). Narayan (2005) argues that the critical values from Pesaran et al. (2001) are based on large sample sizes of at least 500, and as such would not be fitting for smaller samples. The author proposes a set of critical values that are more fitting for sample sizes of 30 to 80 observations (in increments of 5), which would produce a relative wider confidence interval relative to the larger samples. Therefore, if the F-statistics is greater than the upper critical value, then the null hypothesis of no long-run relation or cointegration is rejected. Given the sample size of this study, the critical bounds values by Narayan (2005) are more appropriate.

To introduce asymmetry in (2.2), the logged real exchange rate variable is separated into two components, real appreciation and real depreciation, using the partial sum technique (2.3) as outlined by Shin et al. (2014).

$$rer_t = \propto + appr_t + depr_t \qquad (2.3)$$

Where $\mathrm{appr_t}$ is the partial sum process of negative changes (appreciation) in the logged real exchange rate, and $\mathrm{depr_t}$ is the partial sum of positive changes (depreciation) computed in (2.4) and (2.5), respectively (see an example in Figure 2B.1). The $\propto$ symbol represents the intercept.

$$\mathrm{appr}_t = \sum_{i=1}^{t} \Delta\mathrm{appr}_i = \sum_{i=1}^{t} \min(\Delta\mathrm{rer}_i, 0) \quad (2.4)$$

$$\mathrm{depr}_t = \sum_{i=1}^{t} \Delta\mathrm{depr}_i = \sum_{i=1}^{t} \max(\Delta\mathrm{rer}_i, 0) \quad (2.5)$$

The value of zero in (2.4) and (2.5) serves as an intuitive threshold level that separates depreciation from appreciation in the real exchange rate (Shin et al., 2014). The inclusion of the asymmetry adaption in the ARDL framework requires substituting the real exchange rate variable (rer) in (2.2) with the partial sums in (2.4) and (2.5) to yield (2.6). The non-linear ARDL framework which is modelled as a piecewise linear setup, given the decomposition of the real exchange rate, incorporates a regime switching cointegrating relationship where the regime is directed the positive and negative changes of the real exchange rate variable (Shin et al., 2014). As such, the model's equilibrium can also be non-linear.

$$\Delta\mathrm{tb}_t = a_0 + \sum_{i=1}^{j} a_{1i}\Delta\mathrm{tb}_{t-i} + \sum_{i=0}^{p} a_{2i}\Delta y_{t-i} + \sum_{i=0}^{k} a_{3i}\Delta y^*_{t-i} + \sum_{i=0}^{m} \psi_{1i}\Delta\mathrm{appr}_{t-i} + \sum_{i=0}^{n} \psi_{2i}\Delta\mathrm{depr}_{t-i} + \rho_1\mathrm{tb}_{t-1} + \theta_1 y^*_{t-1} + \theta_2 y_{t-1} + \delta_1\mathrm{appr}_{t-1} + \delta_2\mathrm{depr}_{t-1} + \sum_{i=1}^{c} \mathrm{Dum}_i + u_t \quad (2.6)$$

The non-linear model is further augmented to capture structural breaks which are represented by dummy variables as exogenous variables in the model. Kyophilavong, Shahbaz and Uddin (2013) suggest that accounting for structural breaks improves the analysis. The occurrence of the 2008 U.S. financial crisis (Dum_fcrisis) which had a global impact is included, which I treat as having a temporary effect since it primarily spanned the 2008-2009 period (Feldkircher, Martin and Florian Huber, 2016). For countries that joined the European Union (EU), this event I treat as having both a temporary and permanent effect. The former effect is captured by an impulse dummy for the time the country currency converted to Euro (Dum_imp), while the permanent effect (Dum_EU) starts when the country joined the EU.

Once the non-linear model is estimated, both short-run and long-run real exchange rate asymmetry hypotheses are tested. For the short-run, the asymmetry test includes (i) examining if the variables, $\Delta \mathrm{appr}$ and $\Delta \mathrm{appr}$, carry different lag lengths and (ii) testing for cumulative asymmetry on said variables, that is, if $\sum_{i=0}^{m} \psi_{1i} = \sum_{i=0}^{n} \psi_{2i}$. If the cumulative difference is statistically different from zero, then short-run asymmetry exists, otherwise there is symmetry. Testing the hypothesis for long-run asymmetry involves testing if the normalized coefficients on the long-run variables 'appr' and 'depr' are equal, that is, $-\frac{\delta_1}{\rho_1} = -\frac{\delta_2}{\rho_1}$. If the hypothesis is rejected, then the real exchange rate has a long-run asymmetric effect on the bilateral trade balance. Both short-run and long-run hypothesis tests are evaluated using the commonly used Wald statistics.

2.4.2.2 Pooled Mean Group Non-linear ARDL Model

Studies of the J-curve are usually between a country and a trading partner(s). So, for the second strategy, I use the pooled mean group (PMG) ARDL model of Pesaran et al. (1999) to which I also include non-linearity to the adjustment process for panel assessment, where z in (2.7) represents each country.[20] The ARDL PMG model assumes an identical long-run effect across countries and gives results for the average short-run effects. Although the PMG model does not account for unobserved factors, it still produces robust results in line with traditional fixed effect models regardless of outliers and order of lags. Additionally, the estimators are asymptotically distributed

[20] The PMG ARDL model is the use of Pesaran and Shin (1999) ARDL model for the panel setting.

as the sample size tends to infinity for a fixed number of groups.[21] Analysis at the panel level should shed light on whether the J-curve is more than just a country-specific case. After estimation, the standard battery of tests is conducted as in the non-linear ARDL model in Section 4.2.

$$\begin{aligned}\Delta tb_{z,t} = a_0 &+ \sum_{i=1}^{j} a_{1i}\Delta tb_{z,t-i} + \sum_{i=0}^{p} a_{2i}\Delta y_{z,t-i} + \sum_{i=0}^{k} a_{3i}\Delta y^*_{t-i} + \sum_{i=0}^{m} \psi_{1i}\Delta appr_{z,t-i} \\ &+ \sum_{i=0}^{n} \psi_{2i}\Delta depr_{z,t-i} + \rho_1 tb_{z,t-1} + \theta_1 y^*_{z,t-1} + \theta_2 y_{z,t-1} + \delta_1 appr_{z,t-1} \\ &+ \delta_2 depr_{z,t-1} + \sum_{i=1}^{c} Dum_i + u_{z,t}\end{aligned} \quad (2.7)$$

2.4.3 Validation of the J-Curve

Evidence supporting the J-curve theory in this study is validated by any of the two definitions outlined by Bahmani-Oskooee (1985) or Bahmani-Oskooee and Fariditaravana (2016). Evidence in favour of the short-run J-curve is defined by a negative or insignificant coefficient at lower lags followed by positive and significant coefficients at higher lag levels of the depreciation variable (initially by Bahmani-Oskooee, 1985; used by Bahmani-Oskooee and Kanitpong, 2017). Another definition combines the short-run deterioration with long-run improvement in the trade balance. This follows Bahmani-Oskooee and Fariditaravana (2016) where the J-curve is evident if the

[21] See Pesaran et al. (1999) for further details.

estimates of the short-run coefficients on depreciation(ψ_{2i}) variable is negative or insignificant, but the estimate of the normalized long-run depreciation variable ($\frac{-\delta_2}{\rho_1}$) is positive and significant.[22]

2.5 Results

This section presents the results for the J-curve assessment within the non-linear ARDL framework at the quarterly frequency for each country's trade with the U.S. (Section 5.1) and assessment at the annual level for the countries trade with the U.S. and their respective largest trading partner using both the linear and non-linear ARDL framework (Section 5.2).

2.5.1 Quarterly Analysis

The quarterly assessment is done in two parts. The first (Section 5.1.1), provides the results for the non-linear ARDL model for each of the 44 countries along with appropriate diagnostic tests. In the second part (Section 5.1.2), the panel estimates for the 44 countries and three sub-categories are presented for the non-linear ARDL PMG model.

2.5.1.1 Non-linear ARDL: 44 Countries

The Augmented Dickey-Fuller unit root test (Dickey and Fuller, 1979) indicates that all variables are integrated of order zero or one (Table 2B.2). The order of integration is therefore suited for the ARDL framework. The non-linear ARDL model starts with a maximum of four lags on the

[22] This follows Bahmani-Oskooee and Brooks (1999) definition from the linear ARDL model with real exchange rate symmetry (see for further details). From the partial summation of the appreciation variable in equation (7) which comprise of negative changes in the real exchange rate, the J-curve definitions also applies to the appreciation variable. Bahmani-Oskooee and Kanitpong (2017) refers to this as the inverse J-curve. For example, the short-run J-curve is present when there is a negative or insignificant coefficient at lower lags followed by positive and significant coefficients at higher lag levels of the appreciation variable.

differenced variables (short-run) in accordance with the general rule of thumb for the analysis of quarterly data, using the Akaike information criterion (AIC) to decide on the optimal lag length for the final models (Tables 2B.3.1 to 2B.3.6). All estimations are done with Newey-West (1987) standard error which are consistent in the presence of heteroscedasticity and autocorrelation of unknown form. The inclusion of structural breaks provides significant coefficient values in the study. All diagnostic test results are presented in Tables 2B.4.1 to 2B.4.3 show that for majority of the countries, there is no evidence of autocorrelation or model misspecification, at least at the 10 percent level of significance. The cumulative sum of the recursive residual (Cusum) and the cumulative sum of squares of recursive residuals (Cumsq) show overall stability in more than half of the country-models, with the others showing indications of marginal instability at least at the 10 percent level of significance. Due to the numerous plots, I present an example in Figure 2B.2.

[Tables 2B.3.1 to 2B.4.3 Here]

The results in Tables 2B.3.1 to 2B.3.6 show that the short-run coefficients on the real exchange rate appreciation and depreciation variables have significant effects on the trade balance in most of the countries. There is also evidence of asymmetry in the adjustment process. First, short-run asymmetry is evident in majority of the cases in terms of different lag lengths on the real appreciation and real depreciation variables. Second, there is less evidence of short-run asymmetric effects, with a significant difference between the short-run real appreciation and depreciation in only 13 cases (Austria, Greece, Australia, Korea, New Zealand, Norway, Sweden, Great Britain, India, Malaysia, Hungary, Ukraine and Costa Rica) using the Wald test (Wald-SR).

I find evidence of a clear pattern of the short-run J-curve hypothesis for five countries, namely Estonia, Slovenia, Luxembourg, Russia and Costa Rica (Tables 2B.3.1 to 2B.3.6 and Figures

2B.3.1 to 2B.3.2). Specifically, following depreciation of Estonia and Slovenia currencies against the U.S. Dollar, there is a negative or insignificant coefficient values on the earlier lags of real depreciation followed by positive and significant coefficients on later lags. This short-run pattern is indicative of the short-run J-curve hypothesis of a pattern of deterioration in the trade balance followed by later improvement. The coefficients on the lagged real appreciation variable show in the short-run an inverse J-curve in the cases of Luxembourg, Russia and Costa Rica. In this regard, appreciation of these countries' currency against the U.S. dollar suggest a deterioration of the U.S. bilateral trade balance with each country in the earlier quarters, followed by improvement in later quarters.

To make the above explanation clear, explanation of the estimates for Estonia and Costa Rica is provided. For Estonia, all variables show some sign of short-run significant effects, while the long-run effects are not statistically significant. To identify evidence of the short-run J-curve, I examine the estimates on the short-run depreciation and appreciation variables separately. The estimates on the earlier lags of the depreciation variable (depr) are either negative or insignificant with the later lags being positive and significant (Table 2B.3.1 and graphical representation in Figure 2B.3.1). This pattern fits the short-run J-curve phenomenon. On the other hand, the short-run appreciation variable has only one lag. Looking at Costa Rica, it is clear that the long-run variables are not statistically significant (Table 2B.3.6). The short-run estimates on the depreciation variable are either negative or insignificant, with no indication of improvement. Conversely, the short-run estimates on the appreciation (appr) variable clearly fits the short-run J-curve pattern, with negative or insignificant coefficients followed by positive and significant coefficient at the fourth lag. Because the pattern is on the appreciation variable it is called the inverse J-curve (Table 2B.3.6 and Figure 2B.3.2). To put this in context, it means that when the

U.S. dollar loses its value against that of the Costa Rica currency, the U.S. trade balance with Costa Rica first worsens then improves over time (vice versa).

Examination of the long-run variables reveal cointegration (long-run relationship) among the level (long-run) variables in all countries, except for Spain, Czech Republic, Norway, Russia, Costa Rica and Mexico. There is evidence of cointegration once the coefficient on the lagged level trade balance variable is less than zero and significant or significant using the bounds test critical values (Tables 2B.3.1 to 2B.3.6).[23] The significant estimates of ρ_1 indicate that any distortion each country has to bilateral trade balance with the U.S. should correct itself within 0.7 to 5.6 quarters (or on average 3 quarters). That is, depreciation transmission to the import price of goods and fall in price of exports, and the subsequent effect on the trade balance should decay within a maximum of 5.6 quarters. In the long-run, a real depreciation (appreciation) of a U.S. trading partner's currency has a significant effect on the trade balance if the coefficient normalized on ρ_1 is significant. The results indicate that a real depreciation or appreciation has a significant long-run effect on the trade balance in 28 of the 44 countries, with evidence of a long-run asymmetric effect on the trade balance in 17 cases, based on the Wald test (Wald-LR) (See Tables 2B.4.1 to 2B.4.3). In 10 of these cases, the long-run effect of real depreciation on trade balance is significantly greater than the long-run effect of a real appreciation.

In order to identify the J-curve using the coefficients of the long-run depreciation and appreciation variables, I focus on their normalized positive and significant long-run effect along with the short-

[23] Of note, the absence of cointegtration in the cases of Russia and Costa Rica provides support for their short-run J-curve phenomenon.

run effects. That is, the J-curve is supported if the coefficients on the short-run real depreciation (appreciation) variable is negative or insignificant for all lags and positive and significant in the long-run. The results in Tables 2B.3.1 to 2B.3.6 provide evidence in support of the J-curve phenomenon for nine countries, namely Switzerland, Croatia, Romania, Australia, New Zealand, Sweden, Hungary, Ukraine and Brazil. The J-curve for the first four listed countries are due to real depreciation, while the others are as a result of real appreciation. The duration and magnitude of the deterioration in the trade balance following a real depreciation varies across countries. There is also clear variation in the magnitude of the long-run improvement in the trade balance, with larger effects coming from a real depreciation relative to a real appreciation.[24]

Given the lack of cross-country evidence to support the J-curve from the quarterly assessment, I consider the role the cost of production could play in affecting the long-run response of bilateral trade balance to changes in the exchange rate.[25] A general assessment of the J-curve results, did not reveal any cross-country pattern. On that note, I examine if there is any statistically significant correlation between the calculated significant long-run effect on the trade balance due to changes in the real exchange rate (long-run elasticity) and the cost of production of each country relative to that of the U.S. Here, I assume that the relative price component of the real exchange rate is a function of the relative cost of production between each country and the U.S. Using available data from the OECD, I employ unit labour cost as a proxy for cost of production in each country. In this regard, I find a negative correlation between the long-run improvement in the trade balance in

[24] Summary of the findings in Table 2B.5 along with the results for cointegration, long-run effects of real exchange rate (appreciation and depreciation) and the J-curve.

[25] Di Mauro et al. (2017) indicate that factoring the cost of production in a trade model amplifies the long-run response of exports to an exchange rate change.

response to the real exchange rate and the relative of cost of production between each country and the U.S. (Figure 2B.4). That is, countries with a lower cost of production relative to the U.S. tend to have greater long-run improvement in their trade balance with the U.S. in response to real exchange rate changes, all things being equal. Specifically, there is a negative and significant correlation of 0.37 at the 10 percent level, between the long-run positive effect of a real depreciation on the trade balance and the relative cost of production with the U.S. The result suggests that the U.S. trading partners with relatively lower cost of production could benefit from a real depreciation strategy to improve their trade balance with the U.S. over time. On the other hand, the correlation between the positive long-run response of trade to a real appreciation and the relative cost of production is negative but insignificant. It is clear that in order for the U.S. to experience further long-run improvement in its trade with its bilateral partners that have a lower production cost, these countries must experience a sharp appreciation in their currencies against the U.S. Dollar over time. For cases where there is only short-term trade benefit to be had following a real depreciation policy, Jelassia et al. (2017) suggest that policymakers should be aggressive, but be well informed of the consequences, when pursuing depreciation as a policy tool to improve their trade balance.[26]

The result in Tables 2B.3.1 to 2B.3.6 also provide long-run domestic and U.S. income effects on the bilateral trade balance. In most cases, there is the expected negative and positive coefficients on the domestic and foreign income variables, respectively, with significant values. The findings

[26] Observing the effect of real exchange rate depreciation of U.S. trading partners' currencies overtime reveals that depreciation does not have a positive long-run effect on the trade balance of U.S.-Austria and U.S.-Jamaica. On the other hand, benefit to the U.S. trade balance with Italy, Czech Republic and Mexico from a depreciation of the Dollar is only short-run lived.

suggest cases of import substitutions in the long-run when the coefficient on the domestic income variable is positive and significant.

2.5.1.2 ARDL PMG

In order to discern any cross-country J-curve pattern, the non-linear ARDL PMG model in the panel setting is first estimated for all 44 countries. Subsequent estimations are done for three subgroups, namely the Euro Area, Advanced Non-Euro Area and Emerging & Developing countries (Table 2B.6). The estimated models based on the AIC criterion indicate no short-run lags on the real appreciation or deprecation variables, which is a critical component of the J-curve pattern. Clearly, there is definitely no indication of a cross-country J-curve relationship. The coefficient on the financial crisis dummy variable is negative and significant only for the full country and the subsample of euro area countries. This suggests that the financial crisis has a negative effect on countries bilateral trade with the U.S. The dummy variable capturing the switch of Euro-Area countries to the Euro currency has a positive and significant effect on the bilateral trade balance with the U.S. Following any disruptions to bilateral trade with the U.S., the full country sample shows that it will take approximately five quarters for trade with the U.S. to return to the original level. Of note, the fastest adjustment is among the group of developing countries. The time it takes for the Advanced Non-Euro economies bilateral trade with the U.S. to return to its original path after disruption is on average approximately 5.3 quarters. The fastest adjustment time is three quarters among the emerging and developing economies.

[Table 2B.6 Here]

For long-run effects, the key variables of interest, real appreciation and depreciation, both have the expected positive and significant coefficients, with the exception of the full sample for real depreciation. With the exception of the emerging & developing economies, the long-run asymmetric hypothesis test, based on the Wald test, indicates real exchange rate asymmetry for all country groups. The long-run income variables have the expected significant signed coefficients. Of note, all models have a significant constant, which Bahmani-Oskooee and Ratha (2004) indicates is a reflection of the importance of institutional and infrastructural factors in the trade balance outcome.

From the quarterly assessment, in most cases, real depreciation has a positive long-run effect (significant or insignificant) on countries trade with the U.S. The long-run effect at the group level is however positive and significant. This result from the assessment is relatively in line with the literature, but the response of the trade balance at the aggregate or disaggregated level to changes in real depreciation varies in magnitude. Unlike Nusair (2017)'s non-linear ARDL model using aggregated trade data for European transition economies, I do not find support for J-curve in the cases of Slovakia and the Czech Republic. Further, findings for Russia fit the short-run J-curve pattern, while I find short-run evidence for Estonia. In Bahmani-Oskooee and Ratha's (2004) use of a linear ARDL model of 18 U.S. bilateral trading partners for the period 1975 to 2000, they find support for the J-curve for 11 cases (namely Canada, France, Germany, Japan, Italy, Austria, Denmark, Ireland, New Zealand, Sweden and Switzerland). Later, with a larger sample (1971-2013) but smaller cross-section of U.S. bilateral trading partners (G7 members), Bahmani-Oskooee and Fariditavana (2016) using a non-linear ARDL model find support in favour of the J-curve for Canada, France, Germany, Italy and the U.K., but not for Japan. My findings only corroborate J-curve evidence for New Zealand, Sweden and Switzerland in the work of Bahmani-

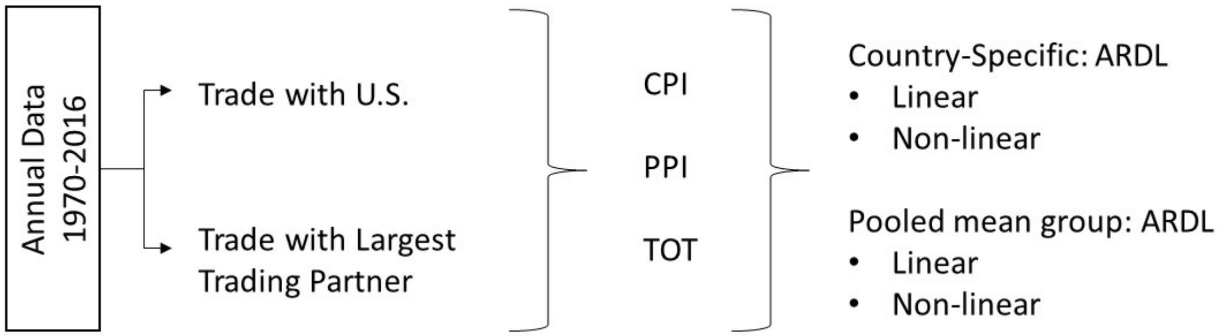
Oskooee and Ratha (2004). In this study, along with those of Bahmani-Oskooee and Ratha (2004) and Bahmani-Oskooee and Fariditavana (2016), real depreciation does have a favourable long-run effect on trade balance. However, this study covers a wider cross-section of U.S bilateral trading partners not looked at by Bahmani-Oskooee and Ratha (2004) and Bahmani-Oskooee and Fariditavana (2016). The additional countries I examined include 14 emerging and developing economies, of which I find evidence to support the J-curve for seven cases (Table 2B.5).

2.5.2 Annual Analysis

In order to ascertain the robustness of the J-curve findings in Section 2.5.1 and to add to the literature, an assessment is conducted at the annual level for the real bilateral exchange rate and bilateral trade balance relationship using both linear and non-linear ARDL frameworks at the country and group levels. Specifically, the assessment looks separately at 26 countries bilateral trade balance with the U.S. as well as with their respective largest trading partner for the period 1970 to 2016, subject to two measures of real bilateral exchange rates (CPI and producer price index (PPI)) as well as the terms of trade index.[27] Relative to the quarterly assessment in Section 5.1, the annual assessment comprises of a smaller group of countries due to data availability.[28] The minimum sample size allowable for this study is in keeping with Narayan (2005) minimum sample requirement for the bounds test critical values of 30. Data on the producer price index comes from the OECD database, while the terms of trade is collated from the World Bank database. The terms of trade index measure the export price relative to the import price of a country. Figure 2.1 shows the overall test profile for this section.

[27] For some countries, the U.S. is their largest trading partner.
[28] See Table 2B.7 for list of countries and data availability.

Figure 2.1. Illustration of the Test profile



2.5.2.1 Real Bilateral Exchange Rate – CPI (RER-CPI)

The upcoming analysis first looks at the response of each country's bilateral trade balance with the U.S. to changes in the CPI based real exchange rate (RER-CPI). The results from the linear ARDL models show that with the exception of Italy, Ireland and Mexico, there exist a long-run relationship among the variables in the model for all countries. The coefficient on the long-run real bilateral exchange rate variable is positive and significant for more than half of the countries, with evidence of J-curve in the case of seven countries, of which three each are from the emerging & developing and the advanced non-Euro area countries (Tables 12.1). In the non-linear model, only Poland, Malaysia and Mexico lack evidence of long-run relationship between real bilateral exchange rate and trade balance. Within the non-linear specification, I find support for the J-curve in 12 cases, of which six are from the developed non-euro area economies. Further, there is clear evidence of asymmetric real bilateral exchange rate effects, in the short-run and long-run across majority of the countries.

[Tables 2B.8.1 to 2B.8.26 Here]

Assessment of bilateral trade with each country's largest trading partner within the linear ARDL model, identifies nine cases of J-curve, primarily among the advanced non-euro economies (Tables 12.2). On the other hand, the non-linear ARDL model shows evidence for ten countries. Importantly, the non-linear model identifies J-curve for four countries (namely Greece, Italy, Canada and Switzerland) that the linear model is unable to capture. The results indicate that the use of asymmetry in the adjustment process of the ARDL specification increase the number of J-curve cases and well as capture asymmetric effects in both the short-run and the long-run.

[Tables 2B.9.1 to 2B.9.19 Here]

For the ARDL pooled mean group model, the results show that a long-run relationship exist among the variables at the group levels for the Euro area, advanced Non-Euro area and emerging and developing economies for both the linear and non-linear frameworks (Table 15.1). The linear model indicates that the RER-CPI only has a significant and positive long-run effect on the trade balance for the euro area and advanced non-euro area group of countries trade balance with the U.S. For the non-linear model, the expected significant long-run effect is present. There is however no cross-country evidence to support the J-curve, as there is no indication of persistent effects from real depreciation on the bilateral trade balance. As it relates to bilateral trade with largest trading partner, the result to a large extent is in contrast to trade with the U.S. In particular, it is only for the emerging & developing country group that I find evidence for J-curve when non-linearity is introduced. In the same vein, the effect of RER-CPI on the trade balance is asymmetric and highly significant.

[Tables 2B.11.1, 2B.11.3 and 2B.11.5 Here]

2.5.2.2 Real Bilateral Exchange Rate – PPI (RER-PPI)

Looking at the results with RER-PPI, there is evidence of cointegration across majority of the countries in both the linear and non-linear ARDL models (Table 2B.13.1). Using the linear model, I only find support for the J-curve in five cases. The introduction of nonlinearity provides evidence for the J-curve for three additional countries. Overall, favour for the J-curve is primarily among the countries within the advanced non-euro area economies. This highlights the advantage of using a non-linear ARDL specification to identify the J-curve, especially when an alternate measure of real bilateral exchange rate is considered.

[Tables 2B.8.1 to 2B.8.26 Here]

Analysis of the effect of RER-PPI changes on the bilateral trade balance with each country's largest trading partner shows evidence of the J-curve in seven and eight cases using the linear and non-linear ARDL models, respectively (Table 2B.13.2). Notably, there are four cases for which the non-linear model identifies the J-curve that the linear model failed to capture. On the other hand, there are three cases for which the linear model identifies the J-curve for which the non-linear specification is not effective. Between both models, there is evidence of the J-curve in 11 out of the 26 countries examined.

[Tables 2B.9.1 to 2B.9.20 Here]

For the ARDL pooled mean group, both the linear and non-linear models show that changes in the RER-PPI have positive and significant long-run effects on the euro area and advanced non-euro area group of countries bilateral trade balance with the U.S. (Table 2B.15.2). The RER-PPI only has a positive and significant long-run linear effect on the emerging & developing group of countries trade balance with the U.S. There is evidence of the J-curve in the linear model for the emerging & developing country group, while the non-linear model identifies the J-curve for the euro area countries. Overall, the results are qualitatively in line with that from the RER-CPI measure.

The cointegrating relationship in both the linear and non-linear ARDL models, when modelling the RER-PPI and bilateral trade relationship with the largest trading partner, is qualitatively in line with that of the RER-CPI (Table 2B.15.2). There is no evidence to support the case of J-curve among any of the group of countries that engaged in trade with their largest trading partner.

[Tables 2B.11.2, 2B.11.4 and 2B.11.6 Here]

2.5.2.3 Terms of Trade (TOT)

My examination of the response of bilateral trade balance to changes in the TOT in the individual country cases (Tables 2B.10.1 to 2B.10.26) indicates the expected inverse J-curve pattern where there is a positive or insignificant relationship between the TOT index and the trade balance in the short-run, followed by a negative and significant relationship in the long-run. For the overall assessment, both the linear and non-linear models show cointegration among the variables in majority of the countries.

[Tables 2B.10.1 to 2B.10.26 Here]

For assessment of countries trade balance with the U.S., the linear model shows that changes in the TOT have a significant long-run effect in 10 countries, with the expected significant negative effect primarily among the advanced non-EA countries (Table 2B.14.1). The response of these countries trade balance with the U.S. to changes in the TOT in the linear model, shows sign of persistent improvement in the trade balance in the short-run followed by the expected deterioration in trade balance in the long-run for only five countries. This pattern is indicative of the inverse J-curve. For the non-linear ARDL model, there are eight cases of J-curve, of which half are among the emerging and developing countries. Overall, the findings show that TOT has significant asymmetric effects in most cases and its introduction to the ARDL model assists in identifying four additional cases of J-curve relative to the linear model.

Looking at the results for the TOT- bilateral trade with each country's largest trading partner, the linear model identifies five cases of J-curve. When non-linearity is introduced, the number of cases for J-curve moves to nine (Table 2B.14.2). Notably, five of these J-curve cases are among the euro-area countries and the remaining four cases are from emerging & developing countries. Overall, inclusion of asymmetric TOT effect on the bilateral trade balance with countries largest trading partners finds favour for the J-curve in six countries that the linear model failed to capture.

The pooled mean group results of the effect of changes in terms of trade on bilateral trade balance with the U.S. indicate that the terms of trade have the expected long-run negative effect on the trade balance for both the linear and non-linear models, but only for the euro area and advanced non-euro countries (Table 2B.15.1). The linear results of each group of countries bilateral trade balance with their largest trading partner response to changes in the TOT is to a large extent consistent with their trade balance with the U.S. The non-linear model assessment relative to the largest trading partner is only consistent for the Euro Area when compared to the U.S. Overall, I find no cross-country evidence to support the J-curve when the terms of trade measure is used.

Notwithstanding, the TOT index has long-run asymmetric effects on bilateral trade balance across the country groups whether trade is with the U.S. or the largest trading partner.

[Tables 2B.11.1, 2B.11.3 and 2B.11.5 Here]

2.6 Discussion

Given the numerous tables and results, I provide a summary of the findings (in Tables 2.1 and 2.2 below) along with the discussion. The findings suggest that some countries take the J-curve as given. This is inferred from the expected deterioration in the bilateral trade balance in the short-run followed by improvement overtime in response to a real depreciation. Although there is support for the J-curve when the linear ARDL model is estimated, the introduction of non-linearity in the ARDL framework increases the number of cases of J-curve, which is in line with the strand of literature on the J-curve. This is the case whether the assessment is based on trade with the U.S. or each country's largest trading partner. In the same vein, the findings are largely consistent even when estimations are subject to real bilateral exchange rate measured by the CPI or PPI as well as the terms of trade index. The use of different proxies for real exchange rate to evaluate the effect on bilateral trade with the U.S. or a country's largest trading partner add to the literature by reinforcing the case for J-curve phenomenon in an asymmetric analysis as well as the need to factor production cost in the J-curve analysis to support bilateral trade policy strategies.

Table 2.1. Summary Results for Countries with Supporting Evidence for J-curve - Bilateral Trade with U.S.

	Trade with the U.S.						
	Quarter	Annual					
Countries	CPI	CPI		PPI		TOT	
	Non	Lin	Non	Lin	Non	Lin	Non
Estonia	√						
Luxembourg	√						
Slovenia	√						
Croatia	√						
Romania	√						
Russia	√						
Ukraine	√						
Costa Rica	√						
Austria						√	√
Finland							
France							
Germany							
Greece			√				√
Ireland		√	√	√	√		
Italy							
Netherlands							
Portugal			√				
Spain			√		√		
Australia	√		√		√		
Canada			√	√	√		
Denmark			√			√	√
Japan							
Korea		√	√				
New Zealand	√						
Norway				√	√		
Sweden	√	√	√	√	√		
Switzerland	√		√				√
U.K.		√			√		
Malaysia		√				√	√
Hungary	√	√	√	√	√		√
Poland						√	
Turkey							√
Brazil	√	√	√			√	√
Mexico							
Count	14	7	12	5	8	5	8
Euro Area (EA)							
Advanced Non-EA							

Emerging & Developing	√

Notes: √ indicates support for the J-curve. 'Lin' and 'Non' represent linear and non-linear ARDL models, respectively. Emerg & Devg represents emerging and developing economies.

The findings provide evidence of J-curve at the cross-country level only for the annual assessment, but this is subject to the country group and the measure of real exchange rate. Specifically, a cross country case for the J-curve in the linear ARDL model is only identified in the RER-PPI and bilateral trade balance relationship for the emerging and developing group of countries. When non-linearity is introduced in ARDL framework, I find support for the J-curve among the euro-area country group. The only other case of J-curve is among the emerging and developing country group when RER-CPI is used in the non-linear ARDL model for country's bilateral trade with the U.S. In both cases of non-linearity, the measures of real bilateral exchange rate have statistically significant asymmetric effects on bilateral trade. In addition, the magnitude of the long-run response of each country bilateral trade to changes in RER-PPI is on average greater relative to the effect from the RER-CPI measure. This significant difference in the long-run elasticities is only significant in cases where bilateral trade is with the U.S.[29]

In the annual assessment, the linear ARDL model finds 15 cases of J-curve across RER-CPI, RER-PPI and TOT for Austria, Ireland, Italy, Portugal, Canada, Denmark, Korea, New Zealand, Norway, Sweden, U.K., Malaysia, Hungary, Turkey and Brazil. By including asymmetric effects in the adjustment process of the ARDL model, I find case of the J-curve in six additional countries

[29] Further analysis indicates that the depth of a country's financial market (stock market capitalization plus outstanding domestic private debt as a share of GDP) has no influence on the J-curve outcome.

namely Greece, Netherland, Spain, Australia, Switzerland and Poland. That is, the non-linear model is able to find evidence to support the J-curve in 21 out of the 26 countries in the annual assessment. In contrast to the quarterly assessment, only 14 cases of J-curve are evident out of the 44 countries using the non-linear ARDL framework when considering bilateral trade with the U.S.

My findings from the non-linear ARDL model in the quarterly assessment are not able to reconcile with the evidence in support of the J-curve for Bahmani-Oskooee and Fariditavana (2016) in the cases of France, Germany, Italy, Canada and U.K. However, evidence at the annual level, failed to reconcile evidence of J-curve for France and Germany with their trade with the U.S. The advantage of using this extended sample over previous studies is the ability to show that evidence of the J-curve is not peculiar to developed countries trading relationship with the U.S. or their largest trading partner but, it extends to emerging and developing economies.

Looking at the long-run asymmetric effect of real bilateral exchange rate on the bilateral trade balance, the effect of real depreciation seems to be significantly larger than the real appreciation for most of the countries, especially for bilateral trade with the U.S. The dominant effect of real depreciation over real appreciation is also reflected in the cross-country analysis. This evidence is consistent at both the quarterly and annual levels, regardless of the measure of real bilateral exchange rate. Further, the use of the terms of trade index to provide evidence in favour of the J-curve, suggests that the price of commodities (implied by the type of commodities) provides a plausible test to evaluate a determinant of the J-curve. This is plausible, given that the price of exports from a country can be largely influenced by the value of its currency. Additionally, the long-run coefficient estimates on both the domestic and foreign income variables have the expected negative and positive effects on the bilateral trade balance in most of the cases,

Table 2.2. Summary Results for Countries with Supporting Evidence for J-curve - Bilateral Trade with largest trading partner

Countries	Largest Trading Partner					
	CPI		PPI		TOT	
	Lin	Non	Lin	Non	Lin	Non
Estonia						
Luxembourg						
Slovenia						
Croatia						
Romania						
Russia						
Ukraine						
Costa Rica						
Austria						√
Finland						
France						
Germany						
Greece		√				√
Ireland	√	√	√	√		
Italy		√	√	√		
Netherlands						√
Portugal					√	√
Spain						√
Australia						
Canada		√	√	√		
Denmark	√		√			
Japan						
Korea	√	√				
New Zealand	√	√	√			
Norway				√	√	
Sweden	√		√			
Switzerland		√				
U.K.	√	√		√		
Malaysia	√				√	√
Hungary				√		√
Poland				√		√
Turkey	√	√	√	√	√	
Brazil	√	√			√	√
Mexico						
Count	9	10	7	8	5	9
Euro Area (EA)				√		
Advanced Non-EA						
Emerging & Developing		√				

Note: See notes in Table 2.1.

respectively. This indicates that income levels in the home and foreign countries are important determinants of bilateral trade balance in the long-run.

The use of the annual level data and varied measures of real bilateral exchange rate as well as the terms of trade adds value to this strand of literature on trade by identifying the need for rigorous empirical analysis and model specification in any real exchange rate and trade balance analysis for policy strategy. The results also reveal that the long-run response of a country's bilateral trade balance with the U.S. to changes in real depreciation is significantly greater when the measure of real depreciation is based on PPI and not the CPI. This is in line with Di Mauro et al. (2017) suggestion that modelling the cost of production in a trade model amplifies the long-run response to a change in the exchange rate change.

The mixed evidence for the J-curve across the literature can be attributed to the lack of short-term deterioration in the trade balance in response to changes in the real change rate which is influenced in part by the sample period considered, model specification and measures of the explanatory variables. The use of the annual frequency data allows me to capture any delay in the J-curve that may have been lacking in quarterly assessments in previous studies due to the maximum four lags modelled. I also include a production cost factor in the assessment via the real bilateral exchange rate based on the producer price index as well as the terms of trade index in the analysis. The inclusion of structural break in the real bilateral exchange rate and bilateral trade balance relationship assessment is recommended in order to properly ascertain the responsiveness of bilateral trade to real depreciation.

By incorporating the previously mentioned specifications to the pooled mean group ARDL framework, I am able to identify cross country support for the J-curve with the non-linear ARDL framework. Although, only for the euro-area and emerging and developing country groups, subject to bilateral trading partners and measure of real bilateral exchange rate. Throughout the study, asymmetric effects of real exchange rate are evident in both the short-run and the long-run in most of the countries as well as in the panel cases. This is regardless of whether a country trade is with the U.S. or its largest trading partner, subject to the measure of real bilateral exchange rate.

2.7 Conclusion

This study empirically assesses if evidence in favour of the J-curve phenomenon is unique to a country's trade with the U.S. or their largest trading partner. It also examines if there is any cross-country J-curve evidence. The study is undertaken in two parts. The first, uses quarterly bilateral trade data for 44 countries and the U.S., for the period 1993 to 2017. The second part uses annual bilateral trade data over period 1970 to 2016, for 26 countries who trade with the U.S. as well as their largest trading partner. Additionally, I subject the annual assessment to two measures of real exchange rate (CPI and PPI based) as well as terms-of-trade. The empirical assessment introduces asymmetric real exchange rate effects and structural breaks in an ARDL framework.

In my quarterly assessment, I find empirical evidence in support of the J-curve as well as that the real exchange rate has both short-run and long-run asymmetric effects on the bilateral trade balance with the U.S. The introduction of nonlinearity adds greater insight to the J-curve analysis and reveals greater country evidence in support of the J-curve phenomenon in a U.S. bilateral trade assessment. In particular, in cases where prior studies fail to find evidence of the J-curve or focused on a limited range of countries. Overall, using the non-linear ARDL model, I find evidence in favour of the J-curve phenomenon in the case of 14 countries, namely Australia, New Zealand, Sweden, Switzerland, Croatia, Hungary, Romania, Ukraine, Brazil, Estonia, Luxembourg, Slovenia, Russia and Costa Rica. Of the 14 cases, seven are from emerging and developing countries. For the J-curve cases, the duration and magnitude of the deterioration in the trade balance after a real depreciation varies across countries. There is also a clear variation in the magnitude of the subsequent long-run improvement in the trade balance, with larger effects coming from a real depreciation relative to a real appreciation.

Given the lack of cross country evidence for the J-curve from the quarterly assessment, I examined the role cost of production could play in the exchange rate and trade balance nexus. The results suggest that, all things being equal, the lower a country's cost of production is relative to the U.S., the more likely it is to experience a greater long-term improvement in its trade balance with the U.S. following real depreciation against the U.S. Dollar. With the insignificant negative correlation between the long-run trade elasticity and relative production cost, the U.S. would not significantly benefit from pursuing a deprecation policy aim at compensating for its lack of competition in terms of production cost. As further real depreciation would still not be sufficient to boost its long-term trade balance with its bilateral trade partners. The findings suggest that the U.S is only willing to pursue a policy of marginal real depreciation that will provide some improvement in its long-term trade benefit with these countries. Further, the U.S. as a global leader can pursue other trade policy tools such as, tariffs and trade agreements, to effectively improve its long-term bilateral trade position.

At the annual level, the results indicate that the J-curve may also be taken as given. By using the non-linear ARDL model, I am able to identify support for the J-curve phenomenon in 21 of the 26 countries in the sample. These countries are Austria, Greece, Ireland, Italy, Netherland, Portugal, Spain, Australia, Canada, Denmark, Korea, New Zealand, Norway, Sweden, Switzerland, U.K., Malaysia, Hungary, Poland, Turkey and Brazil. This represents six additional countries when compared to the linear model. The results suggest that distinguishing between real depreciation and real appreciation as well as considering alternate measures of real bilateral exchange rate is essential when assessing the J-curve phenomenon. In the same vein, there is also support for the J-curve at the cross-country level within the asymmetric framework, subject to model specification. As reflected in the quarterly assessment, including some cost of production influence in the real exchange rate measure amplifies the responsiveness of bilateral trade balance to a real depreciation. That is, the long-run response of bilateral trade balance is on average significantly greater when modelled with real depreciation based on the PPI relative to the CPI measure, but only for bilateral trade with the U.S. and not with the countries' largest trading partner.

Overall, the findings point to the need for greater understanding of the real exchange rate and bilateral trade balance nexus within an asymmetric and disaggregated framework, especially when designing trade policy over the short-run and long-run. For countries that are expected to only benefit from real deprecation policies in the short-run, it is prudent to understand how long after a real depreciation will the improvement in trade balance be lost. Conversely, countries should be knowledgeable of the time it will take to recover from a deterioration in their trade balance and the expected magnitude of the long-run improvement in their trade balance, in accordance with the J-curve pattern. Policymakers may also use the real exchange rate as an automatic stabilizer within their respective economies if there is a shock to external demand. This is in an effort to make tradable goods relatively cheaper in order to at least maintain their exports and by extension keep their trade balance stable. Importantly, my assessment does not include countries under a fixed exchange rate regime and as such the results cannot be extended to them.

The results highlight that the J-curve holds for some countries and not for others, and the results cannot be explained by any obvious country characteristics. There are however other cross-country heterogeneities that could be explored in future research work. One suggestion is disaggregation of bilateral trade flows by industries or commodities which could control for some heterogeneities as well as further reduce any aggregation bias as different industries and commodities trade would react differently to real exchange rate changes.

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Appendix 2

Table 2B.1. Critical values for the Bound tests: Case III: Unrestricted Intercept and no Trend

	Level of Significance					
	10 percent		5 percent		1 percent	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
F-Bound Test, k=3						
Sample						
30	3.008	4.15	3.71	5.018	5.333	7.063
35	2.958	4.1	3.615	4.913	5.198	6.845
40	2.933	4.02	3.548	4.803	5.018	6.61
45	2.893	3.983	3.535	4.733	4.983	6.423
t-Bound Test						
	-2.57	-3.46	-2.86	-3.78	-3.43	-4.37

Note: k =3 represents the three regressors in the ARDL models. The bounds critical values are taken from Narayan (2005).

Table 2B.2. Dickey-Fuller Unit Root Test Results – Quarterly Data

Countries	**Level Variables**				**First Differenced Variables**			
	Ln Tb	**LnY**	**Appr**	**Depr**	**LnTb**	**LnY_i**	**Appr**	**Depr**
U.S.		-2.81				-4.5***		
Austria	-1.3	-1.72	-1.6	-2.8	-13.9***	-9.0***	-9.7***	-7.2***
Belgium	-4.7***	-2.6	-1.6	-2.8	---	-9.8***	-9.7***	-7.3***
Estonia	-5.4***	-3.3*	-1.9	-3.0	---	-4.4***	-9.5***	-6.8***
Finland	-4.5***	-2.2	-1.6	-3.0	----	-6.2***	-9.7***	-7.3***
France	-1.9	-2.8***	-1.5	-2.9	----	-6.4***	-9.7***	-7.2***
Germany	-2.3	-4.1***	-1.3	-2.8	-3.6**	----	-9.4***	-7.2***
Greece	-5.7***	-1.7	-1.6	-2.2	----	-4.5***	-9.8***	-7.6***
Ireland	-1.4	-1.8	-3.9a	-2.2	-5.6***	-10.9***	-8.1a***	-8.1***
Italy	-2.4	-2.4	-1.6	-3.2*	-3.0**	-4.6***	-9.8***	-7.2**
Latvia	-2.0	-2.1	-2.8	-0.7	-7.5***	4.3***	-7.2***	-9.8***
Luxembourg	-7.7***	-1.7	-1.6	-2.8	----	-8.0***	-9.7***	-6.5***
Netherland	-0.4	-2.2	-1.3	-2.8	-6.4***	-5.3***	-9.4***	-7.3***
Portugal	-2.8	-3.6a	-1.6	-3.0	-5.5***	-10.0a***	-9.8***	-7.4***
Slovakia	-3.4*	-3.3*	-2.0	-2.6	-7.7***	-6.6***	-9.8***	-7.0***
Slovenia	-6.5***	-2.4	-2.0	-2.8	-9.4***	-5.4***	-9.7***	-6.7***
Spain	-2.3	-4.4a	-1.6	-2.8	-10.6***	-9.5a***	-9.8***	-7.3***
Australia	-2.0	-3.0	-2.6	-2.7	-4.9***	-8.2***	-6.7***	-8.2***
Canada	-1.7	-2.5	-2.4a	-1.1	-5.2***	-5.8***	-8.2a***	-8.4***
Czech Republic	-1.6	-2.7	-4.0a	-2.5	-3.4*	-7.3***	-7.4a***	-7.1***
Denmark	-3.4*	-2.3	-3.2a	-2.7***	-5.3***	-4.5***	-9.0a***	-6.7***
Iceland	-2.4	-1.3	-2.6	-2.7	-6.2***	-9.3***	-3.6***	-4.9***
Japan	-2.4	-4.1***	-3.3*	-2.1	-3.8**	---	-5.4***	-4.9***
Korea	-3.0	-1.2	-3.1	-2.5	-11.2***	-7.0***	8.1***	-6.2***
New Zealand	-2.0	-1.7	-1.8	-3.5*	-12.2***	-5.2***	-6.6***	-6.2***
Norway	-1.3	-3.3*	-3.1a	-2.4	-4.1**	-5.8***	-8.4a***	-7.8***
Sweden	-1.6	-2.9	-2.5	-3.6**	-5.1***	-5.3***	-7.2***	-6.6***
Switzerland	-2.1	-3.1	-2.6	-1.6	-7.8***	-4.6***	-8.1***	-6.9***
Great Britain	-1.11	-3.1	-2.5	-2.4	-4.5***	-7.0***	-7.1***	-6.6***
Bangladesh	-1.8	-2.0	-0.6	-3.1	-6.0***	-4.9***	-4.2***	-4.5***
India	-4.3	-4.6a	-1.6	-2.8	-5.8***	-6.3a***	7.5***	-10.8***
Malaysia	-2.4	-1.9	-1.3	-2.1	-4.8***	-5.8***	-8.8***	-5.8***
Croatia	-3.6**	-1.3	-4.6	-2.6	-6.8***	-11.9***	-8.6***	-6.5***
Hungary	-1.7	-2.0	-2.2	-2.0	-5.3***	-6.5***	-7.3***	-7.1***
Poland	-2.1	-3.1	-1.5	-2.3	-8.9***	-8.3***	-7.4***	-7.0***
Romania	-3.9**	-3.2*	-1.4	-2.2	-11.2***	-3.0	-8.3***	-7.1***
Turkey	-2.7a	-2.5	-0.4	-4.4***	-10.9a***	-9.7***	-4.5***	----
Russia	-2.2	-5.1***	-5.1***	-2.9a	-3.8**	----	----	-9.3a***
Ukraine	-4.5***	-3.6**	-3.2*	-3.4*	----	-3.1	-5.7***	-4.8***
Brazil	-1.9	-0.3	-2.0	-1.9	-12.0***	-6.1***	-6.4***	-8.7***
Colombia	-1.6	-2.0	-3.8**	-2.3	-4.3***	-5.9***	-8.0***	-8.1***
Costa Rica	-2.8	-2.5	-2.9	-2.1	-3.9**	-3.2*	-6.0***	-7.3***
Mexico	-4.7	-2.2	-1.7	-2.9	-7.8***	-6.0***	-8.1***	-9.1***
Trinidad & Tobago	-1.8	0.7	-3.5a	-1.5	-11.6***	-10.6***	-9.3a***	-45.1***
Jamaica	-5.5***	-1.5	-4.6a	-3.3*	----	-4.8***	-7.2a***	----

Notes: Estimation includes intercept and trend. The asterisks *, ** and *** refers to 10%, 5% and 1% level of significance, respectively. The letter 'a' indicates the unit root test is done with a break. The use of 'Ln' refers to the natural logarithm while '---' indicates that the variable is free of unit root at the 1% level.

Table 2B.3.1. Short-run and Long-run Estimates using AIC Criterion to Select the Optimum Lags[30]

Panel A: Short-run Results

Variable	Austria	Belgium	Estonia	Finland	France	Germany	Greece	Ireland
Δtb_{t-1}	-0.50 (0.16)***	-0.04 (0.10)	0.31 (0.16)*	<0.01 (0.08)	-0.17 (0.16)	-0.12 (0.12)	0.10 (0.15)	-0.51 (0.12)***
Δtb_{t-2}	-0.51 (0.16)***		0.32 (0.13)**		-0.46 90.10)***	-0.01 (0.10)	0.13 (0.09)	-0.55 (0.10)***
Δtb_{t-3}	-0.49 (0.16)***		0.02 (0.11)		-0.30 (0.09)***	-0.02 (0.09)		-0.41 (0.09)***
Δtb_{t-4}			0.21 (0.08)**			0.57 (0.09)***		
Δy_t	-0.87 (1.96)	-0.50 (0.42)	2.32 (1.97)	-1.01 (1.23)	1.10 (0.73)	0.07 (0.36)	-4.38 (1.47)***	-0.47 (0.28)
Δy_{t-1}		0.81 (0.39)**	5.55 (2.00)***			0.62 (0.34)*		
Δy_{t-2}		-0.67 (0.44)	-1.14 (2.41)			-1.08 (0.35)***		
Δy_{t-3}		-0.69 (0.35)*	2.33 (1.94)					
Δy_{t-4}		-0.73 (0.40)*	5.68 (1.97)***					
Δy_t*	1.82 (4.03)	1.99 (1.30)	-5.22 (6.05)	-3.48 (2.77)	-0.32 (0.87)	0.10 (0.77)	-0.91 (3.27)	-2.82 (1.69)*
$\Delta y_{t-1}*$	-6.16 (3.94)	-2.69 (1.09)**						
$\Delta Appr_t$	-5.11 (1.97)**	0.37 (0.59)	3.65 (2.22)	-2.10 (0.74)***	-0.20 (0.52)	0.21 (0.42)	3.13 (1.35)**	-0.83 (1.03)
$\Delta Appr_{t-1}$		0.03 (0.01)***	0.41 (0.12)***			-0.01 (0.06)	0.10 (0.03)***	1.29 (0.91)
$\Delta Appr_{t-2}$						-0.17 (0.06)***	0.06 (0.03)**	
$\Delta Appr_{t-3}$							0.13 (0.02)***	
$\Delta Depr_t$	-2.05 (1.51)	-0.55 (0.35)	0.05 (2.75)	0.20 (1.00)	0.12 (0.36)	-0.25 (0.26)	-0.98 (1.25)	1.16 (0.85)
$\Delta Depr_{t-1}$	2.50 (1.03)**		2.11 (3.27)					-0.93 (0.46)**
$\Delta Depr_{t-2}$			-0.72 (3.77)					0.29 (0.43)
$\Delta Depr_{t-3}$			-1.02 (2.46)					0.15 (0.23)
$\Delta Depr_{t-4}$			5.91 (2.47)**					-1.09 (0.53)**
Dum_fcrisis	-0.30 (0.19)	-0.01 (0.05)	0.17 (0.39)	0.02 (0.08)	-0.05 (0.03)	-0.05 (0.03)*	-0.27 (0.19)	-0.09 (0.08)
Dum_imp	-10.91 (4.61)**	2.24 (1.95)	8.32 (5.64)	-4.36 (1.36)***	-0.49 (0.93)	0.09 (0.25)	13.89 (7.57)*	-0.36 (0.23)
Dum_EU	-1.77 (1.18)	-0.75 (0.59)	0.86 (2.70)	0.83 (0.34)**	0.09 (0.13)	0.01 (0.05)	4.09 (2.29)*	0.16 (0.12)

Panel B: Long-run results normalized on coefficient of lagged level dependent variable

tb_{t-1}	-0.48 (0.20)**	-0.65 (0.13)***	-0.79 (0.19)***	-0.59 (0.09)***	-0.56 (0.20)***	-0.20 (0.05)***	-0.82 (0.13)***	-0.28 (0.12)**
Constant	-3.99 (3.38)	1.55 (1.56)	3.50 (8.57)	2.50 (1.68)	-1.80 (1.41)	-0.28 (0.47)	0.62 (2.86)	1.47 (1.87)
y_{t-1}	0.46 (2.36)	-1.13 (0.55)**	-0.39 (2.03)	-1.91 (0.61)***	0.31 (079)	-0.43 (0.80)	-2.67 (0.75)***	0.67 (0.66)
y_{t-1*}	1.45 (2.67)	0.45 (0.48)	-0.42 (3.54)	0.97 (0.97)	0.47 (0.54)	0.88 (0.58)	2.51 (1.09)**	-1.62 (1.57)
$Apprt_{t-1}$	-1.52 (0.78)*	-0.38 (0.24)	0.43 (1.08)	0.56 (0.34)	0.03 (0.14)	0.03 (0.35)	0.83 (0.43)*	0.09 (0.66)
$Deprt_{t-1}$	-1.49 (0.62)**	-0.38 (0.18)**	0.93 (0.88)	0.84 (0.39)**	-0.07 (0.14)	0.11 (0.28)	0.70 (0.37)*	0.23 (0.76)

[30] Notes: *, ** and *** refers to 10%, 5% and 1% level of significance, respectively. Numbers in parentheses next to the coefficients are standard errors. The covariance estimator is based on Newey-West (1987) which are consistent in the presence of both heteroskedascity and autocorrelation of unknown form. The notes apply to Tables 2B.3.1 – 2B.11.6.

Table 2B.3.2. Short-run and Long-run Estimates using Akaike Information Criterion (AIC) Criterion to Select the Optimum Lags

Panel A: Short-run Results

Variable	Italy	Latvia	Luxembourg	Netherlands	Portugal	Slovakia	Slovenia	Spain
Δtb_{t-1}	-0.72 (0.14)***	0.09 (0.18)	0.77 (0.28)***	0.05 (0.18)	-0.11 (0.21)	-0.16 (0.21)	-0.11 (0.21)	-0.65 (0.19)***
Δtb_{t-2}	-0.69 (0.09)***	0.19 (0.13)	0.58 (0.21)***	-0.15 (0.15)	-0.24 (0.17)	-0.19 (0.23)	-0.13 (0.19)	-0.64 (0.16)***
Δtb_{t-3}	-0.69 (0.07)***		0.44 (0.18)**	-0.08 (0.14)	-0.33 (0.14)**	0.03 (0.16)	<0.01 (0.15)	-0.37 (0.13)***
Δtb_{t-4}			0.31 (0.11)***	0.23 (0.14)	0.20 (0.11)*	-0.18 (0.12)	0.21 (0.14)	
Δy_t	-0.29 (0.56)	-5.62 (4.37)	4.90 (2.35)**	1.31 (0.80)	4.71 (2.03)**	0.64 (1.91)	0.30 (1.83)	-1.61 (1.28)
Δy_{t-1}	-1.03 (0.73)	-4.84 (2.22)**	3.17 (1.78)*	-0.76 (0.61)	-3.06 (1.46)**			-1.12 (1.07)
Δy_{t-2}			3.70 (2.04)*	-0.06 (0.67)	-1.62 (1.43)			-0.71 (1.14)
Δy_{t-3}			3.57 (2.33)	-1.64 (0.56)***	0.73 (1.43)			-1.83 (1.37)
Δy_{t-4}			3.67 (1.28)***		-3.48 (1.78)*			
Δy_t*	0.57 (1.11)	7.95 (11.98)	3.99 (10.49)	0.23 (1.12)	-3.86 (4.16)	-18.80 (6.96)***	8.24 (4.02)**	3.32 (1.98)*
Δy_{t-1}*		14.15 (10.79)	-7.87 (12.00)		13.84 (4.04)***	2.70 (12.05)	-10.93 (5.30)**	
Δy_{t-2}*		3.92 (10.47)	-20.00 (9.17)**		-7.28 (4.06)*	12.18 (9.85)	6.76 (5.10)	
Δy_{t-3}*		14.23 (12.80)				16.85 (7.64)**		
Δy_{t-4}*						-20.97 (8.49)**		
$\Delta Appr_t$	0.06 (0.45)	-0.76 (4.93)	-2.92 (2.23)	-0.44 (0.66)	2.05 (1.81)	0.84 (1.93)	-2.53 (1.85)	0.05 (0.76)
$\Delta Appr_{t-1}$	0.02 (<0.01)***		-0.28 (0.12)**		-0.03 (0.02)	-0.20 (0.22)		0.04 (0.02)**
$\Delta Appr_{t-2}$	0.01 (<0.01)**		0.26 (0.10)**		0.12 (0.02)***	-0.75 (0.18)***		-0.02 (0.01)
$\Delta Appr_{t-3}$	0.02 (0.01)***		0.38 (0.11)***			-0.36 (0.21)*		0.07 (0.02)***
$\Delta Appr_{t-4}$			0.40 (0.08)***					-0.04 (0.01)***
$\Delta Depr_t$	0.17 (0.39)	2.11 (2.71)	0.19 (2.33)	-0.77 (0.43)*	-0.26 (1.03)	-3.15 (2.90)	-1.62 (1.87)	0.08 (0.62)
$\Delta Depr_{t-1}$				0.67 (0.45)			-0.60 (2.04)	
$\Delta Depr_{t-2}$							0.59 (1.59)	
$\Delta Depr_{t-3}$							-4.04 (1.37)***	
$\Delta Depr_{t-4}$							2.47 (1.45)*	
Dum_fcrisis	-0.08 (0.04)**	0.74 (0.53)	0.07 (0.29)	-0.08 (0.06)	-0.15 (0.24)	-0.85 (0.57)	0.33 (0.17)*	-0.13 (0.09)
Dum_imp	-0.47 (3.25)	-0.54 (0.89)	-17.66 (8.06)**	-0.41 (0.45)	9.52 (9.27)	3.52 (6.28)	-15.39 (9.80)	-0.81 (3.80)
Dum_EU	0.89 (0.58)	-0.28 (0.56)	6.31 (2.00)***	0.13 (0.10)	9.52 (9.27)	-0.37 (2.87)	1.43 (1.81)	1.06 (0.80)

Panel B: Long-run Results normalized on coefficient of lagged level dependent variable

Variable	Italy	Latvia	Luxembourg	Netherlands	Portugal	Slovakia	Slovenia	Spain
tb_{t-1}	-0.21 (0.11)*	-0.92***	-2.07 (0.34)***	-0.68 (0.17)***	-0.53 (0.24)**	-0.42 (0.24)*	-0.60 (0.21)***	-0.14 (0.16)
Constant	-1.19 (0.69)*	28.24 (11.36)**	-40.63 (9.72)***	-7.62 (2.21)***	-0.55 (4.53)	5.25 (12.44)	5.39 (2.12)**	-1.29 (1.66)
y_{t-1}	-2.73 (1.82)	1.62 (1.41)	1.70 (0.57)***	2.95 (0.64)***	1.85 (1.56)	0.39 (3.65)	-2.75 (1.52)*	-2.24 (5.48)
y_{t-1*}	4.43 (2.14)**	-7.11 (2.81)**	2.63 (0.91)***	-0.57 (0.35)	-1.75 (2.65)	-2.97 (3.58)	0.79 (1.00)	4.47 (6.79)
$Apprt_{t-1}$	0.58 (0.37)	3.80 (0.82)***	0.96 (0.22)***	-0.02 (0.21)	0.40 (0.76)	0.00 (1.62)	0.50 (0.56)	1.53 (2.43)
$Deprt_{t-1}$	-0.55 (0.65)	3.06 (1.43)**	0.27 (0.30)	-0.45 (0.19)**	1.85 (1.23)	2.03 (2.75)	1.22 (0.68)*	0.81 (1.61)

Table 2B.3.3. Short-run and Long-run Estimates using AIC Criterion to Select the Optimum Lags

Panel A: Short-run Results

Variable	Australia	Canada	Czech	Denmark	Iceland	Japan	Korea	New Zealand
Δtb_{t-1}	0.18 (0.12)	0.16 (0.16)	-0.76 (0.15)***	0.01 (0.23)	-0.03 (0.25)	-0.08 (0.09)	-0.16 (0.07)**	0.29 (0.20)
Δtb_{t-2}	0.04 (0.11)	0.13 (0.14)	-0.74 (0.13)***	-0.17 (0.18)	-0.10 (0.20)	-0.18 (0.09)*		-0.25 (0.17)
Δtb_{t-3}	0.06 (0.10)	-0.14 (0.10)	-0.54 (0.11)***	-0.13 (0.14)	-0.19 (0.12)			-0.05 (0.12)
Δtb_{t-4}	0.24 (0.10)**	0.29 (0.10)***		0.36 (0.09)***				0.20 (0.14)
Δy_t	0.08 (0.96)	1.21 (0.22)***	0.47 (0.78)	0.40 (0.56)	-1.56 (1.35)	0.64 (0.32)*	-1.13 (0.47)**	2.16 (1.30)
Δy_{t-1}		-0.59 (0.34)*	0.28 (0.89)	1.01 (0.59)*				
Δy_{t-2}		-1.02 (0.27)***	1.63 (0.62)***					
Δy_{t-3}		-0.94 (0.20)***	1.86 (1.47)					
Δy_{t-4}		-0.51 (0.32)						
Δy_t*	0.18 (1.11)	-0.25 (0.43)	-0.24 (2.21)	-2.17 (1.08)**	5.16 (5.63)	0.29 (0.88)	-0.14 (0.87)	-0.44 (2.24)
Δy_{t-1}*		-0.85 (0.48)*						-4.57 (2.19)**
Δy_{t-2}*		1.49 (0.55)***						
Δy_{t-3}*		1.25 (0.42)***						
Δy_{t-4}*		-0.82 (0.41)**						
$\Delta Appr_t$	-0.13 (0.35)	-0.06 (0.18)	-0.45 (0.90)	0.65 (0.86)	1.15 (2.38)	-0.31 (0.23)	1.10 (0.30)***	-0.39 (0.85)
$\Delta Appr_{t-1}$	-0.37 (0.46)							0.31 (0.78)
$\Delta Appr_{t-2}$	-0.72 (0.38)*							-1.21 (0.63)*
$\Delta Appr_{t-3}$	-0.92 (0.32)***							0.34 (0.63)
$\Delta Appr_{t-4}$								-1.88 (0.61)***
$\Delta Depr_t$	0.58 (0.23)**	-0.34 (0.15)**	-0.58 (0.89)	-0.13 (0.58)	3.28 (1.58)**	-0.17 (0.23)	0.16 (0.20)	0.72 (0.60)
$\Delta Depr_{t-1}$			1.45 (0.77)*					
$\Delta Depr_{t-2}$			0.12 (0.62)					
$\Delta Depr_{t-3}$			1.80 (0.53)***					
$\Delta Depr_{t-4}$			-1.69 (0.65)**					
Dum_fcrisis	0.02 (0.04)	0.05 (0.02)***	0.17 (0.15)	0.03 (0.05)	-0.16 (0.31)	-0.02 (0.02)	-0.03 (0.03)	-0.04 (0.07)

Panel B: Long-run Results normalized on coefficient of lagged level dependent variable

Variable	Australia	Canada	Czech	Denmark	Iceland	Japan	Korea	New Zealand
tb_{t-1}	-0.79 (0.12)***	-0.88 (0.14)***	-0.19 (0.12)	-0.54**	-0.91 (0.27)***	-0.25 (0.08)***	-0.30 (0.09)***	-0.90 (0.21)***
Constant	-4.53 (2.47)*	-3.54 (0.51)***	0.41 (1.85)	1.05 (1.39)	-3.43 (11.23)	-0.69 (0.66)	-1.20 (0.61)*	-7.15 (2.04)***
y_{t-1}	-0.39 (1.03)	2.16 (0.18)***	-2.64 (3.60)	0.64 (1.03)	-2.45 (1.20)	-0.83 (0.54)	-0.04 (0.48)	1.75 (0.63)***
y_{t-1*}	1.46 (0.33)***	-1.23 (0.18)***	1.97 (2.26)	-1.04 (0.95)	2.59 (2.84)	1.68 (0.65)**	0.99 (0.44)**	0.03 (0.44)
$Apprt_{t-1}$	0.73 (0.10)***	-0.18 (0.03)***	0.42 (0.74)	0.06 (0.33)	1.88 (0.83)**	0.40 (0.29)	1.19 (0.62)*	0.35 (0.13)***
$Deprt_{t-1}$	0.69 (0.19)***	-0.39 (0.04)***	1.76 (1.64)	0.88 (0.32)***	3.25 (1.12)***	0.02 (-0.25)	1.13 (0.37)***	0.23 (0.16)

Table 2B.3.4. Short-run and Long-run Estimates using AIC Criterion to Select the Optimum Lags

Panel A: Short-run Results

Variable	Norway	Sweden	Switzerland	U.K.	Bangladesh	India	Malaysia	Croatia
Δtb_{t-1}	-0.35 (0.14)**	-0.40 (0.09)***	-0.11 (0.17)	-0.35 (0.14)**	0.02 (0.22)	0.09 (0.16)	0.45 (0.20)**	0.89 (0.35)**
Δtb_{t-2}	-0.37 (0.12)***	-0.06 (0.11)	-0.27 (0.14)**	-0.49 (0.12)***	0.04 (0.18)	-0.18 (0.12)		0.56 (0.28)*
Δtb_{t-3}	-0.20 (0.12)	-0.33 (0.11)***	-0.17 (0.12)	-0.33 (0.08)***	0.11 (0.11)	-0.12 (0.14)		-0.14 (0.34)
Δtb_{t-4}					0.32 (0.09)***	0.16 (0.14)		-0.56 (0.22)**
Δy_t	0.85 (0.92)	1.76 (0.68)**	-2.12 (1.03)**	-0.17 (1.02)	2.10 (1.01)**	-0.86 (0.65)	0.25 (0.71)	-3.40 (2.29)
Δy_{t-1}						0.36 (0.62)	-2.32 (0.84)**	11.25 (3.14)**
Δy_{t-2}						0.99 (0.63)	-1.91 (0.65)***	4.70 (1.77)**
Δy_{t-3}						0.07 (0.59)	-1.43 (0.53)**	
Δy_{t-4}						1.78 (0.67)***		
Δy_t*	3.73 (2.62)	-0.36 (1.03)	0.92 (2.06)	0.82 (0.98)	-2.45 (5.25)	4.61 (2.00)**	-0.05 (2.15)	18.44 (14.03)
Δy_{t-1}*					4.96 (6.90)	2.87 (2.10)		2.79 (6.30)
Δy_{t-2}*					-1.97 (6.75)			-0.04 (9.48)
Δy_{t-3}*					7.72 (6.46)			-14.47 (8.71)
Δy_{t-4}*					-13.10 (4.58)***			1.72 (8.05)
$\Delta Appr_t$	-1.90 (1.39)	0.10 (0.46)	1.22 (1.00)	-1.11 (0.51)**	-3.64 (5.76)	3.19 (1.32)**	0.61 (0.91)	5.85 (5.36)
$\Delta Appr_{t-1}$	0.48 (1.21)	-1.36 (0.64)**				2.81 (1.32)**	0.69 (0.94)	-15.19 (9.40)
$\Delta Appr_{t-2}$	-2.63 (1.01)**	-0.75 (0.40)*				0.45 (1.17)	1.46 (1.00)	-10.27 (5.03)*
$\Delta Appr_{t-3}$		-0.07 (0.53)				1.87 (1.20)	2.98 (1.11)**	-2.11 (6.65)
$\Delta Appr_{t-4}$		-1.12 (0.84)					1.07 (0.95)	4.94 (3.09)
$\Delta Depr_t$	-0.42 (0.75)	0.96 (0.37)**	-0.12 (0.79)	-0.05 (0.35)	2.41 (4.03)	0.16 (1.03)	0.18 (0.53)	3.93 (3.31)
$\Delta Depr_{t-1}$	1.51 (1.01)		-1.58 (1.18)		1.73 (4.04)		-1.27 (0.85)	-6.26 (2.97)*
$\Delta Depr_{t-2}$					-2.52 (4.25)		-1.17 (0.58)*	-4.00 (3.09)
$\Delta Depr_{t-3}$					5.74 (3.36)*			-7.03 (2.43)**
$\Delta Depr_{t-4}$								-5.31 (1.97)**
Dum_fcrisis	0.05 (0.10)	-0.10 (0.04)**	-0.07 (0.07)	<0.01 (0.03)	0.29 (0.15)*	-0.04 (0.09)	-0.12 (0.07)	-0.66 (0.55)

Panel B: Long-run Results normalized on coefficient of lagged level dependent variable

Variable	Norway	Sweden	Switzerland	U.K.	Bangladesh	India	Malaysia	Croatia
tb_{t-1}	-0.19 (0.14)	-0.15 (0.06)**	-0.48 (0.14)***	-0.21 (0.10)**	-1.11 (0.24)***	-0.76 (0.21)***	-1.38 (0.17)***	-2.07 (0.51)***
Constant	-2.47 (3.82)	-0.75 (0.79)	5.73 (2.00)***	2.08 (1.84)	-9.55 (5.72)	0.03 (1.64)	-15.20 (2.84)***	101.56 (52.23)*
y_{t-1}	1.49 (4.88)	-1.51 (2.34)	-1.79 (0.72)**	-5.59 (4.42)	2.36 (1.23)*	-0.24 (0.34)	2.36 (0.84)**	-10.19 (1.88)***
y_{t-1*}	1.44 (3.40)	2.69 (2.85)	-0.99 (0.93)	3.74 (2.44)	0.53 (0.88)	0.30 (0.62)	0.30 (0.66)	3.51 (3.31)
$Apprt_{t-1}$	1.43 (2.25)	1.71 (0.77)**	0.13 (0.38)	1.92 (1.53)	3.84 (1.41)***	1.68 (0.43)***	1.55 (0.15)***	15.67 (3.65)***
$Deprt_{t-1}$	0.61 (1.37)	1.39 (0.80)*	1.06 (0.46)**	0.28 (0.68)	-1.44 (1.41)	2.72 (0.60)***	0.58 (0.41)	6.15 (1.26)***

Table 2B.3.5. Short-run and Long-run Estimates using AIC Criterion to Select the Optimum Lags

Panel A: Short-run Results

Variable	Hungary	Poland	Romania	Turkey	Russia	Ukraine	Brazil	Colombia
Δtb_{t-1}	-0.29 (0.22)	-0.26 (0.11)**	0.64 (0.81)	-0.51 (0.10)***	-0.55 (0.11)***	0.56 (0.40)	-0.35 (0.09)***	-0.19 (0.11)*
Δtb_{t-2}	-0.27 (0.16)		0.26 (0.60)	-0.38 (0.12)***	-0.23 (0.12)*	0.51 (0.25)	-0.28 (0.11)**	-0.10 (0.10)
Δtb_{t-3}	-0.31 (0.12)**		0.07 (0.31)	-0.10 (0.10)	-0.12 (0.12)		-0.35 (0.07)***	-0.06 (0.11)
Δtb_{t-4}	-0.14 (0.11)			0.15 (0.09)	-0.43 (0.10)***			0.26 (0.10)***
Δy_t	0.53 (0.95)	-1.31 (1.44)	-0.78 (2.09)	-1.77 (0.63)***	0.81 (1.12)	-0.94 (1.35)	-1.41 (0.58)**	-1.10 (0.47)**
Δy_{t-1}	2.39 (0.82)***		3.36 (2.17)		0.39 (1.31)	-3.45 (1.46)**	-1.42 (0.37)***	
Δy_{t-2}			1.18 (1.11)		-3.64 (1.29)***	-2.22 (1.36)	-1.51 (0.51)***	
Δy_{t-3}					-1.86 (1.25)			
Δy_{t-4}					2.57 (1.06)**			
Δy_t^*	-2.94 (2.15)	2.94 (2.82)	3.09 (6.24)	-0.68 (1.58)	-0.42 (4.27)	-15.31 (9.00)	3.04 (1.32)**	0.66 (1.10)
Δy_{t-1}^*			-2.48 (7.08)		0.36 (3.64)	26.73 (9.60)**	4.38 (1.37)***	
Δy_{t-2}^*			-13.13 (9.60)		11.57 (5.11)**	-6.65 (11.18)	-0.51 (1.60)	
Δy_{t-3}^*			-5.61 (5.24)		3.46 (3.55)	-13.10 (9.13)	4.08 (1.73)**	
Δy_{t-4}^*			2.92 (4.17)		-8.51 (2.93)***	20.21 (9.00)**	-3.24 (1.62)**	-0.28 (0.64)
$\Delta Appr_t$	-0.29 (0.86)	1.06 (0.95)	4.27 (1.57)**	0.75 (0.34)**	-0.77 (0.58)	-2.48 (2.62)	0.31 (0.34)	
$\Delta Appr_{t-1}$	-0.50 (0.88)		2.86 (2.38)		-2.26 (0.64)***	-5.22 (2.02)**	-0.31 (0.26)	
$\Delta Appr_{t-2}$	-1.32 (0.80)		-0.38 (2.15)		1.98 (0.52)***	-2.76 (2.53)	-0.06 (0.35)	
$\Delta Appr_{t-3}$	-1.82 (1.03)*		2.08 (2.36)		1.07 (0.63)*	-3.58 (1.00)***	0.73 (0.50)	
$\Delta Appr_{t-4}$						-3.06 (2.28)		
$\Delta Depr_t$	0.74 (0.48)	-0.18 (0.88)	-1.01 (2.24)	0.26 (0.45)	0.59 (0.32)*	2.04 (1.95)	0.44 (0.14)***	0.28 (0.63)
$\Delta Depr_{t-1}$		0.79 (0.69)	-2.94 (1.80)		0.44 (0.20)**	-4.14 (1.94)**		
$\Delta Depr_{t-2}$			0.45 (2.46)		-0.62 (0.13)***			
$\Delta Depr_{t-3}$			-1.58 (1.45)					
$\Delta Depr_{t-4}$								
Dum_fcrisis	0.15 (0.09)	0.09 (0.13)	-0.62 (0.28)**	-0.13 (0.09)	0.32 (0.12)**	-0.29 (0.27)	0.15 (0.08)*	0.02 (0.05)

Panel B: Long-run Results normalized on coefficient of lagged level dependent variable

tb_{t-1}	-0.73 (0.25)***	-0.28 (0.10)***	-2.24 (1.00)**	-0.18 (0.08)**	-0.05 (0.08)	-1.53 (0.51)***	-0.18 (0.06)***	-0.19 (0.09)**
Constant	-10.69 (3.32)***	-1.17 (1.66)	-32.33 (20.50)	1.26 (2.04)	3.57 (2.37)	26.60 (9.78)**	-1.55 (1.13)	2.13 (1.67)
y_{t-1}	-1.73 (0.82)**	-2.78 (2.35)	-2.77 (0.58)***	-4.48 (2.30)*	6.88 (17.59)	0.58 (1.78)	2.04 (1.17)*	-3.77 (1.57)**
y_{t-1*}	4.99 (1.41)***	3.30 (2.65)	5.69 (0.67)***	2.20 (2.16)	-18.81 (37.88)	-2.72 (1.88)	-0.02 (1.28)	1.12 (1.22)
$Apprt_{t-1}$	1.00 (0.32)***	0.48 (1.30)	0.11 (0.34)	1.20 (0.99)	7.12 (12.94)	2.69 (0.62)***	2.66 (0.80)***	-0.48 (0.71)
$Deprt_{t-1}$	1.45 (0.25)***	2.15 (0.88)**	1.42 (0.32)***	3.32 (1.36)**	7.58 (13.64)	1.04 (0.67)	2.39 (0.84)***	0.11 (0.59)

Table 2B.3.6. Short-run and Long-run Estimates using AIC Criterion to Select the Optimum Lags

Panel A: Short-run Results

Variable	Costa Rica	Mexico	Trinidad & Tobago	Jamaica
Δtb_{t-1}	-0.32 (0.18)*	-0.53 (0.11)***	-0.03 (0.11)	0.15 (0.12)
Δtb_{t-2}	-0.16 (0.16)	-0.26 (0.10)**		
Δtb_{t-3}	-0.40 (0.16)**	-0.24 (0.11)**		
Δtb_{t-4}				
Δy_{t}	-0.72 (1.28)	-0.83 (0.29)***	2.67 (1.02)**	0.69 (0.66)
Δy_{t-1}	-3.72 (1.59)**	-0.85 (0.24)***		
Δy_{t-2}	-2.92 (1.50)*	-0.07 (0.21)		
Δy_{t-3}	-2.88 (1.36)**	-0.88 (0.20)***		
Δy_{t-4}	-2.55 (1.28)*			
Δy_{t}^*	1.32 (2.50)	0.62 (0.54)	1.62 (2.30)	10.52 (4.56)**
Δy_{t-1}^*	1.59 (2.42)	1.04 (0.51)**		-10.13 (3.73)***
Δy_{t-2}^*	-2.41 (2.59)	-0.11 (0.54)		
Δy_{t-3}^*	2.43 (1.79)	-0.92 (0.36)**		
Δy_{t-4}^*	2.40 (1.57)			
$\Delta Appr_{t}$	0.72 (1.43)	-0.43 (016)***	2.91 (1.34)**	-0.23 (2.01)
$\Delta Appr_{t-1}$	-1.03 (1.74)	0.32 (0.14)**		
$\Delta Appr_{t-2}$	-0.15 (1.37)	0.48 (0.18)**		
$\Delta Appr_{t-3}$	1.33 (1.11)	0.40 (0.17)**		
$\Delta Appr_{t-4}$	3.08 (1.11)***	-0.33 (0.19)*		
$\Delta Depr_{t}$	-2.78 (2.45)	0.33 (0.12)***	-0.55 (3.56)	0.98 (1.85)
$\Delta Depr_{t-1}$	1.21 (2.74)		-0.27 (0.51)	1.32 (1.63)
$\Delta Depr_{t-2}$	2.51 (3.21)			3.18 (1.35)**
$\Delta Depr_{t-3}$	-6.43 (1.86)***			-2.12 (1.32)
$\Delta Depr_{t-4}$				3.94 (1.50)**
Dum_fcrisis	-0.07 (0.10)	-0.06 (0.02)***	-0.17 (0.15)	0.03 (0.11)

Panel B: Long-run Results normalized on coefficient of lagged level dependent variable

tb_{t-1}	-0.06 (0.16)	0.01 (0.05)	-0.44 (0.10)***	-0.77 (0.13)***
Constant	4.88 (2.49)*	-0.39 (0.56)	-2.14 (2.02)	-20.71 (10.69)*
y_{t-1}	52.06	2.46 (35.37)	3.78 (0.49)***	1.85 (0.97)*
y_{t-1*}	-65.70 (197.62)	-14.93 (113.98)	-2.28 (1.34)*	0.21 (1.03)
$Apprt_{t-1}$	26.37 (86.95)	-9.81 (67.20)	2.86 (0.83)***	-1.86 (0.51)***
$Deprt_{t-1}$	-14.49 (26.15)	-3.14 (21.84)	2.90 (4.41)	-4.81 (0.98)***

Table 2B.4.1. Diagnostics Test Results

Variable	Austria	Belgium	Estonia	Finland	France	Germany	Greece	Ireland
Adj R^2	0.70	0.37	0.38	0.26	0.56	0.52	0.36	0.42
Reset Test	1.73	1.01	0.16	0.02	0.44	0.93	0.02	0.19
LM Test	0.57	8.45*	13.28**	5.30	8.81*	4.86	3.34	5.33
Cusum	Stable	Stable	Stable	Stable	Unstable♣	Unstable♣	Stable	Stable
Cusumq	Unstable♣	Stable	Unstable♣	Stable	Unstable♣	Unstable♣	Unstable♣	Stable
Summ.Appr	-5.11 (1.97)**	0.41 (0.59)	4.06 (2.20)*	-2.10 (0.74)***	-0.20 (0.52)	0.03 (0.45)	3.42 (1.38)**	0.46 (1.35)
Summ. Depr	0.45 (1.87)	-0.55 (0.35)	6.33 (7.53)	0.20 (1.00)	0.12 (0.36)	-0.25 (0.26)	-0.98 (1.25)	-0.41 (1.09)
Wald-SR	-5.56 (3.24)*	0.96 (0.85)	-2.27 (7.99)	-2.30 (1.48)	-0.32 (0.75)	0.28 (0.64)	4.41 (2.26)*	0.87 (2.09)
Wald-LR	-0.04 (0.60)	0.00 (0.20)	-0.49 (1.43)	-0.27 (0.13)**	0.10 (0.17)	-0.08 (0.17)	0.13 (0.35)	-0.14 (0.52)

Variable	Italy	Latvia	Luxemberg	Netherlands	Portugal	Slovakia	Slovenia	Spain
Adj R^2	0.66	0.35	0.64	0.41	0.47	0.33	0.42	0.43
Reset Test	3.28**	2.57*	0.12	0.78	0.10	0.53	0.21	1.32
LM Test	4.31	4.85	4.21	7.31	3.09	2.30	0.74	17.74***
Cusum	Stable	Stable	Unstable♣	Stable	Unstable♣	Stable	Stable	Stable
Cusumq	Unstable♣	Stable	Stable	Unstable♣	Stable	Unstable	Stable	Stable
SummAppr	0.12 (0.46)	-0.76 (4.93)	-2.16 (2.27)	-0.44 (0.66)	0.20 (0.06)***	-0.47 (1.81)	-2.53 (1.85)	0.11 (0.77)
SummDepr	0.17 (0.39)	2.12 (2.71)	0.19 (2.33)	-0.10 (0.61)	-0.26 (1.03)	-3.15 (2.90)	-3.20 (3.93)	0.08 (0.62)
Wald-SR	-0.05 (0.77)	-2.87 (7.10)	-2.35 (4.03)	0.34 (1.09)	0.46 (1.04)	2.68 (4.37)	-0.67 (5.13)	0.03 (1.13)
Wald-LR	1.13 (0.67)*	0.73 (0.78)	0.69 (0.12)***	0.43 (0.08)***	-1.45 (0.75)*	-2.03 (3.86)	-0.72 (0.37)*	0.72 (1.89)

Notes: Reset Test refers to Ramsey Reset for misspecification, distributed as $\chi^2(1)$ uses 2 fitted terms. LM test is the Breusch-Godfrey Lagrange multiplier test for serial correlation at 4 lags, distributed as $\chi^2(4)$ (Observed–rsquared value probability value used). The Cusum is the cumulative sum of recursive residuals and Cusumq is the cumulative sum of squares of recursive residuals. Both Cusum and Cusumq tests are use td to determine the stability of the short and long-run coefficients. ♣ The cumulative sum of squares is for the most part within the 5% level of significance, suggesting that the residual variance is somewhat stable. 'SummAppr' and 'SummDepr' refers to the Wald test of the summation of the short-run coefficients of appreciation and depreciation of real exchange rate, respectively. Wald-SR is the Wald test of short-run symmetry ($\sum_{i=0}^{m}\psi_{1i} = \sum_{i=0}^{n}\psi_{2i}$). Wald-LR is the Wald test of the long-run symmetry ($-\frac{\delta_1}{\rho_1} = -\frac{\delta_2}{\rho_1}$). The asterisks *, ** and *** refers to the 10%, 5% and 1% level of significance.

Table 2B.4.2. Diagnostics Test Results (See Notes in Table 2B.4.1.)

Variable	Australia	Canada	Czech	Denmark	Iceland	Japan	Korea	New Zealand
Adj R^2	0.31	0.64	0.58	0.52	0.40	0.30	0.35	0.70
Reset Test	0.71	0.64	3.65**	2.33	0.21	3.64**	1.95	0.27
LM Test	6.79	3.29	20.38***	8.64*	2.67	6.52	2.14	7.12
Cusum	Stable	Unstable	Stable	Stable	Stable	Stable	Unstable♣	Stable
Cusumq	Unstable♣	Stable	Stable	Stable	Stable	Stable	Stable	Stable
Summ.Appr	-2.15 (0.65)***	-0.06 (0.18)	-0.45 (0.90)	0.65 (0.86)	1.15 (2.38)	-0.31 (0.23)	1.10 (0.30)***	-2.83 (1.50)*
Summ. Depr	0.58 (0.23)**	-0.34 (0.15)**	1.10 (1.74)	-0.13 (0.58)	3.28 (1.58)**	-0.17 (0.23)	0.16 (0.20)	0.72 (0.60)
Wald-SR	-2.72 (0.80)***	0.29 (0.25)	-1.56 (2.29)	0.77 (1.26)	-2.12 (3.47)	-0.14 (0.38)	0.93 (0.38)**	-3.55 (1.77)**
Wald-LR	0.04 (0.22)	0.21 (0.02)***	-1.34 (1.41)	-0.81 (0.16)	-1.37 (0.93)	0.38 (0.12)***	0.06 (0.42)	0.12 (0.07)*

Variable	Norway	Sweden	Switzerland	Great Britain	Bangladesh	India	Malaysia	Croatia
Adj R^2	0.28	0.47	0.31	0.40	0.62	0.50	0.55	0.52
Reset Test	1.86	1.63	0.40	1.27	1.13	2.27	0.01	2.42
LM Test	12.19**	3.59	3.03	3.95	11.01**	3.38	3.13	33.72
Cusum	Stable	Stable	Unstable	Stable	Stable	Stable	Stable	Stable
Cusumq	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable
Summ.Appr	-4.04 (2.01)**	-3.20 (1.03)***	1.22 (1.00)	-1.11 (0.51)**	-3.64 (5.76)	8.32 (3.55)**	6.81 (1.88)***	-16.77 (15.29)
Summ. Depr	1.08 (1.42)	0.96 (0.37)**	-1.70 (1.34)	-0.05 (0.35)	7.36 (6.09)	0.16 (1.03)	-2.26 (1.35)	-18.67 (6.11)**
Wald-SR	-5.13 (3.03)*	-4.16 (1.07)***	2.92 (2.09)	-1.06 (0.62)*	-11.0 (9.77)	8.16 (3.99)**	9.08 92.92)***	1.89 (15.14)
Wald-LR	0.82 (1.26)	0.32 (0.26)	-0.93 (0.30)***	1.64 (1.10)	5.29 (2.52)**	-1.03 (0.41)**	0.97 (0.28)***	9.51 (2.80)**

Variable	Hungary	Poland	Romania	Turkey	Russia	Ukraine	Brazil	Colombia
Adj R^2	0.49	0.24	0.53	0.39	0.49	0.51	0.40	0.17
Reset Test	2.86*	4.87**	0.73	1.31	1.55	1.67	2.00	7.55
LM Test	2.77	8.92*	21.39***	1.16	6.84	13.22**	9.22*	9.09*
Cusum	Stable	Unstable	Stable	Stable	Stable	Stable	Stable	Stable
Cusumq	Stable	Unstable♣	Unstable♣	Stable	Stable	Stable	Stable	Stable
Summ.Appr	-3.93 (2.02)*	1.06 (0.95)	8.83 (5.68)	0.75 (0.34)**	0.02 (0.87)	-17.09 (6.58)**	0.68 (0.97)	-0.28 (0.64)
Summ. Depr	0.74 (0.48)	0.61 (0.77)	-5.08 (6.24)	0.26 (0.45)	0.41 (0.52)	-2.10 (3.08)	0.44 (0.14)***	0.28 (0.63)
Wald-SR	-4.67 (2.26)**	0.45 (1.47)	13.91 (11.12)	0.49 (0.61)	-0.40 (0.71)	-15.00 (8.07)*	0.24 (1.00)	-0.56 (1.06)
Wald-LR	-0.45 (0.22)**	-1.67 (1.14)	-1.31 (0.27)***	-2.12 (1.06)**	-0.46 (2.78)	1.65 (0.65)**	0.27 (0.23)	-0.59 (0.43)

Table 2B.4.3. Diagnostics Test Results (See Notes in Table 3.1)

Variable	Costa Rica	Mexico	Trinidad & Tobago	Jamaica
Adj R^2	0.58	0.55	0.20	0.42
Reset Test	1.05	5.08***	0.64	0.39
LM Test	18.32***	1.17	1.89	1.09
Cusum	Stable	Stable	Stable	Stable
Cusumq	Unstable♣	Unstable	Stable	Unstable
Summ.Appr	3.95 (2.54)	0.43 (0.44)	2.91 (1.34)**	-0.23 (2.01)
Summ. Depr	-5.49 (2.94)*	0.33 (0.12)***	-0.82 (3.54)	7.31 (4.94)
Wald-SR	9.44 (4.53)**	0.11 (0.50)	3.72 (4.24)	-7.54 (6.22)
Wald-LR	40.86 (110.85)	-6.67 (45.63)	-0.04 (3.64)	2.94 (0.56)***

Table 2B.5.1. Summary Results of Non-Linear ARDL Model

Countries			Long-run Effect		J-curve	
		Coint.	Depr	Appr	Depr	Appr
Sample	Euro-Area					
1994q1-2017q2	Austria	Yes	Negative	Negative		
1997q1-2017q2	Belgium	Yes	Negative	-	-	-
1999q2-2017q2	Estonia	Yes	-	-	Yes-SR	-
1993q3-2017q2	Finland	Yes	Positive	-	-	-
1994q1-2017q2	France	Yes	-	-	-	-
1994q2-2017q2	Germany	Yes	-	-	-	-
1994q1-2017q2	Greece	Yes	Positive	Positive	-	-
1994q1-2017q2	Ireland	Yes	-	-	-	-
1994q1-2017q2	Italy	Yes	-	-	-	-
2000q3-2017q2	Latvia	Yes	Positive	Positive	-	-
1998q2-2017q2	Luxembourg	Yes	-	Positive	-	Yes-SR
1994q2-2017q2	Netherland	Yes	Negative	-	-	-
1994q2-2017q2	Portugal	Yes	-	-	-	-
1994q2-2017q2	Slovakia	Yes	-	-	-	-
1994q2-2017q2	Slovenia	Yes	Positive	-	Yes-SR	-
1994q2-2017q2	Spain	No	-	-	-	-
	Advanced Non-EURO Area					
1994q2-2017q2	Australia	Yes	Positive	Positive	-	Yes
1994q2-2017q2	Canada	Yes	Negative	Negative	-	-
1994q2-2017q2	Czech-Rep.	No	-	-	-	-
1994q2-2017q2	Denmark	Yes	Positive	-	-	-
1998q2-2017q2	Iceland	Yes	Positive	Positive	-	-
1993q4-2017q2	Japan	Yes	-	-	-	-
1993q3-2017q2	Korea	Yes	Positive	Positive	-	-
1994q2-2017q1	New Zealand	Yes	-	Positive	-	Yes
1994q1-2017q2	Norway	No	-	-	-	-
1994q1-2017q2	Sweden	Yes	Positive	Positive	-	Yes
1994q1-2017q2	Switzerland	Yes	Positive	-	Yes	-
1994q1-2017q2	Great Britain	Yes	-	-	-	-
	Emerging & Developing					
1996q3-2014q1	Bangladesh	Yes	-	Positive	-	-
1995q3-2017q1	India	Yes	Positive	Positive	-	-
2006q1-2017q1	Malaysia	Yes	-	Positive	-	-
2008q4-2017q4	Croatia	Yes	Positive	Positive	Yes	Yes
1994q2-2017q2	Hungary	Yes	Positive	Positive	-	Yes
1993q3-2017q2	Poland	Yes	Positive	-	-	-
2005q4-2017q1	Romania	Yes	Positive	-	Yes	-
1994q2-2017q2	Turkey	Yes	Positive	-	-	-
1994q2-2017q2	Russia	No	-	-	-	Yes-SR
2006q4-2017q2	Ukraine	Yes	-	Positive	-	Yes
1994q2-2017q2	Brazil	Yes	Positive	Positive	-	Yes
1994q2-2017q2	Colombia	Yes	-	-	-	-
2001q2-2017q2	Costa Rica	No	-	-	-	Yes-SR
1994q2-2017q2	Mexico	No	-	-	-	-
1993q3-2016q4	Trinidad & Tobago	Yes	-	Positive	-	-
1999q2-2015q4	Jamaica	Yes	Negative	Negative	-	-

Notes: '-'indicates result is not significant and 'SR' indicates short-run j-curve. 'Coint.', 'Depr' and 'Appr' represent cointegration, depreciation and appreciation, respectively.

Table 2B.6.1. ARDL Pooled Mean Group Short-run and Long-run Estimates using AIC Criterion to Select the Optimum Lags

Panel A: Short-run Results				
Variable	All Countries	Euro-Area (EA)	Advanced Non-EA	Emerging & Developing
Δtb_{t-1}	-0.34 (0.02)***	-0.40 (0.07)***	-0.35 (0.05)***	-0.20 (0.05)***
Δtb_{t-2}	-0.28 (0.04)***	-0.36 (0.07)***	-0.37 (0.07)***	-0.11 (0.04)**
Δtb_{t-3}	-0.21 (0.03)***	-0.29 (0.05)***	-0.28 (0.04)***	-0.10 (0.04)***
Δy_t	0.26 (0.23)	0.41 (0.48)	0.25 (0.31)	0.08 (0.27)
Δy_t*	-0.31 (0.40)	-0.16 (0.86)	-0.32 (0.54)	1.66 (0.65)**
$\Delta Appr_t$	0.23 (0.25)	-0.76 (0.38)**	-0.10 (0.26)	0.57 (0.46)
$\Delta Depr_t$	0.08 (0.19)	-0.13 (0.23)	0.06 (0.01)	-0.11 (0.27)
Dum_fcrisis	-0.04 (0.02)**	-0.07 (0.03)**	-0.01 (0.01)	0.03 (0.04)
Dum_imp		-1.91 (1.68)		
Dum_EU		0.56 (0.17)***		
Panel B: Long-run Results				
ECM	-0.20 (0.02)***	-0.26 (0.05)***	-0.19 (0.04)***	-0.32 (0.09)***
Constant	-0.79***	0.82 (0.17)***	-1.22 (0.29)***	-0.78 (0.19)***
y_{t-1}	-0.36***	-1.63 (0.22)***	0.10 (0.09)	-0.05 (0.10)
y_{t-1*}	1.38***	0.97 (0.41)**	1.37 (0.21)***	0.81 (0.30)**
Appr	0.02*	0.57 (0.18)***	0.71 (0.08)***	1.37 (0.13)***
Depr	-0.19***	0.84 (0.21)***	0.52 (0.11)***	1.40 (0.14)***
Quarters for correction	5.0	3.8	5.3	3.1
Wald-LR	0.21 (0.04)***	-0.27 (0.08)***	0.20 (0.06)***	-0.03 (0.04)
Countries	44	16	12	16
Sample	1994q1-2015q4	1994q1-2017q2	1994q1-2017q2	1996q3-2015q4

Notes: ECM is the cointegrating variable which indicates long-run relationship among variables when coefficient is negative and significant. Numbers in parentheses next to the coefficients are standard errors. Wald-LR is the Wald test of the long-run symmetry ($Appr_t = Depr_t$). The asterisks *, ** and *** refers to the 10%, 5% and 1% level of significance. Quarter to full correction is computed by 1/ECM (For example, All countries 1/0.20=5 quarters)

Table 2B.7.1. Trade Data as at 2016 in US $ Millions

Country	Largest Trading Partner	Export	Import	Total Trade	Data Availability for U.S. and Largest Trading Partner: CPI	PPI	TOT
Euro- Area							
Austria	Germany				√	√	√
Finland	Germany	7553	10279	17832	√	√	√
France	Germany	80000	110345	190345	√		√
Germany	Netherlands	86795	139866	226661	√	√	√
Greece	Germany	2167	5405	7572	√		√
Ireland	U.S.	35152	14524	49676	√	√	√
Italy	Germany	58346	66359	124705	√	√	√
Netherlands	Germany	138955	77425	216380	√	√	√
Portugal	Spain	14333	22323	36656	√		√
Spain	France	44437	37972	82,409	√	√	√
Advanced Non-Euro							
Australia	japan	23692	15802	39,494.00	√	√	√
Canada	U.S.	297589	222801	520390	√	√	√
Denmark	Germany	15553	18440	33993	√	√	√
Japan	U.S.	130428	69303	199731[a]	√	√	√
Korea	U.S.	66753	43389	110142[a]	√	√	√
New Zealand	Australia	5753	4595	10348[a]	√	√	√
Norway	U.K.	18548	3674	22,222	√	√	√
Sweden	Germany	14726	26464	41190	√	√	√
Switzerland	Germany	43704	52014	95718	√	√	√
U.K.	Germany	43764	86810	130574	√	√	√
Emerging & Developing							
Malaysia	U.S.	19353	13418	32,771[b]	√	√	√
Hungary	Germany	28652	25220	53872	√	√	√
Poland	Germany	55355	55745	111100	√	√	√
Turkey	Germany	13998	21474	35472	√	√	√
Brazil	U.S.	23300	25611	48911[a]	√		√
Mexico	U.S.	302575	190277	492852	√	√	√
Count					26	22	26

Note: Total trade equal the total value of exports and imports for each country with their largest trading partner. [a] China and [b] Singapore are these countries largest trading partners, but due to data limitations (for industrial production index) the second largest trading partner is used. √ indicates data availability for at least 30 years.

Table 2B.8.1. Austria's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S.

	RER-CPI		RER-PPI	
Variables	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	-0.03(0.12)	0.01(0.12)	-0.03(0.14)	-0.01(0.29)
Δtb_{t-2}			-0.35(0.17)	-0.51(0.21)*
Δtb_{t-3}				
Δtb_{t-4}				
Δy_t	2.74(1.76)	3.03(1.56)*	1.02(1.14)	4.67(2.31)*
Δy_{t-1}	-3.25(1.11)**	-2.03(1.16)*	5.76(1.79)**	2.47(1.38)
Δy_{t-2}	1.93(1.38)	2.70(1.63)	-4.01(1.72)*	
Δy_{t-3}			1.84(1.33)	
$\Delta y^{us}{}_{t}$	-0.65(1.22)	-1.31(1.13)	3.33(1.40)*	-2.04(2.56)
$\Delta y^{us}{}_{t-1}$	3.73(1.51)**	4.02(1.49)**	-1.75(0.86)	-0.24(1.07)
$\Delta y^{us}{}_{t-2}$			4.47(1.92)*	1.38(0.91)
$\Delta y^{us}{}_{t-3}$			0.80(0.56)	
Δrer_{t}	-0.34(0.19)*		1.68(0.66)*	
Δrer_{t-1}	0.21(0.05)***		0.74(0.14)***	
Δrer_{t-2}	0.13(0.04)***		0.51(0.11)**	
Δrer_{t-3}	0.12(0.05)**		0.37(0.06)***	
$\Delta appr_{t}$		-0.48(0.43)		0.73(1.54)
$\Delta appr_{t-1}$		0.31(0.08)***		0.34(0.13)*
$\Delta appr_{t-2}$		0.19(0.08)**		0.13(0.13)
$\Delta appr_{t-3}$		0.15(0.06)**		
$\Delta depr_{t}$		0.19(0.35)		-0.83(0.55)
$\Delta depr_{t-1}$				-2.84(1.06)**
$\Delta depr_{t-2}$				-3.26(1.45)*
dum_fcrisis	0.16(0.10)	0.27(0.13)**	0.71(0.20)**	0.23(0.12)
dum_imp	-2.84(0.57)***	-1.69(1.24)	2.36(1.41)	0.82(3.23)
dum_ex	2.11(0.57)***	0.81(0.72)	2.34(0.84)**	1.19(3.17)
Panel B: Long-run Estimates				
Y	1.62(1.06)	-0.38(1.47)		
Y^{us}	-2.29(1.31)*	-3.59(1.40)**	2.50(0.58)**	-2.16(0.41)***
Rer	0.98(0.44)**		-0.04(0.18)	
Appr		-0.15(0.51)		0.13(1.03)
Depr		1.70(0.56)***		1.21(0.78)
Constant	0.57(1.70)	11.25(5.21)**	14.31(4.21)**	8.19(5.44)
Panel C: Diagnostics				
Adj R^2	0.55	0.58	0.88	0.71
F- Test	4.62	6.48	13.78	8.69
t-bound Test	-9.55	-10.06	-5.07	-2.75
ECM	-0.61(0.06)***	-0.727***	-1.48(0.29)***	-1.25(0.45)**
Reset Test (fpvalue)	0.75	0.84	0.58	0.44
LM Test pvalue	0.30	0.09	<0.01	0.17
$CS(CS^2)$	S(S)	S(S)	S(U)	S(U♣)
Wald-SR		-0.02(0.69)		8.12(3.86)*
Wald-LR		-1.85(0.97)*		-1.08(1.23)
Norm pvalue	0.06	<0.01	0.72	0.27
Jcurve	No	No	No	No

Table 2B.8.2. Finland's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S.

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	0.13(0.16)	-0.03(0.15)	0.11(0.17)	-0.01(0.14)
Δy_t	-1.84(0.95)*	-2.58(1.23)**	-1.76(0.89)*	-2.34(1.35)*
$\Delta y^{US}{}_t$	2.37(1.42)	3.41(2.05)	2.34(1.32)*	2.95(1.83)
$\Delta y^{US}{}_{t-1}$		2.32(1.49)		
Δrer_t	0.72(0.45)		0.86(0.45)*	
$\Delta appr_t$		-0.36(1.14)		-0.25(1.18)
$\Delta depr_t$		1.72(0.79)**		1.66(0.86)*
$\Delta depr_{t-1}$		0.31(1.27)		0.24(1.56)
$\Delta depr_{t-2}$		1.19(0.94)		1.07(1.14)
$\Delta depr_{t-3}$		-2.18(1.23)*		-2.01(1.25)
dum_fcrisis	0.07(0.15)	0.34(0.20)*	0.08(0.15)	0.29(0.18)
dum_imp	0.14(0.73)	-1.64(2.04)	0.02(0.74)	-1.59(2.17)
dum_ex	1.15(0.32)***	1.47(0.61)**	1.53(0.34)***	1.62(0.76)**
Panel B: Long-run Estimates				
Y	-0.56(0.96)	-0.97(1.37)	-0.29(0.89)	-0.31(1.33)
Y^{US}	1.17(1.17)	0.72(3.09)	0.88(1.10)	0.33(2.56)
Rer	1.06(0.37)***		1.43(0.43)***	
Appr		1.63(1.50)		1.65(1.49)
Depr		1.65(2.40)		1.60(2.20)
Constant	-2.34(1.44)	0.61(4.26)	-2.64(1.49)*	0.21(3.62)
Panel C: Diagnostics				
Adj R^2	0.26	0.31	0.28	0.27
F- Test	2.83	0.85	4.48	0.82
t-bound Test	-3.95	-2.17	-3.67	-2.48
ECM	-0.62(0.16)***	-0.44(0.20)**	-0.63(0.17)***	-0.51(0.21)**
Reset Test (fpvalue)	0.93	1.01	0.56	1.32
LM Test pvalue	0.37	0.34	0.34	0.37
$CS(CS^2)$	S(S)	S(S)	S(S)	S(S)
Wald-SR		-1.39(2.69)		-1.22(3.40)
Wald-LR		-0.01(1.31)		0.05(1.08)
Norm pvalue	0.01	0.42	0.01	0.08
Sample	45	43	45	43
J-curve	No	No	No	No

Table 2B.8.3. France's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S.

Variable	RER-CPI	
	Linear	Non-Linear
Panel A: Short-run Estimates		
Δtb_{t-1}	-0.39(0.13)***	-0.28(0.13)**
Δy_t	-1.23(0.70)*	-1.07(0.91)
Δy_{t-1}	-2.21(0.71)***	-1.70(0.90)*
Δy_{t-2}	-1.01(0.45)**	-1.72(0.69)**
Δy_{t-3}	-0.59(0.27)**	-0.83(0.52)
$\Delta y^{US}{}_{t}$	0.77(0.36)**	1.22(0.53)**
$\Delta y^{US}{}_{t-1}$	-2.61(0.46)***	2.33(0.60)***
$\Delta y^{US}{}_{t-2}$		1.17(0.58)*
Δrer_t	-0.06(0.15)	
$\Delta appr_t$		-0.62(0.39)
$\Delta appr_{t-1}$		0.10(0.05)*
$\Delta depr_t$		0.80(0.37)**
$\Delta depr_{t-1}$		-0.65(0.33)*
$\Delta depr_{t-2}$		-0.63(0.34)*
dum_fcrisis	-0.02(0.07)	0.05(0.08)
dum_imp	-1.17(0.29)***	-2.38(0.52)***
dum_ex	1.12(0.15)***	1.48(0.36)***
Panel B: Long-run Estimates		
Y	0.02(0.39)	0.53(0.34)
Y^{US}	0.37(0.19)*	-0.28(0.38)
Rer	0.92(0.21)	
Appr		0.79(0.27)***
Depr		1.04(0.23)***
Constant	-1.95(0.93)**	-1.08(1.29)
Panel C: Diagnostics		
Adj R^2	0.70	0.73
F- Test	15.65	17.04
t-bound Test	-5.73	-5.66
ECM	-0.65(0.11)***	-0.93(0.16)***
Reset Test	3.08	1.88
LM Test pvalue	0.10	0.25
$CS(CS^2)$	S(S)	S(S)
Wald-SR		
Wald-LR		-0.24(0.14)*
Norm pvalue	0.59	0.44
Sample	43	43
J-curve	No	No

Table 2B.8.4. Germany's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S.

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	0.05(0.14)	-0.01(0.14)	-0.00(0.15)	-0.04(0.14)
Δtb_{t-2}	0.19(0.11)*	0.27(0.10)**	0.17(0.12)	0.30(0.10)***
Δtb_{t-3}	0.25(0.16)	0.25(0.17)	0.22(0.17)	0.18(0.16)
Δy_t	-0.53(0.50)	-1.01(0.53)*	-0.64(0.49)	-1.08(0.57)*
Δy_{t-1}	-0.89(0.60)	0.43(0.67)	-1.04(0.63)	0.63(0.70)
Δy_{t-2}	1.11(0.60)*	1.75(0.77)**	1.07(0.55)*	1.76(0.73)**
Δy_{t-3}		1.15(0.43)***		1.40(0.60)**
$\Delta y^{US}{}_{t}$	1.23(0.77)	0.94(0.70)	1.03(0.86)	0.64(0.69)
$\Delta y^{US}{}_{t-1}$	1.09(0.91)	1.30(1.02)	0.84(0.75)	1.07(0.87)
$\Delta y^{US}{}_{t-2}$	-1.10(0.74)	-0.39(0.76)	-1.24(0.70)*	-0.44(0.71)
$\Delta y^{US}{}_{t-3}$	-1.00(0.41)**	-1.65(0.51)***	-1.33(0.52)**	-1.96(0.60)***
Δrer_{t}	-0.09(0.20)		-0.16(0.22)	
Δrer_{t-1}			-0.23(0.19)	
$\Delta appr_{t}$		-0.93(0.26)***		-0.84(0.35)**
$\Delta depr_{t}$		0.77(0.43)*		0.92(0.53)
$\Delta depr_{t-1}$				-0.63(0.47)
dum_fcrisis	-0.01(0.07)	-0.11(0.06)*	-0.05(0.08)	-0.12(0.08)
dum_imp	-0.29(0.09)***	-0.46(0.12)***	-0.30(0.12)**	-0.43(0.13)***
dum_ex	0.30(0.10)***	0.14(0.12)	0.24(0.10)**	0.10(0.13)
Panel B: Long-run Estimates				
Y	0.19(0.44)	-1.99(0.75)**	0.15(0.55)	-2.14(0.64)***
Y^{US}	0.60(0.35)	-0.20(0.34)	0.98(0.39)**	-0.10(0.36)
Rer	0.76(0.22)***		0.94(0.32)***	
Appr		-0.12(0.25)		-0.01(0.32)
Depr		0.87(0.15)***		1.17(0.20)***
Constant	-1.93(0.64)***	7.66(3.72)*	-2.64(1.04)**	8.28(3.70)**
Panel C: Diagnostics				
Adj R^2	0.58	0.64	0.56	0.62
F- Test	14.65	46.30	8.39	40.80
t-bound Test	-7.01	-6.91	-5.13	-7.44
ECM	-0.61(0.09)***	-0.86(0.12)***	-0.58(0.11)***	-0.90(0.12)***
Reset Test (fpvalue)	3.64**	2.99*	3.42*	2.67*
LM Test pvalue	0.04	<0.01	0.04	0.00
CS(CS^2)	S(S)	S(S♣)	S(S)	S(S)
Wald-SR		-1.70(0.62)**		
Wald-LR		-0.99(0.29)***		-1.18(0.29)***
Norm pvalue	0.56	0.74		0.83
Sample	43	43	43	43
J-curve	No	No	No	No

Table 2B.8.5. Greece's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S.

Variable	RER-CPI	
	Linear	Non-Linear
Panel A: Short-run		
Δtb_{t-1}	-0.42(0.12)***	-0.25(0.16)
Δy_t	-3.83(1.60)**	-0.43(3.85)
Δy_{t-1}		1.30(2.26)
Δy_{t-2}		-3.01(1.82)
$\Delta y^{US}{}_t$	4.81(1.84)**	1.73(2.96)
Δrer_t	1.58(0.64)**	
Δrer_{t-1}	0.14(0.04)***	
$\Delta appr_t$		2.47(1.11)**
$\Delta appr_{t-1}$		0.24(0.06)***
$\Delta appr_{t-2}$		0.33(0.06)***
$\Delta depr_t$		1.90(1.21)
$\Delta depr_{t-1}$		-5.60(2.10)**
$\Delta depr_{t-2}$		-4.15(1.49)**
$\Delta depr_{t-3}$		3.08(2.17)
dum_fcrisis	-0.53(0.34)	-0.52(0.29)*
dum_imp	-1.50(4.36)	-6.91(8.77)
dum_ex	9.79(2.86)***	21.17(8.53)*
Panel B: Long-run Estimates		
Y	-1.50(0.76)*	-1.24(1.29)
Y^{US}	1.57(0.70)**	1.08(3.09)
Rer	2.96(1.27)**	
Appr		3.69(1.68)**
Depr		4.11(0.83)***
Constant	-9.65(3.34)***	0.95(6.23)
Panel C: Diagnostics		
Adj R^2	0.58	0.67
F- Test	2.86	7.21
t-bound Test	-2.75	-3.98
ECM	-0.54(0.20)***	-0.96(0.24)***
Reset Test (fpvalue)	2.44	0.02
LM Test pvalue	0.19	0.52
$CS(CS^2)$	S(S♣)	S(S)
Wald-SR		7.81(3.96)*
Wald-LR		-0.42(1.71)
Norm pvalue	0.74	0.86
Sample	45	43
J-curve	No	Yes

Table 2B.8.6. Ireland's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S.

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	-0.19(0.13)	-0.20(0.18)	-0.19(0.13)	-0.40(0.14)**
Δtb_{t-2}				-0.36(0.12)***
Δtb_{t-3}				-0.23(0.15)
Δy_t	0.20(0.33)	0.39(0.37)	0.05(0.27)	0.13(0.31)
Δy_{t-1}	0.21(0.40)	0.34(0.50)	0.03(0.32)	-0.18(0.48)
Δy_{t-2}	-0.75(0.37)*	-0.84(0.41)*	-0.69(0.35)*	-0.97(0.37)**
Δy_{t-3}	-0.84(0.46)*	0.73(0.67)	0.48(0.43)	0.78(0.68)
Δy^{US}_t	-1.40(1.11)	-1.39(1.37)	-1.75(1.07)	-2.01(1.40)
Δrer_t	0.21(0.21)		0.43(0.33)	
Δrer_{t-1}	0.15(0.25)		0.18(0.39)	
Δrer_{t-2}	0.23(0.25)		-0.10(0.23)	
Δrer_{t-3}	0.55(0.20)**		0.79(0.21)***	
$\Delta appr_t$		0.28(0.45)		-0.66(0.72)
$\Delta appr_{t-1}$		0.71(0.44)		0.47(0.61)
$\Delta appr_{t-2}$				-0.98(0.34)**
$\Delta depr_t$		0.05(0.52)		1.38(0.66)**
$\Delta depr_{t-1}$		-0.17(0.81)		0.69(0.63)
$\Delta depr_{t-2}$		0.41(0.48)		0.99(0.40)**
$\Delta depr_{t-3}$		1.05(0.40)**		1.44(0.35)***
dum_fcrisis	-0.04(0.10)	-0.02(0.14)	-0.09(0.11)	-0.10(0.17)
dum_imp	0.15(0.22)	0.15(0.27)	0.25(0.19)	0.31(0.26)
dum_ex	0.15(0.25)	0.17(0.31)	-0.12(0.15)	-0.49(0.22)**
Panel B: Long-run Estimates				
Y	1.83(0.65)***	2.18(1.79)	2.02(0.94)**	14.43(27.44)
Y^{US}	-3.74(2.03)*	-3.94(2.76)	-3.09(2.54)	-26.69(51.95)
Rer	-1.10(1.43)		-0.18(0.74)	
Appr		-1.12(1.87)		-3.77(9.00)
Depr		-1.64(2.81)		-4.75(10.93)
Constant	3.02(1.94)	2.79(1.97)	1.91(2.20)	4.87(2.64)*
Panel C: Diagnostics				
Adj R^2	0.42	0.39	0.49	0.47
F- Test	5.01	1.27	4.75	0.14
t-bound Test	-2.40	-1.76	-2.64	-0.54
ECM	-0.31(0.13)**	-0.28(0.16)*	-0.27(0.10)**	-0.07(0.13)
Reset Test	0.24	1.43	1.26	1.09
LM Test pvalue	0.03	0.01	0.18	0.22
$CS(CS^2)$	S(S)	S(S)	S(S♣)	S(S)
Wald-SR		-0.36(2.32)		-5.67(1.80)***
Wald-LR		0.52(1.54)		0.98(4.96)
Norm pvalue	0.65	0.65	0.87	0.97
Sample	43	43	43	43
J-curve	Yes-SR	Yes-SR	Yes-SR	Yes-SR

Note: Ireland's largest trading partner is also the U.S.

Table 2B.8.7. Italy's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S.

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	-0.24(0.20)	-0.40(0.15)**	-0.27(0.26)	-0.12(0.24)
Δtb_{t-2}		-0.07(0.10)	-0.29(0.20)	
Δtb_{t-3}			-0.23(0.20)	
Δy_t	-1.85(0.58)***	-1.51(0.51)***	-0.86(1.28)	-1.64(0.52)**
Δy_{t-1}	-1.09(0.67)	-1.55(0.52)***	-0.80(0.73)	-1.09(1.15)
Δy_{t-2}		-0.50(0.69)	-1.02(0.66)	0.59(1.23)
Δy_{t-3}			-1.54(0.72)*	-2.73(0.70)***
Δy^{US}_{t}	1.82(0.54)***	2.31(0.53)***	3.31(1.10)**	5.35(1.57)**
Δy^{US}_{t-1}	0.68(0.71)	2.27(0.77)***	1.95(0.45)***	2.61(1.94)
Δy^{US}_{t-2}	0.25(0.45)	1.98(1.29)	2.58(0.73)***	0.06(2.13)
Δy^{US}_{t-3}	-0.97(0.28)***		2.35(0.62)***	5.31(0.79)***
Δrer_{t}	0.57(0.19)***		0.75(0.43)	
Δrer_{t-1}			0.07(0.01)***	
Δrer_{t-2}			0.04(0.01)**	
Δrer_{t-3}			0.03(0.01)**	
$\Delta appr_{t}$		-0.56(0.29)*		2.24(0.64)**
$\Delta appr_{t-1}$		0.02(0.02)		0.09(0.01)***
$\Delta appr_{t-2}$				0.11(0.02)***
$\Delta appr_{t-3}$				0.06(0.02)**
$\Delta depr_{t}$		1.69(0.45)***		-0.73(1.11)
$\Delta depr_{t-1}$		0.74(0.32)**		1.97(0.93)*
$\Delta depr_{t-2}$				0.04(0.86)
$\Delta depr_{t-3}$				-0.72(0.30)*
dum_fcrisis	-0.07(0.06)	-0.01(0.10)	0.29(0.16)*	0.51(0.22)*
dum_imp	0.16(2.46)	-6.39(2.38)**	-2.65(2.56)	3.25(2.61)
dum_ex	3.93(1.19)***	2.31(1.32)*	8.13(1.37)***	13.02(2.52)***
Panel B: Long-run Estimates				
Y	0.04(2.02)	2.34(1.42)	0.64(0.54)	-0.28(1.38)
Y^{US}	0.85(2.82)	-4.50(3.16)	-0.88(1.11)	0.66(2.21)
Rer	6.46(8.45)		1.28(0.93)	
Appr		0.81(0.76)		1.07(0.22)***
Depr		2.76(1.42)*		0.35(1.02)
Constant	-4.10(2.00)**	2.38(1.84)	-6.45(1.54)***	-0.79(4.46)
Panel C: Diagnostics				
Adj R^2	0.56	0.67	0.67	0.90
F- Test	1.16	2.95	1.80	40.20
t-bound Test	-0.69	-2.04	-1.63	-2.96
ECM	-0.08(0.12)	-0.34(0.17)*	-0.80(0.49)	-1.52(0.51)**
Reset Test	2.46	1.39	0.12	0.08
LM Test pvalue	<0.01	0.95	0.03	0.03
$CS(CS^2)$	S(S)	S(S♣)	S(S)	S♣(U)
Wald-SR				
Wald-LR		-1.94(0.99)*		0.72(0.87)
Norm pvalue	0.66	0.94	0.84	0.93
Sample	43	44	32	32
J-curve	No	No	No	No

Table 2B.8. 8. Netherland's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S.

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run				
Δtb_{t-1}	-0.38(0.18)**	-0.28(0.26)	-0.31(0.18)*	-0.39(0.23)
Δtb_{t-2}	-0.20(0.13)			
Δtb_{t-3}				
Δy_t	-0.16(1.32)	-1.09(1.09)	-0.42(1.36)	-1.13(1.16)
Δy_{t-1}	2.24(1.21)*	4.13(2.70)	2.93(1.20)**	2.39(1.71)
Δy_{t-2}		2.12(2.34)		
Δy_{t-3}		1.53(1.51)		
Δy^{US}_{t}	1.11(1.21)	2.07(0.80)**	1.45(1.10)	1.65(1.07)
Δy^{US}_{t-1}	-2.08(1.30)	-1.81(1.17)	-2.87(1.24)**	-2.29(1.33)
Δy^{US}_{t-2}	0.41(0.58)	-0.48(1.05)	0.36(0.59)	0.69(0.61)
Δy^{US}_{t-3}	-2.10(0.54)***	-2.44(0.93)**	-2.48(0.57)***	-2.45(0.57)***
Δrer_t	0.32(0.26)		0.42(0.34)	
$\Delta appr_t$		0.92(0.40)**		0.39(0.60)
$\Delta appr_{t-1}$				0.26(0.16)
$\Delta appr_{t-2}$				-0.30(0.25)
$\Delta depr_t$		-0.47(0.58)		0.77(0.44)*
$\Delta depr_{t-1}$		0.18(0.51)		-0.82(0.55)
$\Delta depr_{t-2}$		1.45(0.43)***		1.42(0.74)*
$\Delta depr_{t-3}$				
dum_fcrisis	0.09(0.10)	0.20(0.11)*	0.05(0.09)	0.09(0.10)
dum_imp	-0.02(0.15)	0.55(0.29)*	0.21(0.21)	0.09(0.28)
dum_ex	0.33(0.19)*	0.02(0.24)	0.16(0.21)	0.14(0.24)
Panel B: Long-run Estimates				
Y	-6.26(4.38)	-10.88(5.25)*	-8.46(6.12)	-13.26(12.34)
Y^{US}	4.56(3.04)	5.65(4.26)	6.05(4.04)	978(9.58)
Rer	1.55(0.66)**		0.91(0.82)	
Appr		-0.40(1.06)		1.07(1.95)
Depr		0.29(0.56)		0.65(1.66)
Constant	1.76(1.69)	8.47(7.91)	2.57(1.80)	2.86(3.49)
Panel C: Diagnostics				
Adj R^2	0.38	0.44	0.36	0.40
F- Test	2.62	2.13	1.19	0.40
t-bound Test	-2.88	-1.24	-2.11	-1.24
ECM	-0.30(0.10)***	-0.41(0.33)	-0.27(0.13)**	-0.19(0.16)
Reset Test (fpvalue)	0.22	1.26	0.53	0.60
LM Test pvalue	0.11	0.01	0.03	0.01
$CS(CS^2)$	S(S♣)	S(S♣)	S(S♣)	U(S)
Wald-SR		-0.23(1.22)		-1.03(1.98)
Wald-LR		-0.68		0.43(1.63)
Norm pvalue	0.52	0.91	0.47	0.34
Sample	43	43	43	43
J-curve	No	No	No	No

Table 2B.8.9. Portugal's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S.

Variable	RER-CPI	
	Linear	Non-Linear
Panel A: Short-run Estimates		
Δtb_{t-1}	-0.31(0.12)**	-0.04(0.18)
Δtb_{t-2}		-0.12(0.11)
Δy_t	1.59(1.06)	1.70(1.04)
Δy_{t-1}	-1.94(1.13)*	0.25(0.80)
Δy_{t-2}		1.04(1.01)
Δy_{t-3}		3.57(0.94)***
$\Delta y^{US}{}_{t}$	1.39(1.11)	0.27(0.93)
$\Delta y^{US}{}_{t-1}$		6.62(1.89)***
$\Delta y^{US}{}_{t-2}$		2.65(1.79)
$\Delta y^{US}{}_{t-3}$		1.91(1.38)
Δrer_{t}	-0.03(0.62)	
Δrer_{t-1}	<-0.01(0.04)	
Δrer_{t-2}	0.13(0.03)***	
$\Delta appr_{t}$		-1.88(0.80)**
$\Delta appr_{t-1}$		-0.11(0.06)*
$\Delta appr_{t-2}$		-0.04(0.05)
$\Delta appr_{t-3}$		-0.11(0.05)**
$\Delta depr_{t}$		0.57(0.61)
$\Delta depr_{t-1}$		-1.10(0.94)
$\Delta depr_{t-2}$		-2.08(0.55)***
dum_fcrisis	0.04(0.21)	-0.34(0.20)
dum_imp	-4.08(3.75)	0.20(3.55)
dum_ex	3.77(1.48)**	-8.89(3.16)**
Panel B: Long-run Estimates		
Y	-0.45(1.21)	0.58(0.36)
Y^{US}	4.53(1.57)***	-4.07(1.06)***
Rer	2.09(0.93)**	
Appr		-1.24(0.33)***
Depr		2.01(0.27)***
Constant	-10.14(3.08)***	16.62(5.57)***
Panel C: Diagnostics		
Adj R^2	0.41	0.74
F- Test	7.00***	116.10
t-bound Test	-2.61	-6.10
ECM	-0.36(0.14)**	-1.44(0.24)***
Reset Test (fpvalue)	0.66	0.20
LM Test pvalue	0.02	0.64
$CS(CS^2)$	U(S)	S(S)
Wald-SR		0.47(1.29)
Wald-LR		-3.24(0.29)***
Norm pvalue	0.84	0.56
Sample	44	43
J-curve	No	Yes

Table 2B.8.10. Spain's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S.

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	-0.40(0.13)***	0.16(0.23)	-0.52(0.12)***	-0.26(0.16)
Δtb_{t-2}		0.29(0.17)		
Δtb_{t-3}				
Δy_{t}	-1.30(0.41)***	0.54(0.74)	-1.45(0.43)***	0.58(0.64)
Δy_{t-1}	-1.51(0.54)***		-1.66(0.54)***	-1.18(0.71)
$\Delta y^{US}{}_{t}$	1.76(0.32)***	0.22(0.66)	1.64(0.30)***	0.01(0.52)
$\Delta y^{US}{}_{t-1}$	1.07(0.64)	2.36(0.88)**	1.37(0.62)**	5.23(0.85)***
$\Delta y^{US}{}_{t-2}$	0.58(0.44)	2.37(0.67)***	0.84(0.47)*	4.13(0.63)***
$\Delta y^{US}{}_{t-3}$	-0.99(0.45)**		-0.92(0.50)*	1.50(0.67)**
Δrer_{t}	0.30(0.24)		0.46(0.25)*	
$\Delta appr_{t}$		0.03(0.42)		-0.60(0.46)
$\Delta appr_{t-1}$		0.09(0.02)***		0.12(0.03)***
$\Delta appr_{t-2}$		0.06(0.02)***		0.07(0.02)**
$\Delta depr_{t}$		1.27(0.59)**		1.80(0.56)***
$\Delta depr_{t-1}$		-1.32(0.45)***		-1.32(0.68)*
$\Delta depr_{t-2}$		-1.60(0.42)***		-1.50(0.70)**
$\Delta depr_{t-3}$		-0.50(0.44)		-0.54(0.57)
dum_fcrisis	-0.15(0.07)*	0.08(0.08)	-0.18(0.07)**	-0.14(0.14)
dum_imp	-2.45(1.37)*	-2.68(2.60)	-2.66(1.39)*	-6.40(2.02)***
dum_ex	3.70(0.54)***	2.78(1.16)**	4.75(0.70)***	3.40(1.44)**
Panel B: Long-run Estimates				
Y	-0.71(1.33)	1.00(0.28)***	-2.35(4.70)	1.77(0.30)***
Y^{US}	2.15(1.07)*	-2.17(0.50)***	2.15(3.58)	-3.97(0.65)***
Rer	3.82(2.37)		12.85(22.15)	
Appr		0.41(0.22)*		0.50(0.23)*
Depr		1.64(0.24)***		2.48(0.22)***
Constant	-4.79(1.10)***	4.22(1.28)***	-4.45(1.07)***	7.98(1.85)***
Panel C: Diagnostics				
Adj R^2	0.53	0.62	0.54	0.77
F- Test	3.31	79.11	0.16	91.80
t-bound Test	-1.64	-6.72	-0.61	-4.54
ECM	-0.19(0.12)	-1.17(0.17)***	-0.07(0.12)	-1.15(0.25)***
Reset Test (fpvalue)	0.42	0.25	0.44	1.01
LM Test pvalue	0.03	<0.01	0.17	0.23
$CS(CS^2)$	S(S)	S(S)	S(S)	S(S)
Wald-SR		2.33(1.24)*		1.14(1.95)
Wald-LR		-1.24(0.14)***		-1.98(0.21)***
Norm pvalue	0.76	0.52	0.83	0.47
Sample	43	43	42	39
J-curve	No	Yes	No	Yes

Table 2B.8.11. Australia's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S.

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	-0.05(0.12)	0.08(0.14)	0.08(0.13)	0.18(0.16)
Δtb_{t-2}	-0.16(0.11)			
Δy_{t}	-1.20(1.07)	-0.92(1.28)	-0.73(0.79)	-1.23(1.02)
Δy_{t-1}		2.18(1.57)		
Δy_{t-2}		1.90(1.13)		
$\Delta y^{US}{}_{t}$	-0.15(0.59)	-0.05(1.01)	-0.22(0.51)	-0.57(0.61)
$\Delta y^{US}{}_{t-1}$	-0.62(0.51)	-1.85(0.79)**	-1.16(0.64)*	-0.84(0.67)
$\Delta y^{US}{}_{t-2}$		-2.47(0.76)***	-0.59(0.50)	-1.30(0.59)**
Δrer_{t}	0.37(0.16)**		0.57(0.21)	
Δrer_{t-1}			-0.32(0.28)	
Δrer_{t-2}			-0.41(0.27)	
$\Delta appr_{t}$		0.33(0.36)		0.21(0.48)
$\Delta appr_{t-1}$		-0.60(0.22)**		-1.17(0.29)***
$\Delta appr_{t-2}$		-0.44(0.42)		-0.89(0.62)
$\Delta appr_{t-3}$				-0.57(0.39)
$\Delta depr_{t}$		1.09(0.47)*		1.70(0.46)***
$\Delta depr_{t-1}$		-0.75(0.41)*		-0.31(0.47)
$\Delta depr_{t-2}$		-1.56(0.45)***		-0.93(0.34)**
$\Delta depr_{t-3}$		-1.10(0.60)*		-0.85(0.41)*
dum_fcrisis	-0.10(0.07)	-0.23(0.10)**	-0.12(0.07)	-0.26(0.06)***
Panel B: Long-run Estimates				
Y	-3.26(1.39)**	-4.97(0.91)***	-2.53(0.84)***	-3.08(0.61)***
Y^{US}	2.63(1.34)*	2.32(0.68)***	1.93(0.80)**	1.44(0.46)***
Rer	0.32(0.25)		0.77(0.23)***	
Appr		0.78(0.22)***		1.12(0.22)***
Depr		1.80(0.53)***		1.73(0.38)***
Constant	0.86(0.41)**	9.35(2.76)***	1.11(0.35)***	6.58(1.94)***
Panel C: Diagnostics				
Adj R^2	0.37	0.43	0.42	0.48
F- Test	9.33	36.07	18.09	52.60
t-bound	-3.78	-9.19	-5.08	-6.63
$\overline{E}$CM	-0.44(0.12)***	-0.93(0.10)	-0.65(0.13)	-1.10(0.17)***
Reset Test	2.00	1.65	1.99	0.64
LM Test	0.11	0.08	0.04	0.10
$CS(CS^2)$	S(S)	S(S)	S(S)	S(S♣)
Wald-SR		1.61(1.57)		
Wald-LR		-1.02(0.35)***		-0.61(0.20)***
Norm	0.80	0.92	0.53	0.92
Sample	44	43	44	43
J-curve	No	Yes	No	Yes

Table 2B.8.12. Canada's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S.

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	0.20(0.22)	0.04(018)	0.30(0.24)	0.22(0.20)
Δy_t	-0.04(0.35)	0.09(0.39)	0.06(0.39)	0.24(0.39)
Δy_{t-1}	0.28(0.14)*	0.65(0.30)**	0.36(0.19)*	0.63(0.32)*
Δy_{t-2}	-0.14(0.13)			
Δy_{t-3}	-0.32(0.18)*			
$\Delta y^{US}{}_{t}$	-0.26(0.48)	-0.60(0.55)	-0.20(0.60)	-0.47(0.54)
$\Delta y^{US}{}_{t-1}$		-0.60(0.52)		-0.47(0.54)
$\Delta y^{US}{}_{t-2}$		-0.70(0.41)		-0.43(0.21)*
$\Delta y^{US}{}_{t-3}$		-1.04(0.38)**		-0.46(0.28)
Δrer_{t}	0.00(0.13)		0.16(0.18)	
Δrer_{t-1}	-0.40(0.09)***		-1.15(0.17)***	
Δrer_{t-2}			-0.62(0.21)***	
Δrer_{t-3}			-0.48(0.21)**	
$\Delta appr_{t}$		1.08(0.32)***		0.93(0.44)**
$\Delta appr_{t-1}$		0.13(0.39)		-0.66(0.30)**
$\Delta appr_{t-2}$		0.27(0.32)		
$\Delta appr_{t-3}$		1.18(0.42)***		
$\Delta depr_{t}$		-1.25(0.51)**		-0.44(0.30)
$\Delta depr_{t-1}$		-0.33(0.34)		-0.79(0.30)**
$\Delta depr_{t-2}$		0.45(0.30)		-0.43(0.26)
$\Delta depr_{t-3}$		-1.12(0.36)***		-0.81(0.25)***
dum_fcrisis	-0.01(0.04)	0.03(0.05)	0.01(0.03)	0.04(0.06)
Panel B: Long-run Estimates				
Y	-1.00(0.63)	-1.17(0.90)	-1.01(0.33)***	-0.48(0.50)
Y^{US}	0.53(0.44)	2.50(1.21)*	0.71(0.27)**	0.59(0.52)
Rer	0.88(0.32)***		1.79(0.32)***	
Appr		0.26(0.48)		1.32(0.32)***
Depr		-0.92(1.14)		1.04(0.43)**
Constant	0.90(0.32)***	-1.46(1.14)	0.90(0.22)***	-0.03(0.41)
Panel C: Diagnostics				
Adj R^2	0.23	0.44	0.35	0.40
F- Test	2.73	3.52	13.09	5.53
t-bound Test	-3.27	-3.24	-5.54	-5.22
ECM	-0.40(0.12)***	-0.34(0.10)***	-0.63(0.11)***	-0.58(0.11)***
Reset Test (fpvalue)	2.13	0.48	3.38*	1.48
LM Test pvalue	0.01	0.23	0.16	0.02
$CS(CS^2)$	S(S)	S(S)	S(S)	S(S)
Wald-SR		4.92(1.69)***		2.74(0.92)***
Wald-LR		1.17(0.71)		0.28(0.25)
Norm pvalue	0.85	0.91	0.90	0.18
Sample	43	43	43	43
J-curve	No	Yes-SR	Yes	Yes

Note: U.S. is also Canada's largest trading partner

Table 2B.8.13. Denmark's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S.

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	-0.38(0.16)**	-0.15(0.12)	-0.22(0.14)	-0.28(0.21)
Δtb_{t-2}	-0.22(0.14)			-0.16(0.14)
Δy_t	-0.75(0.30)**	-0.23(0.30)	-0.50(0.28)*	-0.66(0.32)*
Δy_{t-1}	-1.04(0.43)**		-0.73(0.34)**	-1.20(0.51)**
Δy_{t-2}	-0.72(0.41)			-0.93(0.40)**
Δy_{t-3}	-0.42(0.21)*			
Δy^{US}_{t}	0.77(0.45)	0.20(0.42)	0.63(0.45)	0.17(0.59)
Δy^{US}_{t-1}				1.24(0.48)**
Δy^{US}_{t-2}				0.94(0.82)
Δrer_{t}	0.64(0.26)**		0.89(0.31)***	
Δrer_{t-1}			0.34(0.24)	
$\Delta appr_{t}$		-0.02(0.42)		-0.13(0.69)
$\Delta appr_{t-1}$		-0.44(0.40)		
$\Delta appr_{t-2}$		-0.56(0.35)		
$\Delta depr_{t}$		1.08(0.43)**		1.48(0.45)***
$\Delta depr_{t-1}$				-1.03(0.55)*
dum_fcrisis	0.12(0.08)	0.13(0.06)**	0.15(0.07)**	0.09(0.07)
Panel B: Long-run Estimates				
Y	-2.77(1.33)**	-1.26(0.69)*	-2.59(1.92)	
Y^{US}	3.39(1.13)***	-0.17(0.77)	4.23(1.93)**	
Rer	5.52(1.71)***		7.36(3.73)*	
Appr		1.69(0.46)***		
Depr		2.85(0.43)***		
Constant	-3.01(0.64)***	3.56(1.11)***	-2.64(0.62)***	5.52(1.32)***
Panel C: Diagnostics				
Adj R^2	0.54	0.52	0.45	0.57
F- Test	9.31	42.43	2.29	61.35
t-bound Test	-3.02	-5.13	-1.95	-5.21
ECM	-0.26	-0.57(0.11)	-0.13(0.07)*	-0.66(0.13)***
Reset Test (fpvalue)	0.40	0.22	1.83	0.12
LM Test pvalue	0.41	0.75	0.04	0.04
$CS(CS^2)$	S(S)	S(S)	S(S♣)	S(S)
Wald-SR		-2.10(0.90)**		-0.58(1.14)
Wald-LR		-1.16(0.19)		-1.78(0.22)***
Norm pvalue	0.71	0.79	0.59	0.44
Sample	39	42	41	40
J-curve	No	Yes	No	No

Table 2B.8.14. Japan's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S.

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	0.29(0.14)*	0.24(0.12)*	0.24(0.13)*	0.20(0.11)*
Δy_t	-0.33(0.31)	-0.56(0.37)	-0.52(0.32)	-0.72(0.35)**
$\Delta y^{US}{}_t$	0.57(0.79)	0.96(0.70)	0.86(0.70)	1.22(0.64)*
$\Delta y^{US}{}_{t-1}$		-0.93(0.62)		
Δrer_t	-0.05(0.15)		0.05(0.15)	
$\Delta appr_t$		-0.23(0.36)		-0.09(0.33)
$\Delta depr_t$		0.16(0.22)		0.21(0.24)
dum_fcrisis	-0.07(0.08)	-0.12(0.09)	-0.06(0.08)	-0.11(0.09)
Panel B: Long-run Estimates				
Y	1.26(0.54)**	1.48(0.57)**	1.39(0.58)**	1.63(0.67)**
Y^{US}	-0.32(0.31)	-0.02(0.60)	-0.49(0.38)	-0.14(0.71)
Rer	0.36(0.44)		0.63(0.49)	
Appr		0.55(0.46)		0.86(0.57)
Depr		0.34(0.45)		0.61(0.50)
Constant	-2.59(1.13)**	-2.34(1.16)	-2.79(0.97)***	-2.08(1.20)*
Panel C: Diagnostics				
Adj R^2	0.23	0.23	0.27	0.26
F- Test	5.41	3.77	4.12	2.57
t-bound Test	-2.76	-2.83	-2.75	-2.87
ECM	-0.50(0.18)	-0.44(0.16)***	-0.45(0.16)***	-0.39(0.14)***
Reset Test	2.45	2.65	1.53	1.96
LM Test pvalue	0.24	0.67	0.30	0.86
$CS(CS^2)$	S(S)	S(S)	S(S)	S(S)
Wald-SR		-0.39(0.50)		-0.30(0.49)
Wald-LR		0.21(0.24)		0.25(0.32)
Norm pvalue	0.32	0.80	0.46	0.93
Sample	45	45	45	45
J-curve	No	No	No	No

Note: U.S. is also Japan's largest trading partner.

Table 2B.8.15. Korea's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S.

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	-0.22(0.22)	-0.32(0.16)*	-0.33(0.12)**	-0.28(0.16)*
Δtb_{t-2}	0.14(0.15)			
Δy_t	-0.05(0.58)	0.04(0.48)	-0.03(0.50)	-0.08(0.50)
Δy_{t-1}	<0.01(0.75)			
Δy_{t-2}	-0.20(0.71)			
$\Delta y^{US}{}_t$	-0.09(0.96)	0.03(1.08)	0.20(0.68)	-0.11(063)
Δrer_t	0.82(0.28)***		0.93(0.33)***	
Δrer_{t-1}	-0.44(0.48)			
Δrer_{t-2}	-0.48(0.42)			
$\Delta appr_t$		0.76(0.76)		0.52(0.89)
$\Delta depr_t$		0.88(0.38)**		1.25(0.45)**
$\Delta depr_{t-1}$		-0.70(0.32)**		
$\Delta depr_{t-2}$		-0.47(0.36)		
dum_fcrisis	-0.05(0.18)	-0.04(0.17)	-0.12(0.09)	-0.23(0.12)*
Panel B: Long-run Estimates				
Y	0.34(0.34)	0.39(0.41)	0.25(0.62)	0.99(0.52)*
Y^{US}	-1.58(0.93)	-1.62(0.99)	-3.00(3.14)	-3.38(1.88)*
Rer	3.00(0.96)***		4.74(3.02)	
Appr		3.43(0.94)***		5.93(2.61)**
Depr		3.37(0.99)***		4.03(1.96)**
Constant	-7.26(2.61)***	2.75(1.71)	-4.48(1.73)**	3.85(1.92)*
Panel C: Diagnostics				
Adj R^2	0.37	0.42	0.30	0.34
F- Test	4.21	5.54	1.72	3.17
t-bound Test	-3.26	-4.20	-1.98	-2.72
ECM	-0.49(0.15)***	-0.46(0.11)***	-0.22(0.11)*	-0.31(0.11)**
Reset Test (fpvalue)	0.85	1.01	0.37	0.44
LM Test pvalue	0.31	0.30	0.57	0.90
$CS(CS^2)$	S(S)	S(S)	S♣(S)	S(S)
Wald-SR		1.05(1.01)		-0.73(1.16)
Wald-LR		0.07(0.51)		1.90(1.00)*
Norm pvalue	0.20	0.44	<0.01	0.08
Sample	44	44	45	45
J-curve	Yes	Yes	No	No

Note: Korea's largest trading partner is also the U.S.

Table 2B.8.16. New Zealand's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S.

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	0.07(0.18)	0.34(0.20)	0.27(0.20)	0.14(0.27)
Δtb_{t-2}		0.33(0.20)	0.26(0.18)	0.09(0.21)
Δtb_{t-3}				-0.25(0.19)
Δy_t	1.33(0.76)*	1.17(0.63)*	1.33(0.63)**	1.19(0.57)*
Δy_{t-1}	0.21(0.87)	-0.72(0.88)	-0.01(0.78)	-0.32(1.41)
Δy^{US}_t	-3.32(1.11)***	-4.21(1.07)***	-3.48(1.10)***	-3.72(1.13)***
Δrer_t	0.24(0.25)		0.10(0.31)	
Δrer_{t-1}	-0.51(0.21)**		-0.59(0.29)*	
$\Delta appr_t$		-0.64(0.38)		-1.20(0.75)
$\Delta appr_{t-1}$				-0.42(0.59)
$\Delta appr_{t-2}$				0.20(0.97)
$\Delta depr_t$		0.42(0.58)		0.60(0.72)
$\Delta depr_{t-1}$		-0.71(0.42)		-0.75(0.90)
dum_fcrisis	-0.10(0.14)	-0.33(0.17)*	-0.14(0.13)	-0.33(0.19)*
Panel B: Long-run Estimates				
Y	1.42(1.30)	2.15(1.03)**	1.69(0.85)*	1.61(1.81)
Y^{US}	-0.69(0.67)	-0.71(0.49)	-0.77(0.38)*	-.22(0.71)
Rer	0.63(0.22)***		0.53(0.25)**	
Appr		0.25(0.26)		0.43(0.46)
Depr		-0.01(0.47)		0.07(0.79)
Constant	-2.88(2.76)	-6.28(4.25)	-4.50(2.62)	-4.43(4.87)
Panel C: Diagnostics				
Adj R^2	0.35	0.39	0.41	0.35
F- Test	3.25	3.11	4.23	1.93
t-bound Test	-3.85	-4.62	-4.51	-2.68
ECM	-0.80(0.21)***	-1.03(0.22)***	-1.02(0.23)***	-0.78(0.29)**
Reset Test (fpvalue)	0.85	0.54	0.37	2.25
LM Test pvalue	0.30	0.87	0.73	0.34
$CS(CS^2)$	S(S)	S(S)	S(S)	U(S)
Wald-SR		-0.34(0.75)		-1.26(2.00)
Wald-LR		0.26(0.27)		0.36(0.48)
Norm pvalue	0.90	0.86	0.57	0.99
Sample	38	38	38	38
J-curve	No	No	No	No

Table 2B.8. 17. Norway's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S.

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	-0.13(0.15)	0.02(0.15)	0.05(0.18)	0.25(0.20)
Δtb_{t-2}				0.38(0.16)**
Δy_t	-1.20(2.02)	-0.45(2.05)	-2.71(2.50)	-0.93(1.84)
Δy_{t-1}			-1.73(2.86)	-3.27(1.43)**
$\Delta y^{US}{}_t$	2.42(1.36)*	2.19(1.22)*	2.78(1.69)	3.46(1.56)**
$\Delta y^{US}{}_{t-1}$		-0.01(1.33)	1.02(1.86)	0.23(1.07)
$\Delta y^{US}{}_{t-2}$		-2.31(0.99)**	-1.41(2.21)	02.33(0.93)**
Δrer_t	0.30(0.57)		0.14(0.50)	
Δrer_{t-1}	0.21(0.50)		0.32(0.75)	
Δrer_{t-2}	-1.16(0.55)**		-1.35(0.62)**	
$\Delta appr_t$		-0.27(1.08)		-1.59(1.01)
$\Delta appr_{t-1}$		1.66(0.69)**		-0.45(1.43)
$\Delta appr_{t-2}$		-3.52(0.74)***		-4.75(1.37)***
$\Delta appr_{t-3}$				-3.46(1.15)***
$\Delta depr_t$		-1.00(0.63)		1.95(1.39)
$\Delta depr_{t-1}$		1.42(1.46)		3.68(3.25)
$\Delta depr_{t-2}$		3.66(1.06)***		6.68(1.87)***
$\Delta depr_{t-3}$		1.44(1.01)		3.80(1.65)**
dum_fcrisis	0.14(0.15)	0.11(0.20)	0.28(0.21)	0.18(0.24)
Panel B: Long-run Estimates				
Y	1.43(0.98)	-0.58(0.70)	-0.40(1.23)	-0.30(0.56)
Y^{US}	-1.53(1.38)	6.75(2.42)**	0.88(1.19)	5.63(2.57)**
Rer	1.11(1.81)		1.55(0.44)***	
Appr		0.06(1.05)		0.82(0.37)**
Depr		-3.29(1.87)*		-2.78(1.98)
Constant	-0.42(2.08)	-15.52(4.17)***	-3.18(1.90)	-24.17(11.99)*
Panel C: Diagnostics				
Adj R^2	0.16	0.56	0.21	0.65
F- Test	0.84	12.02	5.36	30.46
t-bound Test	-2.52	-5.13	-3.28	-5.31
ECM	-0.35(0.14)**	-0.65(0.13)***	-0.65(0.20)***	-1.15(0.22)***
Reset Test (fpvalue)	0.71	0.60	1.16	0.34
LM Test pvalue	0.94	0.14	0.07	0.01
$CS(CS^2)$	S(S)	S(S)	U(S)	S(S)
Wald-SR		-7.64(3.71)*		-26.36(9.09)**
Wald-LR		3.35(0.95)***		3.60(1.64)**
Norm pvalue	0.83	0.76	0.34	0.78
Sample	44	43	37	36
J-curve	No	No	Yes	Yes

Table 2B.8.18. Sweden's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S.

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	-0.21(0.14)	-0.14(0.11)	-0.26(0.20)	-0.20(0.15)
Δtb_{t-2}	-0.29(0.11)**	-0.25(0.09)**	-0.27(0.16)*	-0.33(0.11)***
Δy_{t}	0.35(0.66)	0.28(0.45)	-0.08(0.86)	0.02(0.48)
Δy_{t-1}	-1.19(0.59)*		-1.64(0.49)***	
Δy_{t-2}			-0.92(0.78)	
Δy_{t-3}			0.76(0.28)**	
Δy^{US}_{t}	1.13(0.66)*	1.89(0.56)***	1.45(0.82)*	2.44(0.48)***
Δy^{US}_{t-1}			-0.09(0.68)	-0.83(0.60)
Δy^{US}_{t-2}			1.59(0.75)**	
Δrer_{t}	0.33(0.17)*		0.59(0.28)**	
Δrer_{t-1}	0.09(0.37)		0.37(0.46)	
Δrer_{t-2}	-0.04(0.17)		0.31(0.32)	
Δrer_{t-3}	0.51(0.27)*		0.95(0.34)**	
$\Delta appr_{t}$		-0.35(0.58)		0.32(0.54)
$\Delta appr_{t-1}$		-1.24(0.44)***		-1.24(0.56)**
$\Delta appr_{t-2}$		-1.23(0.31)***		-0.91(0.34)**
$\Delta depr_{t}$		0.66(0.41)		0.49(0.42)
dum_fcrisis	-0.18(0.15)	-0.03(0.09)	-0.23(0.13)*	<0.01(0.10)
Panel B: Long-run Estimates				
Y	-6.56(13.34)	-1.93(1.15)	1.59(5.90)	-3.71(2.58)
Y^{US}	4.85(8.72)	2.91(1.04)***	0.71(4.58)	6.26(2.84)**
Rer	5.00(6.89)		-3.29(8.60)	
Appr		2.02(0.60)***		4.19(1.71)**
Depr		1.67(0.47)***		2.94(1.37)**
Constant	-0.11(1.19)	-2.16(1.53)	0.33(1.47)	-3.50(1.61)**
Panel C: Diagnostics				
Adj R^2	0.52	0.62	0.51	0.56
F- Test	1.88	73.07	1.57	19.33
t-bound Test	-0.54	-3.26	0.57	-2.22
ECM	-0.11(0.20)	-0.63(0.19)***	0.11(0.20)	-0.38(0.17)**
Reset Test (fpvalue)	0.46	0.53	2.82*	0.26
LM Test pvalue	0.62	0.04	0.24	0.04
CS(CS^2)	U(S)	U(S)	U(S)	U(S)
Wald-SR		-3.48(1.08)***		-2.32(1.10)**
Wald-LR		0.34(0.22)		1.25(0.54)**
Norm pvalue	0.92	0.55	0.93	0.67
Sample	43	44	42	43
J-curve	Yes-SR	Yes	Yes-SR	Yes

Table 2B.8.19. Switzerland's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S.

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	-0.03(0.13)	0.21(0.23)	-0.07(0.12)	0.20(0.23)
Δy_t	-0.37(1.18)	-0.76(0.73)	-0.31(1.21)	-1.59(0.98)
Δy_{t-1}		-1.60(1.17)		-1.02(0.83)
Δy_{t-2}		-1.00(0.83)		-1.83(1.00)*
Δy_{t-3}		-1.21(0.88)		
$\Delta y^{US}{}_t$	-0.22(0.96)	0.42(0.79)	-0.21(0.97)	0.61(0.92)
$\Delta y^{US}{}_{t-1}$	0.49(0.81)	2.71(0.70)***		3.65(0.71)***
$\Delta y^{US}{}_{t-2}$		1.07(0.99)		2.25(1.17)*
$\Delta y^{US}{}_{t-3}$		2.22(0.80)**		2.17(0.71)***
Δrer_t	-0.17(0.27)		-0.29(0.28)	
$\Delta appr_t$		-1.88(0.50)***		-1.29(0.51)**
$\Delta appr_{t-1}$		0.03(0.57)		-0.27(0.66)
$\Delta appr_{t-2}$		-1.08(0.42)**		-1.09(0.34)***
$\Delta depr_t$		2.32(0.59)***		1.16(0.42)**
dum_fcrisis	-0.09(0.10)	0.20(0.13)	-0.12(0.10)	0.12(0.11)
Panel B: Long-run Estimates				
Y	0.05(0.71)	0.68(0.46)	-0.11(0.68)	-0.11(0.36)
Y^{US}	0.48(0.55)	-2.29(0.72)***	0.52(0.54)	-2.60(0.74)***
Rer	0.52(0.57)		0.61(0.67)	
Appr		0.49(0.27)*		0.20(0.21)
Depr		1.70(0.42)***		1.76(0.51)***
Constant	-1.30(0.82)	5.69(2.61)**	-0.93(0.66)	10.77***
Panel C: Diagnostics				
Adj R^2	0.15	0.51	0.18	0.45
F- Test	1.37	9.74	1.40	10.19
t-bound Test	-4.70	-5.60	-4.52	-5.74
ECM	-0.58(0.12)***	-0.95(0.17)***	-0.55(0.12)	-1.06(0.18)***
Reset Test	0.32	2.14	0.08	0.90
LM Test pvalue	0.30	0.31	0.60	0.07
$CS(CS^2)$	S(S)	S(S)	S(S)	S(S)
Wald-SR		-5.25(1.10)***		-3.81(1.07)***
Wald-LR		-1.20(0.37)***		-1.56(0.44)***
Norm pvalue	0.91	0.76	0.96	0.87
Sample	45	45	45	45
J-curve	No	Yes	No	No

Table 2B.8.20. United Kingdom's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S.

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	-0.04(0.13)	-0.02(0.11)	0.04(0.10)	0.01(0.13)
Δtb_{t-2}		0.20(0.15)	0.28(0.1	0.61(0.18)***
Δtb_{t-3}			00.29(0.16)*	0.32(0.19)
Δy_{t}	0.45(0.73)	-0.17(0.77)	0.96(0.80)	1.22(1.10)
Δy_{t-1}	-1.48(0.50)***	-2.52(0.83)***	-1.77(0.54)***	-0.68(1.86)
Δy_{t-2}		-1.82(1.07)*	-0.96(0.95)	-2.02(1.57)
Δy_{t-3}				1.90(1.34)
$\Delta y^{US}{}_{t}$	-1.28(0.86)	-0.88(0.77)	-1.57(0.99)	-1.85(0.92)*
$\Delta y^{US}{}_{t-1}$		0.47(0.59)		-2.08(1.31)
$\Delta y^{US}{}_{t-2}$		1.38(0.50)**		2.21(0.65)***
$\Delta y^{US}{}_{t-3}$				-2.28(1.00)**
Δrer_{t}	-0.18(0.23)		-0.20(0.21)	
Δrer_{t-1}	0.50(0.31)			
Δrer_{t-2}	0.08(0.20)			
Δrer_{t-3}	0.44(0.24)*			
$\Delta appr_{t}$		-0.97(0.33)***		-1.71(0.44)***
$\Delta appr_{t-1}$				0.32(0.81)
$\Delta appr_{t-2}$				1.32(0.75)*
$\Delta depr_{t}$		0.91(0.36)**		0.85(0.52)
$\Delta depr_{t-1}$				-0.63(0.52)
$\Delta depr_{t-2}$				-0.07(0.48)
$\Delta depr_{t-3}$				1.07(0.44)**
dum_fcrisis	-0.23(0.11)**	-0.23(0.10)**	-0.11(0.08)	-0.17(0.09)*
Panel B: Long-run Estimates				
Y	0.45(1.48)	1.78(1.45)	1.56(1.19)	-0.07(2.61)
Y^{US}	-0.10(0.59)	-1.09(1.67)	-0.30(0.39)	0.07(1.71)
Rer	-0.69(1.61)		0.56(0.67)	
Appr		1.21(0.88)		-0.98(1.21)
Depr		1.61(1.05)		-1.06(1.73)
Constant	-0.41(1.00)	-1.12(1.15)	-2.38(1.45)	0.02(2.61)
Panel C: Diagnostics				
Adj R^2	0.23	0.31	0.18	0.44
F- Test	0.31	1.40	1.24	3.09
t-bound Test	-2.79	-2.00	-3.65	-3.54
ECM	-0.24(0.09)***	-0.31(0.15)*	-0.44(0.12)***	-0.47(0.13)***
Reset Test (fpvalue)	0.75	1.15	0.29	0.24
LM Test pvalue	0.05	0.61	0.07	0.09
$CS(CS^2)$	S(S)	U(S)	S(S)	S(S♣)
Wald-SR		-1.88(0.62)***		-1.28(1.23)
Wald-LR		-0.40(0.62)		0.09(0.61)
Norm pvalue	0.64	0.98	0.86	0.74
Sample	43	44	43	43
J-curve	Yes-SR	No	No	Yes-SR

Table 2B.8.21. Malaysia's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S.

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	-0.11(0.12)	-0.75(0.34)**	0.10(0.11)	-1.31(0.90)
Δtb_{t-2}		-0.37(0.14)**		-1.40(0.71)
Δtb_{t-3}		-0.20(0.19)		-0.29(0.35)
Δy_t	0.01(0.16)	0.21(0.28)	0.37(0.51)	1.17(1.20)
Δy_{t-1}		-0.45(0.22)*	-0.31(0.12)**	-3.08(3.69)
Δy_{t-2}			0.09(0.18)	-0.52(1.33)
Δy_{t-3}				0.88(1.17)
$\Delta y^{US}{}_{t}$	0.50(1.28)	0.28(0.98)	-074(0.74)	-4.89(5.29)
$\Delta y^{US}{}_{t-1}$	1.58(0.46)***	6.46(1.53)***	2.18(0.92)**	9.05(4.92)
$\Delta y^{US}{}_{t-2}$	1.77(0.54)***	3.83(1.23)***		8.34(4.32)
$\Delta y^{US}{}_{t-3}$		2.59(0.83)***		3.03(1.43)
Δrer_{t}	0.38(0.61)		0.10(0.41)	
Δrer_{t-1}	-0.23(0.35)			
Δrer_{t-2}	-0.66(0.30)**			
$\Delta appr_{t}$		0.53(0.67)		3.07(2.86)
$\Delta appr_{t-1}$		0.80(0.65)		3.07(2.85)
$\Delta appr_{t-2}$		-1.04(0.74)		7.11(4.16)
$\Delta appr_{t-3}$				3.30(1.60)
$\Delta depr_{t}$		0.62(0.69)		-1.09(1.02)
$\Delta depr_{t-1}$		-2.14(0.65)***		-3.31(1.61)
$\Delta depr_{t-2}$		-1.45(0.38)***		-2.70(2.08)
$\Delta depr_{t-3}$		-1.00(0.34)***		
dum_fcrisis	-0.06(0.12)	0.02(0.12)	0.00(0.11)	-0.03(0.43)
Panel B: Long-run Estimates				
Y	0.63(0.26)**	22.92(303.06)	0.56(0.26)**	6.55(18.60)
Y^{US}	-2.40(0.96)**	-255.49(3305.85)	-1.11(0.73)	-25.55(73.43)
Rer	2.32(0.80)***		1.31(0.35)	
Appr		43.70(585.92)		2.61(5.48)
Depr		189.20(2448.49)		10.23(25.01)
Constant	2.60		1.61(1.84)	28.28(17.41)
Panel C: Diagnostics				
Adj R^2	0.28	0.35	0.44	0.34
F- Test	4.95	0.02	24.63	
t-bound Test	-3.32	0.08	-4.09	-0.43
ECM	-0.42(0.13)***	0.02(0.28)	-0.89(0.22)	-0.33(0.80)
Reset Test (fpvalue)	0.17	0.15	2.01	1.37
LM Test pvalue	0.23	0.04	0.10	<0.01
CS(CS^2)	S(S♣)	S♣(S)	S(S)	S(S♣)
Wald-SR		4.26(1.62)**		12.39(8.82)
Wald-LR		-145.49(1862.78)		-7.62(19.88)
Norm pvalue	0.59	0.01	0.67	0.65
Sample	44	44	32	32
J-curve	Yes	No	No	No

Note: Malaysia's largest trading partner is U.S.

Table 2B.8.22. Hungary's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S.

Variables	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	0.76(0.42)	-0.13(0.22)	-0.07(0.16)	0.35(0.56)
Δtb_{t-2}	0.84(0.38)*	-0.73(0.14)**		0.44(0.48)
Δtb_{t-3}	0.21(0.16)	-0.87(0.07)***		-0.28(0.25)
Δy_{t}	-1.69(0.57)**	-0.15(0.54)	-0.94(0.67)	-3.32(1.84)
Δy_{t-1}	0.21(0.54)	0.39(0.20)		0.32(1.23)
Δy_{t-2}	0.74(0.64)	1.30(0.37)*		0.14(1.01)
Δy_{t-3}	-1.31(0.39)***	-3.23(0.42)**		-4.50(1.95)
$\Delta y^{US}{}_{t}$	2.01(2.09)	-7.55(1.18)**	3.95(3.10)	-0.31(4.31)
$\Delta y^{US}{}_{t-1}$	-5.55(1.62)***	-17.15(1.27)**		-10.48(5.43)
$\Delta y^{US}{}_{t-2}$	2.71(2.03)	-8.75(1.26)**		-7.18(4.45)
$\Delta y^{US}{}_{t-3}$		-2.54(0.84)*		4.42(3.04)
Δrer_{t}	1.09(0.52)*		1.69(0.55)***	
Δrer_{t-1}	-2.21(0.85)**		-1.12(0.50)**	
Δrer_{t-2}	-0.99(0.94)		-0.21(0.90)	
$\Delta appr_{t}$		4.42(0.55)**		3.07(1.69)
$\Delta appr_{t-1}$		4.89(0.77)**		4.23(2.57)
$\Delta appr_{t-2}$		6.95(0.60)***		-0.14(2.94)
$\Delta appr_{t-3}$		-1.26(0.66)		-1.48(1.91)
$\Delta depr_{t}$		-4.86(0.71)**		-0.11(1.30)
$\Delta depr_{t-1}$		-14.04(1.00)***		5.74(3.41)
$\Delta depr_{t-2}$		-10.30(1.04)**		-1.08(1.03)
$\Delta depr_{t-3}$		2.40(0.77)*		2.07(0.86)
dum_fcrisis	-0.42(0.37)	-0.37(0.15)	0.31(0.26)	-0.95(0.74)
Panel B: Long-run Estimates				
Y	-0.47(0.22)*	-0.74(0.14)**	-0.37(0.32)	-0.23(0.19)
Y^{US}	3.4(0.49)***	5.87(0.61)**	2.28(0.57)***	5.67(1.22)**
Rer	1.44(0.28)***		3.11(0.85)***	
Appr		2.90(0.15)***		3.16(0.64)**
Depr		3.31(0.19)***		1.26(0.78)
Constant	-42.01(9.22)***	-39.84(3.33)***	-21.99(8.85)**	-35.40(11.35)*
Panel C: Diagnostics				
Adj R^2	0.66	0.97	0.32	0.84
F- Test	19.56	135.51	7.39	14.15
t-bound Test	-4.14	-7.02	-4.11	-2.20
ECM	-2.05(0.49)***	-1.96**	-0.89(0.22)***	-1.66(0.75)
Reset Test (fpvalue)	1.99	1.80	4.26**	1.19
LM Test pvalue	0.95	0.07	0.61	<0.01
CS(CS^2)	S(S)	S(S)	S(S♣)	S(S)
Wald-SR		41.81(3.14)***		10.54(7.72)
Wald-LR		-0.41(0.10)*		1.90(0.65)
Norm pvalue	0.80	0.13	0.87	0.39
Sample	30	30	31	31
J-curve	Yes	Yes-SR	Yes	Yes

Table 2B.8.23. Poland's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S.

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	-0.76(0.35)*	-0.74(0.21)**	-0.07(0.30)	-0.46(0.10)***
Δtb_{t-2}		0.14(0.17)	0.55(0.27)*	0.24(0.12)*
Δtb_{t-3}		0.28(0.24)	0.21(0.23)	0.25(0.19)
Δy_{t}	-2.69(1.09)**	-0.72(1.46)	-0.82(1.77)	-0.01(1.21)
Δy_{t-1}	0.53(0.95)	-0.55(0.90)	0.58(1.22)	-0.71(0.51)
Δy_{t-2}	-1.80(1.19)	-3.14(1.31)*	-1.49(1.42)	-2.25(0.79)**
Δy_{t-3}	-4.47(1.55)**	-2.92(0.56)***	-3.48(1.14)**	-2.07(0.40)***
$\Delta y^{US}{}_{t}$	11.26(2.47)***	5.35(1.99)**	14.25(3.10)***	6.59(1.53)***
$\Delta y^{US}{}_{t-1}$	-0.39(3.97)	1.55(2.73)	2.33(4.62)	1.96(1.92)
$\Delta y^{US}{}_{t-2}$	-3.35(1.71)*	-1.50(1.17)	-3.93(1.75)*	-4.33(0.58)***
$\Delta y^{US}{}_{t-3}$	3.08(2.39)	1.91(1.77)	2.34(2.44)	
Δrer_{t}	1.09(0.52)*		1.18(0.75)	
Δrer_{t-1}	4.03(1.58)**		0.39(2.22)	
Δrer_{t-2}	4.26(1.91)*		2.45(1.69)	
Δrer_{t-3}	1.20(0.94)			
$\Delta appr_{t}$		2.60(1.21)*		3.61(1.19)**
$\Delta appr_{t-1}$		5.55(1.76)**		3.35(1.00)**
$\Delta appr_{t-2}$		7.24(1.51)***		7.05(1.23)***
$\Delta depr_{t}$		0.12(0.72)		-0.91(0.54)
dum_fcrisis	1.90(0.72)**	2.02(0.63)**	2.61(1.07)**	2.01(0.58)**
Panel B: Long-run Estimates				
Y	4.35(2.72)	10.96(11.30)	-1.26(3.74)	-3.56(2.99)
Y^{US}	-4.95(5.54)	-7.96(12.05)	10.06(13.98)	15.42(8.69)
Rer	4.33(1.40)**		6.35(3.57)	
Appr		5.42(4.39)		7.06(3.11)*
Depr		0.97(5.65)		4.21(2.99)
Constant	0.61(7.07)	1.13(3.78)	-16.47(7.49)*	-11.87(2.46)***
Panel C: Diagnostics				
Adj R^2	0.49	0.73	0.54	0.90
F- Test	4.39	0.53	1.13	1.82
t-bound Test	1.29	0.86	-0.68	-2.13
ECM	0.49(0.38)	0.17(0.19)	-0.34(0.49)	-0.24(0.11)*
Reset Test (fpvalue)	1.41	0.70	1.21	1.40
LM Test pvalue	0.16	<0.01	0.95	0.05
$CS(CS^2)$	S(S)	S(S)	S(S)	S(S)
Wald-SR		15.27(2.89)***		14.91(2.39)***
Wald-LR		4.45(5.95)		2.86(2.13)
Norm pvalue	0.87	0.55	0.98	0.84
Sample	30	30	30	30
J-curve	No	No	No	No

Table 2B.8.24. Turkey's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S.

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	0.26(0.54)	-0.61(0.46)	0.33(0.52)	-3.21(2.79)
Δtb_{t-2}	0.43(0.32)	-0.27(0.31)	0.46(0.31)	-2.42(2.20)
Δtb_{t-3}	0.69(0.25)**	0.30(0.23)	0.70(0.25)**	-1.11(1.32)
Δy_t	-1.01(0.73)	-2.70(0.80)**	-0.80(0.69)	-5.32(2.85)
Δy_{t-1}	-0.53(1.49)	-0.91(1.27)	-0.08(1.28)	-7.02(6.53)
Δy_{t-2}	-0.29(1.23)	-1.60(1.10)	0.05(1.32)	-7.76(1.91)
Δy_{t-3}	1.61(0.87)*	0.79(0.72)	1.91(0.88)*	-0.73(1.91)
$\Delta y^{US}{}_{t}$	0.64(0.91)	0.24(1.42)	0.84(0.92)	0.95(1.95)
$\Delta y^{US}{}_{t-1}$	-0.44(1.93)	3.60(1.59)*	-0.70(1.88)	15.57(12.94)
$\Delta y^{US}{}_{t-2}$	0.50(2.46)	3.46(1.75)*	0.39(2.70)	15.26(10.30)
$\Delta y^{US}{}_{t-3}$	-4.45(1.05)***		-4.69(1.03)***	9.93(10.26)
Δrer_{t}	-0.12(0.46)		-0.06(0.54)	
Δrer_{t-1}	-0.52(0.45)		-0.68(0.52)	
$\Delta appr_{t}$		-0.34(0.41)		-4.69(2.58)
$\Delta appr_{t-1}$				-0.57(1.23)
$\Delta appr_{t-2}$				-7.96(6.20)
$\Delta depr_{t}$		0.11(0.77)		3.98(2.34)
$\Delta depr_{t-1}$		-2.18(1.35)		-7.47(4.76)
$\Delta depr_{t-2}$		-1.41(0.86)		-2.97(1.74)
dum_fcrisis	0.06(0.12)	-0.15(0.17)	0.11(0.13)	-1.33(1.17)
Panel B: Long-run Estimates				
Y	-0.16(1.33)	-11.80(11.40)	-0.50(0.90)	0.17(2.22)
Y^{US}	1.79(1.15)	-5.85(11.66)	1.84(1.04)	8.39(3.31)*
Rer	1.24(1.40)		1.31(1.34)	
Appr		0.17(3.46)		-1.65(1.21)
Depr		14.53(19.01)		-7.62(4.69)
Constant	-5.49(1.61)***	11.91(4.47)**	-4.93(1.95)**	39.94(29.96)
Panel C: Diagnostics				
Adj R^2	0.65	0.62	0.64	0.70
F- Test	24.10	2.20	22.27	52.08
t-bound Test	-2.31	-0.97	-2.55	0.80
ECM	-0.64(0.28)**	-0.22(0.23)	-0.67(0.26)**	1.12(1.41)
Reset Test (fpvalue)	2.04	0.39	2.39	0.65
LM Test pvalue	0.19	0.60	0.05	0.00
$CS(CS^2)$	S(S)	S♣(S)	S(S)	S(S)
Wald-SR		3.13(1.88)		-6.75(7.80)
Wald-LR		-14.35(17.01)		5.97(4.25)
Norm pvalue	0.38	0.63	0.26	0.82
Sample	30	30	30	30
J-curve	No	No	No	No

Table 2B.8.25. Brazil's Bilateral Trade Balance with the U.S.

Variable	RER-CPI	
	Linear	Non-Linear
Panel A: Short-run Estimates		
Δtb_{t-1}	0.07(0.13)	-0.29(0.13)*
Δy_t	-0.71(0.47)	-0.75(0.56)**
Δy_{t-1}	-0.88(0.36)**	-1.21(0.55)
Δy_{t-2}	-1.44(0.60)**	-1.09(0.71)
Δy_{t-3}	-1.19(0.44)**	
$\Delta y^{US}{}_t$	3.17(1.07)***	2.09(1.07)*
$\Delta y^{US}{}_{t-1}$	1.25(0.87)	0.58(1.14)
$\Delta y^{US}{}_{t-2}$		-1.56(0.75)*
$\Delta y^{US}{}_{t-3}$		-1.82(0.68)**
Δrer_t	0.81(0.13)***	
Δrer_{t-1}	-0.77(0.25)***	
Δrer_{t-2}	-0.44(0.18)**	
$\Delta appr_t$		0.89(0.32)**
$\Delta appr_{t-1}$		-0.41(0.48)
$\Delta appr_{t-2}$		0.23(0.34)
$\Delta appr_{t-3}$		0.90(0.21)***
$\Delta depr_t$		0.58(0.36)
$\Delta depr_{t-1}$		-0.34(0.29)
$\Delta depr_{t-2}$		-0.46(0.41)
dum_fc	0.39(0.15)**	0.26(0.11)**
Panel B: Long-run Estimates		
Y	0.89(0.23)***	1.30(1.02)
Y^{US}	-0.69(0.22)***	1.09(1.57)
Rer	2.02(0.19)***	
Appr		2.54(0.69)***
Depr		1.91(0.38)***
Constant	-1.96(0.65)***	-4.21(2.18)*
Panel C: Diagnostics		
Adj R^2	0.76	0.77
F- Test	184.11	67.20
t-bound Test	-4.61	-1.70
ECM	-0.75(0.16)***	-0.44(0.26)
Reset Test (fpvalue)	2.67	6.01**
LM Test pvalue	0.01	<0.01
$CS(CS^2)$	S(S)	S(S)
Wald-SR		1.82(1.33)
Wald-LR		0.62(0.59)
Norm pvalue	0.41	0.83
Sample	34	33
J-curve	Yes	Yes

Note: The U.S. is also Brazil's largest trading partner.

Table 2B.8.26. Mexico's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S.

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	-0.03(0.26)	-0.11(0.26)	-0.61(0.18)***	-0.93(0.18)***
Δtb_{t-2}	-0.05(0.12)	-0.27(0.22)	-0.22(0.18)	-0.73(0.22)***
Δtb_{t-3}		-0.09(0.19)		-0.32(0.14)**
Δy_t	0.00(0.65)	-0.18(0.95)	-0.37(0.54)	0.72(0.61)
Δy_{t-1}			0.09(0.45)	
Δy_{t-2}			0.52(0.52)	
Δy_{t-3}			0.84(0.45)*	
$\Delta y^{US}{}_{t}$	-0.58(1.15)	-0.33(0.94)	0.59(0.50)	1.09(0.50)*
$\Delta y^{US}{}_{t-1}$	-0.86(0.75)	-1.37(0.80)	-0.64(0.36)*	-1.29(0.44)**
$\Delta y^{US}{}_{t-2}$	0.00(0.48)	-0.13(0.65)		-0.65(0.45)
$\Delta y^{US}{}_{t-3}$	-0.11(0.49)			
Δrer_{t}	0.66(0.29)**		0.44(0.16)**	
Δrer_{t-1}	0.19(0.27)		0.80(0.20)***	
Δrer_{t-2}			0.33(0.22)	
Δrer_{t-3}			0.31(0.15)*	
$\Delta appr_{t}$		0.33(0.77)		-0.47(0.41)
$\Delta appr_{t-1}$		0.40(0.38)		0.40(0.37)
$\Delta depr_{t}$		0.68(0.54)		0.88(0.31)**
$\Delta depr_{t-1}$		0.80(0.42)*		2.06(0.42)***
$\Delta depr_{t-2}$		0.88(0.41)**		1.06(0.29)***
$\Delta depr_{t-3}$		0.47(0.37)		0.66(0.29)**
dum_fcrisis	-0.18(0.13)	-0.17(0.11)	-0.12(0.07)	-0.05(0.04)
Panel B: Long-run Estimates				
Y	-0.84	-0.49(1.69)	-3.27(1.68)*	0.71(0.82)
Y^{US}	0.68	2.51(1.47)	3.05(1.38)**	4.24(0.92)***
Rer	-0.77		-2.21(1.73)	
Appr		-1.00(2.31)		-0.61(0.81)
Depr		-2.02(2.18)		-3.20(1.07)**
Constant	1.61(1.09)	2.96(3.74)	1.90(0.82)**	-10.23(3.76)**
Panel C: Diagnostics				
Adj R^2	0.59	0.65	0.67	0.78
F- Test	0.30	1.04	1.90	9.30
t-bound Test	-1.63	-1.59	-1.59	-3.40
ECM	-0.33(0.20)	-0.41(0.26)	-0.29(0.18)	-0.54(0.16)
Reset Test	38.2	26.31	4.41**	0.93
LM Test pvalue	0.67	0.00	0.13	0.01
$CS(CS^2)$	S(S)	S(S)	S(S)	S(S)
Wald-SR		-2.11(1.59)		-4.72(1.46)***
Wald-LR		1.02(0.96)		2.59(0.85)**
Norm pvalue	0.01	0.74	0.70	0.59
Sample	36	36	32	32
J-curve	No	No	No	No

Note: The U.S. is also Mexico's largest trading partner

Table 2B.9.1. Austria's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with its Largest Trading Partner (Germany)

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	0.61(0.19)***	1.34(0.44)***	1.01(0.47)*	0.13(0.26)
Δtb_{t-2}	-0.39(0.18)**	0.20(0.33)	0.21(0.31)	-0.24(0.12)
Δtb_{t-3}	0.46(0.24)*	1.25(0.52)**	0.68(0.52)	
Δy_t	-0.43(0.37)	-0.27(0.44)	0.20(0.88)	0.88(1.06)
Δy_{t-1}	0.16(0.69)	1.24(0.54)**	0.44(0.90)	-0.73(0.78)
Δy_{t-2}	-1.30(0.54)**	-0.22(0.47)	0.29(0.92)	-2.12(0.44)***
Δy_{t-3}	0.96(0.60)	1.89(0.96)*		
$\Delta y^{Larg}{}_{t}$	0.39(0.30)	0.15(0.38)	-0.38(0.75)	-0.04(0.43)
$\Delta y^{Larg}{}_{t-1}$	1.11(0.63)*	-0.39(0.43)	-0.56(0.70)	-0.51(0.37)
$\Delta y^{Larg}{}_{t-2}$	1.11(0.63)*	0.46(0.37)	-0.24(0.52)	0.73(0.24)**
$\Delta y^{Larg}{}_{t-3}$	-0.46(0.28)	-1.00(0.46)**		
Δrer_{t}	-0.04(0.07)		0.10(0.12)	
Δrer_{t-1}	-0.03(0.01)*			
$\Delta appr_{t}$		-0.28(0.11)**		1.03(0.45)*
$\Delta appr_{t-1}$		0.04(0.03)		-0.04(0.02)*
$\Delta appr_{t-2}$		0.05(0.02)*		
$\Delta depr_{t}$		0.20(0.20)		-0.60(0.28)*
$\Delta depr_{t-1}$		0.28(0.13)*		-0.35(0.29)
$\Delta depr_{t-2}$		0.43(0.12)***		-0.33(0.28)
$\Delta depr_{t-3}$		0.33(0.21)		
dum_fcrisis	-0.03(0.04)	0.01(0.04)	-0.10(0.08)	-0.06(0.05)
dum_imp	-0.03(0.20)	0.40(0.35)	-0.06(0.31)	1.06(0.60)
dum_ex	-0.09(0.11)**	-1.34(0.39)***	0.12(0.21)	1.71(1.22)
Panel B: Long-run Estimates				
Y	1.53(1.26)	-0.31(0.30)	0.34(0.44)	-0.06(0.72)
Y^{Larg}	-1.11(2.22)	-0.43(0.35)	0.10(0.56)	1.94(0.71)**
Rer	0.09(0.24)		0.11(0.10)	
Appr		-0.44(0.09)***		0.71(0.61)
Depr		0.43(0.16)**		-0.28(0.25)
Constant	-0.47(1.46)	1.72(1.20)	-2.83(1.32)*	
Panel C: Diagnostics				
Adj R^2	0.30	0.46	0.21	0.77
F- Test	2.72	155.87	1.85	2.33
t-bound Test	-2.19	-2.95	-2.81	-7.87
ECM	-0.24(0.11)**	-1.04(0.35)***	-1.13(0.40)**	-0.92(0.12)***
Reset Test (fpvalue)	7.80***	5.45**	7.99**	2.03
LM Test pvalue	0.53	0.43	<0.01	0.06
$CS(CS^2)$	S(S)	S(S)	S(S)	S(S)
Wald-SR		-1.42(0.39)***		2.27(1.14)
Wald-LR		-0.87(0.13)***		0.99(0.76)
Norm pvalue	0.89	0.68	0.86	0.47
Sample	43		30	30
J-curve	No	No	No	No

Table 2B.9.2. Finland's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with its Largest trading partner (Germany)

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	-0.11(0.19)	0.03(0.14)	-0.10(0.19)	-0.20(0.22)
Δy_t	-0.03(0.36)	0.19(0.26)	-0.07(0.38)	-0.13(0.40)
Δy_{t-1}	-0.43(0.39)		-0.46(0.37)	-0.49(0.38)
Δy_{t-2}	-0.80(0.64)		-0.83(0.64)	-0.92(0.72)
Δy_{t-3}				-0.66(0.45)
$\Delta y^{Larg}{}_{t}$	1.22(0.84)	1.39(0.97)	1.37(0.87)	1.52(0.92)
Δrer_{t}	0.01(0.17)		0.05(0.20)	
Δrer_{t-1}	-0.01(0.05)		-0.01(0.06)	
Δrer_{t-2}	-0.14(0.4)***		-0.14(0.04)***	
Δrer_{t-3}	-0.21(0.07)***		-0.20(0.08)**	
$\Delta appr_{t}$		-0.75(0.54)		-0.59(0.54)
$\Delta appr_{t-1}$		0.04(0.05)		0.02(0.05)
$\Delta appr_{t-2}$		-0.14(0.05)**		-0.18(0.05)***
$\Delta appr_{t-3}$		-0.19(0.06)***		-0.21(0.08)**
$\Delta depr_{t}$		0.66(0.48)		0.93(0.61)
$\Delta depr_{t-1}$		0.60(0.34)*		
dum_fcrisis	0.20(0.11)*	0.22(0.12)*	0.22(0.11)*	0.18(0.12)
dum_imp	0.21(0.32)	-0.47(0.85)	0.12(0.33)	-0.93(0.91)
dum_ex	-0.13(0.22)	-0.58(0.27)**	0.00(0.28)	0.06(0.45)
Panel B: Long-run Estimates				
Y	-2.20(2.99)	-1.64(0.90)*	-2.44(3.41)	-0.69(1.12)
Y^{Larg}	3.94(5.98)	1.00(2.09)	5.17(7.39)	2.72(3.59)
Rer	-0.15(1.12)		0.60(1.71)	
Appr		-1.06(0.67)		0.39(1.41)
Depr		-0.89(0.51)*		-0.08(0.82)
Constant	-1.05(1.93)	0.36(2.76)	-1.65(2.11)	-2.11(2.65)
Panel C: Diagnostics				
Adj R^2	0.24	0.29	0.23	0.27
F- Test	0.31	1.93	0.21	0.31
t-bound Test	-0.96	-4.17	-0.96	-1.62
ECM	-0.14(0.14)	-0.36(0.09)***	-0.12(0.13)	-0.24(0.15)
Reset Test (fpvalue)	0.25	0.37	0.20	0.19
LM Test pvalue	0.24	0.10	0.23	0.48
$CS(CS^2)$	S(S)	S(S)	S(S)	S(S)
Wald-SR		-2.30(0.89)**		-1.89(1.07)*
Wald-LR		-0.17(0.36)		0.48(0.90)
Norm pvalue	0.99	0.98	0.94	0.85
Sample	43	43	43	43
J-curve	No	No	No	No

Table 2B.9.3. France's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with its Largest trading partner (Germany)

Variable	RER-CPI	
	Linear	Non-Linear
Panel A: Short-run Estimates		
Δtb_{t-1}	-0.58(0.23)**	-0.46(0.15)***
Δtb_{t-2}	-0.42(0.18)**	-0.50(0.15)***
Δtb_{t-3}	-0.18(0.10)*	-0.25(0.10)**
Δy_t	-1.04(0.32)***	-0.72(0.37)*
$\Delta y^{Larg}{}_t$	1.09(0.32)***	1.16(0.26)***
$\Delta y^{Larg}{}_{t-1}$		-0.38(0.22)*
Δrer_t	-0.01(0.05)	
Δrer_{t-1}	-0.03(0.02)	
Δrer_{t-2}	-0.05(0.01)***	
$\Delta appr_t$		0.31(0.23)
$\Delta depr_t$		-0.11(0.22)
$\Delta depr_{t-1}$		-0.08(0.13)
$\Delta depr_{t-2}$		-0.35(0.14)**
dum_fcrisis	-0.05(0.03)	-0.05(0.04)
dum_imp	0.08(0.14)	0.24(0.27)
dum_ex	-0.18(0.10)*	0.17(0.14)
Panel B: Long-run Estimates		
Y	-0.31(0.55)	0.56(0.21)**
Y^{Larg}	0.89(0.74)	1.33(0.46)***
Rer	0.01(0.20)	
Appr		0.40(0.12)***
Depr		0.18(0.15)
Constant	-0.91(0.88)	-4.61(1.93)**
Panel C: Diagnostics		
Adj R^2	0.49	0.53
F- Test	1.18	4.92
t-bound Test	-2.08	-2.90
ECM	-0.35(0.17)	-0.57(0.20)
Reset Test (fpvalue)	0.18	0.80
LM Test pvalue	0.86	0.04
$CS(CS^2)$	S(S)	S(S♣)
Wald-SR		0.85(0.42)*
Wald-LR		0.22(0.11)*
Norm pvalue	0.71	0.78
Sample	43	43
J-curve	No	No

Table 2B.9.4. Germany's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with its Largest trading partner (Netherlands)

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	-0.10(0.12)	-0.04(0.15)	-0.24(0.13)*	-0.26(0.14)*
Δtb_{t-2}	0.16(0.10)	0.25(0.15)	0.09(0.13)	-0.12(0.16)
Δtb_{t-3}	0.31(0.25)	0.46(0.21)**	0.27(0.22)	0.21(0.17)
Δy_t	-0.15(0.33)	0.03(0.49)	-0.05(0.38)	0.04(0.36)
Δy_{t-1}				0.95(0.42)*
$\Delta y^{Larg}{}_{t}$	-0.84(0.44)*	-1.09(0.54)*	-0.57(0.49)	-0.86(0.57)
$\Delta y^{Larg}{}_{t-1}$	-0.08(0.53)	-0.13(0.65)	-0.43(0.54)	0.08(0.60)
$\Delta y^{Larg}{}_{t-2}$	-0.61(0.42)	-0.80(0.39)*	-0.94(0.48)*	-0.10(0.33)
$\Delta y^{Larg}{}_{t-3}$	0.42(0.38)			0.72(0.62)
Δrer_{t}	-0.55(0.13)***		-0.52(0.13)***	
Δrer_{t-1}	-0.44(0.17)**		-0.51(0.17)***	
Δrer_{t-2}	-0.15(0.08)*		-0.19(0.09)*	
Δrer_{t-3}	-0.21(0.06)***		-0.21(0.08)**	
$\Delta appr_{t}$		-1.02(0.32)***		-0.55(0.23)**
$\Delta appr_{t-1}$		-0.44(0.17)**		-0.25(0.11)**
$\Delta appr_{t-2}$		-0.47(0.16)***		-0.29(0.15)*
$\Delta appr_{t-3}$		-0.31(0.14)**		-0.21(0.09)**
$\Delta depr_{t}$		-0.34(0.22)		-0.51(0.19)**
$\Delta depr_{t-1}$		-0.52(0.35)		-0.85(0.32)**
$\Delta depr_{t-2}$		0.37(0.29)		
dum_fc	0.01(0.04)	0.01(0.05)	0.01(0.04)	0.09(0.05)*
dum_imp	-0.26(0.08)***	-0.36(0.12)***	-0.23(0.07)***	-0.13(0.12)
dum_ex	-0.07(0.05)	-0.23(0.09)**	-0.09(0.07)	-0.17(0.07)**
Panel B: Long-run Estimates				
Y	0.67(0.26)**	1.02(0.43)**	0.52(0.34)	-0.26(0.46)
Y^{Larg}	-0.68(0.44)	-1.09(0.77)	0.00(0.97)	-2.13(0.78)**
Rer	0.34(0.22)		0.47(0.40)	
Appr		0.02(0.29)		-0.22(0.25)
Depr		-0.10(0.26)		0.26(0.22)
Constant	-0.33(1.24)	0.64	-1.74(2.05)	7.77(4.31)*
Panel C: Diagnostics				
Adj R^2	0.59	0.64	0.59	0.64
F- Test	21.29	9.77	9.51	18.07
t-bound Test	-5.18	-5.41	-3.07	-3.87
ECM	-0.75(0.15)***	-0.87(0.16)***	-0.64(0.21)***	-0.83(0.21)***
Reset Test (fpvalue)	2.70*	1.70	3.53**	1.71
LM Test pvalue	0.02	0.38	0.10	0.11
$CS(CS^2)$	S(S)	S(S)	U(S)	S(S)
Wald-SR		-1.76(0.95)*		0.06(0.42)
Wald-LR		0.12(0.23)		-0.49(0.26)*
Norm pvalue	0.89	0.51	0.73	0.64
Sample	43	43	43	43
J-curve	No	No	No	No

Table 2B.9.5. Greece's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with its Largest trading partner (Germany)

Variable	RER-CPI	
	Linear	Non-Linear
Panel A: Short-run		
Δtb_{t-1}	-0.41(0.13)***	-0.46(0.16)**
Δtb_{t-2}	-0.38(0.11)***	-0.70(0.16)***
Δtb_{t-3}	-0.40(0.16)**	-0.56(0.27)*
Δy_{t}	-0.92(0.55)	-0.47(0.73)
Δy_{t-1}	-1.06(0.58)*	-0.72(0.55)
Δy_{t-2}	-0.81(0.59)	-0.94(0.60)
Δy_{t-3}		-0.94(0.78)
$\Delta y^{Larg}{}_{t}$	0.83(0.65)	0.01(0.64)
$\Delta y^{Larg}{}_{t-1}$	1.38(0.66)**	3.55(1.47)**
$\Delta y^{Larg}{}_{t-2}$	0.81(0.47)*	2.64(1.01)**
$\Delta y^{Larg}{}_{t-3}$		1.73(1.06)
Δrer_{t}	-0.31(0.18)*	
Δrer_{t-1}	0.02(0.01)	
Δrer_{t-2}	0.05(0.01)***	
$\Delta appr_{t}$		-0.89(0.49)*
$\Delta appr_{t-1}$		0.03(0.02)
$\Delta appr_{t-2}$		0.09(0.02)***
$\Delta depr_{t}$		-0.07(0.68)
$\Delta depr_{t-1}$		0.81(0.71)
$\Delta depr_{t-2}$		0.34(0.58)
$\Delta depr_{t-3}$		1.09(0.42)**
dum_fcrisis	0.01(0.11)	-0.07(0.11)
dum_imp	-2.29(1.51)	0.35(2.25)
dum_ex	0.24(0.72)	-5.45(2.38)**
Panel B: Long-run Estimates		
Y	-1.77(0.50)***	-2.46(1.05)**
Y^{Larg}	-0.94(0.65)	-5.91(3.91)
Rer	0.11(0.24)	
Appr		-1.66(1.19)
Depr		-0.76(0.58)
Constant	5.76(1.74)***	19.65(6.90)**
Panel C: Diagnostics		
Adj R^2	0.54	0.52
F- Test	7.59	4.70
t-bound Test	-2.64	-2.21
ECM	-0.53(0.20)**	-0.57(0.26)
Reset Test (fpvalue)	0.65	0.37
LM Test pvalue	0.02	<0.01
$CS(CS^2)$	S(S)	S(S)
Wald-SR		-2.95(1.31)**
Wald-LR		-0.90(0.90)
Norm pvalue	0.77	0.84
Sample	43	43
J-curve	No	Yes-SR

Table 2B.9.6. Italy's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with its Largest trading partner (Germany)

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	0.15(0.22)	0.37(0.26)	0.39(0.15)**	1.89(0.72)**
Δtb_{t-2}	0.16(0.12)	0.68(0.31)**	0.76(0.15)***	1.73(0.50)**
Δy_{t}	-1.10(0.34)***	-0.82(0.33)**	-1.11(0.25)***	-0.83(0.74)
Δy_{t-1}		0.12(0.48)	-0.65(0.30)*	0.67(0.84)
Δy_{t-2}		1.38(0.71)*	1.42(0.48)**	2.18(0.87)*
Δy_{t-3}		0.91(0.59)	-0.57(0.20)**	-1.36(0.77)
$\Delta y^{Larg}{}_{t}$	0.81(0.38)**	0.18(0.36)	-0.22(0.40)	-0.91(0.49)
$\Delta y^{Larg}{}_{t-1}$		-1.58(0.75)**	-0.76(0.35)*	-2.21(1.46)
$\Delta y^{Larg}{}_{t-2}$		-1.93(0.64)***	-1.86(0.55)***	-3.35(0.75)***
$\Delta y^{Larg}{}_{t-3}$		-1.63(0.58)**		0.34(0.33)
Δrer_{t}	-0.02(0.12)		-0.24(0.08)***	
Δrer_{t-1}			-0.05(0.01)***	
Δrer_{t-2}			-0.01(<0.01)***	
$\Delta appr_{t}$		-0.40(0.25)		-0.37(0.33)
$\Delta appr_{t-1}$		-0.03(0.01)***		-0.10(0.03)**
$\Delta appr_{t-2}$		-0.02(0.01)*		-0.04(0.02)
$\Delta appr_{t-3}$				-0.03(0.02)
$\Delta depr_{t}$		-0.10(0.37)		0.25(0.46)
$\Delta depr_{t-1}$				-0.68(0.83)
$\Delta depr_{t-2}$				-0.89(0.70)
$\Delta depr_{t-3}$				-0.58(0.19)**
dum_fcrisis	-0.05(0.04)	-0.15(0.04)***	-0.26(0.06)***	-0.27(0.08)**
dum_imp	-1.07(0.71)	-5.25(1.96)**	-4.47(0.77)***	-9.23(2.26)***
dum_ex	0.85(1.06)	2.32(0.90)**	2.53(0.77)***	6.24(3.67)
Panel B: Long-run Estimates				
Y	-0.48(0.21)**	-0.41(0.17)**	-0.05(0.06)	-0.02(0.10)
Y^{Larg}	0.98(0.31)	2.17(0.77)**	1.29(0.12)***	0.76(0.50)
Rer	0.29(0.24)		0.33(0.05)***	
Appr		0.39(0.15)**		0.37(0.14)**
Depr		-0.02(0.21)		0.58(0.06)***
Constant	-2.10(2.11)	0.48	-10.08(2.03)***	-8.65(7.30)
Panel C: Diagnostics				
Adj R^2	0.37	0.48	0.86	0.90
F- Test	6.53	6.48	46.39	244.00
t-bound Test	-2.93	-3.62	-5.86	-3.72
ECM	-0.50(0.17)***	-0.89(0.24)***	-1.28(0.22)***	-2.65(0.71)
Reset Test (fpvalue)	4.06**	0.22	0.52	0.77
LM Test pvalue	0.33	0.65	<0.01	<0.01
$CS(CS^2)$	S(S♣)	S(S)	S(S)	S(S)
Wald-SR		11.68(0.53)***		1.35(1.89)
Wald-LR		0.41(0.23)*		-0.20(0.09)*
Norm pvalue	0.89	0.87	0.57	0.92
Sample	44	43	33	32
J-curve	No	Yes	Yes	Yes

Table 2B.9.7. Netherland's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with its Largest trading partner (Germany)

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	0.28(013)**	0.34(0.14)**	0.41(0.13)***	0.42(0.23)*
Δtb_{t-2}	0.23(0.08)***	0.31(0.13)**	0.33(0.10)***	0.32(0.18)*
Δy_t	-0.58(0.52)	-0.51(0.49)	-0.39(0.63)	-0.63(0.70)
Δy_{t-1}	0.36(0.43)	0.09(0.57)	0.35(0.43)	0.18(0.75)
Δy_{t-2}	1.01(0.55)*	0.86(0.51)	1.04(0.52)*	1.13(0.56)*
$\Delta y^{Larg}{}_t$	0.38(0.40)	0.46(0.49)	0.37(0.39)	0.53(0.56)
Δrer_t	0.32(0.15)**		0.26(0.18)	
Δrer_{t-1}	0.37(0.15)**		0.41(0.14)***	
Δrer_{t-2}	0.35(0.10)***		0.43(0.08)***	
Δrer_{t-3}	0.28(0.08)***		0.34(0.07)***	
$\Delta appr_t$		0.71(0.28)**		0.58(0.35)
$\Delta appr_{t-1}$		0.38(0.16)**		0.36(0.20)*
$\Delta appr_{t-2}$		0.49(0.12)***		0.44(0.12)***
$\Delta appr_{t-3}$		0.44(0.11)***		0.31(0.11)***
$\Delta depr_t$		0.12(0.31)		-0.17(0.27)
$\Delta depr_{t-1}$				0.49(0.51)
$\Delta depr_{t-2}$				0.61(0.31)*
$\Delta depr_{t-3}$				0.53(0.31)
dum_fcrisis	0.03(0.05)	0.06(0.05)	0.02(0.05)	0.04(0.07)
dum_imp	-0.18(0.15)	-0.13(0.22)	-0.19(0.15)	<0.01(0.23)
dum_ex	0.50(0.12)***	0.65(0.11)***	0.47(0.12)***	0.47(0.16)***
Panel B: Long-run Estimates				
Y	-0.88(0.19)***	-0.61(0.46)	-0.67(0.14)***	-0.67(0.46)
Y^{Larg}	0.02(0.19)	0.03(0.30)	-0.06(0.15)	0.11(0.29)
Rer	-0.24(0.10)**		-0.29(0.08)***	
Appr		<0.01(0.14)		-0.27(0.15)*
Depr		0.05(0.10)		-0.32(0.16)*
Constant	4.58(1.06)***	3.05(3.40)	4.44(0.62)***	3.22(3.75)
Panel C: Diagnostics				
Adj R^2	0.56	0.58	0.58	0.55
F- Test	23.06	8.08	28.18	18.62
t-bound Test	-5.51	-5.99	-6.84	-4.90
ECM	-1.16(0.21)***	-1.19(0.20)***	-1.31(0.19)***	-1.34(0.27)
Reset Test (fpvalue)	2.80	2.24	3.12*	2.38
LM Test pvalue	0.26	0.12	0.07	<0.01
$CS(CS^2)$	S(S)	S(S)	S(S)	S(S)
Wald-SR		1.92(0.63)***		0.23(1.22)
Wald-LR		-0.05(0.16)		0.05(0.19)
Norm pvalue	0.46	0.79	0.78	0.92
Sample	43	43	43	43
J-curve	No	No	No	No

Table 2B.9.8. Portugal's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with its Largest trading partner (Spain)

Variable	RER-CPI	
	Linear	Non-Linear
Panel A: Short-run Estimates		
Δtb_{t-1}	-0.44(0.15)***	-1.22(0.32)***
Δtb_{t-2}	-0.44(0.16)**	-1.09(0.29)***
Δtb_{t-3}		-0.47(0.23)*
Δy_{t}	0.59(0.67)	0.31(0.69)
Δy_{t-1}	0.77(0.88)	1.41(0.90)
Δy_{t-2}	1.18(0.71)	1.09(0.75)
$\Delta y^{Larg}{}_{t}$	0.43(0.83)	0.37(0.73)
$\Delta y^{Larg}{}_{t-1}$	-1.77(0.56)***	-1.42(0.76)*
Δrer_{t}	0.03(0.21)	
$\Delta appr_{t}$		1.48(0.63)**
$\Delta appr_{t-1}$		0.13(0.04)***
$\Delta appr_{t-2}$		0.15(0.04)***
$\Delta appr_{t-3}$		0.14(0.03)***
$\Delta depr_{t}$		-0.45(0.58)
$\Delta depr_{t-1}$		-0.59(0.52)
$\Delta depr_{t-2}$		0.29(0.51)
$\Delta depr_{t-3}$		-1.03(0.35)***
dum_fcrisis	-0.06(0.12)	0.07(0.16)
dum_imp	-2.34(1.00)**	-1.81(2.46)
dum_ex	2.48(0.68)***	9.55(2.02)***
Panel B: Long-run Estimates		
Y	-29.71(160.36)	-1.03(4.45)
Y^{Larg}	34.53(189.90)	0.24(5.57)
Rer	15.84(78.91)	
Appr		-7.88(5.41)
Depr		-3.03(2.53)
Constant	-2.94(1.39)**	-0.19(1.58)
Panel C: Diagnostics		
Adj R^2	0.32	0.58
F- Test	0.04	4.74
t-bound Test	-0.20	1.23
ECM	-0.03(0.14)	0.21(0.17)
Reset Test (fpvalue)	3.59**	2.93*
LM Test pvalue	0.06	0.07
$CS(CS^2)$	S(S)	S(S♣)
Wald-SR		3.69(1.23)***
Wald-LR		-4.86(3.23)
Norm pvalue	0.45	0.96
Sample	44	43
J-curve	No	No

Table 2B.9.9. Spain's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with its Largest trading partner (France)

Variable	RER-CPI	
	Linear	Non-Linear
Panel A: Short-run Estimates		
Δtb_{t-1}	-0.11(0.16)	-0.21(0.07)**
Δtb_{t-2}	0.17(0.13)	
Δy_t	-0.02(0.47)	-1.17(0.67)
Δy_{t-1}	-0.40(0.83)	-0.12(0.47)
Δy_{t-2}	-1.62(0.52)***	-1.59(0.52)***
Δy_{t-3}		1.00(0.95)
$\Delta y^{Larg}{}_{t}$	-0.56(0.65)	2.33(1.02)**
$\Delta y^{Larg}{}_{t-1}$	1.51(1.10)	0.58(0.97)
$\Delta y^{Larg}{}_{t-2}$	1.96(0.80)**	1.42(1.05)
$\Delta y^{Larg}{}_{t-3}$	-0.64(0.59)	-2.05(1.28)
Δrer_{t}	0.45(0.25)*	
$\Delta appr_{t}$		0.57(0.36)
$\Delta appr_{t-1}$		0.05(0.03)**
$\Delta appr_{t-2}$		0.07(0.01)***
$\Delta appr_{t-3}$		0.06(0.02)**
$\Delta depr_{t}$		-0.03(0.33)
$\Delta depr_{t-1}$		0.19(0.19)
$\Delta depr_{t-2}$		1.20(0.40)***
dum_fcrisis	0.09(0.06)	0.27(0.12)**
dum_imp	1.88(1.13)	1.87(1.55)
dum_ex	0.38(0.48)	0.94(0.61)
Panel B: Long-run Estimates		
Y	1.59(1.02)	-2.06(1.12)*
Y^{Larg}	-4.63(1.70)**	2.83(2.14)
Rer	0.11(0.14)	
Appr		0.15(0.14)
Depr		-0.35(0.17)*
Constant	8.25(1.90)***	-2.28(3.08)
Panel C: Diagnostics		
Adj R^2	0.36	0.65
F- Test	13.67	31.45
t-bound Test	-4.73	-3.46
ECM	-0.61(0.13)***	-0.68(0.20)***
Reset Test (fpvalue)	3.42	3.42
LM Test pvalue	0.18	0.03
$CS(CS^2)$	S(S)	S♣(S)
Wald-SR		
Wald-LR		0.49(0.13)***
Norm pvalue	0.66	0.22
Sample	43	43
J-curve	No	No

Table 2B.9.10. Australia's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with its Largest trading partner (Japan)

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	0.02(0.16)	-0.03(0.24)	0.01(0.16)	-0.13(0.21)
Δy_t	-0.02(1.20)	-0.30(0.85)	-0.23(1.19)	0.23(0.78)
Δy_{t-1}		1.79(0.81)**		-0.52(0.91)
Δy_{t-2}		2.43(0.97)**		0.90(0.73)
Δy_{t-3}		1.07(0.88)		1.40(1.11)
$\Delta y^{Larg}{}_{t}$	0.19(0.56)	-0.89(0.56)	0.10(0.58)	0.10(0.48)
$\Delta y^{Larg}{}_{t-1}$		-0.48(0.46)		0.99(0.49)*
$\Delta y^{Larg}{}_{t-2}$		-1.76(0.75)**		
Δrer_{t}	0.34(0.28)		0.37(0.29)	
$\Delta appr_{t}$		1.85(0.45)***		1.21(0.52)**
$\Delta depr_{t}$		-0.84(0.34)**		-0.97(0.48)*
$\Delta depr_{t-1}$		-2.50(0.85)***		
$\Delta depr_{t-2}$		-1.23(0.79)		
$\Delta depr_{t-3}$		-0.82(0.66)		
dum_fcrisis	0.28(0.11)**	0.60(0.10)***	0.26(0.10)**	0.52(0.13)***
Panel B: Long-run Estimates				
Y	0.46(0.33)	-3.11(2.13)	0.35(0.34)	1.11(0.83)
Y^{Larg}	-1.02(0.31)***	0.18(0.59)	-1.28(0.30)***	-1.45(0.36)***
Rer	-0.58(0.11)***		-0.65(0.12)***	
Appr		0.03(0.33)		-0.60(0.16)***
Depr		2.22(1.59)		-0.84(0.42)*
Constant	3.10(1.01)***	7.54(3.42)**	4.54(1.32)***	1.68(1.76)
Panel C: Diagnostics				
Adj R^2	0.44	0.67	0.45	0.57
F- Test	44.79	42.86	39.90	35.70
t-bound Test	-4.73	-4.02	-4.95	-4.23
ECM	-0.86(0.18)***	-0.63(0.16)	-0.84(0.17)***	-0.78(0.18)***
Reset Test (fpvalue)	1.77	0.12	2.55*	1.04
LM Test pvalue	0.64	0.04	0.77	0.36
$CS(CS^2)$	S(U)	U(S)	S(U)	S(S♣)
Wald-SR				
Wald-LR		-2.19(1.27)*		0.24(0.37)
Norm pvalue	0.51	0.81	0.38	0.51
Sample	45	43	45	43
J-curve	No	No	No	No

Table 2B.9.11. Denmark's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with its Largest trading partner (Germany)

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	0.54(0.22)**	-0.22(0.13)	0.54(0.20)**	-0.25(0.14)*
Δtb_{t-2}	0.65(0.18)***		0.66(0.19)***	
Δtb_{t-3}	0.61(0.20)***		0.62(0.22)***	
Δy_t	0.79(0.33)**	0.30(0.35)	0.92(0.31)***	0.22(0.35)
Δy_{t-1}	0.37(0.33)		0.31(0.30)	
Δy_{t-2}	0.59(0.45)		0.66(0.46)	
$\Delta y^{Larg}{}_t$	-0.97(0.50)*	-0.43(0.74)	-0.76(0.56)	-0.15(0.81)
Δrer_t	-0.04(0.22)		-0.10(0.21)	
Δrer_{t-1}	0.34(0.25)		0.23(0.20)	
Δrer_{t-2}	-0.17(0.17)		-0.29(0.14)*	
Δrer_{t-3}	0.54(0.15)***		0.57(0.15)***	
$\Delta appr_t$		0.00(0.50)		0.07(0.56)
$\Delta appr_{t-1}$				0.09(0.22)
$\Delta appr_{t-2}$				-0.35(0.35)
$\Delta depr_t$		0.14(0.43)		-0.03(0.56)
dum_fcrisis	0.05(0.11)	0.05(0.09)	0.08(0.10)	0.06(0.08)
Panel B: Long-run Estimates				
Y	0.59(0.11)***	1.07(0.63)	0.74(0.13)***	1.18(0.67)*
Y^{Larg}	-0.72(0.20)***	1.10(1.88)	-0.87(0.26)***	2.00(2.94)
Rer	-0.57(0.12)***		-0.60(0.15)***	
Appr		-0.46(0.33)		-0.24(0.49)
Depr		-1.35(0.79)*		-1.56(1.08)
Constant		-4.03(3.62)	1.43(1.12)	-4.46(3.64)
Panel C: Diagnostics				
Adj R^2	0.54	0.30	0.53	0.22
F- Test	27.80	3.94	18.66	1.44
t-bound Test	-6.26	-3.18	-7.48	-2.35
ECM	-1.09(0.17)***	-0.43(0.14)***	-0.92(0.12)	-0.33(0.14)
Reset Test	0.17	1.71	0.72	1.25
LM Test pvalue	0.04	0.62	0.18	0.20
$CS(CS^2)$	S(S)	S(S♣)	S(S)	S(U)
Wald-SR		-0.15(0.77)		-0.17(1.13)
Wald-LR		0.90(0.83)		1.32(1.24)
Norm pvalue	0.68	0.73	0.79	0.83
Sample	40	42	40	42
J-curve	Yes-SR	No	Yes-SR	No

Table 2B.9.12. New Zealand's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with its Largest trading partner (Australia)

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	-0.35(0.26)	-0.48(0.18)**	-0.41(0.24)	-0.49(0.19)**
Δtb_{t-2}	-0.28(0.23)	-0.20(0.23)	-0.19(0.21)	-0.19(0.23)
Δtb_{t-3}	-0.54(0.27)*	-0.32(0.15)*	-0.43(0.28)	-0.43(0.21)*
Δy_{t}	-1.73(0.66)**	-2.97(0.51)***	-2.21(0.45)***	-2.81(0.68)***
Δy_{t-1}	-1.35(0.60)**	-1.77(0.39)***	-0.99(0.25)***	-1.44(0.46)***
Δy_{t-2}	-1.08(0.69)			
Δy_{t-3}	-0.77(0.43)*			
$\Delta y^{Larg}{}_{t}$	0.43(1.31)	-0.58(0.46)	0.83(0.74)	-0.78(0.62)
$\Delta y^{Larg}{}_{t-1}$	1.92(0.53)***	2.67(0.69)***	1.67(0.53)***	2.41(0.59)***
$\Delta y^{Larg}{}_{t-2}$	-1.49(0.82)*	-0.82(0.59)	-2.00(0.68)***	-0.89(0.67)
$\Delta y^{Larg}{}_{t-3}$		-1.55(0.84)*		-1.56(0.76)*
Δrer_{t}	-0.66(0.24)**		-0.50(0.23)**	
Δrer_{t-1}	0.19(0.18)		0.12(0.18)	
Δrer_{t-2}	0.48(0.16)***		0.44(0.17)**	
Δrer_{t-3}	0.42(0.16)**		0.37(0.12)***	
$\Delta appr_{t}$		-1.14(0.47)**		-1.12(0.53)*
$\Delta appr_{t-1}$		0.34(0.29)		0.30(0.26)
$\Delta appr_{t-2}$		0.79(0.23)***		0.64(0.24)**
$\Delta depr_{t}$		0.37(0.25)		0.35(0.31)
$\Delta depr_{t-1}$		-0.96(0.20)***		-0.87(0.26)***
$\Delta depr_{t-2}$		-0.38(0.31)		
dum_fcrisis	0.14(0.08)	0.08(0.07)	0.10(0.07)	0.09(0.09)
Panel B: Long-run Estimates				
Y	-0.15(1.65)	-2.63(0.54)***	-1.48(1.25)	-2.22(0.60)***
Y^{Larg}	-0.16(1.17)	-1.54(0.49)***	0.60(0.74)	-1.88(0.74)**
Rer	-1.56(0.62)**		-1.41(0.76)*	
Appr		-0.48(0.26)*		-0.57(0.22)**
Depr		0.81(0.39)*		0.83(0.32)**
Constant	0.88(1.32)	11.16(1.70)**	1.52(0.81)*	10.62(2.21)***
Panel C: Diagnostics				
Adj R^2	0.30	0.57	0.33	0.49
F- Test	2.94	13.41	10.39	12.13
t-bound Test	-2.27	-6.00	-1.91	-4.62
ECM	-0.44(0.20)**	-0.67(0.11)***	-0.33(0.17)*	-0.66(0.14)
Reset Test (fpvalue)	2.57	2.03	1.89	3.91**
LM Test pvalue	0.15	0.01	0.30	0.09
$CS(CS^2)$	S(S)	U(S♣)	S(S)	U(S)
Wald-SR		0.95(0.84)		0.34(0.69)
Wald-LR		-1.29(0.24)***		-1.41(0.32)***
Norm pvalue	0.21	0.43	0.35	0.77
Sample	36	38	38	38
J-curve	Yes-SR	Yes	Yes-SR	No

Table 2B.9.13. Norway's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with its Largest trading partner (United Kingdom)

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	0.02(0.10)	0.24(0.10)**	0.07(0.21)	0.31(0.24)
Δtb_{t-2}				0.55(0.17)***
Δtb_{t-3}				-0.20(0.11)*
Δy_t	0.54(1.08)	0.44(1.28)	0.61(1.96)	2.32(0.98)**
Δy_{t-1}	-3.43(0.94)***	-2.66(0.87)***	-2.30(1.68)	2.49(1.22)*
Δy_{t-2}			-1.14(1.31)	-0.22(0.65)
Δy_{t-3}			-2.19(1.53)	1.25(0.93)
$\Delta y^{Larg}{}_t$	0.41(0.78)	0.91(1.42)	-0.18(2.67)	0.35(1.16)
$\Delta y^{Larg}{}_{t-1}$				-6.97(1.68)***
$\Delta y^{Larg}{}_{t-2}$				-4.65(1.15)***
Δrer_t	<-0.01(0.38)		-0.90(0.40)**	
Δrer_{t-1}			-0.16(0.52)	
Δrer_{t-2}			0.53(0.66)	
Δrer_{t-3}			0.68(0.42)	
$\Delta appr_t$		1.87(0.93)*		-0.77(0.21)***
$\Delta appr_{t-1}$				0.51(0.70)
$\Delta appr_{t-2}$				-1.58(0.35)
$\Delta appr_{t-3}$				-1.04(0.37)**
$\Delta depr_t$		-1.66(0.49)***		-0.42(0.33)
$\Delta depr_{t-1}$		-1.50(0.82)*		-1.86(0.58)***
$\Delta depr_{t-2}$				2.14(0.69)**
$\Delta depr_{t-3}$				2.08(0.62)***
dum_fcrisis	0.17(0.07)***	0.57(0.17)***	0.10(0.17)	0.17(0.08)*
Panel B: Long-run Estimates				
Y	-0.84(2.28)	-1.72(1.45)	-1.90(1.77)	-5.49(1.27)***
Y^{Larg}	1.70(5.09)	0.66(3.67)	4.18(4.45)	8.81(2.86)**
Rer	1.67(1.63)		-0.94(0.42)**	
Appr		2.54(1.00)**		-0.46(0.18)**
Depr		3.57(1.14)***		1.09(0.30)***
Constant	-1.20(3.13)	1.56(4.19)	-4.03(6.44)	-18.11(6.42)**
Panel C: Diagnostics				
Adj R^2	0.17	0.28	0.29	0.84
F- Test	0.75	4.39	6.17	68.80
t-bound Test	-2.98	-3.20	-3.41	-6.48
ECM	-0.21(0.07)***	-0.34(0.11)***	-0.58(0.17)***	-1.12(0.17)***
Reset Test (fpvalue)	0.76	1.26	0.01	0.65
LM Test pvalue	0.48	0.89	0.03	0.01
$CS(CS^2)$	S(S♣)	S(S)	S(S♣)	S(S)
Wald-SR		5.03(1.62)***		-4.83(1.14)***
Wald-LR		-1.03(0.45)**		-1.55(0.17)***
Norm pvalue	0.86	0.16	0.93	<0.01
Sample	45	45	36	36
J-curve	No	No	No	Yes-SR

Table 2B.9.14. Sweden's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with its Largest trading partner (Germany)

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	-0.21(0.20)	-0.07(0.21)	-0.04(0.16)	-0.12(0.17)
Δy_{t}	-0.08(0.33)	-0.13(0.34)	-0.03(0.42)	0.07(0.46)
Δy_{t-1}	-0.38(0.29)			
Δy_{t-2}	-0.50(0.34)			
Δy_{t-3}	-0.85(0.30)***			
$\Delta y^{Larg}{}_{t}$	1.45(0.37)***	1.34(0.54)**	1.40(0.42)***	1.13(0.51)**
$\Delta y^{Larg}{}_{t-1}$	1.06(0.37)***	0.42(0.39)	0.54(0.33)	
$\Delta y^{Larg}{}_{t-2}$	1.43(0.40)***	0.76(0.49)*	0.98(0.35)***	
$\Delta y^{Larg}{}_{t-3}$	0.77(0.27)***			
Δrer_{t}	<0.01(0.16)		0.02(0.18)	
Δrer_{t-1}	0.32(0.18)		0.26(0.19)	
Δrer_{t-2}	0.12(0.18)		0.17(0.17)	
Δrer_{t-3}	0.26(0.11)**		0.28(0.16)*	
$\Delta appr_{t}$		0.08(0.49)		0.33(0.44)
$\Delta depr_{t}$		0.07(0.32)		-0.22(0.41)
dum_fcrisis	0.15(0.08)*	0.15(0.09)	0.17(0.06)**	0.15(0.10)
Panel B: Long-run Estimates				
Y	0.65(1.06)	-1.23(1.67)	-0.71(0.99)	-0.65(1.20)
Y^{Larg}	-2.49(1.71)	0.12(3.58)	-0.48(0.81)	5.18(6.10)
Rer	-1.96(1.12)*		-1.53(0.94)	
Appr		-1.03(0.86)		-0.46(1.04)
Depr		-0.88(1.18)		-2.23(1.98)
Constant	2.30(0.54)***	0.59(2.74)	2.16(1.03)**	-2.70(1.90)
Panel C: Diagnostics				
Adj R^2	0.33	0.13	0.28	0.14
F- Test	1.09	0.46	0.88	0.35
t-bound Test	-1.65	-1.27	-1.57	-1.30
ECM	-0.20(0.12)	-0.17(0.13)	-0.27(0.17)	-0.14(0.11)
Reset Test (F-test)	0.02	2.60*	2.12	0.24
LM Test pvalue	0.12	0.79	0.22	0.69
$CS(CS^2)$	$S^{\clubsuit}$(S)	U(S)	U(S)	U(S)
Wald-SR		-0.15(0.39)		0.55(0.80)
Wald-LR		-0.15(1.25)		1.77(2.02)
Norm pvalue	0.62	0.85	0.72	0.64
Sample	43	44	42	45
J-curve	Yes-SR	No	No	No

Table 2B.9.15. Switzerland's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with its Largest trading partner (Germany)

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	-0.15(0.16)	-0.11(0.20)	-0.16(0.16)	-0.02(0.15)
Δtb_{t-2}		-0.19(0.12)		
Δy_{t}	-0.66(0.45)	-0.66(0.65)	-0.67(0.45)	-0.41(0.47)
Δy_{t-1}	-0.69(0.35)*	-0.76(0.37)*	-0.69(0.35)*	-0.75(0.33)**
Δy_{t-2}				0.13(0.31)
Δy_{t-3}				-0.62(0.33)*
$\Delta y^{Larg}{}_{t}$	0.28(0.48)	0.26(0.47)	0.30(0.47)	0.30(0.40)
$\Delta y^{Larg}{}_{t-1}$		0.81(0.44)*		
$\Delta y^{Larg}{}_{t-2}$		0.77(0.41)*		
$\Delta y^{Larg}{}_{t-3}$		0.48(0.37)		
Δrer_{t}	-0.03(0.12)		-0.02(0.12)	
$\Delta appr_{t}$		0.51(0.20)**		-0.11(0.21)
$\Delta appr_{t-1}$		0.58(0.35)		
$\Delta appr_{t-2}$		0.43(0.24)*		
$\Delta appr_{t-3}$		0.55(0.24)*		
$\Delta depr_{t}$		-0.43(0.45)		0.24(0.39)
$\Delta depr_{t-1}$		-0.46(0.46)		
$\Delta depr_{t-2}$		-0.68(0.29)**		
$\Delta depr_{t-3}$		-0.55(0.22)**		
dum_fcrisis	-0.08(0.06)	-0.09(0.05)	-0.07(0.05)	-0.02(0.05)
Panel B: Long-run Estimates				
Y	-0.86(0.69)	-1.08(0.33)***		-0.38(0.51)
Y^{Larg}	1.49(0.96)	-0.0(0.65)		0.52(0.66)
Rer	-0.19(0.16)			
Appr		-0.24(0.12)*		-0.08(0.13)
Depr		0.31(0.10)***		0.09(0.15)
Constant	-1.38(0.83)	3.40(1.81)*		-0.80(0.88)
Panel C: Diagnostics				
Adj R^2	0.27	0.45		0.40
F- Test	10.71	21.70		16.01
t-bound Test	-2.94	-3.86	-2.96	-5.02
ECM	-0.45(0.15)***	-0.87(0.22)***	-0.43(0.15)***	-0.66(0.13)***
Reset Test	1.75	6.83	1.94	1.46
LM Test pvalue	0.66	0.01	0.62	0.32
$CS(CS^2)$	U(S♣)	S(S)	U(S♣)	U(U)
Wald-SR		4.19(1.60)**		-0.34(0.56)
Wald-LR		-0.55(0.10)***		-0.17(0.10)
Norm pvalue	0.53	0.41	0.58	0.63
Sample	45	45	45	45
J-curve	No	Yes	No	No

Table 2B.9.16. United Kingdom's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with its Largest trading partner (Germany)

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	0.49(0.15)***	0.55(0.16)***	0.71(0.16)***	0.72(0.19)***
Δtb_{t-2}	0.20(0.12)		0.29(0.12)**	0.27(0.13)*
Δtb_{t-3}	0.25(0.09)***		0.22(0.10)**	
Δy_t	-2.62(0.36)***	-1.52(0.57)**	-2.51(0.36)***	-1.53(0.43)***
Δy_{t-1}		1.05(0.79)	1.07(0.61)*	1.30(0.77)
$\Delta y^{Larg}{}_{t}$	1.67(0.36)***	1.26(0.52)**	1.61(0.49)***	1.08(0.50)**
$\Delta y^{Larg}{}_{t-1}$	-0.43(0.29)	-1.65(0.75)**	-0.77(0.42)*	-1.37(0.62)**
$\Delta y^{Larg}{}_{t-2}$	0.81(0.19)***	0.43(0.25)	1.13(0.24)***	0.71(0.28)**
$\Delta y^{Larg}{}_{t-3}$	-0.44(0.28)	-0.61(0.22)**	-0.48(0.24)*	-0.56(0.21)**
Δrer_{t}	0.05(0.18)		0.02(0.14)	
Δrer_{t-1}	0.23(0.14)		0.34(0.18)*	
Δrer_{t-2}	0.15(0.18)		0.28(0.23)	
Δrer_{t-3}	0.51(0.11)***		0.59(0.11)***	
$\Delta appr_{t}$		-0.14(0.31)		-0.17(0.23)
$\Delta appr_{t-1}$		0.53(0.35)		0.54(0.24)**
$\Delta appr_{t-2}$		0.32(0.43)		0.36(0.31)
$\Delta appr_{t-3}$		0.75(035)**		0.48(0.24)*
$\Delta depr_{t}$		-0.01(0.41)		0.02(0.40)
$\Delta depr_{t-1}$		0.21(0.40)		0.45(0.37)
$\Delta depr_{t-2}$		0.57(0.26)**		0.74(0.30)**
$\Delta depr_{t-3}$		0.52(0.32)		0.96(0.28)***
dum_fcrisis	0.02(0.05)	<-0.01(0.06)	0.04(0.05)	<-0.01(0.06)
Panel B: Long-run Estimates				
Y	-0.13(0.18)	0.40(0.35)	-0.69(0.29)**	-0.50(0.26)*
Y^{Larg}	-1.10(0.16)***	0.30(0.73)	-1.05(0.10)***	-0.10(0.44)
Rer	-0.66(0.15)***		-0.82(0.15)***	
Appr		-0.96(0.25)***		-0.93(0.16)***
Depr		-1.70(0.55)***		-1.38(0.33)***
Constant	4.02(0.81)***	-2.17(2.45)	6.98(1.37)***	2.11(1.99)
Panel C: Diagnostics				
Adj R^2	0.63	0.66	0.66	0.69
F- Test	15.99	8.80	38.47	25.46
t-bound Test	-4.78	-6.36	-4.72	-6.25
ECM	-0.83(0.17)***	-0.64(0.10)***	-0.98(0.21)***	-0.99(0.16)***
Reset Test (fpvalue)	0.87	0.20	0.49	0.33
LM Test pvalue	0.66	<0.01	0.02	<0.01
CS(CS^2)	S(S♣)	S(S)	S(S)	S(S)
Wald-SR		0.16(0.90)		-0.96(0.56)
Wald-LR		0.73(0.37)*		0.45(0.21)**
Norm pvalue	0.02	0.45	0.32	0.57
Sample	43	43	43	43
J-curve	Yes-SR	Yes-SR	No	Yes-SR

Table 2B.9.17. Hungary's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with its Largest trading partner (Germany).

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	-0.34(0.23)	-3.06(1.17)	-0.43(0.23)*	-2.80(0.67)**
Δtb_{t-2}	-0.82(0.30)**	-1.98(0.72)	-0.89(0.30)**	-2.17(0.45)**
Δtb_{t-3}		-1.70(0.65)		-1.71(0.48)**
Δy_t	-0.18(0.27)	-0.72(0.35)	-0.16(0.27)	-0.15(0.49)
Δy_{t-1}	0.25(0.28)	-0.55(0.54)	0.22(0.26)	-0.08(0.16)
Δy_{t-2}	-0.60(0.30)*	-0.77(0.52)	-0.64(0.29)**	-1.85(0.53)**
Δy_{t-3}	0.40(0.20)*	-0.62(0.60)	0.43(0.21)*	-0.86(0.39)
$\Delta y^{Larg}{}_t$	-0.85(0.59)	2.11(2.23)	-0.86(0.54)	-0.14(0.87)
$\Delta y^{Larg}{}_{t-1}$		-2.90(3.53)		-0.32(0.82)
$\Delta y^{Larg}{}_{t-2}$		-2.45(2.22)		1.15(0.67)
$\Delta y^{Larg}{}_{t-3}$		-1.58(2.73)		
Δrer_t	0.10(0.15)		0.12(0.16)	
$\Delta appr_t$		1.27(1.25)		0.76(0.41)
$\Delta appr_{t-1}$		-1.05(0.53)		-0.97(0.26)**
$\Delta appr_{t-2}$		0.11(0.83)		0.00(0.32)
$\Delta appr_{t-3}$		1.74(0.78)		1.95(0.79)*
$\Delta depr_t$		-2.28(1.79)		-1.33(0.58)
$\Delta depr_{t-1}$		0.63(1.36)		2.64(0.57)**
$\Delta depr_{t-2}$		-1.08(1.35)		0.85(0.52)
$\Delta depr_{t-3}$		-3.18(1.52)		-1.02(0.59)
dum_fcrisis	-0.06(0.11)	0.21(0.30)	-0.05(0.10)	0.07(0.19)
Panel B: Long-run Estimates				
Y	-0.03(1.11)	-0.04(0.10)		-0.28(0.19)
Y^{Larg}	-1.26(2.98)	-1.61(1.78)		0.39(0.39)
Rer	-0.74(1.20)			
Appr		-0.38(0.28)		0.02(0.16)
Depr		0.43(0.39)		0.66(0.38)
Constant	2.12(2.03)	-18.15(21.24)	2.16(1.86)	2.83(1.09)
Panel C: Diagnostics				
Adj R^2	0.59	0.79	0.59	0.87
F- Test	0.36	43.89	0.08	73.16
t-bound Test	-0.52	2.00	-0.27	2.88
ECM	-0.21(0.40)	2.84(1.42)	-0.10(0.35)	2.38(0.83)*
Reset Test	6.72**	1.51	6.54**	0.82
LM Test pvalue	0.86	<0.01	0.76	<0.01
$CS(CS^2)$	S(S)	S(S♣)	S(S)	U(S)
Wald-SR		7.99(6.60)		0.60(1.94)
Wald-LR		-0.81(0.57)		-0.64(0.23)*
Norm pvalue	0.84	0.54	0.79	0.44
Sample	30	30	30	30
J-curve	No	No	No	Yes-SR

Table 2B.9.18. Poland's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with its Largest trading partner (Germany)

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	0.09(0.16)	0.73(0.73)	0.04(0.23)	0.11(0.11)
Δtb_{t-2}	0.23(0.16)	0.51(0.30)	-0.01(0.24)	0.09(0.09)
Δtb_{t-3}	0.66(0.20)***	-0.28(0.41)	0.88(0.27)**	0.57(0.16)**
Δy_t	0.05(0.36)	-1.25(0.63)	0.67(0.45)	0.52(0.24)*
Δy_{t-1}	-0.30(0.14)*	-1.17(0.79)	0.27(0.36)	-0.22(0.08)**
Δy_{t-2}	-0.74(0.31)**	0.77(0.80)	-0.86(0.48)	-0.96(0.23)***
Δy_{t-3}		1.25(0.63)	-0.51(0.42)	-0.31(0.21)
$\Delta y^{Larg}{}_{t}$	-0.15(0.71)	3.12(1.70)	-1.62(0.98)	-0.35(0.34)
$\Delta y^{Larg}{}_{t-1}$	0.60(0.43)	-0.59(1.45)	-0.24(0.37)	
$\Delta y^{Larg}{}_{t-2}$	0.39(0.39)	-1.56(1.17)	0.19(0.47)	
$\Delta y^{Larg}{}_{t-3}$	0.70(0.36)*	-1.37(0.62)	0.64(0.34)*	
Δrer_{t}	0.12(0.17)		-0.03(0.18)	
Δrer_{t-1}	0.51(0.23)**		-0.18(0.32)	
Δrer_{t-2}	0.66(0.32)*		0.75(0.25)**	
Δrer_{t-3}			0.34(0.31)	
$\Delta appr_{t}$		2.02(0.62)*		0.47(0.17)**
$\Delta appr_{t-1}$		1.77(1.18)		0.36(0.20)
$\Delta appr_{t-2}$		-0.31(0.79)		1.03(0.32)**
$\Delta appr_{t-3}$		0.17(0.33)		0.53(0.30)
$\Delta depr_{t}$		-0.81(0.45)		-0.52(0.28)
$\Delta depr_{t-1}$		-0.28(0.54)		-0.60(0.35)
$\Delta depr_{t-2}$		-0.87(0.75)		-0.08(0.23)
$\Delta depr_{t-3}$		-2.27(0.98)		-0.49(0.24)
dum_fcrisis	-0.01(0.09)	0.13(0.30)	-0.13(0.10)	0.09(0.05)
Panel B: Long-run Estimates				
Y	-0.57(0.53)	-13.95(123.58)	0.03(0.21)	-0.08(0.12)
Y^{Larg}	0.89(0.69)	54.76(461.32)	0.14(0.52)	0.58(0.33)
Rer	-0.33(0.48)		0.11(0.11)	
Appr		5.73(43.14)		0.29(0.07)***
Depr		0.37(4.94)		0.27(0.10)**
Constant	-1.00(1.53)	16.39(3.95)*	-1.37(1.77)	-2.70(1.15)*
Panel C: Diagnostics				
Adj R^2	0.78	0.88	0.83	0.89
F- Test	0.64	0.03	2.36	12.41
t-bound Test	-2.47	-0.12	-4.09	-6.19
ECM	-0.71(0.29)**	-0.09(0.76)	-1.30(0.32)***	-1.20(0.19)***
Reset Test (fpvalue)	0.25	0.90	0.17	0.63
LM Test pvalue	0.04	0.00	0.08	0.01
$CS(CS^2)$	S(S)	S(S♣)	S(S)	S(S)
Wald-SR		7.88(1.61)**		4.09(1.41)**
Wald-LR		5.37(40.64)		0.02(0.11)
Norm pvalue	<0.01	0.71	0.61	0.78
Sample	30	30	30	30
J-curve	No	No	No	Yes

Table 2B.9.19. Turkey's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with its Largest trading partner (Germany)

Variable	RER-CPI		RER-PPI	
	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	-0.06(0.36)	0.80(0.81)	0.79(0.51)	4.30(0.15)**
Δtb_{t-2}	-0.14(0.19)	0.58(0.75)	0.47(0.20)**	2.19(0.10)**
Δtb_{t-3}	-0.24(0.10)**			1.18(0.06)**
Δy_t	-1.69(0.44)***	-0.64(0.69)	-1.15(0.51)**	0.18(0.11)
Δy_{t-1}	-0.47(0.71)	-1.04(1.23)	0.64(0.70)	4.78(0.31)**
Δy_{t-2}	0.50(0.67)	0.01(0.93)	1.06(0.69)	5.26(0.39)**
Δy_{t-3}			0.41(0.17)**	6.35(0.33)**
$\Delta y^{Larg}{}_{t}$	0.78(0.93)	-0.41(2.01)	0.25(0.75)	3.71(0.42)*
$\Delta y^{Larg}{}_{t-1}$	-1.60(0.94)	-1.03(2.04)	-2.85(1.04)**	-7.56(0.55)**
$\Delta y^{Larg}{}_{t-2}$	-1.41(0.57)**	-0.79(1.74)	-2.09(0.70)**	-6.16(0.51)*
$\Delta y^{Larg}{}_{t-3}$	-0.39(0.51)	0.17(1.29)	-0.95(0.45)*	-7.10(0.36)**
Δrer_{t}	0.33(0.21)		0.56(0.21)**	
Δrer_{t-1}	-0.22(0.45)		-0.43(0.40)	
Δrer_{t-2}	-0.03(0.24)		-0.32(0.22)	
$\Delta appr_{t}$		-0.61(0.68)		0.90(0.36)
$\Delta appr_{t-1}$		-1.69(1.17)		-1.24(0.09)**
$\Delta appr_{t-2}$		-1.68(1.10)		-4.29(0.30)**
$\Delta appr_{t-3}$		-1.03(1.29)		2.09(0.11)**
$\Delta depr_{t}$		1.99(1.90)		2.60(0.35)*
$\Delta depr_{t-1}$		1.44(1.43)		2.23(0.28)*
$\Delta depr_{t-2}$		0.48(1.49)		6.08(0.34)**
$\Delta depr_{t-3}$		0.68(1.82)		0.58(0.22)
dum_fcrisis	-0.10(0.13)	-0.38(0.32)	-0.13(0.14)	-0.19(0.10)
Panel B: Long-run Estimates				
Y	-1.02(0.34)**	1.04(0.87)	-0.82(0.10)***	-0.48(0.07)*
Y^{Larg}	2.24(0.94)**	0.06(1.79)	1.46(0.30)***	1.27(0.12)*
Rer	0.46(0.19)**		0.46(0.08)***	
Appr		0.81(0.35)*		0.57(0.01)***
Depr		-0.10(0.36)		0.32(0.02)**
Constant	-8.23(2.43)***	-6.25(11.80)	-8.94(2.30)***	-28.49(2.45)*
Panel C:				
Adj R^2	0.77	0.67	0.80	0.99
F- Test	116.63	18.12	216.71	77577.07
t-bound Test	-2.82	-3.07	-3.47	-32.11
ECM	-1.29(0.46)**	-1.81(0.59)**	-2.39(0.69)***	-7.48(0.23)**
Reset Test (fpvalue)	1.89	26.99**	0.12	<0.01
LM Test pvalue	0.07	0.00	<0.01	<0.01
CS(CS^2)	S(S)	S(S)	S(S♣)	S(S♣)
Wald-SR		-9.60(8.27)		-14.03(1.71)*
Wald-LR		0.91(0.64)		0.25(0.03)
Norm pvalue	0.82	0.40	0.78	0.52
Sample	30	30	30	30
J-curve	Yes	Yes	Yes	Yes-SR

Table 2B.10.1. Austria's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S. and its Largest trading partner – Terms of Trade

	US		Germany	
Variables	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	-0.24(0.21)	-0.27(0.11)**	0.43(0.09)***	0.57(0.18)***
Δtb_{t-2}		-0.10(0.15)	-0.34(0.11)***	-0.42(0.18)**
Δtb_{t-3}		0.21(0.08)**		
Δy_{t}	3.88(1.26)***	5.41(0.99)***	-0.96(0.63)	-0.75(0.55)
Δy_{t-1}	-2.72(1.65)		0.14(0.47)	0.70(0.66)
Δy_{t-2}	4.18(1.73)**		-1.03(0.43)**	-0.39(0.56)
Δy_{t-3}				0.98(0.52)*
Δy^{i}_{t}	-3.23(0.96)***	0.69(0.75)	0.56(0.45)	0.23(0.44)
Δy^{i}_{t-1}	1.83(0.77)**	3.09(0.70)***	<-0.01(0.32)	-1.08(0.79)
Δy^{i}_{t-2}	-2.43(1.20)*	0.99(0.75)	0.92(0.42)**	0.01(0.57)
Δy^{i}_{t-3}	-2.74(1.05)**	-1.43(0.54)**		-0.90(0.37)**
Δtot_{t}	1.37(3.22)		-0.46(0.50)	
Δtot_{t-1}	4.23(3.02)			
Δtot_{t-2}	1.48(3.47)			
Δtot_{t-3}	-5.55(2.95)*			
ΔNeg_{t}		12.41(3.52)***		-0.10(1.08)
ΔNeg_{t-1}		11.21(5.01)**		2.99(2.11)
ΔNeg_{t-2}		3.58(2.45)		1.18(1.53)
ΔNeg_{t-3}		9.70(2.47)***		1.85(1.35)
ΔPos_{t}		14.75(6.56)**		-4.76(4.47)
ΔPos_{t-1}		40.58(4.22)***		-5.23(1.82)**
ΔPos_{t-2}		29.22(8.29)***		-1.24(1.77)
ΔPos_{t-3}				-2.86(2.09)
dum_fcrisis	-0.19(0.11)*	0.23(0.08)***	-0.02(0.04)	-0.04(0.04)
Panel B: Long-run Estimates				
Y	-0.89(8.61)	5.83(0.73)***	-1.09(1.00)	-0.84(0.65)
Y^{us}	1.24(10.14)	-4.34(0.64)***	1.30(1.47)	1.52(1.52)
Tot	-6.25(18.96)		-2.58(2.75)	
Neg		-5.90(2.00)***		-3.05(1.33)**
Pos		-43.29(8.13)***		-2.65(5.09)
Constant	4.90(12.09)	-1.70(0.77)**	1.46(2.28)	-2.12(2.57)
Panel C: Diagnostics				
Adj R^2	0.41	0.79	0.31	-2.12(2.57)
F- Test	1.21	105.27	1.16	4.13
t-bound Test	-0.83	-8.58	-1.55	-2.29
ECM	-0.18(0.21)	-0.89(0.10)***	-0.14(0.09)	-0.55(0.24)**
Reset Test	1.53	1.00	6.23***	3.14*
LM Test	0.18	0.07	0.36	0.25
$CS(CS^2)$	S(S)	S♣(S)	S(S♣)	S(S)
Wald-SR		-47.66(8.33)***		20.02(9.88)*
Wald-LR		37.38(6.61)***		-0.40(4.14)
Norm pvalue	0.67	0.79	0.11	0.28
Sample	43	43	44	43
J-curve	Yes-SR	Yes	No	Yes

Table 2B.10.2. Finland's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S. and its Largest trading partner – Terms of Trade

	TOT-US		TOT-Germany	
Variables	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	0.28(0.14)*	0.29(0.14)**	-0.35(0.21)	-0.14(0.17)
Δtb_{t-2}			-0.35(0.12)***	
Δy_t	-0.49(1.10)	-0.30(1.11)	-0.75(0.44)	-0.74(0.47)
Δy_{t-1}			-1.01(0.39)**	-0.88(0.44)*
Δy_{t-2}			-1.49(0.50)***	-1.11(0.54)**
Δy_{t-3}			-1.56(0.54)***	-1.22(0.54)**
$\Delta y^i_{\ t}$	1.45(1.55)	1.23(1.50)	1.23(0.75)	0.96(0.53)*
$\Delta y^i_{\ t-1}$			0.35(0.46)	1.17(0.56)*
$\Delta y^i_{\ t-2}$			1.14(0.56)*	1.29(0.59)**
$\Delta y^i_{\ t-3}$			0.94(0.58)	1.16(0.68)
$\Delta tot_{\ t}$	2.32(1.89)		0.50(0.69)	
$\Delta tot_{\ t-1}$			-0.51(0.54)	
$\Delta tot_{\ t-2}$			-1.06(0.65)	
$\Delta tot_{\ t-3}$			-1.80(0.94)*	
$\Delta Neg_{\ t}$		1.37(2.04)		-0.26(1.16)
ΔNeg_{t-1}				-0.70(1.32)
ΔNeg_{t-2}				-2.78(1.14)**
$\Delta Neg_{\ t-3}$				-3.96(1.01)***
$\Delta Pos_{\ t}$		4.36(3.75)		1.39(1.28)
$\Delta Pos_{\ t-1}$		-4.65(2.69)*		-1.99(2.15)
dum_fcrisis	0.04(0.16)	0.05(0.18)	0.02(0.11)	0.10(0.08)
Panel B: Long-run Estimates				
Y	-0.66(0.68)	-0.55(0.82)	-1.50(7.81)	-1.54(0.76)*
Y^{us}	1.32(0.82)	0.37(1.29)	2.06(8.78)	03.30(2.23)
Tot	-0.95(0.96)		24.91(67.22)	
Neg		-0.89(1.19)		0.31(1.50)
Pos		1.26(2.01)		10.48(2.85)***
Constant	1.61(4.05)	0.49(2.53)	-7.69(2.64)***	6.64(2.36)**
Panel C: Diagnostics				
Adj R^2	0.28	0.27	0.32	0.43
F- Test	6.78	4.41	0.06	6.46
t-bound Test	-6.41	-5.34	-0.37	-3.63
ECM	-0.81(0.13)***	-0.77(0.14)***	-0.06(0.17)	-0.36(0.10)***
Reset Test (fpvalue)	0.11	0.90	0.15	0.69
LM Test pvalue	0.93	0.91	0.57	0.16
$CS(CS^2)$	S(S)	S(S)	S(S♣)	S(S)
Wald-SR		1.66(6.54)		-7.11(5.09)
Wald-LR		-2.15(2.07)		-10.17(3.18)***
Norm pvalue	0.06	0.15	0.67	0.49
Sample	45	45	43	43
J-curve	No	No	No	No

Table 2B.10.3. France's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S. and its Largest trading partner – Terms of Trade

	TOT-US		TOT-Germany	
Variables	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	-0.11(0.17)	-0.22(0.17)	-0.12(0.15)	-0.05(0.16)
Δy_t	-1.01(0.86)	-0.85(0.66)	-0.47(0.33)	-0.95(0.37)**
Δy_{t-1}	-1.19(0.79)	-1.83(0.96)*		
Δy_{t-2}		-1.20(0.75)		
$\Delta y^i{}_t$	0.99(0.82)	0.81(0.77)	0.42(0.23)*	0.62(0.28)**
$\Delta y^i{}_{t-1}$	1.58(0.53)***	1.90(0.63)***		0.78(0.29)**
$\Delta y^i{}_{t-2}$		0.41(0.95)		0.65(0.21)***
$\Delta y^i{}_{t-3}$		-1.29(0.50)**		0.26(0.18)
Δtot_t	-0.58(0.67)		0.19(0.46)	
ΔNeg_t		-2.01(0.70)***		0.53(0.30)*
ΔPos_t		3.43(1.81)*		0.29(0.54)
ΔPos_{t-1}		3.87(1.29)***		-2.52(0.55)***
ΔPos_{t-2}				-1.51(0.45)***
ΔPos_{t-3}				-1.57(0.30)***
dum_fcrisis	-0.08(0.10)	-0.12(0.09)	-0.06(0.03)**	0.00(0.03)
Panel B: Long-run Estimates				
Y	0.00(0.65)	1.49(0.51)***	0.74(0.28)**	-0.76(0.37)*
Y^{us}	0.51(0.19)**	0.49(0.20)**	-0.37(0.09)***	-1.21(0.24)***
Tot	-2.46(1.30)*		0.50(0.41)	
Neg		-1.82(1.02)*		1.22(0.20)***
Pos		-2.53(1.38)*		3.36(0.67)***
Constant	5.11(3.05)	-6.45(1.99)***	-2.60(1.90)	6.45(1.28)***
Panel C: Diagnostics				
Adj R^2	0.39	0.46	0.33	0.52
F- Test	13.76	16.68	6.98	25.59
t-bound Test	-3.66	-4.04	-2.94	-4.31
ECM	-0.55(0.15)***	-0.72(0.18)***	-0.60(0.20)***	-0.79*0.18)***
Reset Test (fpvalue)	0.64	1.12	1.11	0.30
LM Test pvalue	0.47	0.40	0.91	0.19
$CS(CS^2)$	S(S)	S(S)	S(S)	S(S)
Wald-SR		-9.31(2.97)***		5.85(1.50)***
Wald-LR		0.71(0.83)		-2.14(0.63)***
Norm pvalue	1.00	0.97	0.52	0.64
Sample	45	43	45	43
J-curve	No	No	No	No

Table 2B.10.4. Germany's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S. and its Largest trading partner – Terms of Trade

	TOT-US		TOT-Netherlands	
Variables	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	-0.22(0.18)	-0.26(0.22)	-0.09(0.09)	-0.08(0.07)
Δtb_{t-2}			0.21(0.07)***	0.24(0.07)***
Δtb_{t-3}			0.39(0.19)**	0.44(0.16)***
Δy_t	-1.00(0.60)	-0.95(0.59)	-0.71(0.37)*	-0.78(0.35)**
Δy_{t-1}	-0.76(0.43)*	-0.91(0.53)*	0.88(0.27)***	0.66(0.27)**
Δy_{t-2}	0.82(0.54)	0.82(0.55)		
$\Delta y^i{}_t$	1.58(0.44)***	1.56(0.62)**	0.57(0.46)	0.39(0.37)
$\Delta y^i{}_{t-1}$	1.07(0.75)	1.21(0.82)	0.54(0.32)	0.55(0.33)
$\Delta y^i{}_{t-2}$	-0.72(0.64)	-0.78(0.70)	0.24(0.18)	0.04(0.21)
$\Delta y^i{}_{t-3}$	-1.00(0.41)**	-1.18(0.58)*	1.08(0.34)***	0.77(0.29)**
Δtot_t	0.14(0.77)		1.77(0.46)***	
Δtot_{t-1}			0.59(0.32)*	
ΔNeg_t		-0.38(1.28)		1.05(0.54)*
ΔNeg_{t-1}				1.54(0.60)**
ΔNeg_{t-2}				-1.03(0.63)
ΔPos_t		0.88(1.01)		2.51(0.38)***
dum_fcrisis	-0.12(0.05)**	-0.13(0.07)*	-0.05(0.03)*	-0.11(0.05)**
Panel B: Long-run Estimates				
Y	-1.86(0.92)*	-1.82(1.17)	-0.35(0.24)	-0.21(0.35)
Y^{us}	2.70(0.69)***	2.87(1.03)**	-0.29(0.17)	0.05(0.71)
Tot	-4.74(1.45)***		-0.42(0.40)	
Neg		-4.47(1.47)***		-0.05(0.38)
Pos		-4.85(2.46)*		-0.84(0.91)
Constant	6.42(1.52)***	-1.34(1.88)	2.19(0.70)***	0.20(1.01)
Panel C: Diagnostics				
Adj R^2	0.56	0.53	0.69	0.79
F- Test	14,.57	12.40	95.18	20.25
t-bound Test	-3.47	-3.74	-6.39	-5.57
ECM	-0.34(0.10)***	-0.35(0.09)***	-0.51(0.08)***	-0.41(0.07)***
Reset Test (fpvalue)	0.29	1.50	4.61**	0.44
LM Test pvalue	0.17	0.16	0.02	0.21
$CS(CS^2)$	U(S)	S♣(S)	S(S)	S(S)
Wald-SR		-1.25(1.75)		-0.95(1.22)
Wald-LR		0.38(1.99)		0.79(0.66)
Norm pvalue	0.67	0.78	0.36	0.62
Sample	43	43	43	43
J-curve	No	No	No	No

Table 2B.10.5. Greece's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S. and its Largest trading partner – Terms of Trade

	TOT-US		TOT-Germany	
Variables	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	-0.38(0.17)**	-0.39(0.17)**	-0.36(0.10)***	-0.06(0.12)
Δtb_{t-2}			-0.24(0.11)**	-0.14(0.18)
Δtb_{t-3}			-0.37(0.13)***	-0.28(0.13)**
Δy_t	-2.32(1.70)	-5.26(1.97)**	-0.37(0.26)	-0.88(0.65)
Δy_{t-1}			-0.75(0.60)	
Δy^i_t	4.94(2.14)**	7.61(2.91)**	0.99(0.49)*	0.80(0.63)
Δy^i_{t-1}			1.07(0.66)	1.81(0.73)**
Δy^i_{t-2}				1.33(0.61)**
Δtot_t	-1.81(2.54)		0.12(0.66)	
ΔNeg_t		-10.61(4.14)**		-0.01(1.50)
ΔNeg_{t-1}		-8.01(4.68)*		1.93(1.09)*
ΔNeg_{t-2}				2.79(1.15)**
ΔPos_t		13.78(4.28)***		0.21(1.34)
ΔPos_{t-1}		17.05(5.98)***		-0.10(1.53)
ΔPos_{t-2}		11.67(4.89)**		-0.96(1.83)
ΔPos_{t-3}		8.17(5.15)		2.07(1.69)
dum_fcrisis	-0.47(0.35)	-0.32(0.43)	0.06(0.08)	
Panel B: Long-run Estimates				
Y	-2.92(1.43)**	-1.58(1.18)	-1.73(0.52)***	-1.72(0.38)***
Y^{us}	3.51(1.22)***	9.36(4.31)**	-0.52(0.18)***	-1.53(0.48)***
Tot	-7.15(5.05)		-1.84(0.80)**	
Neg		-8.47(4.79)*		-3.42(0.44)***
Pos		-16.84(9.07)*		-1.67(0.70)**
Constant	12.62(7.18)*	-18.05(6.21)***	8.14(2.32)***	13.12(3.02)***
Panel C: Diagnostics				
Adj R^2	0.46	0.50	0.43	0.54
F- Test	4.56	4.06	26.38	59.48
t-bound Test	-2.44	-2.44	-3.59	-6.04
ECM	-0.42(0.17)**	-0.54(0.22)**	-0.46(0.13)***	-1.01(0.17)***
Reset Test (fpvalue)	1.79	0.88	1.78	2.92*
LM Test pvalue	0.97	0.80	0.18	0.04
$CS(CS^2)$	S(S)	S(S)	S(S)	S(S)
Wald-SR		-69.29(15.89)***		3.50(3.45)
Wald-LR		8.37(6.28)		-1.75(0.69)**
Norm pvalue	0.48	0.53	0.87	0.76
Sample	45	43	43	43
J-curve	No	Yes	No	Yes

Table 2B.10.6. Ireland's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S. and its Largest trading partner – Terms of Trade

	TOT-US	
Variables	Linear	Non-Linear
Panel A: Short-run Estimates		
Δtb_{t-1}	-0.13(0.11)	-0.07(0.11)
Δy_t	0.48(0.39)	0.57(0.41)
Δy_{t-1}	0.25(0.35)	0.13(0.32)
Δy_{t-2}	-0.71(0.47)	-0.89(0.49)*
Δy_{t-3}	0.93(0.27)***	0.69(0.36)*
Δy^i_t	0.93(0.27)***	-1.08(1.00)
Δtot_t	-0.70(0.92)	
Δtot_{t-1}	-0.53(0.84)	
Δtot_{t-2}	1.34(0.56)**	
ΔNeg_t		0.40(1.17)
ΔNeg_{t-1}		-0.65(0.95)
ΔNeg_{t-2}		1.73(0.77)**
ΔPos_t		-2.93(2.13)
dum_fcrisis	0.07(0.10)	0.01(0.11)
Panel B: Long-run Estimates		
Y	2.26(0.45)***	2.42(0.39)***
Y^{us}	-4.64(1.56)***	-4.23(1.92)**
Tot	-1.45(2.55)	
Neg		-0.11(2.30)
Pos		-3.08(2.78)
Constant	6.20(3.96)	4.12(1.70)**
Panel C: Diagnostics		
Adj R^2	0.38	0.37
F- Test	80.35	51.28
t-bound Test	-3.85	-2.67
ECM	-0.32(0.08)***	-0.37(0.14)**
Reset Test (fpvalue)	0.35	0.04
LM Test pvalue	0.13	0.32
$CS(CS^2)$	S(S)	
Wald-SR		
Wald-LR		2.97(2.40)
Norm pvalue	0.92	0.73
Sample	43	43
J-curve	No	No

Note: Ireland's largest trading partner is also the United States

Table 2B.10.7. Italy's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S. and its Largest trading partner – Terms of Trade

	TOT-US		TOT-Germany	
Variables	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	0.16(0.14)	0.16(0.14)	-0.15(0.15)	-0.01(0.13)
Δtb_{t-2}			0.32(0.13)**	0.29(0.14)**
Δy_t	-2.10(0.66)***	-2.12(0.69)***	-0.90(0.31)***	-0.83(0.35)**
Δy_{t-1}			-0.50(0.30)	
$\Delta y^i{}_t$	2.35(0.54)***	1.97(0.49)***	0.72(0.35)*	0.46(0.36)
$\Delta y^i{}_{t-1}$			0.42(0.56)	0.20(0.71)
$\Delta y^i{}_{t-2}$			0.02(0.15)	0.13(0.27)
$\Delta y^i{}_{t-3}$			-0.71(0.20)***	-0.54(0.31)*
Δtot_t	-0.08(0.85)		0.90(0.22)***	
Δtot_{t-1}			-0.60(0.26)**	
Δtot_{t-2}			-0.50(0.29)*	
ΔNeg_t		0.69(1.00)		1.22(0.39)***
ΔPos_t		-1.46(1.13)		0.49(0.43)
ΔPos_{t-1}				-1.35(0.41)***
ΔPos_{t-2}				-1.04(0.38)**
dum_fcrisis	-0.08(0.06)	-0.08(0.06)	>-0.01(0.05)	<0.01(0.06)
Panel B: Long-run Estimates				
Y	0.24(0.68)	0.14(0.99)	-1.00(0.56)*	-1.29(0.43)***
Y^{us}	0.79(0.46)*	-0.56(1.70)	-0.40(0.19)**	-0.60(0.95)
Tot	-1.38(2.75)		2.39(1.19)*	
Neg		-2.18(4.02)		1.71(1.23)
Pos		-0.23(3.46)		2.20(0.78)***
Constant	0.55(2.52)	0.28(1.14)	-1.35(0.73)*	3.88(2.29)
Panel C: Diagnostics				
Adj R^2	0.35	0.36	0.47	0.42
F- Test	5.32	0.88	2.30	5.24
t-bound Test	-1.25	-0.82	-3.56	-3.72
ECM	-0.23(0.18)	-0.17(0.21)	-0.28(0.12)**	-0.45(0.12)***
Reset Test (fpvalue)	0.40	1.25	0.35	0.18
LM Test pvalue	0.11	0.12	0.17	0.15
$CS(CS^2)$	$S(S^{\clubsuit})$	S(S)	S(S)	$S(S^{\clubsuit})$
Wald-SR		2.15(1.66)		3.13(0.84)***
Wald-LR		-1.95(2.30)		-0.49(1.26)
Norm pvalue	0.82	0.47	0.56	0.47
Sample	45	45	43	43
J-curve	No	No	No	No

Table 2B.10.8. Netherland's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S. and its Largest trading partner – Terms of Trade

	TOT-US		TOT-Germany	
Variables	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	-0.21(0.14)	-0.22(0.12)*	0.29(0.15)*	0.14(0.13)
Δtb_{t-2}			0.33(0.16)*	
Δtb_{t-3}				
Δy_t	-1.61(1.11)	-1.35(1.21)	-0.72(0.60)	-0.07(0.71)
Δy_{t-1}	3.04(1.02)***	3.41(1.19)***	-1.06(0.63)	-0.04(0.53)
Δy_{t-2}			-0.70(0.55)	0.23(0.53)
Δy_{t-3}			-1.19(0.62)*	-0.97(0.57)
$\Delta y^i_{\ t}$	1.82(0.62)***	2.13(0.74)***	0.94(0.59)	2.01(0.82)**
$\Delta y^i_{\ t-1}$	-3.46(1.02)***	-3.67(0.99)***		-0.89(0.59)
$\Delta y^i_{\ t-2}$	-0.29(0.61)	-0.08(0.65)		
$\Delta y^i_{\ t-3}$	-2.43(0.50)***	-2.60(0.58)***		
$\Delta tot_{\ t}$	-5.61(2.43)**		-2.14(1.77)	
$\Delta tot_{\ t-1}$			-3.85(1.40)**	
$\Delta Neg_{\ t}$		-8.65(2.66)***		-3.76(2.38)
ΔNeg_{t-1}				-2.48(1.64)
ΔNeg_{t-2}				-2.96(1.72)
$\Delta Neg_{\ t-3}$				-3.56(1.23)***
$\Delta Pos_{\ t}$		3.79(6.48)		-1.34(3.46)
$\Delta Pos_{\ t-1}$				13.34(6.09)**
$\Delta Pos_{\ t-2}$				9.79(4.58)**
$\Delta Pos_{\ t-3}$				13.38(4.26)***
dum_fcrisis	0.08(0.07)	0.11(0.06)*	0.16(0.08)**	0.23(0.11)*
Panel B: Long-run Estimates				
Y	-11.84(5.24)**	-12.02(5.78)**	-0.09(1.15)	1.69(1.62)
Y^{us}	8.14(3.38)**	7.90(4.26)*	0.54(0.74)	4.92(4.24)
Tot	-2.03(3.47)		2.69(1.82)	
Neg		-3.88(3.94)		-4.70(9.67)
Pos		-0.68(10.03)		-29.03(33.33)
Constant	8.81(6.06)	5.61(2.07)**	-7.57(7.03)	-8.61(2.25)***
Panel C: Diagnostics				
Adj R^2	0.49	0.51	0.20	0.38
F- Test	4.78	3.89	14.75	5.31
t-bound Test	-3.23	-0.34(0.13)**	-2.86	-1.48
ECM	-0.35(0.11)***	-0.34(0.13)**	-0.54(0.19)***	-0.32(0.21)
Reset Test (fpvalue)	0.39	0.19	5.70***	4.73**
LM Test pvalue	0.04	0.04	0.11	<0.01
$CS(CS^2)$	S(S)	S♣(S)	S(S)	S(S)
Wald-SR		-12.44(7.50)		-
Wald-LR		-3.20(7.74)		24.33(23.89)
Norm pvalue	0.59	0.53	0.16	0.47
Sample	43	43	43	43
J-curve	No	No	No	No

Table 2B.10.9. Portugal's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S. and its Largest trading partner – Terms of Trade

	TOT-US		TOT-Spain	
Variables	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	-0.37(0.27)	-0.49(0.12)***	-0.28(0.15)*	-0.02(0.13)
Δtb_{t-2}	0.25(0.16)		-0.21(0.23)	-0.10(0.17)
Δtb_{t-3}	0.37)**		0.20(0.19)	0.39(0.14)**
Δy_t	5.26(1.29)***	2.32(0.86)**	1.32(0.83)	1.89(0.63)***
Δy_{t-1}	-1.94(1.43)			
Δy_{t-2}	-0.33(1.18)			
Δy_{t-3}	1.89(0.92)*			
$\Delta y^i{}_t$	0.13(1.54)	2.60(0.94)***	0.18(0.73)	0.19(0.71)
$\Delta y^i{}_{t-1}$	-0.70(2.05)		-1.61(0.48)***	-1.33(0.64)**
$\Delta y^i{}_{t-2}$	-0.70(1.69)			1.17(0.51)**
$\Delta y^i{}_{t-3}$	-3.24(1.33)**			
Δtot_t	-1.05(2.12)		-1.03(0.78)	
Δtot_{t-1}	-0.15(1.34)		2.06(0.76)**	
Δtot_{t-2}	-0.55(1.50)			
Δtot_{t-3}	-4.35(1.50)***			
ΔNeg_t		-2.18(1.03)**		-1.64(0.54)***
ΔNeg_{t-1}				0.41(0.69)
ΔNeg_{t-2}				0.08(0.50)
ΔNeg_{t-3}				-1.29(0.48)**
ΔPos_t		5.12(2.32)**		1.35(0.87)
ΔPos_{t-1}				-0.54(1.32)
ΔPos_{t-2}				-3.11(1.11)**
dum_fcrisis	0.51(0.23)**	0.18(0.21)	-0.08(0.12)	-0.08(0.15)
Panel B: Long-run Estimates				
Y	28.82(168.07)	0.82(0.61)	-2.33(5.28)	2.70(0.83)***
Y^{us}	-38.33(227.40)	0.17(0.99)	9.71(13.54)	-1.17(1.75)
Tot	16.95(65.28)		-6.69(9.92)	
Neg		0.18(0.76)		-1.07(0.61)*
Pos		2.21(0.96)**		-2.11(1.09)*
Constant	-1.85(9.82)	-2.35(1.24)*	-0.36(1.99)	-3.05(1.22)**
Panel C: Diagnostics				
Adj R^2	0.44	0.43	0.39	0.44
F- Test	0.10	8.74	0.52	14.65
t-bound Test	-0.18	-2.83	-1.00	-1.88
ECM	-0.06(0.31)	-0.38(0.13)***	-0.09(0.09)	-0.37(0.20)*
Reset Test (fpvalue)	1.02	0.36	0.84	0.58
LM Test pvalue	0.01	0.07	0.40	<0.01
CS(CS^2)	S(S)	S(S)	S(S)	S(S♣)
Wald-SR		-7.30(3.08)**		-6.36(3.62)*
Wald-LR		-2.03(0.89)**		1.04(0.61)
Norm pvalue	0.50	0.85	0.06	<0.01
Sample	43	45	43	43
J-curve	No	No	No	No

Table 2B.10.10. Spain's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S. and its Largest trading partner – Terms of Trade

	TOT-US		TOT-France	
Variables	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	-0.17(0.14)	0.15(0.29)	-0.13(0.17)	-0.32(0.19)
Δtb_{t-2}		0.37(0.18)*		
Δy_t	-0.34(0.48)	-1.41(0.82)*	-0.83(0.65)	0.25(0.50)
Δy_{t-1}			0.02(0.69)	1.94(1.03)*
Δy_{t-2}			-0.75(0.50)	1.30(1.05)
Δy_{t-3}			1.37(0.64)**	2.15(0.92)**
$\Delta y^i{}_t$	1.20(0.63)	1.29(0.60)**	0.83(1.21)	0.28(1.26)
$\Delta y^i{}_{t-1}$	0.31(0.46)	-0.77(0.70)	0.23(0.91)	-3.16(2.08)
$\Delta y^i{}_{t-2}$	0.40(0.55)	-0.79(0.45)*	0.03(0.81)	-2.73(1.50)*
$\Delta y^i{}_{t-3}$	-1.21(0.42)***	-1.49(0.81)*	-2.50(0.94)**	-3.77(1.32)***
Δtot_t	0.63(0.28)**		-1.11(0.45)**	
Δtot_{t-1}			0.12(0.47)	
Δtot_{t-2}			-0.78(0.46)	
ΔNeg_t		0.28(0.55)		-0.48(0.61)
ΔNeg_{t-1}		-0.92(1.10)		1.34(0.50)**
ΔNeg_{t-2}		-1.08(0.69)		1.02(0.44)**
ΔPos_t		2.08(1.16)*		-1.23(0.69)*
ΔPos_{t-1}		-1.12(0.84)		
ΔPos_{t-2}		1.52(1.07)		
dum_fcrisis	-0.06(0.07)	0.02(0.12)	0.14(0.07)**	0.04(0.05)
Panel B: Long-run Estimates				
Y	-0.32(0.52)	-2.24(2.10)	-0.97(0.34)***	-4.19(3.42)
Y^{us}	1.87(0.41)***	2.95(2.49)	0.22(0.39)	7.80(6.87)
Tot	-1.56(0.71)**		-0.42(0.70)	
Neg		2.00(1.21)		-2.62(1.06)**
Pos		1.86(0.86)**		-4.44(1.77)**
Constant	0.03(0.98)	-0.83(1.22)	2.68(1.93)	-7.26(6.67)
Panel C: Diagnostics				
Adj R^2	0.36	0.35	0.49	0.55
F- Test	13.15	4.32	7.14	6.41
t-bound Test	-3.84	-1.77	-1.88	-3.32
ECM	-0.45(0.12)***	-0.37(0.21)*	-0.51(0.27)*	-0.43(0.13)***
Reset Test	0.96	0.19	6.93***	5.19**
LM Test pvalue	0.56	<0.01	0.49	0.79
CS(CS^2)	S(S)	S(S)	U(S)	S(S)
Wald-SR		-4.21(3.63)		3.12(1.43)**
Wald-LR		0.14(1.06)		1.82(0.74)**
Norm pvalue	0.53	0.66	0.82	0.29
Sample	43	43	43	43
J-curve	No	No	No	Yes

Table 2B.10.11. Australia's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S. and its Largest trading partner – Terms of Trade

	TOT-US		TOT-Japan	
Variables	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	0.02(0.10)	0.12(0.15)	-0.10(0.16)	-0.08(0.19)
Δy_t	-0.79(0.99)	-1.02(0.91)	0.15(1.27)	-0.44(0.88)
Δy_{t-1}			-1.04(0.94)	-1.60(0.79)*
Δy^i_t	-0.70(0.67)	-0.71(0.72)	-0.29(0.56)	-0.26(0.70)
Δy^i_{t-1}	-0.89(0.47)*	-1.70(0.72)**	1.02(0.60)*	1.02(0.63)
Δy^i_{t-2}	-0.62(0.46)	-0.97(0.53)*		
Δtot_t	-0.19(0.24)		1.06(0.57)*	
Δtot_{t-1}			-1.09(0.40)**	
ΔNeg_t		-1.76(0.78)**		1.71(1.04)
ΔNeg_{t-1}				-0.20(1.24)
ΔNeg_{t-2}				-2.82(1.31)**
ΔNeg_{t-3}				-2.38(1.09)**
ΔPos_t		0.34(0.76)		-0.76(1.00)
ΔPos_{t-1}		1.14(0.79)		-1.68(0.93)*
ΔPos_{t-2}				0.61(0.93)*
ΔPos_{t-3}				1.48(0.63)**
dum_fcrisis	-0.15(0.09)*	-0.18(0.11)	0.17(0.13)	0.19(0.12)
Panel B: Long-run Estimates				
Y	-3.51(1.07)***	-3.33(1.07)***	-0.35(0.76)	0.68(1.17)
Y^{us}	2.89(0.99)	2.91(0.82)***	0.18(0.68)	-0.26(0.58)
Tot	-0.13(0.21)		1.20(0.23)***	
Neg		-0.15(0.39)		1.07(1.71)
Pos		-0.39(0.15)**		0.74(0.30)**
Constant	1.47(0.45)***	0.93(1.07)	-2.30(0.69)***	-1.04(6.41)
Panel C: Diagnostics				
Adj R^2	0.32	0.32	0.38	0.49
F- Test	10.24	19.44	14.52	56.53
t-bound Test	-5.77	-4.89	-3.37	-6.12
ECM	-0.58(0.10)***	-0.78(0.16)***	-0.65(0.19)***	-1.06(0.17)***
Reset Test	1.50	2.40	2.15	1.03
LM Test pvalue	0.21	0.15	0.72	0.71
$CS(CS^2)$	S(S)	S(S)	S(S)	S(S)
Wald-SR		-3.24(1.64)*		-3.34(2.14)
Wald-LR		0.24(0.43)		0.33(1.59)
Norm pvalue	0.94	0.57	0.37	0.74
Sample	44	44	45	43
J-curve	No	No	No	No

Table 2B.10.12. Canada Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S. and its Largest trading partner – Terms of Trade

	TOT-US	
Variables	Linear	Non-Linear
Panel A: Short-run Estimates		
Δtb_{t-1}	0.26(0.18)	0.19(0.15)
Δy_t	-0.07(0.40)	0.16(0.37)
Δy_{t-1}	0.15(0.19)	0.87(0.37)**
Δy_{t-2}	-0.21(0.17)	
Δy_{t-3}	-0.29(0.19)	
Δy^i_t	-0.27(0.53)	-0.58(0.33)*
Δy^i_{t-1}		-1.17(0.43)**
Δy^i_{t-2}		-0.29(0.26)
Δy^i_{t-3}		-0.82(0.26)***
Δtot_t	0.39(0.27)	
ΔNeg_t		1.28(0.54)**
ΔPos_t		-0.19(0.62)
ΔPos_{t-1}		-1.55(0.75)**
dum_fcrisis	-0.03(0.05)	-0.05(0.03)*
Panel B: Long-run Estimates		
Y	-0.48(1.27)	-0.29(1.00)
Y^{us}	0.32(1.01)	1.19(1.04)
Tot	-1.02(0.89)	
Neg		1.68(0.92)*
Pos		-0.44(0.55)
Constant	1.61(1.13)	-1.07(0.53)*
Panel C: Diagnostics		
Adj R^2	0.10	0.28
F- Test	1.06	5.57
t-bound Test	-2.23	-3.18
ECM	-0.29(0.13)**	-0.39(0.12)***
Reset Test (fpvalue)	1.75	1.35
LM Test pvalue	0.28	0.28
$CS(CS^2)$	S(S)	S(S)
Wald-SR		0.46(0.64)
Wald-LR		2.12(0.81)**
Norm pvalue	0.79	0.83
Sample	43	43
J-curve	No	No

Note: Canada's largest trading partner is the United States

Table 2B.10.13. Denmark's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S. and its Largest trading partner – Terms of Trade

	TOT-US		TOT-Germany	
Variables	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	0.03(0.14)	0.73(0.20)***	0.15(0.19)	0.25(0.19)
Δtb_{t-2}		0.455(0.22)*	0.25(0.20)	0.36(0.20)*
Δtb_{t-3}		0.14(0.12)	0.25(0.14)*	0.36(0.19)*
Δy_t	-0.30(0.33)	0.82(0.41)*	0.54(0.39)	0.27(0.35)
Δy_{t-1}		3.13(0.94)***		
Δy_{t-2}		2.52(0.82)***		
Δy_{t-3}		0.97(0.48)*		
$\Delta y^i{}_t$	-0.77(0.65)	-2.38(0.78)***	-0.48(0.43)	-0.50(0.52)
$\Delta y^i{}_{t-1}$	-1.21(0.58)**	-5.16(1.39)***		1.11(0.66)
$\Delta y^i{}_{t-2}$		-2.51(0.68)***		
$\Delta y^i{}_{t-3}$		-2.39(0.86)**		
Δtot_t	1.89(1.84)		-3.06(0.82)***	
Δtot_{t-1}	4.50(2.09)**			
Δtot_{t-2}	1.04(1.51)			
Δtot_{t-3}	-2.17(0.69)***			
ΔNeg_t		-1.43(3.17)		-4.31(1.64)**
ΔNeg_{t-1}		15.93(2.89)***		
ΔPos_t		15.77(2.28)***		0.64(1.92)
ΔPos_{t-1}		26.81(5.91)***		
ΔPos_{t-2}		28.33(6.04)***		
ΔPos_{t-3}		13.89(4.23)***		
dum_fcrisis	-0.09(0.10)	-0.01(0.09)	0.13(0.05)**	0.24(0.07)***
Panel B: Long-run Estimates				
Y	-5.53(1.70)***	-1.66(0.28)***	1.61(0.49)***	0.56(0.19)***
Y^{us}	7.66(2.27)***	2.52(0.40)***	-1.14(0.54)**	-1.81(0.80)**
Tot	-15.39(5.85)**		1.16(1.11)	
Neg		-8.34(1.12)***		-0.58(0.98)
Pos		-4.09(0.98)***		3.16(1.91)
Constant	19.07(4.22)***	-6.92(1.25)***	-4.52(2.84)	2.64(1.92)
Panel C: Diagnostics				
Adj R^2	0.39	0.69	0.34	0.33
F- Test	5.89	121.39	6.22	9.35
t-bound Test	-2.85	-5.75	-4.19	-4.61
ECM	-0.31(0.11)***	-1.61(0.28)***	-0.59(0.14)***	-0.62(0.13)***
Reset Test (fpvalue)	0.13	0.12	0.13	0.05
LM Test pvalue	0.14	0.09	0.34	0.09
$CS(CS^2)$	S(S)	S(S)	S(S)	S(S)
Wald-SR		-70.29(12.58)***		-4.95(2.92)
Wald-LR		-4.26(0.55)***		-3.75(1.61)**
Norm pvalue	0.36	0.84	0.92	0.56
Sample	42	39	42	42
J-curve	Yes-SR	Yes	No	No

Table 2B.10.14. Japan's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S. and its Largest trading partner – Terms of Trade

	TOT-US	
Variables	Linear	Non-Linear
Panel A: Short-run Estimates		
Δtb_{t-1}	0.18(0.12)	-0.14(0.14)
Δy_t	-0.70(0.47)	-1.07(0.47)**
Δy_{t-1}		-0.92(0.41)**
Δy_{t-2}		-0.52(0.44)
$\Delta y^i{}_t$	0.94(0.75)	1.22(0.69)*
Δtot_t	-0.05(0.26)	
ΔNeg_t		0.04(0.34)
ΔPos_t		-0.29(0.54)
dum_fcrisis	-0.10(0.07)	-0.27(0.10)**
Panel B: Long-run Estimates		
Y	0.88(0.48)*	1.02(1.25)
Y^{us}	-0.66(0.57)	1.02(1.25)
Tot	-0.86(0.72)	
Neg		-2.15(2.24)
Pos		-8.63(8.35)
Constant	1.44(1.54)	-2.91(1.06)**
Panel C: Diagnostics		
Adj R^2	0.30	0.37
F- Test	2.63	0.47
t-bound Test	-2.88	-1.32
ECM	-0.37(0.13)***	-0.18(0.13)
Reset Test (fpvalue)	2.12	0.73
LM Test pvalue	0.27	0.30
$CS(CS^2)$	S♣(S)	S(S♣)
Wald-SR		0.34(0.72)
Wald-LR		6.48(6.22)
Norm pvalue	0.84	0.34
Sample	45	44
J-curve	No	No

Note: Japan's largest trading partner is the United States.

Table 2B.10.15. Korea's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S. and its Largest trading partner – Terms of Trade

	TOT-US	
Variables	Linear	Non-Linear
Panel A: Short-run Estimates		
Δtb_{t-1}	-0.15(0.18)	-0.24(0.24)
Δtb_{t-2}	0.65(0.17)***	0.45(0.18)**
Δtb_{t-3}	0.41(0.17)**	0.31(0.11)**
Δy_t	-1.52(0.59)**	-1.50(0.68)**
Δy_{t-1}	-0.82(0.39)**	0.86(0.48)*
Δy_{t-2}	-1.08(0.33)***	
Δy_{t-3}	-0.70(0.37)*	
$\Delta y^i{}_t$	2.64(0.84)***	3.47(0.71)***
$\Delta y^i{}_{t-1}$	1.03(0.87)	1.42(1.28)
Δtot_t	-0.75(0.58)	
Δtot_{t-1}	-2.63(0.62)***	
ΔNeg_t		-0.54(0.86)
ΔNeg_{t-1}		-1.78(0.76)**
ΔNeg_{t-2}		1.25(1.28)
ΔNeg_{t-3}		
ΔPos_t		-0.55(0.92)
ΔPos_{t-1}		-7.07(1.47)***
ΔPos_{t-2}		-4.80(1.10)***
ΔPos_{t-3}		-1.97(0.91)**
dum_fcrisis	0.31(0.16)*	0.46(0.15)***
Panel B: Long-run Estimates		
Y	-1.16(5.78)	51.20(229.48)
Y^{us}	-13.94(47.66)	3.67(22.51)
Tot	-9.76(36.10)	
Neg		97.58(433.84)
Pos		-181.73(813.93)
Constant	4.97(1.61)***	2.13(1.91)
Panel C: Diagnostics		
Adj R^2	0.44	0.49
F- Test	0.03	0.02
t-bound Test	-0.29	0.22
ECM	-0.04(0.15)	0.03(0.14)
Reset Test (fpvalue)	1.24	0.91
LM Test pvalue	0.87	0.07
$CS(CS^2)$	S(S♣)	S(S♣)
Wald-SR		13.33(2.92)***
Wald-LR		279.31(1247.70)
Norm pvalue	0.59	0.69
Sample	43	43
J-curve	No	No

Note: Korea's largest trading partner is also the United States

Table 2B.10.16. New Zealand's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S. and its Largest trading partner – Terms of Trade

	TOT-US		TOT-Australia	
Variables	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	0.28(0.15)*	0.73(0.18)***	0.38(0.17)**	-0.29(0.31)
Δtb_{t-2}	0.27(0.15)*	0.53(0.15)***	0.28(0.14)*	-0.25(0.30)
Δtb_{t-3}				-0.28(0.23)
Δy_t	1.47(0.73)*	3.34(0.58)***	-1.08(0.38)**	-0.69(0.33)**
Δy_{t-1}	-0.02(0.63)	-0.05(0.66)	-0.52(0.51)	-0.40(0.43)
Δy_{t-2}			-0.40(0.35)	
Δy_{t-3}			-0.75(0.25)***	
$\Delta y^i{}_t$	-3.62(1.13)***	-4.01(0.97)***	2.18(0.66)***	1.84(1.01)*
$\Delta y^i{}_{t-1}$			2.89(0.76)***	2.62(0.92)***
Δtot_t	-0.84(0.90)		1.10(0.48)**	
Δtot_{t-1}	1.17(0.75)		-2.36(0.53)***	
Δtot_{t-2}			-1.12(0.41)**	
Δtot_{t-3}			-1.36(0.46)***	
ΔNeg_t		-5.77(2.03)**		-0.60(1.97)
ΔNeg_{t-1}		-5.56(3.55)		-3.87(2.13)*
ΔNeg_{t-2}		-2.49(2.00)		-2.81(1.64)
ΔNeg_{t-3}		-3.00(1.50)*		-2.29(1.10)*
ΔPos_t		1.39(0.98)		1.58(1.04)
ΔPos_{t-1}		5.23(2.20)**		
ΔPos_{t-2}		0.67(1.96)		
dum_fcrisis	-0.24(0.13)*	-0.41(0.10)***	0.02(0.05)	0.14(0.08)*
Panel B: Long-run Estimates				
Y	2.22(0.60)***	3.03(0.40)***	-0.06(0.24)	1.09(2.53)
Y^{us}	-0.80(0.27)***	-0.70(0.18)***	-0.89(0.19)***	-1.09(1.23)
Tot	-1.32(0.41)***		2.72(0.36)***	
Neg		0.54(1.86)		3.94(4.77)
Pos		-1.08(0.93)		2.74(1.73)
Constant	-0.45(1.33)	-14.87(3.60)***	-9.08(2.48)***	-0.11(2.76)
Panel C: Diagnostics				
Adj R^2	0.44	0.55	0.55	0.34
F- Test	9.14	54.01	23.00	2.77
t-bound Test	-4.93	-6.66	-5.08	-1.58
ECM	-0.96(0.19)***	-1.59(0.24)***	-1.11(0.21)***	-0.44(0.28)
Reset Test (fpvalue)	0.37	1.75	1.29	2.07
LM Test pvalue	0.33	0.04	0.76	0.17
$CS(CS^2)$	S(S)	U(S)	S(S)	S(S)
Wald-SR		-24.12(8.75)**		-11.15(6.33)*
Wald-LR		1.62(0.99)		1.21(3.34)
Norm pvalue	0.58	0.39	0.54	0.81
Sample	38	38	36	38
J-curve	No	No	No	No

Table 2B.10.17. Norway's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S. and its Largest trading partner – Terms of Trade

	TOT-US		TOT- United Kingdom	
Variables	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	-0.27(0.13)*	-0.24(0.17)	-0.05(0.11)	-0.05(0.12)
Δy_t	-1.35(1.73)	-1.26(2.04)	1.36(1.21)	1.10(1.22)
Δy_{t-1}			-2.74(1.01)**	-1.87(0.97)*
$\Delta y^i{}_t$	1.93(1.29)	1.93(1.27)	0.41(1.25)	0.64(0.75)
Δtot_t	0.62(0.91)		1.21(0.54)	
Δtot_{t-1}			-0.51(0.54)	
Δtot_{t-2}			-1.15(0.35)***	
Δtot_{t-3}			-0.81(0.46)*	
ΔNeg_t		0.31(1.97)		1.01(0.99)
ΔPos_t		1.01(1.30)		1.19(0.69)*
dum_fcrisis	0.35(0.20)*	0.27(0.21)	0.10(0.16)	0.19(0.16)
Panel B: Long-run Estimates				
Y	-1.17(2.62)	-0.55(2.09)	2.91(1.33)**	0.44(1.81)
Y^{us}	1.70(3.10)	1.86(2.96)	-2.70(1.64)	-2.81(3.31)
Tot	-2.41(2.36)		3.13(1.32)**	
Neg		-0.91(2.57)		-1.03(2.58)
Pos		-1.75(1.96)		0.30(1.39)
Constant	3.08(2.07)	-1.99(3.24)	-5.60(3.32)	3.11(3.08)
Panel C: Diagnostics				
Adj R^2	0.22	0.18	0.30	0.21
F- Test	1.06	0.96	3.79	1.10
t-bound Test	-1.89	-1.71	-2.67	-2.55
ECM	-0.35(0.19)*	-0.41(0.24)*	-0.42(0.16)**	-0.28(0.11)**
Reset Test (fpvalue)	2.27	2.22	0.39	1.75
LM Test pvalue	0.65	0.73	0.95	0.68
$CS(CS^2)$	S(S)	S(S)	S(S♣)	S(S♣)
Wald-SR		-0.71(2.71)		-0.18(1.35)
Wald-LR		0.84(1.43)		-1.33(1.40)
Norm pvalue	0.46	0.63	0.53	0.67
Sample	45	45	43	45
J-curve	No	No	No	No

Table 2B.10.18. Sweden Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S. and its Largest trading partner – Terms of Trade

	TOT-US		TOT-Germany	
Variables	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	0.12(0.19)	0.14(0.22)	-0.19(0.20)	-0.21(0.21)
Δy_t	0.17(0.66)	0.20(0.65)	-0.83(0.53)	-0.80(0.45)*
Δy_{t-1}	-0.76(0.57)	0.39(0.67)		
Δy_{t-2}	0.29(0.40)	0.29(0.53)		
Δy_{t-3}	1.36(0.41)***	2.31(0.64)***		
$\Delta y^i{}_t$	1.21(0.87)	1.82(1.41)	1.90(0.46)***	2.08(0.28)***
$\Delta y^i{}_{t-1}$		-1.76(0.96)*	0.56(0.37)	0.98(0.29)***
$\Delta y^i{}_{t-2}$		0.32(0.89)	0.68(0.23)***	0.69(0.21)***
$\Delta y^i{}_{t-3}$		-1.83(0.90)*		-1.30(1.13)
Δtot_t	-0.81(0.80)		-0.91(0.55)	
Δtot_{t-1}			-1.03(0.43)***	
ΔNeg_t		-3.78(2.28)		-1.14(1.53)
ΔPos_t		3.83(2.05)*		0.51(1.06)
ΔPos_{t-1}				-3.90(0.63)***
ΔPos_{t-2}				-3.99(0.65)***
ΔPos_{t-3}				-1.30(1.13)
dum_fcrisis	-0.17(0.15)	-0.08(0.18)	0.17(0.09)*	0.30(0.08)***
Panel B: Long-run Estimates				
Y	-1.51(2.28)	-4.17(4.46)	-42.24(452.43)	-2.08(1.23)
Y^{us}	1.03(1.64)	4.34(5.32)	25.95(280)	-0.53(0.75)
Tot	-7.39(3.14)**		-17.62(173.01)	
Neg		-4.51(3.52)		0.77(1.42)
Pos		-4.89(5.00)		7.94(3.85)**
Constant	10.25(3.66)***	-0.34(1.29)	1.96(1.94)	3.07(0.96)
Panel C: Diagnostics				
Adj R^2	0.42	0.48	0.25	0.48
F- Test	10.12	7.96	0.00	1.96
t-bound Test	-2.28	-2.48	-0.10	-1.83
ECM	-0.27(0.12)**	-0.30(0.12)**	-0.01(0.14)	-0.31(0.17)*
Reset Test (fpvalue)	0.04	0.36	0.74	0.22
LM Test pvalue	0.64	0.17	0.99	0.99
CS(CS^2)	U(S)	U(S♣)	U(S)	U(S)
Wald-SR		-7.61(4.14)*		7.53(3.16)**
Wald-LR		0.39(6.14)		-7.17(3.07)**
Norm pvalue	0.81	0.42	0.66	0.64
Sample	43	43	44	43
J-curve	No	No	No	No

Table 2B.10.19. Switzerland's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S. and its Largest trading partner – Terms of Trade

	TOT-US		TOT-Germany	
Variables	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	0.17(0.19)	0.10(0.14)	-0.19(0.11)	-0.02(0.12)
Δy_t	-0.02(1.12)	-0.93(0.97)	-0.16(0.32)	-0.23(0.41)
Δy_{t-1}			-1.27(0.36)***	-0.78(0.28)**
Δy_{t-2}			-0.16(0.30)	0.23(0.29)
Δy_{t-3}			-0.85(0.30)***	-0.50(0.27)*
Δy^i_t	0.64(0.97)	1.44(0.73)*	0.17(0.28)	0.40(0.30)
Δy^i_{t-1}			0.69(0.28)**	
Δy^i_{t-2}			0.23(0.21)	
Δy^i_{t-3}			0.47(0.26)*	
Δtot_t	1.59(1.15)		1.29(0.39)***	
Δtot_{t-1}	1.26(1.60)		-0.70(0.36)*	
Δtot_{t-2}	4.23(1.26)***			
ΔNeg_t		-3.76(3.87)		2.41(1.03)**
ΔNeg_{t-1}		4.60(3.29)		-2.11(0.54)***
ΔNeg_{t-2}		7.39(1.79)***		1.04(0.63)
ΔNeg_{t-3}		3.41(3.43)		-1.45(0.71)*
ΔPos_t		3.14(2.93)		0.52(0.67)
dum_fcrisis	-0.04(0.10)	0.03(0.08)	0.02(0.05)	-0.03(0.04)
Panel B: Long-run Estimates				
Y	-0.59(0.56)	-0.88(0.46)*	0.03(0.16)	-0.56(0.26)**
Y^i	2.06(1.13)*	1.81(0.94)*	0.06(0.21)	1.09(0.40)**
Tot	-5.37(3.29)		1.36(0.42)***	
Neg		-5.88(2.31)**		1.80(0.46)***
Pos		-5.03(2.60)*		1.34(0.23)***
Constant	12.56(7.25)*	-2.83(1.89)	-5.06(1.25)***	-2.19(0.53)***
Panel C: Diagnostics				
Adj R^2		0.33	0.59	0.65
F- Test	2.71	2.81	64.17	48.32
t-bound Test	-4.17	-5.28	-6.93	-4.47
ECM	-0.70(0.17)***	-0.82(0.15)***	-0.73(0.11)***	-0.79(0.18)***
Reset Test (fpvalue)	0.87	0.11	2.41	5.98
LM Test pvalue	0.42	0.69	0.10	0.06
$CS(CS^2)$	S(S)	S(S)	S(S♣)	S(S)
Wald-SR		8.50(4.56)*		-0.62(1.80)
Wald-LR		-0.85(1.08)		0.47(0.50)
Norm pvalue	0.97	0.14	0.78	0.11
Sample	44	43	43	43
J-curve	No	Yes	No	No

Table 2B.10.20. United Kingdom's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S. and its Largest trading partner – Terms of Trade

	TOT-US		TOT-Germany	
Variables	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	-0.15(0.13)	0.07(0.11)	0.20(0.13)	0.27(0.15)*
Δy_t	0.65(0.72)	0.26(0.54)	-1.96(0.42)***	-1.93(0.54)***
Δy_{t-1}	-0.95(0.64)	-1.11(0.48)		
Δy^i_t	-1.15(1.05)	-0.61(1.03)	1.35(0.46)***	1.20(0.54)**
Δtot_t	1.49(0.79)*		0.62(0.48)	
ΔNeg_t		5.39(1.29)***		-0.57(0.73)
ΔPos_t		-1.56(2.73)		2.48(1.44)*
ΔPos_{t-1}		-5.27(1.61)***		
ΔPos_{t-2}		-1.68(1.13)		
ΔPos_{t-3}		-3.52(2.38)		
dum_fcrisis	-0.10(0.08)	-0.12(0.11)	0.03(0.06)	0.06(0.08)
Panel B: Long-run Estimates				
Y	0.19(1.83)	-1.49(0.64)**	1.38(0.50)***	0.30(0.39)
Y^{us}	-0.82(1.12)	1.32(0.66)*	-0.94(0.28)***	-1.87(0.52)***
Tot	4.46(3.01)		0.13(1.22)	
Neg		7.23(3.17)**		-0.07(0.96)
Pos		1.27(1.32)		2.01(1.12)*
Constant	-4.18(2.51)	1.82(0.89)*	-1.27(1.89)	2.39(1.34)*
Panel C: Diagnostics				
Adj R^2	0.22	0.28	0.48	0.46
F- Test	1.24	3.06	5.54	7.51
t-bound Test	-2.05	-3.38	-3.70	-3.63
ECM	-0.24(0.17)**	-0.54(0.16)***	-0.40(0.11)***	-0.42(0.12)***
Reset Test (fpvalue)	0.19	2.29	0.12	0.27
LM Test pvalue	0.84	0.02	0.22	0.27
CS(CS^2)	U(S)	S♣(S♣)	S(S)	S(S♣)
Wald-SR		17.43(5.27)***		-3.06(1.83)
Wald-LR		5.95(2.42)**		-2.08(1.15)*
Norm pvalue	0.99	0.80	0.61	0.21
Sample	45	43	45	45
J-curve	No	No	No	No

Table 2B.10.21. Malaysia Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S. and its Largest trading partner – Terms of Trade

	TOT-US	
Variables	Linear	Non-Linear
Panel A: Short-run Estimates		
Δtb_{t-1}	0.20(0.18)	0.39(0.17)**
Δy_t	0.01(0.16)	-0.40(0.18)**
Δy_{t-1}	-0.34(0.15)**	
Δy_{t-2}	-0.11(0.25)	
Δy_{t-3}	-0.49(0.17)***	
Δy^i_t	<0.01(0.89)	-0.95(0.75)
Δy^i_{t-1}		-1.39(0.49)***
Δy^i_{t-2}		1.74(0.67)**
Δy^i_{t-3}		-1.05(0.44)**
Δtot_t	-0.52(0.78)	
Δtot_{t-1}	3.68(1.17)***	
Δtot_{t-2}	1.47(0.98)	
Δtot_{t-3}	1.40(0.53)**	
ΔNeg_t		1.62(0.89)*
ΔNeg_{t-1}		2.68(0.59)***
ΔNeg_{t-2}		-1.32(0.91)
ΔNeg_{t-3}		5.01(1.22)***
ΔPos_t		4.53(1.38)***
ΔPos_{t-1}		3.00(1.32)**
ΔPos_{t-2}		6.60(1.58)***
dum_fcrisis	-0.12(0.13)	-0.33(0.15)**
Panel B: Long-run Estimates		
Y	0.47(0.16)***	-0.04(0.12)
Y^{us}	0.35(0.25)	1.35(0.39)***
Tot	-3.46(1.01)***	
Neg		-1.21(0.44)**
Pos		-1.67(0.45)
Constant	10.05(5.21)*	-5.42(1.60)***
Panel C: Diagnostics		
Adj R^2	0.33	0.57
F- Test	23.43	39.07
t-bound Test	-3.89	-4.17
ECM	-0.77(0.20)***	-1.17(0.28)***
Reset Test (fpvalue)	0.50	0.01
LM Test pvalue	0.26	0.95
$CS(CS^2)$	S(S♣)	S(S♣)
Wald-SR		-6.12(2.61)**
Wald-LR		0.46(0.42)
Norm pvalue	0.62	0.23
Sample	43	43
J-curve	Yes	Yes

Note: Malaysia's largest trading partner is also the United States

Table 2B.10.22. Hungary's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S. and its Largest trading partner – Terms of Trade

	TOT-US		TOT-Germany	
Variables	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	0.12(0.15)	2.08(0.88)	-0.74(0.25)**	0.50(0.70)
Δtb_{t-2}	0.48(0.09)***	0.71(0.18)*	-0.95(0.16)***	-0.18(0.38)
Δtb_{t-3}		1.04(0.38)	-0.50(0.13)***	-0.42(0.19)
Δy_t	-2.72(0.60)***	7.63(3.94)	-0.82(0.16)***	-0.67(0.32)
Δy_{t-1}	0.37(0.53)	12.28(7.26)	0.36(0.17)*	0.08(0.18)
Δy_{t-2}	-0.43(0.47)	15.99(7.87)		-0.42(0.27)
Δy_{t-3}	-2.43(0.77)**	19.38(10.37)		-0.77(0.36)
$\Delta y^i{}_t$	1.89(2.06)	-18.61(6.16)*	-0.56(0.33)	-1.08(0.84)
$\Delta y^i{}_{t-1}$	-0.69(1.78)	-31.22(13.76)	-0.81(0.25)***	1.55(1.07)
$\Delta y^i{}_{t-2}$	0.22(1.31)	-12.42(7.00)	-1.33(0.39)***	0.60(0.76)
$\Delta y^i{}_{t-3}$	5.19(1.45)***	-34.91(17.01)		1.03(0.55)
Δtot_t	-0.63(2.16)		-1.45(0.84)	
Δtot_{t-1}	-3.24(2.66)		-2.17(0.68)***	
Δtot_{t-2}	-4.94(1.89)**		-1.33(0.54)**	
Δtot_{t-3}			1.09(0.72)	
ΔNeg_t		4.53(14.12)		-5.57(3.26)
ΔNeg_{t-1}		124.66(61.02)		1.85(3.73)
ΔNeg_{t-2}		24.69(24.59)		3.49(1.47)
ΔNeg_{t-3}		-19.72(10.59)		2.51(2.21)
ΔPos_t		-65.32(36.77)		1.29(1.17)
ΔPos_{t-1}		-33.97(13.13)		-1.79(0.58)*
ΔPos_{t-2}		13.78(6.77)		-3.12(0.69)**
ΔPos_{t-3}		29.85(13.34)		-1.47(0.99)
dum_fcrisis	-0.36(0.20)	-3.48(1.08)*	-0.03(0.04)	-0.06(0.05)
Panel B: Long-run Estimates				
Y	-0.79(0.54)	-1.80(0.22)**	0.95(4.23)	-0.07(0.11)
Y^{us}	1.79(2.18)	3.75(0.66)**	3.12(8.29)	-1.68(0.28)**
Tot	11.68(5.25)*		-8.70(29.71)	
Neg		-14.66(4.25)*		-6.05(1.07)**
Pos		-15.10(3.17)**		1.55(0.78)
Constant	-34.11(11.83)**	-48.36(23.24)	-1.72(2.35)	10.38(5.13)
Panel C: Diagnostics				
Adj R^2	0.66	0.84	0.78	0.94
F- Test	8.80	160.41	0.11	232.93
t-bound Test	-3.76	-2.94	0.25	-2.01
ECM	-0.60(0.16)***	-4.38(1.49)*	0.08(0.33)	-2.10(1.04)
Reset Test (fpvalue)	0.89	50.95**	0.74	0.79
LM Test pvalue	<0.01	0.00	<0.01	0.00
$CS(CS^2)$	S(S)	U(S)	S(S)	S(S)
Wald-SR		189.83(131.73)		7.37(6.45)
Wald-LR		0.44(1.86)		-7.60(0.73)***
Norm pvalue	0.28	0.19	0.76	0.78
Sample	30	30	30	30
J-curve	No	Yes	No	Yes

Table 2B.10.23. Poland Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S. and its Largest trading partner – Terms of Trade

	TOT-US		TOT-Germany	
Variables	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	0.16(0.41)	2.27(2.41)	0.42(0.15)**	0.57(0.13)**
Δtb_{t-2}	0.57(0.18)**	1.24(0.78)	0.15(0.08)*	0.58(0.09)***
Δtb_{t-3}	0.27(0.24)	0.45(0.70)	0.56(0.15)***	0.58(0.16)**
Δy_t	-4.06(3.57)	5.19(10.61)	-0.24(0.14)	-0.68(0.28)*
Δy_{t-1}	1.88(0.76)**	2.88(1.15)	-0.29(-14)*	0.34(0.14)*
Δy_{t-2}	0.10(0.68)	2.08(2.26)	-0.22(0.19)	0.33(0.25)
Δy_{t-3}	-2.65(1.43)	-4.09(2.15)		0.36(0.17)
$\Delta y^i{}_t$	8.48(3.23)**	4.74(8.25)	-1.60(0.51)**	-2.19(0.2)**
$\Delta y^i{}_{t-1}$	-2.94(3.83)	9.79(14.10)	-0.05(0.47)	-2.28(0.45)**
$\Delta y^i{}_{t-2}$	-3.88(3.09)	11.78(17.25)	-0.57(0.23)**	-1.53(0.32)**
$\Delta y^i{}_{t-3}$	4.50(3.40)	16.14(10.98)	0.61(0.38)	
Δtot_t	6.17(7.46)		-0.28(0.41)	
Δtot_{t-1}	-2.91(2.98)		0.88(0.24)***	
Δtot_{t-2}	-3.75(2.65)		0.05(0.20)	
Δtot_{t-3}	-6.75(3.55)*		-0.56(0.34)	
ΔNeg_t		-4.21(14.93)		0.43(0.59)
ΔNeg_{t-1}		26.44(30.83)		2.76(0.95)*
ΔNeg_{t-2}		1.53(17.56)		3.00(0.83)**
ΔNeg_{t-3}		8.43(21.12)		-0.49(0.31)
ΔPos_t		-13.65(34.48)		-0.77(0.54)
ΔPos_{t-1}		-22.16(14.08)		-0.59(0.58)
ΔPos_{t-2}		-7.27(7.98)		-0.56(1.03)
ΔPos_{t-3}		-4.03(9.69)		-1.50(0.53)*
dum_fcrisis	0.96(0.58)	0.79(1.23)	-0.28(0.08)***	-0.62(0.10)***
Panel B: Long-run Estimates				
Y	-2.06(5.40)	2.69(1.18)	-0.02(0.07)	-0.28(0.07)**
Y^{us}	7.18(12.93)	-6.29(2.89)	0.20(0.23)	1.31(0.36)**
Tot	16.48(33.41)		0.15(0.43)	
Neg		-18.03(8.46)		0.18(0.51)
Pos		-17.11(7.63)		-0.75(0.25)*
Constant	-42.82	-17.76(21.65)	-1.66(2.45)	-6.99(1.14)***
Panel C: Diagnostics				
Adj R^2	0.41	0.43	0.85	0.95
F- Test	0.65	1.38	0.73	20.46
t-bound Test	-1.36	-0.96	-9.43	-11.15
ECM	-0.43(0.31)	-2.03(2.12)	-1.02(0.11)***	-1.65(0.15)***
Reset Test (fpvalue)	0.36	2.52	0.34	4.12
LM Test pvalue	<0.01	0.00	0.22	0.78
CS(CS^2)	S(S)	U(S)		S(S♣)
Wald-SR		79.30(113.09)		9.12(2.45)**
Wald-LR		-0.92(4.17)		0.92(0.52)
Norm pvalue	0.69	0.66	0.97	0.32
Sample	30	30	30	30
J-curve	Yes-SR	No	No	Yes-SR

Table 2B.10.24. Turkey's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S. and its Largest trading partner – Terms of Trade

	TOT-US		TOT-Germany	
Variables	Linear	Non-Linear	Linear	Non-Linear
Panel A: Short-run Estimates				
Δtb_{t-1}	-0.53(0.15)***	-1.37(0.34)**	-0.42(0.17)**	-0.67(0.91)
Δtb_{t-2}	-0.15(0.10)	-0.83(0.18)***	-0.37(0.23)	-0.75(0.50)
Δtb_{t-3}	0.42(0.08)***		-0.27(0.18)	-0.83(0.24)**
Δy_t	-0.83(0.57)	-0.71(0.89)	-2.29(0.28)***	-2.53(0.62)***
Δy_{t-1}	-2.75(0.71)***	-3.04(1.30)*	-1.11(0.32)***	-1.54(0.87)
Δy_{t-2}	-3.62(0.46)***	-5.16(0.59)***		-0.87(0.95)
Δy_{t-3}		-1.53(0.47)**		-1.65(0.76)*
$\Delta y^i{}_t$	1.17(1.20)	0.68(1.80)	1.41(0.60)**	1.98(1.29)
$\Delta y^i{}_{t-1}$	4.35(1.14)***	8.33(2.22)**	0.57(0.50)	3.43(1.45)*
$\Delta y^i{}_{t-2}$	5.79(1.04)***	11.26(1.18)**		0.54(1.13)
$\Delta y^i{}_{t-3}$	-4.12(0.55)***			1.58(1.02)
Δtot_t	1.35(0.60)**		0.27(0.67)	
Δtot_{t-1}	2.75(0.38)***		1.50(0.41)***	
Δtot_{t-2}			1.33(0.43)***	
ΔNeg_t		1.14(2.13)		2.96(2.07)
ΔNeg_{t-1}		6.75(1.00)***		4.25(2.13)
ΔNeg_{t-2}		2.09(0.88)*		4.48(1.51)**
ΔNeg_{t-3}		1.27(1.20)		2.61(1.77)
ΔPos_t		0.75(2.02)		-4.40(2.88)
ΔPos_{t-1}		1.41(2.36)		
ΔPos_{t-2}		-1.19(1.57)		
ΔPos_{t-3}		-2.33(0.67)**		
dum_fcrisis	-0.07(0.09)	-0.18(0.15)	0.03(0.10)	0.40(0.13)**
Panel B: Long-run Estimates				
Y	-0.53(1.41)	1.28(1.14)	-0.93(0.31)***	3.33(53.22)
Y^{us}	2.24(2.15)	6.40(1.49)**	>-0.01(0.24)	-25.72(325.55)
Tot	19.08(27.06)		-3.13(1.58)*	
Neg		11.00(4.66)*		-45.88(579.38)
Pos		0.67(3.35)		-54.30(698.06)
Constant	13.19(7.11)*	14.82(6.51)*	14.51(5.79)**	11.96(7.39)
Panel C: Diagnostics				
Adj R^2	0.91	0.93	0.80	0.70
F- Test	4.23	110.22	12.50	0.25
t-bound Test	0.58	1.50	-4.63	-0.08
ECM	0.13(0.23)	0.61(0.41)	-0.79(0.17)***	-0.11(1.42)
Reset Test (fpvalue)	1.43	0.32	0.85	8.51*
LM Test pvalue	0.37	0.00	0.98	<0.01
$CS(CS^2)$	S(S)	S(S♣)	S(S♣)	S(S♣)
Wald-SR		12.61(7.71)		18.71(8.38)*
Wald-LR		10.34(4.28)*		8.42(118.85)
Norm pvalue	0.52	0.39	0.41	<0.01
Sample	30	30	30	30
J-curve	No	Yes-SR	Yes	No

Table 2B.10.25. Brazil's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S. and its Largest trading partner – Terms of Trade

	TOT-US	
Variables	Linear	Non-Linear
Panel A: Short-run Estimates		
Δtb_{t-1}	0.13(0.15)	0.27(0.22)
Δy_t	-1.07(0.50)**	-1.46(0.47)***
Δy_{t-1}	1.13(0.47)**	-0.02(0.64)
Δy_{t-2}	1.50(0.48)***	1.00(0.55)*
$\Delta y^i{}_t$	3.11(1.05)***	1.91(1.11)
Δtot_t	0.16(0.43)	
Δtot_{t-1}	-0.77(0.47)	
Δtot_{t-2}	-2.07(0.50)***	
Δtot_{t-3}	-1.67(0.48)***	
ΔNeg_t		-1.02(0.96)
ΔNeg_{t-1}		1.27(0.76)
ΔNeg_{t-2}		-1.17(0.68)
ΔNeg_{t-3}		-2.11(0.68)***
ΔPos_t		1.19(0.94)
ΔPos_{t-1}		-1.07(0.61)*
ΔPos_{t-2}		-1.32(0.96)
dum_fcrisis	0.27(0.11)**	0.04(0.14)
Panel B: Long-run Estimates		
Y	-2.48(7.07)	2.20(1.72)
Y^{us}	7.87(16.45)	3.17(3.47)
Tot	9.80(18.13)	
Neg		1.43(2.02)
Pos		-2.77(2.05)
Constant	-5.90(2.89)*	-4.69(2.16)**
Panel C: Diagnostics		
Adj R^2	0.52	0.61
F- Test	0.12	0.85
t-bound Test	-0.69	-2.25
ECM	-0.08(0.12)	-0.24(0.11)**
Reset Test (fpvalue)	2.24	1.62
LM Test pvalue	0.95	0.68
$CS(CS^2)$	S(S)	S(S)
Wald-SR		-1.83(2.51)
Wald-LR		4.21(2.65)
Norm pvalue	0.92	0.66
Sample	39	39
J-curve	No	Yes-SR

Note: Brazil's largest trading partner is also the United States

Table 2B.10.26. Mexico's Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S. and its Largest trading partner – Terms of Trade

	TOT-US	
Variables	Linear	Non-Linear
Panel A: Short-run Estimates		
Δtb_{t-1}	0.10(0.17)	0.08(0.12)
Δtb_{t-2}	-0.11(0.11)	0.12(0.17)
Δtb_{t-3}	0.17(0.12)	0.29(0.15)*
Δy_t	-2.10(0.64)***	-2.00(0.60)***
Δy_{t-1}	-0.95(0.76)	-0.25(0.50)
Δy_{t-2}		0.71(0.72)
Δy^i_t	1.23(0.74)	0.63(0.96)
Δy^i_{t-1}		-0.88(0.69)
Δtot_t	0.89(0.34)**	
ΔNeg_t		0.03(0.53)
ΔPos_t		0.86(1.21)
ΔPos_{t-1}		-1.12(0.73)
ΔPos_{t-2}		-1.64(0.83)*
dum_fcrisis	-0.03(0.08)	-0.13(0.13)
Panel B: Long-run Estimates		
Y	-0.54(0.55)	-2.50(1.37)*
Y^{us}	0.76(0.65)	1.64(0.74)**
Tot	1.08(0.33)***	
Neg		0.11(0.82)
Pos		1.49(1.45)
Constant	-4.87(1.95)**	1.68(2.53)
Panel C: Diagnostics		
Adj R^2	0.67	0.57
F- Test	3.66	3.59
t-bound Test	-4.24	-2.08
ECM	-0.86(0.20)***	-0.58(0.28)*
Reset Test (fpvalue)	18.44	4.93
LM Test pvalue	0.02	<0.01
$CS(CS^2)$	S(S)	S(S)
Wald-SR		1.93(2.38)
Wald-LR		-1.38(2.06)
Norm pvalue	0.95	0.48
Sample	35	34
J-curve	No	No

Note: Mexico's largest trading partner is also the U.S.

Table 2B.11.1. Results of Pooled Mean Group Euro-Area Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S

	RER-CPI		RER-PPI			TOT	
Variables	Linear	Non-Linear	Linear	Non-Linear		Linear	Non-Linear
Panel A: Short-run Estimates							
Δtb_{t-1}	-0.12(0.06)*	-0.22(0.05)***		-0.16(0.05)***	Δtb_{t-1}	-0.07(0.08)	-0.08(0.08)
Δtb_{t-2}				-0.08(0.08)			
Δy_t	-0.66(0.47)	-0.60(0.49)	-0.56(0.40)	-0.42(0.66)	Δy_t	-0.18(0.47)	-0.24(0.52)
Δy_{t-1}		-1.01(0.37)***		-0.18(0.48)	Δy_{t-1}		
Δy_{t-2}				0.07(0.22)	Δy_{t-2}		
$\Delta y^{US}{}_{t}$	1.60(0.46)***	1.56(0.47)***	1.03(0.40)**	1.80(0.60)***	$\Delta y^{US}{}_{t}$	1.20(0.50)**	1.54(0.56)***
$\Delta y^{US}{}_{t-1}$		1.40(0.26)***		1.27(0.41)***	$\Delta y^{i}{}_{t-1}$		
$\Delta y^{US}{}_{t-2}$				0.68(0.47)	$\Delta y^{i}{}_{t-2}$		
ΔRer_{t}	-0.09(0.14)		-0.27(0.11)**		ΔTot_{t}	0.50(0.54)	
Δtot_{t-1}					Δtot_{t-1}		
$\Delta Appr_t$		-0.23(0.22)		-0.26(0.16)	ΔNeg_t		-0.78(0.78)
$\Delta Appr_{t-1}$		0.09(0.06)		0.10(0.07)	$\Delta Appr_{t-1}$		
$\Delta Appr_{t-2}$				-0.17(0.11)			
$\Delta Depr_{t}$		-0.21(0.20)		-0.20(0.43)	ΔPos_{t}		2.48(1.65)
$\Delta Depr_{t-1}$		0.01(0.15)		-0.30(0.49)	$\Delta Depr_{t-1}$		
$\Delta Depr_{t-2}$				-0.07(0.62)			
dum_fcrisis	0.01(0.08)	-0.02(0.08)	0.02(0.2)	0.07(0.04)**	dum_fcrisis	-0.02(0.06)	-0.02(0.06)
dum_imp	0.08(0.55)	-1.13(0.93)	-0.58(0.37)	-1.38(0.94)			
dum_ex	1.34(0.32)***	1.42(0.35)***	1.22(0.43)***	1.31(0.52)**			
Panel B: Long-run Estimates							
Y	0.33(0.21)	0.37(0.18)**	>-0.01(0.23)	1.02(0.16)***	Y	-0.39(0.23)*	-0.05(0.20)
Y^{us}	0.61(0.19)***	-0.39(0.33)	0.86(0.23)***	-1.88(0.27)***	Y^{us}	1.07(0.19)***	0.60(0.21)***
Rer	1.24(0.18)***		1.32(0.23)***		Tot	-0.98(0.41)**	
Appr		1.12(0.19)***		0.70(0.18)***	Neg		-1.66(0.49)***
Depr		1.52(0.19)***		1.44(0.19)***	Pos		-1.21(0.59)**
Constant	-2.70(0.35)***	-0.02(0.10)	-2.35(0.49)***	1.78(0.55)***	Constant	0.50(0.16)***	-0.75(0.16)***

Panel C: Diagnostics							
R^2	0.52	0.58	0.43	0.57	R^2	0.43	0.45
F- Test	27.86	23.20	17.64	21.27	F- Test	33.17	26.18
t-bound Test	-10.41	-11.64	-7.43	-4.40	t-bound	-4.16	-4.31
ECM	-0.37(0.04)***	-0.41(0.04)***	-0.36(0.05)	-0.52(0.12)***	ECM	-0.30(0.07)***	-0.28(0.07)***
Wald-LR		-0.40(0.13)***		-0.74(0.11)***	Wald-LR		-0.45(0.43)
observations	450	450	290	276	observation	450	450
J-curve	No	No	No	Yes		No	No

Table 2B.11.2. Results of Pooled Mean Group Euro-Area Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the Largest Trading Partner

	RER-CPI		RER-PPI			TOT	
Variables	Linear	Non-Linear	Linear	Non-Linear	Variables	Linear	Non-Linear
Panel A: Short-run Estimates							
Δtb_{t-1}	-0.09(0.08)	-0.09(0.08)	-0.12(0.13)	-0.17(0.18)	Δtb_{t-1}	-0.11(0.06)*	-0.13(0.06)**
Δtb_{t-2}	-0.01(0.06)	-0.01(0.07)	0.08(0.08)		Δtb_{t-2}		
Δy_{t}	-0.17(0.20)	-0.18(0.19)	-0.41(0.33)	-0.73(0.32)**	Δy_{t}	-0.29(0.20)	-0.20(0.21)
Δy_{t-1}			0.02(0.19)		Δy_{t-1}		
Δy_{t-2}			-0.22(0.38)				
Δy^{L}_{t}	0.24(0.20)	0.24(0.19)	0.22(0.52)	0.63(0.38)	Δy^{L}_{t}	0.50(0.23)**	0.28(0.26)
Δy^{i}_{t-1}			-0.24(0.11)		Δy^{i}_{t-1}		
Δy^{i}_{t-2}			0.01(0.48)		Δy^{i}_{t-2}		
ΔRer^{L}_{t}	0.02(0.09)		-0.10(0.11)		ΔTot^{L}_{t}	-0.12(0.25)	
ΔRer_{t-1}			-0.04(0.04)		Δtot_{t-1}		
ΔRer_{t-2}			-0.03(0.02)				
$\Delta Appr^{L}_{t}$		0.04(0.12)		-0.03(0.19)	ΔNeg^{L}_{t}		0.09(0.33)
$\Delta Appr_{t-1}$					$\Delta Appr_{t-1}$		
$\Delta Depr^{L}_{t}$		-0.05(0.14)		-0.06(0.13)	ΔPos^{L}_{t}		-0.18(0.69)
ΔPos_{t-3}					ΔPos_{t-3}		
dum_fc	0.01(0.03)	0.02(0.03)	0.02(0.06)	0.03(0.04)	dum_fc	0.03(0.03)	<0.01(0.03)
dum_imp	-0.08(0.30)	<0.01(0.36)	-0.50(0.37)	-0.52(0.53)			
dum_ex	<0.01(0.05)	0.07(0.04)*	0.08(0.05)*	0.11(0.07)			
Panel B: Long-run Estimates							
Y	-0.73(0.21)***	-0.60(0.21)***	-0.48(0.10)***	0.53(0.17)***	Y	-0.38(0.27)	-0.14(0.22)
Y^{L}	0.41(0.23)*	0.57(0.30)*	0.81(0.13)***	-0.04(0.29)	Y^{L}	-0.39(0.24)	0.62(0.39)
Rer	-0.01(0.09)		0.06(0.06)		Tot	-0.57(0.35)*	
$Appr^{L}$		0.07(0.10)		0.21(0.10)**	Neg^{L}		-1.63(0.44)***
$Depr^{L}$		0.01(0.10)		-0.01(0.12)	Pos^{L}		-3.02(0.64)***
Constant	0.34(0.10)***	0.01(0.03)	-0.80(0.27)***	-0.52(0.22)**	Constant	0.73(0.18)***	-0.32(0.09)***
Panel C: Diagnostics							

R^2	0.32	0.33	0.46	0.42	R^2	0.23	0.27
F- Test	5.19	3.80	14.78	3.46	F- Test	8.80	7.46
t-bound Test	-4.00	-4.25	-3.31	-2.70	t-bound Test	-4.05	-3.91
ECM	-0.26(0.07)***	-0.27(0.06)**	-0.42(0.13)***	-0.27(0.10)***	ECM	-0.13(0.03)***	-0.14(0.04)***
Wald-LR		0.05(0.09)		0.22(0.10)**	Wald-LR		1.39(0.31)***
observations	440	440	255	265	observations	450	450
J-curve	No	No	No	No	J-curve	No	No

Table 2B.11.3. Results of Pooled Mean Group Advanced Non-Euro Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S

	RER-CPI		RER-PPI			TOT	
Variables	Linear	Non-Linear	Linear	Non-Linear	Variables	Linear	Non-Linear
Panel A: Short-run Estimates							
Δtb_{t-1}					Δtb_{t-1}		
Δy_t	-0.05(0.21)	-0.09(0.20)	-0.26(0.31)	-0.32(0.28)	Δy_t	>-0.01(0.27)	-0.07(0.29)
Δy_{t-1}					Δy_{t-1}		
Δy^i_t	0.27(0.37)	0.50(0.37)	0.38(0.42)	0.56(0.40)	Δy^i_t	0.01(0.40)	-0.12(0.41)
Δy^i_{t-1}					Δy^i_{t-1}		
Δy^i_{t-2}					Δy^i_{t-2}		
ΔRer_t	-0.10(0.019)		-0.11(0.14)		ΔTot_t	0.74(0.16)***	
Δtot_{t-1}					ΔTot_{t-1}		
$\Delta Appr_t$		-0.35(0.23)		-0.38(0.24)	ΔNeg_t		0.85(0.49)*
$\Delta Appr_{t-1}$					ΔNeg_{t-1}		
$\Delta Depr_t$		0.11(0.21)		0.11(0.20)	ΔPos_t		0.59(0.38)
ΔPos_{t-3}					ΔPos_{t-3}		
dum_fcrisis	<0.01(0.04)	-0.04(0.06)	0.02(0.04)	>-0.01(0.05)	dum_fcrisis	0.02(0.03)	0.01(0.03)
Panel B: Long-run Estimates							
Y	-0.12(0.09)	-0.05(0.09)	-0.16(0.11)	-0.12(0.11)	Y	-0.02(0.10)	0.03(0.09)
Y^{us}	0.63(0.15)***	-0.76(0.35)**	0.47(0.16)***	-0.05(0.27)	Y^{us}	0.06(0.12)	0.42(0.17)**
Rer	1.49(0.22)***		1.10(0.20)***		Tot	-0.68(0.18)***	
Appr		1.02(0.20)***		1.07(0.21)***	Neg		-0.38(0.18)**
Depr		1.80(0.23)***		1.41(0.25)***	Pos		-1.06(0.21)***
Constant	-1.25(0.40)***	0.89(0.15)***	-0.92(0.25)***	0.27(0.06)***	Constant	1.05(0.18)***	-0.53(0.10)***
Panel C: Diagnostics							
R^2	0.28	0.31	0.34	0.35	R^2	0.28	0.31
F- Test	25.27	20.77	10.77	10.33	F- Test	5.41	7.13
t-bound Test	-6.20	-6.19	-5.22	-5.65	t-bound Test	-5.55	-6.14
ECM	-0.26(0.04)***	-0.27(0.04)***	-0.31(0.06)***	-0.31(0.06)***	ECM	-0.34(0.06)***	-0.37(0.06)***
Wald-LR		-0.78(0.16)***		-0.34(0.14)**	Wald-LR		0.67(0.21)***
observations	449	449	441	441	observations	449	449
J-curve	No	No	No	No	J-curve	No	No

Table 2B.11.4. Results of Pooled Mean Group Advanced Non-Euro Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the Largest Trading Partner

	RER-CPI		RER-PPI			TOT	
Variables	Linear	Non-Linear	Linear	Non-Linear		Linear	Non-Linear
Panel A: Short-run Estimates							
Δtb_{t-1}					Δtb_{t-1}	-0.08(0.07)	
Δy_t	-0.56(0.25)**	-0.52(0.25)**	-0.57(0.26)**	-0.55(0.25)**	Δy_t	-0.49(0.20)**	-0.58(0.20)***
Δy_{t-1}					Δy_{t-1}		
$\Delta y^L{}_t$	0.84(0.22)***	0.80(0.22)***	0.81(0.21)***	0.76(0.19)***	$\Delta y^L{}_t$	0.68(0.20)***	0.87(0.24)***
$\Delta y^L{}_{t-1}$					$\Delta y^L{}_{t-1}$		
$\Delta y^L{}_{t-2}$					$\Delta y^L{}_{t-2}$		
$\Delta Rer^L{}_t$	0.24(0.11)**		0.19(0.11)		ΔTot_t	0.04(0.39)	
Δtot_{t-1}					Δtot_{t-1}		
$\Delta Appr_t$		0.39(0.19)**		0.25(0.21)	ΔNeg_t		-0.44(0.44)
$\Delta Appr_{t-1}$					$\Delta Appr_{t-1}$		
$\Delta Depr_t$		0.07(0.21)		0.07(0.20)	ΔPos_t		0.27(0.50)
ΔPos_{t-3}					ΔPos_{t-3}		
dum_fcrisis	0.03(0.04)	0.06(0.06)	0.05(0.03)	0.04(0.05)	dum_fc	0.06(0.04)	0.06(0.03)*
Panel B: Long-run Estimates							
Y	0.54(0.14)***	0.70(0.16)***	0.40(0.14)***	0.43(0.13)***	Y	0.04(0.10)	0.12(0.09)
Y^L	-1.04(0.14)***	-0.92(0.16)***	-1.24(0.15)***	-1.20(0.16)***	Y^L	-0.12(0.12)	-0.44(0.19)**
Rer^L	-0.56(0.08)***		-0.59(0.09)***		Rer	-0.77(0.23)***	
$Appr^L$		-0.57(0.09)***		-0.56(0.09)***	Neg		-0.31(0.20)
$Depr^L$		-0.69(0.14)***		-0.55(0.14)***	Pos		0.22(0.20)
Constant	0.77(0.26)***	0.22(0.12)*	1.18(0.37)***	0.85(0.29)***	Constant	0.79(0.16)***	0.34(0.07)***
Panel C: Diagnostics							
R^2	0.30	0.34	0.34	0.37	R^2	0.37	0.35
F- Test	34.04	27.16	29.19	23.49	F- Test	4.80	2.53
t-bound Test	-3.15	-3.05	-3.14	-3.26	t-bound Test	-5.18	-6.91
ECM	-0.26(0.08)***	-0.24(0.08)***	-0.24(0.08)***	-0.25(0.08)***	ECM	-0.20(0.04)***	-0.25(0.04)***
Wald-LR		0.12(0.09)		-0.01(0.08)	Wald-LR		-0.52(0.21)**

observations	441	441	441	441	observations	441	441
J-curve	No	No	No	No	J-curve	No	No

Note: ^{L} represents largest trading partner.

Table 2B.11.5. Results of Pooled Mean Group Emerging & Developing Economies Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the U.S

	RER-CPI		RER-PPI			TOT	
Variables	Linear	Non-Linear	Linear	Non-Linear	Variables	Linear	Non-Linear
Panel A: Short-run Estimates							
Δtb_{t-1}				-0.69(0.17)***	Δtb_{t-1}		0.09(0.15)**
Δtb_{t-2}				-0.45(0.09)***	Δtb_{t-2}		>-0.01(0.09)
Δy_{t}	-0.64(0.40)	-0.83(0.27)***	-0.02(0.35)	-0.37(1.08)	Δy_{t}	-0.93(0.48)*	-0.63(0.25)**
Δy_{t-1}			0.02(0.28)	-1.23(1.05)	Δy_{t-1}		0.24(0.50)
Δy_{t-2}			-0.17(0.45)	-1.12(1.07)	Δy_{t-2}		0.25(0.57)
$\Delta y^{us}{}_{t}$	-0.48(0.46)	-0.90(0.46)*	0.28(0.66)	-0.74(1.82)	$\Delta y^{us}{}_{t}$	-0.27(0.46)	-0.20(0.75)
$\Delta y^{us}{}_{t-1}$			0.31(0.31)	1.42(1.69)	$\Delta y^{us}{}_{t-1}$		-0.71(0.95)
$\Delta y^{i}{}_{t-2}$			0.33(0.99)	1.17(1.79)	$\Delta y^{i}{}_{t-2}$		0.54(0.94)
ΔRer_{t}	0.29(0.13)**		-0.18(0.27)		ΔTot_{t}	-0.06(0.28)	
ΔRer_{t-1}			0.06(0.39)		Δtot_{t-1}		
ΔRer_{t-2}			0.14(0.40)				
$\Delta Appr_{t}$		0.39(0.12)***		0.29(1.38)	ΔNeg_{t}		0.66(1.03)
$\Delta Appr_{t-1}$				1.67(1.00)*	ΔNeg_{t-1}		4.07(2.07)*
				1.46(1.81)	ΔNeg_{t-2}		-3.94(2.37)*
$\Delta Depr_{t}$		0.04(0.25)		0.17(0.56)	ΔPos_{t}		-0.88(1.90)
$\Delta Depr_{t-1}$				-0.31(0.73)	ΔPos_{t-1}		-3.22(0.90)***
$\Delta Depr_{t-1}$				-0.51(0.36)	ΔPos_{t-2}		-1.29(0.68)*
dum_fcrisis	-0.25(0.08)***	-0.25(0.07)***	-0.02(0.13)		dum_fcrisis	-0.26(0.07)***	-0.21(0.14)
Panel B: Long-run Estimates							
Y	0.20(0.18)	0.63(0.23)***	-0.11(0.15)	-4.71(1.65)***	Y	0.03(0.21)	-0.93(0.14)***
Y^{us}	-0.02(0.29)	1.79(0.45)***	1.31(0.44)***	9.48(2.16)***	Y^{us}	0.26(0.32)	1.56(0.46)***
Rer	0.27(0.18)		0.77(0.22)***		Tot	1.11(0.35)***	
Appr		0.96(0.23)***		-4.03(1.77)**	Neg		0.77(0.19)***
Depr		-0.12(0.25)		-6.49(2.09)***	Pos		0.22(0.56)
Constant	-0.32(0.10)***	-3.59(0.99)***	-3.38(0.72)***	0.51(2.35)	Constant	-2.17(0.44)***	-0.66(0.30)**
Panel C: Diagnostics							

R^2	0.36	0.42	0.58	0.77	R^2	0.34	0.64
F- Test	2.29	6.89	40.20	9.60	F- Test	4.58	14.65
t-bound Test	-4.36	-3.60	-3.86	0.01	t-bound Test	-5.11	-2.42
ECM	-0.35(0.08)***	-0.41(0.11)***	-0.51(0.13)***	<0.01(0.11)	ECM	-0.37(0.07)***	-0.39(0.16)**
Wald-LR		1.09(0.23)***		2.46(0.70)***	Wald-LR		0.55(0.52)
observations	211	211	149	149	observations	216	204
J-curve	No	No	Yes	No	J-curve	No	No

Table 2B.11.6. Results of Pooled Mean Group Emerging & Developing Economies Full Information Estimates of the Linear and Non-Linear ARDL models with Trade with the Largest Trading Partner

	RER-CPI		RER-PPI			TOT	
Variables	Linear	Non-Linear	Linear	Non-Linear	Variables	Linear	Non-Linear
Panel A: Short-run Estimates						Panel A:	
Δtb_{t-1}	-0.21(0.10)**	-0.03(0.06)	-0.34(0.16)**		Δtb_{t-1}	-0.03(0.13)	0.01(0.21)
Δtb_{t-2}	-0.06(0.15)	-0.14(0.12)	-0.21(0.16)		Δtb_{t-2}	-0.03(0.10)	
Δy_t	-0.57(0.39)	-0.52(0.31)*	-0.37(0.46)	-0.21(0.23)	Δy_t	-0.90(0.37)**	-0.88(0.36)**
Δy_{t-1}	-0.16(0.17)	-0.29(0.11)***	-0.24(0.17)	-0.19(0.16)	Δy_{t-1}	-0.14(0.31)	-0.25(0.25)
Δy_{t-2}	0.12(0.28)	-0.05(0.27)			Δy_{t-2}	0.38(0.25)	0.41(0.29)
$\Delta y^L{}_t$	0.29(0.60)	-0.04(0.64)	-0.15(0.35)	-0.71(0.33)**	$\Delta y^L{}_t$	0.30(0.68)	0.61(0.37)
$\Delta y^L{}_{t-1}$	-0.12(0.20)	-0.08(0.40)	0.22(0.30)	-0.28(0.32)	$\Delta y^L{}_{t-1}$	-0.14(0.22)	0.21(0.20)
$\Delta y^L{}_{t-2}$	-0.12(0.38)	-0.37(0.39)			$\Delta y^L{}_{t-2}$	-0.33(0.41)	-0.23(0.41)
$\Delta Rer^L{}_t$	0.06(0.11)		0.22(0.30)		Δtot_t	-0.44(0.39)	
$\Delta Rer^L{}_{t-1}$	0.14(0.10)		0.38(0.20)*		Δtot_{t-1}	-0.25(0.29)	
$\Delta Rer^L{}_{t-2}$	0.01(0.14)				Δtot_{t-2}	-0.53(0.21)**	
$\Delta Appr_t$		0.10(0.27)		0.15(0.34)	ΔNeg_t		0.62(0.90)
$\Delta Appr_{t-1}$		-0.17(0.25)		-0.11(0.28)	ΔNeg_{t-1}		0.94(0.64)
$\Delta Appr_{t-2}$		0.04(0.30)			ΔNeg_{t-2}		-0.93(0.40)**
$\Delta Depr_t$		-0.14(0.28)		-0.22(0.33)	ΔPos_t		-0.45(0.65)
$\Delta Depr_{t-1}$		0.40(0.21)*		0.27(0.25)	ΔPos_{t-1}		-1.13(0.65)*
$\Delta Depr_{t-2}$		-0.26(0.24)			ΔPos_{t-2}		-0.40(0.35)
ΔPos_{t-3}					ΔPos_{t-3}		
dum_fcrisis	-0.02(0.04)	-0.04(0.06)	-0.11(0.05)**	-0.05(0.06)	dum_fcrisis	-0.03(0.07)	-0.07(0.05)
Panel B: Long-run Estimates							
Y	-0.23(0.18)	<0.01(0.16)	-0.77(0.38)**	0.04(0.09)	Y	-0.13(0.08)	-0.09(0.03)***
Y^L	1.15(0.41)***	1.32(0.22)***	0.82(0.38)**	1.40(0.23)***	Y^L	0.70(0.20)***	-0.93(0.15)***
Rer^L	0.15(0.12)		-1.19(0.64)*		Tot^L	0.79(0.28)***	
$Appr^L$		0.57(0.09)***		0.65(0.09)***	Neg^L		-5.02(0.53)***
$Depr^L$		0.05(0.10)		-0.04(0.14)	Pos^L		0.83(0.13)***
Constant	-1.16(0.53)**	-2.29(1.14)**	0.33(0.17)*	-3.13(1.29)**	Constant	-2.45(0.66)***	0.64(0.88)

Panel C: Diagnostics							
R^2	0.65	0.70	0.67	0.68	R^2	0.63	0.68
F- Test	5.51	64.54	2.25	44.64	F- Test	11.89	252.67
t-bound Test	-2.32	-2.04	-1.95	-2.62	t-bound Test	-3.77	-1.20
ECM	-0.26(0.11)**	-0.45(0.22)**	-0.12(0.06)*	-0.55(0.21)**	ECM	-0.40(0.11)***	-0.42(0.35)
Wald-LR		0.51(0.12)***		0.69(0.09)***	Wald-LR		-5.85(0.50)***
observations	199	199	154	154	observations	204	204
J-curve	No	Yes	No	No		No	No

Table 2B.12.1. Summary Results for Country-Specific Trade Balance Equation- RER-CPI Annual Data

	Bilateral Trade with the U.S.					
	Linear ARDL Model			Non-Linear ARDL Model		
Countries	Coint.	Long-run Effect	J-curve	Coint.	Long-run Effect	J-curve
Austria	Yes	Positive	-	Yes	Positive	-
Finland	Yes	Positive	-	Yes	-	-
France	Yes	Positive	-	Yes	Positive	-
Germany	Yes	Positive	-	Yes	Positive	-
Greece	Yes	Positive	-	Yes	Positive	Yes
Ireland	Yes	-	Yes-SR	Yes	-	Yes-SR
Italy	No	-	-	Yes	Positive	-
Netherlands	Yes	Positive	-	Yes	-	-
Portugal	Yes	Positive	-	Yes	Positive	Yes
Spain	Yes	Positive	-	Yes	Positive	Yes
Australia	Yes	Positive	-	Yes	Positive	Yes
Canada	Yes	Positive	-	Yes	Positive	Yes-SR
Denmark	Yes	Positive	-	Yes	Positive	Yes
Japan	Yes	-	-	Yes	-	-
Korea	Yes	Positive	Yes	Yes	Positive	Yes
New Zealand	Yes	Positive	-	Yes	Positive	-
Norway	Yes	-	-	Yes	Negative	-
Sweden	Yes	Positive	Yes-SR	Yes	Positive	Yes
Switzerland	Yes	Positive	-	Yes	Positive	Yes
U.K.	Yes	-	Yes SR	Yes	Positive	-
Malaysia	Yes	Positive	Yes	No	-	-
Hungary	Yes	Positive	Yes	Yes	Positive	Yes-SR
Poland	No	-	-	No	-	-
Turkey	Yes	-	-	Yes	-	-
Brazil	Yes	Negative	Yes	Yes	-	Yes
Mexico	No	-	-	No	-	-

Note: '-'indicates result is not significant and 'SR' indicates short-run J-curve.

Table 2B.12.2. Summary Annual Results for Country-Specific Trade Balance Equation- RER-CPI and Largest Trading Partner

	Bilateral Trade with the Largest Trading Partner					
	Linear ARDL Model			Non-Linear ARDL Model		
Countries	Coint.	Long-run Effect	J-curve	Coint.	Long-run Effect	J-curve
Austria	Yes	Positive	-	Yes	Negative	-
Finland	No	-	-	Yes	-	-
France	Yes	-	-	Yes	Positive	-
Germany	Yes	positive	-	Yes	-	-
Greece	Yes	-	-	Yes	Negative	Yes-SR
Ireland	Yes	-	Yes-SR	Yes	-	Yes-SR
Italy	No	-	-	Yes	Positive	Yes
Netherlands	Yes	Negative	-	Yes	-	-
Portugal	No	-	-	No	-	-
Spain	Yes	-	-	Yes	-	-
Australia	Yes	Negative	-	Yes	Negative	-
Canada	Yes	Positive	-	Yes	Positive	Yes-SR
Denmark	Yes	Negative	Yes-SR	Yes	Negative	-
Japan	Yes	-	-	Yes	-	-
Korea	Yes	Positive	Yes	Yes	Positive	Yes
New Zealand	Yes	Negative	Yes-SR	Yes	-	yes
Norway	Yes	-	-	Yes	Positive	-
Sweden	No	-	Yes-SR	No	-	-
Switzerland	Yes	-	-	Yes	Positive	Yes
U.K.	Yes	-	Yes-SR	Yes	Negative	Yes-SR
Malaysia	Yes	Positive	Yes	-	-	-
Hungary	No	-		Yes	-	-
Poland	Yes	-	-	-	-	-
Turkey	Yes	Positive	Yes	-	Positive	Yes
Brazil	Yes	Positive	Yes	No	-	Yes
Mexico	No	-	-	Yes	-	-

Note: '-'indicates result is not significant and 'SR' indicates short-run J-curve.

Table 2B.13.1. Summary Annual Results for Country-Specific Trade Balance Equation- RER-PPI and Trade with U.S.

	Bilateral Trade with the U.S.					
	Linear ARDL			Non-Linear ARDL Model		
Countries	Coint.	Long-run Effect	J-curve	Coint.	Long-run Effect	J-curve
Austria	Yes	-	-	Yes	Positive	-
Finland	Yes	Positive	-	Yes	-	-
France	NA	-	-	NA	-	-
Germany	Yes	Positive	-	Yes	Positive	-
Greece	NA	-	-	-	-	
Ireland	Yes	-	Yes-SR	No	-	Yes-SR
Italy	No	-	-	Yes	Positive	-
Netherlands	Yes	-	-	No	-	-
Portugal	NA	-	-	-	-	-
Spain	Yes	Positive	-	Yes	Positive	Yes
Australia	Yes	Positive	-	Yes	Positive	Yes
Canada	Yes	Positive	Yes	Yes	Positive	Yes
Denmark	Yes	Positive	-	Yes	Positive	-
Japan	Yes	Positive	-	Yes	Positive	-
Korea	Yes	Positive	-	Yes	Positive	-
New Zealand	Yes	Positive	-	Yes	-	-
Norway	Yes	Positive	Yes	Yes	Positive	Yes
Sweden	No	-	Yes-SR	Yes	Positive	Yes
Switzerland	Yes	-	-	Yes	Positive	-
U.K.	Yes	-	-	Yes	-	Yes-SR
Malaysia	Yes	Positive	-	No	-	-
Hungary	Yes	Positive	Yes	No	-	Yes
Poland	No	-	-	Yes	Positive	-
Turkey	Yes	-	-	No	-	-
Brazil	NA	-	-		-	-
Mexico	No	-	-	Yes	Negative	-

Note: '-'indicates result is not significant and 'SR' indicates short-run J-curve.

Table 2B.13.2. Summary Annual Results for Country-Specific Trade Balance Equation- RER-PPI and Trade with Largest Trading Partner

	Bilateral Trade with the Largest Trading Partner					
	Linear ARDL Model			Non-Linear ARDL Model		
Countries	Coint.	Long-run Effect	J-curve	Coint.	Long-run Effect	J-curve
Austria	Yes	-	-	Yes	Positive	-
Finland	No	-	-	No	-	-
France	NA	-	-	NA	-	-
Germany	Yes	-	-	Yes	-	-
Greece	NA	-	-		-	-
Ireland	Yes	-	Yes-SR	No	-	Yes-SR
Italy	Yes	Positive	Yes	Yes	Positive	Yes
Netherlands	Yes	Negative		Yes	Negative	-
Portugal	NA					-
Spain	No			Yes	Negative	-
Australia	Yes	Negative		Yes	Negative	-
Canada	Yes	Positive	Yes	Yes	Positive	Yes
Denmark	Yes	Negative	Yes-SR	Yes	Negative	-
Japan	Yes	Positive		Yes	Positive	-
Korea	Yes	Positive		Yes	Positive	-
New Zealand	Yes	Negative	Yes-SR	Yes	Positive	-
Norway	Yes	Negative	-	Yes	Positive	Yes-SR
Sweden	No		Yes-SR	No	-	-
Switzerland	Yes	-	-	Yes	-	-
U.K.	Yes	Negative	-	Yes	Negative	Yes-SR
Malaysia	Yes	Positive	-	No	-	-
Hungary	No	-	-	No	-	Yes-SR
Poland	-	-	-	-	-	Yes
Turkey	Yes	Positive	Yes	-	-	Yes-SR
Brazil	NA	-	-	NA	-	-
Mexico	No	-	-	Yes	Negative	-

Note: '-'indicates result is not significant and 'SR' indicates short-run J-curve.

Table 2B.14.1. Summary Annual Results for Country-Specific Trade Balance Equation- Terms of Trade and Trade with the U.S.

	Bilateral Trade with the U.S.					
	Linear ARDL Model			Non-Linear ARDL		
Countries	Coint.	Long-run Effect	J-curve	Coint.	Long-run Effect	Inverted J-curve
Austria	No	-	Yes-SR	Yes	Negative	Yes
Finland	Yes	-	-	Yes	-	-
France	Yes	Negative	-	Yes	Negative	-
Germany	Yes	Negative	-	Yes	Negative	-
Greece	Yes	Negative	-	Yes	Negative	Yes
Ireland	Yes	-	-	Yes	-	-
Italy	No	-	-	No	-	-
Netherlands	Yes	-	-	Yes	-	-
Portugal	Yes	-	-	Yes	-	-
Spain	Yes	Negative	-	Yes	Positive	-
Australia	Yes	-	-	Yes	Negative	-
Canada	Yes	-	-	Yes	Positive	-
Denmark	Yes	Negative	Yes-SR	Yes	Negative	Yes
Japan	Yes	-	-	No	-	-
Korea	No	-	-	No	-	-
New Zealand	Yes	Negative	-	Yes	-	-
Norway	Yes	Negative	-	Yes	-	-
Sweden	Yes	Negative	-	Yes	-	-
Switzerland	Yes	Negative	-	Yes	Negative	Yes
U.K.	Yes	Positive	-	Yes	Positive	
Malaysia	Yes	Negative	Yes	Yes	Negative	Yes
Hungary	Yes	Positive	-	Yes	-	Yes
Poland	No	-	Yes-SR	No	-	-
Turkey	No	-	-	No	-	Yes-SR
Brazil	No	-	Yes-SR	Yes	-	Yes-SR
Mexico	Yes	Positive	-	Yes	-	-

Note: '-'indicates result is not significant and 'SR' indicates short-run J-curve.

Table 2B.14.2. Summary Annual Results for Country-Specific Trade Balance Equation- Terms of Trade and Trade with Largest Trading Partner.

	Bilateral Trade with the Largest Trading Partner					
	Linear ARDL Model			Non-Linear ARDL Model		
Countries	Coint.	Long-run	J-curve	Coint.	Long-run	Inverted
Austria	No	-	-	Yes	-	Yes
Finland	No	-	-	Yes	Positive	-
France	Yes	-	-	Yes	Positive	-
Germany	Yes	-	-	Yes	-	-
Greece	Yes	Negative	-	Yes	Negative	Yes
Ireland	Yes	-	-	Yes	-	-
Italy	Yes	-	-	Yes	Positive	-
Netherlands	Yes	-	-	No	-	Yes-SR
Portugal	No		Yes-SR	Yes	-	Yes-SR
Spain	Yes	Negative	-	Yes	Negative	Yes
Australia	Yes	Positive	-	Yes	Positive	-
Canada	Yes	-	-	Yes	Positive	-
Denmark	Yes	-	-	Yes	Positive	-
Japan	Yes	-	-	No	-	-
Korea	No	-	-	No	-	-
New Zealand	Yes	Positive	-	No	-	-
Norway	Yes	-	Yes-SR	Yes	-	-
Sweden	No	-	-	Yes	Positive	-
Switzerland	Yes	Positive	-	Yes	Positive	-
U.K.	Yes	-	-	Yes	-	-
Malaysia	Yes	Negative	Yes	Yes	Negative	Yes
Hungary	No	-	-	Yes	Positive	Yes
Poland	Yes	-	-	Yes	Negative	Yes-SR
Turkey	Yes	Negative	Yes	No	-	-
Brazil	No	-	Yes-SR	Yes	-	Yes-SR
Mexico	Yes	Positive	-	Yes	-	-

Note: ‘-’indicates result is not significant and ‘SR’ indicates short-run J-curve.

Table 2B.15.1. Summary Results for PMG Trade Balance Equation- RER-CPI Annual Data

	Linear ARDL Model			Non-Linear ARDL Model		
	Bilateral Trade with the U.S.					
Countries	Coint.	Long-run Effect	J-curve	Coint.	Long-run Effect	J-curve
Euro Area	Yes	Positive	-	Yes	Positive	-
Advance Non-EA	Yes	Positive	-	Yes	Positive	-
Emerging & Developing	Yes	-	-	Yes	Positive	-
	Bilateral Trade with Largest Trading Partner					
Euro Area	Yes	-	-	Yes	-	- -
Advance Non-EA	Yes	Negative	-	Yes	Negative	-
Emerging &Developing	Yes	-	-	Yes	Positive	Yes

Note: '-'indicates result is not significant and 'SR' indicates short-run J-curve.

Table 2B.15.2. Summary Results for PMG Trade Balance Equation- RER-PPI Annual Data

	Linear ARDL Model			Non-Linear ARDL Model		
	Bilateral Trade with U.S.					
Countries	Coint.	Long-run Effect	J-curve	Coint.	Long-run Effect	J-curve
Euro Area	Yes	Positive	-	Yes	Positive	Yes
Advanced Non-EA	Yes	Positive	-	Yes	Positive	-
Emerging & Developing	Yes	Positive	Yes	No	-	-
	Bilateral Trade with Largest Trading Partner					
Euro Area	Yes	-	-	Yes	Positive	-
Advance Non-EA	Yes	Negative	-	Yes	Negative	-
Emerging & Developing	Yes	Negative	-	Yes	Positive	-

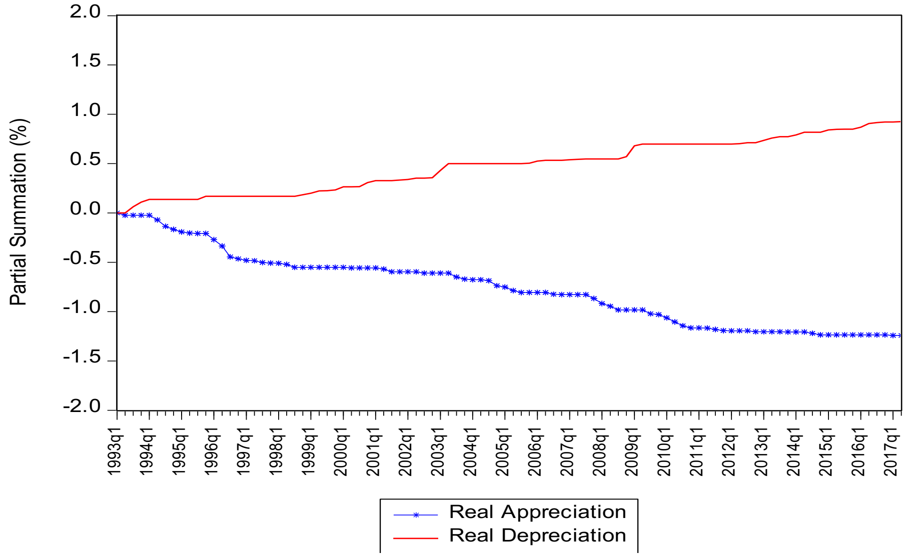
Note: '-'indicates result is not significant and 'SR' indicates short-run J-curve.

Table 2B.15.3. Summary Results for PMG Trade Balance Equation- Terms of Trade Annual Data

	Linear ARDL Model			Non-Linear ARDL Model		
	Bilateral Trade with U.S.					
Countries	Coint.	Long-run	J-curve	Coint.	Long-run	J-curve
Euro Area	Yes	Negative	-	Yes	Negative	-
Advanced Non-EA	Yes	Negative	-	Yes	Negative	-
Emerging & Developing	Yes	Positive	-	Yes	Positive	-
	Bilateral Trade with Largest Trading Partner					
Euro Area	Yes	Negative	-	Yes	Negative	-
Advanced Non-EA	Yes	Negative	-	Yes	-	-
Emerging & Developing	Yes	Positive	-	No	Positive	-

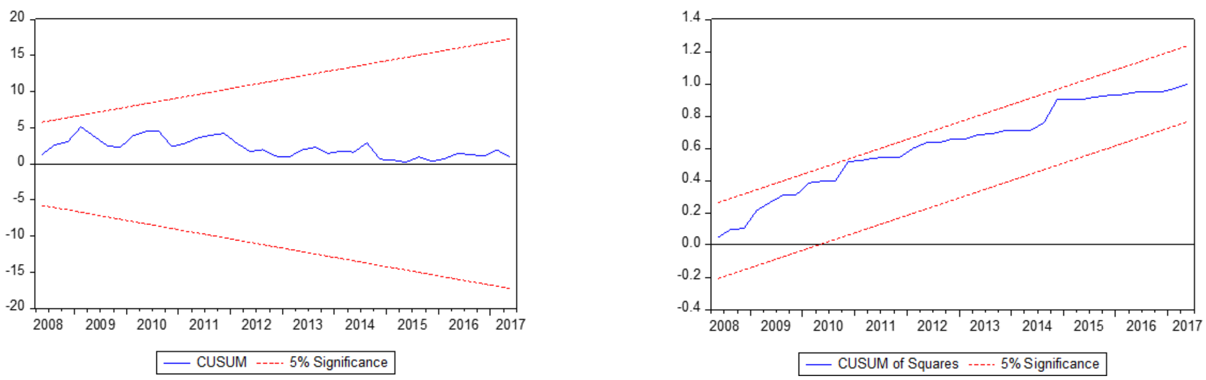
Note: '-'indicates result is not significant and 'SR' indicates short-run J-curve.

Figure 2B.1. Real Depreciation and Appreciation for the Jamaican Dollar against the U.S. Dollar



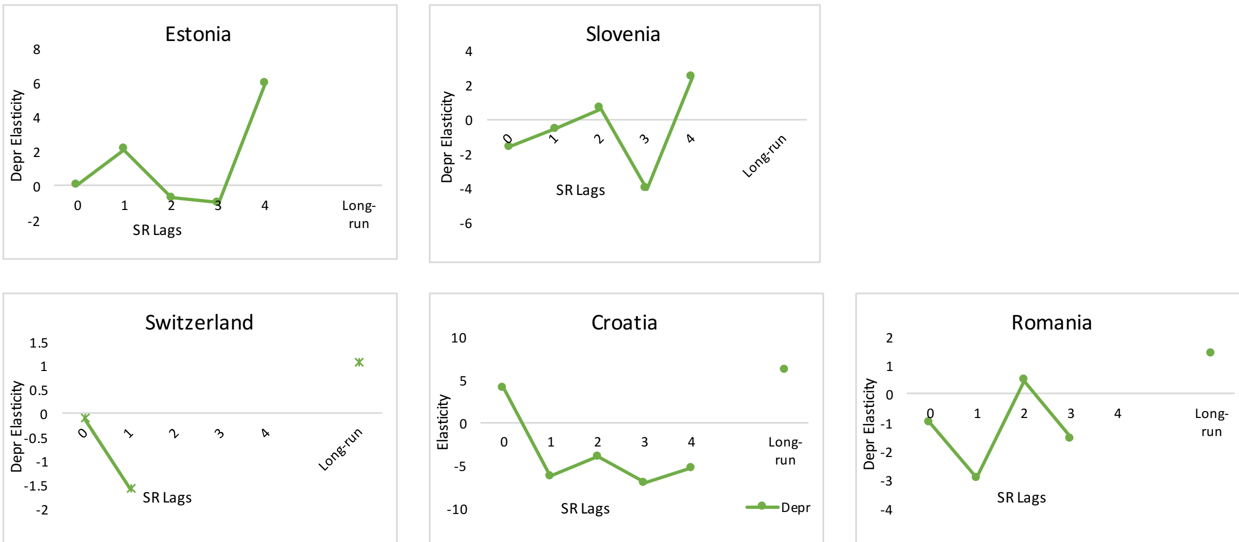
Note: A Representation of the Partial Summation of the Real Depreciation and Real Appreciation for the Jamaican Dollar against the U.S. Dollar

Figure 2B.2. Plots of Cusum and Cusumq tests for the Non-Linear Model for Russia.



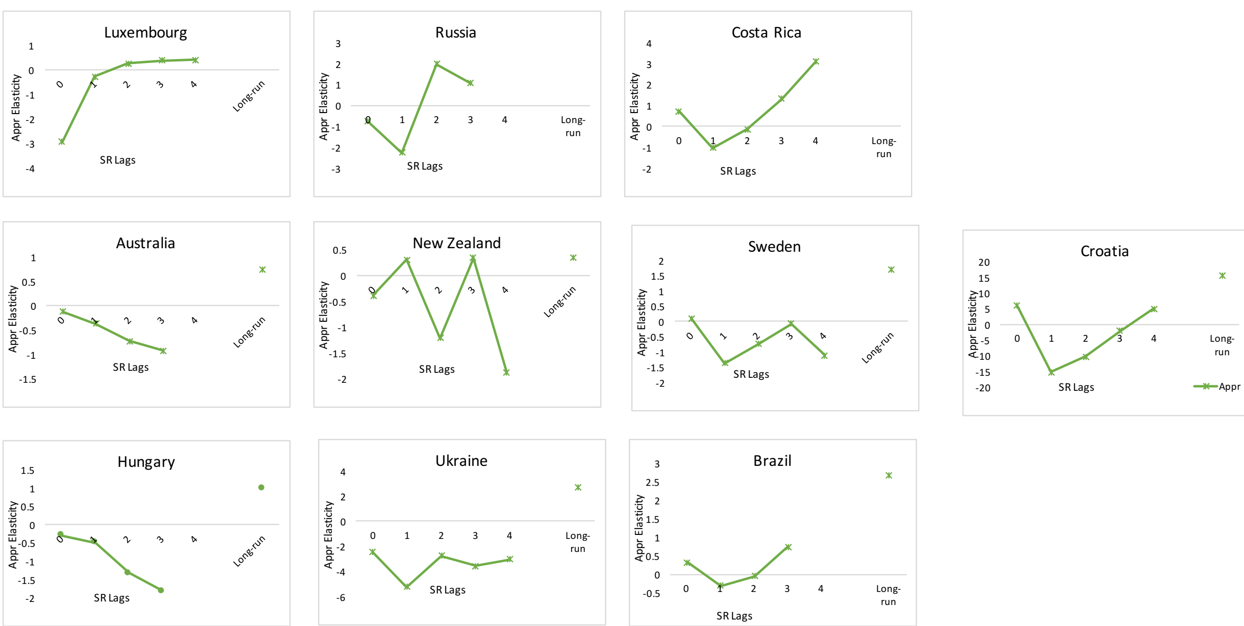
Note: The estimates are stable for both tests since the plots stayed within the 95% confidence interval.

Figure 2B.3.3. Graphical Representation of Countries with Evidence Supporting the J-curve from the Non-Linear Model: Real Depreciation – Quarterly Analysis



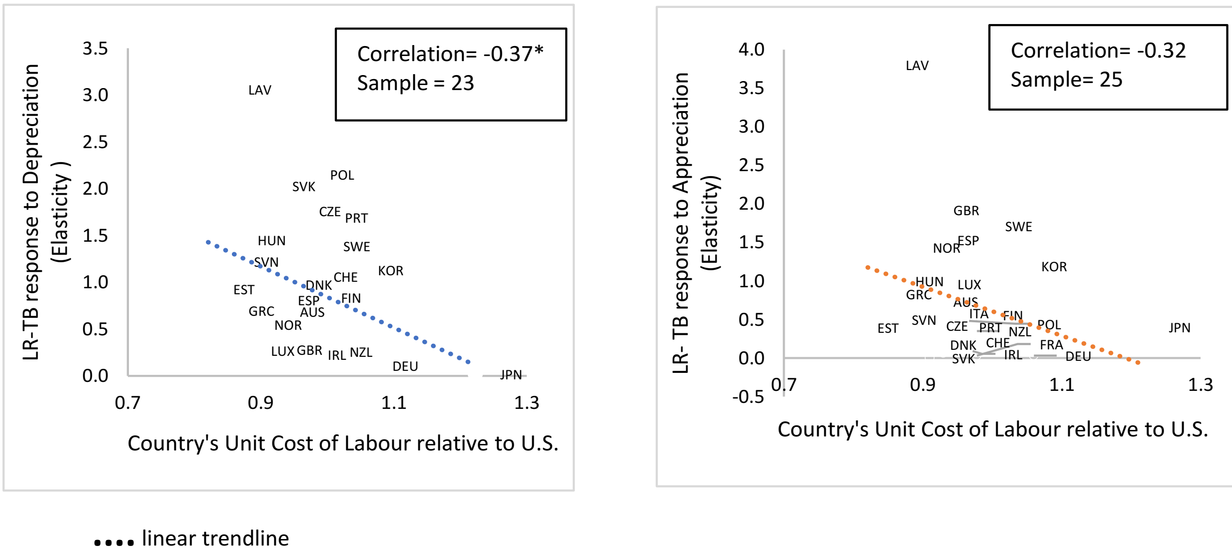
Notes: *Depr* refers to a real depreciation. For the long-run J-curve theory, positive values on the short-run (SR) lags are not statistically significant. Only Estonia and Slovenia estimates fit the short-run J-curve hypothesis.

Figure 2B.3.4. Graphical representation of Countries with evidence supporting the J-curve from the Non-Linear Model: Real Appreciation



Notes: Appr refers to a real appreciation. For the long-run J-curve theory, positive values on the short-run (SR) lags are not statistically significant. Only Luxembourg, Russia and Costa Rica estimates fit the short-run J-curve hypothesis.

Figure 2B.4. Scatterplot of Long-run (LR) positive response of Trade Balance (TB) to Real Exchange Rate and Unit Cost of Labour



Note: Unit labour cost (base year 2010=100) is collected from the OECD database for countries from that group. Data covers 25 countries for which a cost measure is available primarily. The average annual relative cost of production for the 1993-2016 period is used. The Long-run trade elasticity is based on the author's estimates from the nonlinear ARDL model collected from Tables 2.1-2.6 for the respective countries. The asterisk (*) indicates significance of correlation at the 10% level.

3. Remittances, Foreign Aid, Institutions, FDI and Economic Growth

3.1 Introduction

Many emerging markets and developing economies have a challenge sustaining their economic growth, despite having relatively liberal financial markets and are open to trade. An important question is, what can be done to put these countries on a path to sustain their growth and eventually close the gap between themselves and advanced economies? To provide an insight of one possible channel, this paper examines the role of foreign direct investment (FDI) on growth, and more specifically, whether the marginal effect of FDI on economic growth is conditional on three key factors, namely remittances, foreign aid and institutions.

The theoretical and empirical literature on FDI's effect on growth indicate that FDI's importance to the economic growth of a country lies in its ability to boost capital accumulation and productive capacity (Aghion et al., 2016; Vedia-Jerez et al., 2016). Aghion et al. (2016) also indicate that FDI usually comes with additional benefits such as frontier technology at a cheaper cost and the ability to enhance human capital in terms of improving management skills and facilitating technological transfer. The economic growth literature also has physical capital as one of the main determinants of growth (Solow, 1956; Romer, 1990; Rodrik et al., 2004), whose accumulation requires huge investments. For emerging markets and developing economies (EMDEs), FDI is a key source of capital investment. In 2016, FDI to developing countries accounted for over 40 percent of global FDI flows (World Bank, 2018). Among my selected group of 45 EMDEs, data on the ratio of FDI flows to gross domestic product (GDP) for the period 1985-2014, shows an upward trend.[31] The FDI ratio is for the most part higher for the high income group of EMDE (Figure 3C.1).

Given the upward trend of FDI to EMDEs and the known benefits and drawbacks to FDI, it is not only important to understand FDI's direct effect on growth, but to get an insight into the conditional role remittances, foreign aid and institutions might play in FDI's marginal effect in the growth process via their interaction with FDI (Bengoa and Sanchez-Robles, 2003; Basnet and Upadhyaya, 2014; Arndt et al., 2015).[32] In the growth process, foreign aid is capable of enhancing the productivity of foreign capital if the external funds are used to finance complementary public inputs (Selaya and Sunesen, 2012). In Driffield (2013), foreign aid influence on growth comes through a country's public investment. Remittances and FDI are two sources of external funding that complements in the growth process, with remittances used by recipients as an extra source of income that boosts sales of FDI products (Garcia-Fuentes et al., 2016). Although capital is a proximate measure of growth, institutions have a deeper connection to growth (Rodrik et al., 2004). That is, increases in the level of institutions (for example law & order, democratic accountability and investment profile) provides an environment where external capital becomes more productive. Further, institutions (property rights and corruption) may affect the rate of FDI knowledge and other forms of transfers that could stimulate growth (Driffield, 2013). Additionally, institutional reforms can reduce investment risks, reduce sources of corruption and foster greater

[31] See Table 3C.1 for list of the 45 countries and their respective income group classification.

[32] Alfaro et al. (2004) and Alfaro et al. (2009) show that FDI's effect on economic growth and economic development is conditional on the financial market development of the host country. Levine (2005) shows the connection with finance and growth, while Alfaro and Chauvin (2017) shows that FDI and financial development are complements in the growth process.

returns to private investments that can collectively affect development (Dreher et al., 2007; Boerner et. al., 2009).

This study contributes to the literature in the following three ways. First, relative to prior studies, my exhaustive empirical undertaking uses a larger number of institutional measures as well as includes remittances and foreign aid in assessing the FDI and economic growth connection, and also examines how these variables might influence FDI's marginal effect in the growth process among EMDE. The study covers 45 EMDEs for the period 1985 to 2014, using 5-year period averages for the data variables. In the absence of relevant economic theory to inform the role of remittances, foreign aid and institutions in the FDI and economic growth relationship, I hypothesize that considerable parameter heterogeneities stemming from cross-country differences in remittances, foreign aid and institutions exist in empirical economic growth models, especially as it relates to the effect of FDI on economic growth. That is, I allow for the three key factors to have not only a direct effect on economic growth by including each in the model setup, but also allow for each to indirectly affect economic growth by influencing FDI via an interaction.

Second, I extend the analysis by investigating how these said factors could influence FDI's marginal effect on growth of sectoral value added (VAD), specifically for agriculture and manufacturing. The focus on these two sectors are on these grounds. External capital tends to strengthen the industrial capacity of recipient countries and, consequently allowing manufacturing to generate greater linkages in an economy relative to the primary sector (Wang, 2009; Alvarado et al., 2017).[33] However, in my country sample, the agriculture sector accounts for a greater component of GDP VAD in almost half of the countries (Figure 3C.2.1). Further, there exists

[33] Haraguchi et al. (2017) refers to this sector as the main driver of economic growth.

significant correlation between economic growth and growth of both sectors VAD (Figure 3C.2.2). My third contribution examines if the conditional marginal effect of FDI on aggregate growth or growth at the sectoral level (from my first and second investigations) depends on the income level of the countries. The findings of this study should strengthen the literature on the link between FDI and economic growth conditional on key factors. Thereby, providing greater insight for policymakers in EMDE in their effort to shape economic policies for sustained economic growth.

My findings suggest that the positive effect of FDI on growth as well as the growth of agriculture and manufacturing value added (VAD) diminishes as the level of institutions (democratic accountability, ethnic tensions, internal conflict, investment profile, religious tensions and socioeconomic conditions) increases as seen in Solomon (2011), Driffield and Jones (2013) and Iamsiraroj (2016). I attribute this result to FDI and institutions serving as substitutes or institutions playing a role in protecting areas of the domestic economy from any negative externalities associated with FDI. The type of institution at work influencing FDI's effect at the aggregated level, varies across sectors as well as income groups. In the income level assessment, where FDI's effect on growth is negative, investment profile acts as a complement to FDI in the growth process. That is, higher levels on investment profile reduced the negative effect of FDI on growth among the low and high income groups. The results also show that remittances and FDI are complements only in the growth of agriculture VAD. While FDI's marginal effect on economic growth and growth of sectoral VAD is independent of foreign aid and should be treated as such.

Prior studies have extensively assessed the direct effect of remittances, foreign aid and institutions on FDI as well as on economic growth (Rajan and Subramanian, 2008; Arndt et al., 2015; Nwaogu and Ryan, 2015; Garcia-Fuentes et al., 2016; Xu et al., 2017; among others). However, these factors can also affect the FDI and economic growth connection (Solomon, 2011; Selaya and Sunesen, 2012; Driffield and Jones, 2013; Arndt et al., 2015; Iamsiraj, 2016). With limited research in this area, this study provides a way to meaningfully add to the strand of literature by investigating the influence of remittances, foreign aid and institutions on the effect FDI has on economic growth and growth of sectoral VAD among EMDEs. Over the course of this study, I test the following hypotheses (H):

Hypotheses

- H1: Higher remittance inflows enhance the marginal effect of FDI on economic growth
- H2: Higher levels of foreign aid increase the marginal effect of FDI on economic growth
- H3: Increases in the level of institutions enhance the marginal effect of FDI on economic growth

The above hypotheses tests are also conducted for growth of VAD at the sectoral level as well as across income groups. The remainder of the paper is as follows: Section 3.2 outlines the literature while Section 3.3 presents details of the data and the methodologies of this study. Section 3.4 provides the results and section 3.5 presents the discussion. Section 6 concludes.

3.2 Literature Review

Although the empirical literature on the association between FDI and economic growth is abundant, there are still mixed research findings on the effect of FDI on growth and hence inconclusive evidence (Bornschier, 1980; Aghion, et al., 2009; Iamsiraroj, 2016; Alvararado et al., 2017). The literature also shows that there are some key factors at play that have considerable influence on FDI's marginal effect on economic growth. To the best of my knowledge, research on the influence of these factors is limited.

Foreign aid in the form of official development assistance (ODA) in and of itself is not geared towards economic growth. Its primacy is to "…promote the economic development and welfare of developing countries." (OECD, 2018). However, the empirical literature, shows that foreign aid and growth are interrelated. Arndt et al. (2015) believe that to better understand the role of foreign aid in economic growth, it is important to examine the indirect effect of aid acting through the proximate measures of economic growth. Selaya and Sunesen (2012) empirically analyze foreign aid and FDI's complementary relationship for 99 developing countries for the period 1970 to 2001. Using two-stage least squares and system GMM models on an unbalanced panel dataset, they find that foreign aid is able to increase the marginal productivity of foreign capital as long as it is used to finance complementary inputs (such improving human capital and public infrastructure). The authors conclude that the complementary nature of FDI and foreign aid is essential to FDI's contribution to economic growth. Arndt et al. (2015) posit that it is via the effect foreign aid has on the proximate measures on growth that foreign aid's effect on growth materializes over the long-run.

Apart from the direct effect institutions (such as voice and accountability and, government effectiveness) have on FDI (Lucke and Eichler, 2016; Xu et al. 2017), the empirical literature shows that the influence of institutional quality on FDI's marginal effect on growth depends on a country's stage of development as well as its geographical location (Iamsiraroj, 2016). Solomon (2011) through system GMM estimation examines a panel of 111 countries for the period 1981 to 2005 and, finds that the FDI and institutions interaction have a significant effect on economic growth. Using two institutional measures, namely quality of the political environment and quality of economic environment, the results show that beyond the direct positive effect that institutional quality and FDI have on economic growth, their interaction term have a significant negative effect on the FDI and economic growth relationship. In Iamsiraroj's (2016) study, the three-stage least squares (3SLS) model applied to 124 countries for the period 1971 to 2010, shows that the institutional quality variable economic freedom, indirectly affects income growth via its effect on FDI. In particular, in the full country sample and a sub-sample of developing countries, FDI's contribution to the growth of GDP per capita is positive and statistically significant. The interaction term is positive and significant in both cases. In contrast, for the sub-sample of Latin American and Caribbean (LAC) countries, FDI's effect on growth is negative and significant. Further, FDI and economic freedom have a negative interaction in the growth process among the LAC countries.

Driffield and Jones (2013)'s encompassing study examines the impact of FDI, aid, remittances and institutions on economic growth using the entire sample of developing countries from the World Bank database. The authors consider three institution measures namely investment profile, bureaucratic quality and law & order. Using the 3SLS approach, on an unbalanced panel data for the period 1984 to 2008, they find that FDI and bureaucratic accountability have a positive and significant effects on economic growth. Further, aid and investment profile effects on economic growth are negative and significant, while remittance and, law and order effects are insignificant. The authors only interactive effect examined between FDI is with the investment profile. They find the interaction term to be positive and significant in the growth process.

These additional studies also add to the study by showing the direct effect of aid, remittance and institutions on growth. Vedia-Jerez et al. (2016) indicate that low institutional quality can lead to higher investment costs and subsequently low marginal returns on assets. Bengoa and Sanchez-Robles (2003)'s panel analysis of 18 Latin American economies for the period 1970 to 1999 show that FDI is a channel via which economic freedom positively influences economic growth. In a more recent study, McCloud et al. (2018) consider the role of law and order in the FDI and government size connection in a cross-country assessment of 104 countries for the period 1984 to 2010 using 3-year averages. The authors find that strengthening of law and order constrain the response of government size to FDI inflows, with the dampening effect being five times larger in developing countries relative to developed countries. This is in the context where a better legal system prevents fiscal authorities from abusing their power as it relates to reducing taxes and social spending in favour of productive public inputs. These conclusions are generally in line with Rodrik et al. (2004) view that institutional quality, a determinant of economic growth, has deeper implications for growth than proximate causes.[34] It is however in developing countries that the implications are more evident and far reaching, as these countries are challenged in sustaining economic growth due to poor quality institutions (North, 1981; Easterly, 2001). For foreign aid, Rajan and Subramanian (2008) through a cross-country study of 83 countries for the period 1960 to 2000, find no evidence to support the claim that foreign aid significantly impacts economic growth, regardless of the quality of the institutional framework or the geographical region.

Based on the review, my study is closest to and can be compared to that of Driffield and Jones (2013), Arndt et al. (2015) and Iamsiraroj (2016). Arndt et al. (2015) looks at the indirect effect of

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[34] Schein (2016) case study shows that the promotion of inclusive institutions contributes to a faster pace of economic growth in the long-run, if the improvement in the institution is complemented with improvement in proximate measures of growth.

aid on growth acting through proximate measures of growth and sectors share of value added. In my study, I investigate if aid, remittances and institutions influence the marginal effect of FDI on growth at the aggregate and sectoral levels. Iamsiraroj (2016) uses a 3SLS to show the indirect effect of institutional developments on growth via FDI. In my case, I use the interactive term for FDI and the institution variable to capture the influence institutions have on FDI's marginal effect on growth, in order to get an overall marginal effect of FDI not only on aggregate growth but, on growth of sectoral VAD. This allows me to ascertain the effect of FDI as the level of institutions increases. I build on the Driffield and Jones (2013) study by looking at a larger number of institutional measures and include more explicit interactions between FDI and variables of interest. Building on all three studies, I also include an income group assesssment by splitting the sample by income groups as well as use system GMM approach.

In the growth literature, the effect of the explanatory variables can vary across income groups. I account for this variance in my study which Driffield and Jones (2013), Arndt et al. (2015) and Iamsiraroj (2016) in this specific literature failed to consider. I explore whether key factors influence FDI's marginal effect on aggegrate growth as well as the growth of sectoral VAD. This is done to specifically examine the growth of value added in the agriculture and manufturing sectors as well as examine the effect across income groups. My empirical assessments were done using panel ordinary least squares fixed effect as my baseline model and system GMM. The use of system GMM overcomes any potential endogeneity problems that the ordinary least squares (OLS) may have ignored. In one study, I utilize a larger number of institutional variables as well as include remittances and foreign aid as key factors that are likely to influence the FDI and economic growth connection among emerging markets and developing economies. I consider whether the results are sensitive to splitting the sample used, into low and high income groups.

Further, I examine how remittances, foreign aid and institutions influence the FDI and growth of sectoral VAD connection, which to the best of my knowledge has not been previously explored. Additionally, I interpret the interactions in the model specification following the approach laid down by Brambor et al. (2006) and is now commonly used in works beyond economic analysis. My aim is to show that although FDI directly affects growth, there are other critical factors that influence the marginal effect of FDI on economic growth which also extend to the sectoral level.

3.3 Data & Methodology

This section outlines the data and empirical approach I employ to assess the role of remittances, foreign aid and institutions in the FDI economic growth connection. The variables and models selected for this study are informed by the literature (Selaya and Sunesen, 2012; Driffield and Jones, 2013; Arndt et al., 2015; Iamsiraroj, 2016) as well as data availability. Although the focus is on EMDEs, the sample provides sufficient variability across all variables of interest.

3.3.1 Data

For this study, I use annual data spanning the period 1985 to 2014 for 45 EMDEs. Data on real GDP per capita (y), agriculture VAD, manufacturing VAD, personal remittances, foreign aid, FDI, inflation and trade openness are sourced from the World Bank World Development Indicators (WDI).[35] The measure of education is from Barro and Lee (2013). I consider six institutional quality measures (democratic accountability, ethnic tensions, internal conflict, investment profile,

[35] Although gross fixed capital formation (GFCF) is use commonly as a measure of domestic physical capital, it is not included in the empirical panel model alongside FDI. This step is taken because GFCF may include FDI (See the World Bank Database for further details).

religious tensions and socioeconomic conditions) were considered, all of which are taken from the International Country Risk Guide (ICRG) database. All the institutional quality measures are constructed such that a higher value indicates better institutions.[36] All variables are averaged over five-year periods as is common throughout the growth literature to eliminate business cycle effects from the data. In this study, the 5-year period averages are 1985-1989, 1990-1994, 1995-1999, 2000-2004, 2005-2009 and 2010-2014.

3.3.2 Methodology

In my empirical assessment, I use a balanced panel model setup. In so doing, I use two panel estimation procedures for comparison: OLS with fixed effects (OLS-FE) and system GMM. The use of the OLS-FE estimator is known to ignore potential endogeneity issues between the explanatory variables and economic growth, however these results are often reported in growth studies.[37] As such, it will serve as a preliminary baseline for the study. To overcome potential endogeneity issues, I then employ the system GMM approach developed by Blundell and Bond (1998). This system is common throughout the economic growth literature given its advantage over other models to address issues with endogeneity and heterogeneity.[38] In order to assess the

[36] See Table 3C.2 for additional data description and Tables A3.1 to A3.3 for summary statistics.

[37] Pearl (2009) indicates that without valid instruments to account for the potential endogeneity problem between covariates of economic growth, empirical estimates will be biased.

[38] The system GMM estimator is designed for panels with few time periods and many cross-section, handles explanatory variables that are not strictly exogenous as well as controls for heteroscedasticity and autocorrelation within cross-section which makes the estimator more efficient (Hoeffler, 2002; Rodman, 2006). The 3SLS method only produces qualitatively similar results to the GMM method if there is no heteroscedasticity problem (Iamsiraroj, 2016). Although system GMM generates instruments internally, there is the drawback that too many instruments can over fit the model and weaken the joint validity of the instruments due to the downward bias of the coefficient standard errors (Rodman, 2009). To remedy the instrument proliferation issue, I

validity of the instruments in system GMM, I use the Hansen's J statistic of over-identifying restrictions which is consistent in the presence of autocorrelation and heteroscedasticity (Neanidis and Varvarigos, 2009). The Hansen's J statistic tests the hypothesis that the over identifying restrictions are valid against the alternative hypothesis that the over identifying restrictions are invalid. If the null hypothesis is rejected, then the model or the instrumental variables in the model should be revised. The panel growth model I consider from the literature is of the form

$$\Delta y_{it} = \beta_0 + \beta_1 y_{it-1} + \beta_2 FDI_{it} + \beta_3 V_{it} + \beta_4 FDI_{it} * V_{it} + \varphi' X_{it} + \mu_i + T_t + \varepsilon_{it} \quad (3.1)$$

where for country i and time t, Δy_{it} is the 5-year average log difference of real GDP per capita, y_{it-1} represents the logarithm of real GDP per capita at the beginning of each 5-year period, FDI_{it} is the 5-year average of foreign direct investment for the period, V_{it} is the 5-year average of the individual factors that influence FDI (namely remittances, foreign aid and institutions), $FDI_{it} * V_{it}$ is the multiplicative interaction between FDI and the factor that influences FDI, X_{it} represents the set of additional control variables measured at the beginning of the 5-year average or averaged over the period, μ_i captures unobserved country-specific fixed effects, T_i is the period effect and ε_{it} is the error term.[39]

follow Rodman (2009) by restricting the number of instruments by collapsing them, using instruments up to only the first lag or a combination of both. All estimations are done using the STATA 13 software, with system GMM estimation carried out with Rodman (2006)'s xtabond2 command.

[39] In the model, when it is time for the sectoral assessment, the Δy_{it} will represents the growth of the respective sector value-added in decimal form. The initial real GDP is a predetermined variable. Brambor et al. (2006) highlight that omitting constitutive interactive terms can lead to individual coefficients being biased and result in inferential errors. That is, in looking at the influence of remittance on FDI, all three variables (remittance, FDI and the multiplicative term between remittance and FDI) must be included in the regression model.

From equation (3.1), the variables of interest are foreign direct investment, remittances, foreign aid, institutions and their interactions. I am specifically interested in how the individual factors; remittance, foreign aid and institutions may influence the marginal effect of FDI on growth. Instead of assessing only the parameters of interest along with the interaction term as is commonplace, the Brambor et al. (2006) approach provides a way to consider the overall marginal effect of FDI on growth conditional on a key factor variable, while taking into account the standard error that is a function of the covariance between parameters of interest. In doing so, the overall marginal effect of FDI on economic growth conditional on the variables of interest is represented by:

$$\frac{\partial \Delta y}{\partial FDI} = \hat{\beta}_2 + \hat{\beta}_4 V \qquad (3.2)$$

with the standard error bands computed from

$$\hat{\sigma}\frac{\partial \Delta y}{\partial FDI} = \sqrt{var(\hat{\beta}_2) + var(\hat{\beta}_4) + 2 * V * cov(\hat{\beta}_2 \hat{\beta}_4)} \qquad (3.3)$$ [40]

Apart from presenting the empirical estimates in the customary tables, I also provide graphical representations of the marginal effect of FDI on growth (and growth of sectoral VAD) conditional on the individual factor variables of interest along with the associated standard error bands.

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[40] For note, '*var*' and '*cov*' represent the variance and covariance of the parameters associated variables in the model, respectively. The '*' represents the multiplication sign.

3.4 Results

This section presents the results of the influence of remittance, foreign and institutions on FDI's effect of growth at the aggregate level as well as growth of the sectoral VAD. The sectoral analysis includes the agriculture and manufacturing sectors. The results are provided in both tabular and graphical forms.

3.4.1 Growth

Tables 3C.4 to 3C.12 provide the results of the panel estimates for the 45 countries based on FDI, remittances, ODA and institutions, which are considered along with policy control variables (initial GDP per capita, education, inflation and trade) commonly included in the economic growth literature. The tables present panel regression estimates from the OLS-fixed effects and system GMM methods. System GMM method controls for any potential endogeneity between FDI, variable of interest (remittances, ODA or institutions), their interaction and growth. The estimates in the rows correspond with results from the panel OLS-fixed effect and system-GMM estimations, respectively. In the same vein, columns 1 and 2 in each table display results based on FDI along with the control variables. While, the remaining columns show the results for FDI, variable of interest, interaction term alongside the control variables.

Using the information from Tables 3C.4 to 3C.12, Figures 3C.3.1 to 3C.5.3 plot the marginal effect of foreign direct investment on growth (and growth of sectoral VAD, all segmented by income level) conditional on key variables of interest. The solid line in each graph represents the marginal coefficient of FDI associated with the level of variable of interest (remittances, aid or institutions) and the broken lines plot the 90% confidence intervals. Conditional marginal plots are only constructed when the model shows that the coefficients on both the FDI and the interaction variables are statistically significant or the coefficient on the interaction term makes the overall marginal effect significant.[41]

Based on the literature on FDI and growth, it is expected that FDI should contribute positively to economic growth. It is also expected that the coefficient on institutional variable should be positive. That is, higher levels of institutional quality can contribute to growth. Remittance inflows serve as an additional source of disposable income, which the literature indicates can have a positive or negative effect on growth (Basnet and Upadhyaya, 2014). That is, higher levels of remittance inflows can hinder or enhance the growth process. The literature on foreign aid and growth shows that foreign aid in the form of official development assistance can have a positive or negative coefficient, because higher levels of aid inflows can either enhance or diminish growth depending on how the resource is allocated and managed. In the analysis, the importance of the interaction term is to assist in computing the overall marginal effect of FDI on growth. The interpretation of the coefficient based on the interaction between FDI and remittances (or foreign aid or institutions) when it is positive, suggests that FDI and the variable of interest are complements in the growth process. Specifically, the marginal effect of FDI on growth is expected to be greater when the variable of interest (remittances, foreign aid or institutional quality) is higher. On the other hand, if the interaction coefficient is negative, this implies that FDI and the variable of interest are substitutes in the growth process. That is, higher levels of the variable of interest would diminish the effect of FDI on growth. For completeness, an interaction coefficient

[41] A statistically significant coefficient on the interaction term indicates that the variable of interest significantly influences FDI's marginal effect on growth.

that is zero or insignificant indicates that foreign direct investment effect in growth process is independent of the variable of interest. In other words, remittances, foreign aid nor institutional quality would influence the FDI and growth connection. For the control variables, it is expected that education (Barro, 2001) and trade (Kim and Lin, 2009; Agénor, 2004) should contribute positively to economic growth, while inflation have an adverse effect on long term economic growth.

The use of system GMM in the study proves useful in controlling for potentially endogeneity problems and autocorrelation. I successfully controlled for instrument proliferation by restricting the instruments to one lag, collapsing or doing a combination of both. Overall, the instrument count in most of the model specifications are less than the number of cross-sections. The estimates of the control variables namely education and inflation are in line with expectations. While trade effect on economic growth is negative rather than the expected positive sign.[42]

[Insert Table 3C.4 Here]

Looking at the results in columns 1 and 2 of Table 3C.4, FDI's effect on growth is positive but only significant when estimation is by OLS-fixed effects (column 1). Once I control for potential endogeneity through system GMM, the coefficient on FDI is positive but insignificant. The results are, however, in the general sense in line with the expectations that FDI contributes to growth in developing countries.

[42] Kim and Lin (2009) and Agénor (2004) indicate that the long-run effect of trade openness on economic growth depends on the level of economic development and the income level of a country, respectively. The negative coefficient on trade is however similar to the findings of Herzer (2013) who empirically finds that trade has a negative effect on economic growth for developing countries, while the effect is positive for developed countries.

I now place focus on columns 3 to 18 of Table 3C.4, which include the full model specification from equation (1).[43] That is, the coefficients on FDI, variable of interest, interaction term and control variables. On a whole, system GMM estimates are more in line with expectations and significant relative to the OLS-fixed estimates. This is an indication that system GMM estimator is the preferred model given its ability to control for endogeneity bias, as expected. Examination of the results shows that the coefficients on FDI and the variables of interest are qualitatively in line with expectations. Specifically, when FDI is modelled with the institution measures namely democratic accountability (column 8), ethnic tensions (column 10) or investment profile (column 14) the coefficients are simultaneously positive and statistically significant. While the interaction coefficient is only statistically significant for the interaction between FDI and democratic accountability (column 8), with the interactive term value being negative. In this case, the interpretation is that the effect of FDI on economic growth is positive, but the effect diminishes as the level of democratic accountability increases. Together, the results suggest that FDI and democratic accountability are substitutes in the growth process among my selected group of EMDEs. The result showing democratic accountability influencing FDI's marginal effect is characteristic of people of a country voicing their concern, in the face of perceived action by the government of reallocating spending towards productive public inputs at the expense of public expenditure in an effort for the country to remain attractive to external capital inflows. By extension, focus spending on a particular sector at the expense of another, akin to the Dutch disease phenomenon.[44] This sort of allocative behaviour is evident in developing countries with moderate

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[43] The odd number columns include the OLS-fixed effects estimate, while the even number columns have system GMM estimates.

[44] Although FDI contributes positively to economic growth in the study, FDI flows can also contribute to the growth of some sectors and the contraction of others (Bornschier, 1980;

levels of institution development (McCloud et al., 2018). In addition, the other institutional variables as well as remittances and foreign aid have no influence on the link between FDI and economic growth. The insignificant interaction term in these cases is an indication that FDI is independent of these latter key variables in its effect on economic growth and should be modeled as such. Notwithstanding, foreign aid and the other institutional measures have statistically significant direct effect on growth.

To put the findings into perspective, I will look at system GMM results in column 8 of Table 3C.4 for FDI, democratic accountability, interaction term and the policy variables. In the column, the coefficient for FDI is 0.810 and statistically significant at the 5% level, while the interaction coefficient is -0.154 and statistically significant at the 10% level. To provide the conditional marginal effect of FDI on growth, I look at the partial derivative of growth with respect to FDI. That is, $\partial \Delta \mathrm{y} / \partial \mathrm{FDI} = 0.810 - 0.154\ \mathrm{V}$. If democratic accountability is non-existent in a country, then V = 0, and a ten percentage point increase in foreign direct investment as share of GDP is expected to increase growth by 8.1 percentage points. As the value of democratic accountability becomes positive, the marginal effect of FDI on growth weakens due to this negative interaction. This is shown in Figure 3C.3.1 where the effect of FDI on growth is positive at lower values of democratic accountability, but decreases as the value of democratic accountability increases.

[Insert Tables 3C.5 and 3C.6 Here]

Iamsiraroj, 2016; McCloud et al., 2018). A phenomenon documented in the as the Dutch disease (Rajan and Subramanian, 2008).

Further investigations revealed interesting results from the assessment at the income group level: low and high.[45] The idea is to ascertain any income level effects that could be hidden in the aggregated data. Tables 3C.5 and 3C.6 show the estimation results for the low and the high income groups, respectively. With the exception of the models with the investment profile institutional quality (where FDI's direct contribution to growth is negative and significant in both income group assessments), the coefficient on the FDI variable in the full model through system GMM is insignificant but predominantly positive. Within both income group levels, the coefficient on the investment quality variable is insignificant with the respective interaction term between FDI and investment profile positive and statistically significant. That is, investment profile is the only institution measure that significantly influences FDI's marginal effect on growth, which coincides with FDI's adversely affecting growth (see columns 14 of Tables 3C.5 and 3C.6). More specifically, among the low income group of countries, the coefficient on FDI is -1.629, which indicates that higher levels of FDI negatively affects economic growth. However, with the significant and positive interaction term value of 0.199, FDI and investment profile are complements in the growth process, with higher quality of investment profile overcoming the negative effect of FDI on growth (Figure 3C.3.2). For the low income countries, it is only for developments in investment profile with a value above 5, that the institution is able to offset the significant adverse effect of FDI on growth.

[45] The income group for each country in this study is based on the World Bank categorization. The countries in this study fall under one of these four income groups: low income, lower middle, upper middle and high income. To ensure that the income groupings are not too small, I form two income groups, 'Low' and 'High'. The 'Low' group comprises of low income and lower middle income countries, 25 countries in total. While the 'High' includes upper middle and high income countries, which are 20. See Table 3C.1 for further details.

On the other hand, Table 3C.6 (column 14) and Figure 3C.3.3 indicate that among the high income group of countries, FDI effect on growth is -1.845, with the positive interaction term of 0.263 improving the marginal effect of FDI on growth at higher investment levels. Further, it is only when developments in the investment profile measure has a value above 8.5 that the overall marginal effect of FDI on growth is positive and statistically significant.

The income level assessment highlights interesting results for investment profile influence on FDI's effect on growth, which seems to be blurred by the aggregated data. In this regard, the risk to investment with respect to expropriation, profit repatriation and payment delays among EMDE, regardless of their income level, must be earnestly very low, in order to ensure that the influence of a country's investment profile on FDI's marginal effect on economic growth is positive and statistically significant. My findings, however, are in slight contrast to Driffield and Jones (2013) as they find both the direct effect of FDI as well as the interaction term between FDI and investment profile in the growth model to be simultaneously positive and significant.

3.4.2 Growth of Sectoral Level Value Added

The findings in Section 4.1 indicate that better institutions in particular, democratic accountability and investment profile, through their interaction with FDI have significant influence on the marginal effect of FDI on economic growth. Although FDI contributes to growth, in the presence of as well as with the influence of other key factors, FDI's effect can be heterogeneous across sectors of the economy conditional on the type of institution as seen in Bornschier (1980), Arndt et al. (2015) and Iamsiraroj (2016). It is in this light, that I also explore how key factors might influence FDI's marginal effect on growth of agriculture and manufacturing VAD. I focus on manufacturing because FDI strengthens this sector linkages with the rest of the economy through its effect on a country's industrial capacity (Wang, 2009; Alvarado et al., 2017; Haraguchi et al., 2017). The inclusion of the agriculture sector is because of its significant contribution to GDP VAD. In the following sections, agriculture then the manufacturing sector are examined.

3.4.2.1 Growth of Agriculture Value Added

In this section, I continue to look at the factors that influence FDI's marginal effect, but now focusing squarely on the overall marginal effect of FDI on growth of agriculture value added. Relative to growth at the aggregate level, FDI's marginal effect on growth of agriculture VAD is significantly influenced by two additional key factors, namely remittances and socioeconomic conditions. Although the institutional variables ethnic tensions and internal conflict have significant interactions with FDI in the model, their respective influences on FDI's overall marginal effect on agriculture VAD is insignificant.

[Insert Tables 3C.7 to 3C.9 Here]

Unlike in section 4.1, with a few exceptions, the coefficients on FDI in Tables 3C.7 to 3C.9 are predominantly insignificant across specifications. In the results via system GMM, the coefficient on foreign direct investment is only statistically significant in the income level assessment for a few cases. Specifically, in the low income group assessment, the coefficient on FDI is positive and statistically significant when modelled with the institutional measures internal conflict or socioeconomic conditions (Table 3C.8). While in the high income group assessment, the coefficient on FDI is only positive and significant when modelled with democratic accountability or investment profile (Table 3C.9). Interestingly, it is only for these four cases, that the interaction terms are significant, with all values being negative. The negative interaction terms in all these cases indicate that FDI and the corresponding institutional measures are substitutes in the growth process for agriculture VAD. That is, developments of these institutional variables, at the respective income levels, dampens FDI's marginal effect on growth of agriculture VAD (Figures 3C.3.2 to 3C.3.3).

With respect to the low income group, Figure 3C.4.2 shows that the overall marginal effect of FDI on agriculture VAD is negative and statistically significant for above average levels of socioeconomic conditions, while the overall effect is insignificant across all levels of internal conflict. The results reveal that as socioeconomic conditions in these countries improve above average levels, in terms of unemployment, poverty and consumer confidence, there will eventually be increased earnings and greater domestic savings and hence more domestic funds available for investment in the agricultural sector of these countries. Consequently, with the added pool of domestic capital stemming from better socioeconomic conditions, there should be greater reliance on domestic capital instead of external capital, which now makes FDI relatively less productive for growth of agriculture VAD.

For the high income group, above average levels of democratic accountability and investment profile development erase the significant and positive marginal effect of FDI on growth of VAD and makes the effect insignificant. The rationale is that FDI flows to high income group of countries are sometimes accompanied with know-how that can be easily passed on. Because of this knowledge transfer, it would be prudent for governments' in these developing countries not to pursue above average development in institutional qualities with respect to democratic accountability and investment profile, as by doing less, governments ensure that the influence on FDI's effect on growth in the agriculture VAD remains significantly positive.

Looking at the full country sample for growth of agriculture VAD, the results become surprising for system GMM specifications with remittances and ethnic tensions in columns 4 and 10 of Table 3C.7, respectively, as only the interaction term in both cases is statistically significant. In that, the coefficient on the interaction term for FDI and remittances is positive, an indication that FDI and remittances are complements in the growth of agriculture VAD. That is, higher levels of remittances boost FDI's marginal effect on agriculture VAD growth. In the same vein, Figure 3C.4.1 shows that the marginal effect of FDI on growth of agriculture VAD is positive and significant for levels of remittance as a share of GDP at or higher than 2.0 percent. As it relates to the interaction term for FDI and ethnic tensions, the coefficient is significant and negative. Further, as shown in Figure 3C.4.1, FDI's marginal effect on growth of agriculture VAD conditional on ethnic tensions is insignificant across all range of the ethnic tensions measure. This finding suggests and provides evidence that actions to diffuse ethnic tension in EMDE countries, play a more critical role than FDI in the growth of agriculture VAD.

3.4.2.2. Growth of Manufacturing Value Added

While the agriculture sector has a deep connection to the economy of developing countries, the manufacturing sector is regarded as the main driver of economic growth that transforms goods from the primary to the secondary or tertiary state (Haraguchi et al., 2017). This section considers how the factors of interest influence the marginal effect of FDI on growth of manufacture VAD at the aggregate as well as income levels.

[Insert Tables 3C.10 to 3C.12 Here]

These results in column 2 of Table 3C.10 show that when FDI is modelled with the control variables, it has a positive and significant effect on growth of manufacture VAD. This is unlike the insignificant coefficient on the FDI variable in the corresponding full country sample models for economic growth (Table 3C.4) and growth of agriculture VAD (Table 3C.7). The results give credence to Alvarado et al. (2017)'s claim that external capital strengthens the industrial capacity of recipient countries, which is reflected in FDI's unconditional significant contribution to the growth of manufacturing VAD. To put into context, the results in Table 3C.4 column 2 indicate that a ten percentage point increase in FDI increases growth of manufacture VAD by 4.8 percentage points. Looking at the full model specification, FDI's effect on growth of manufacture VAD are statistically significant in more than half of these cases with system GMM. The interaction term between FDI and variables interest is only significant for three institutions namely ethnic tensions (column 10), internal conflict (column 12) and socioeconomic conditions (column 18), with all coefficients having negative values. This suggests that FDI is dependent on these institutions in the growth of manufacture VAD. Surprisingly, the coefficients on all the key variables in the growth of manufacture VAD are all insignificant in system GMM. Looking at Figure 3C.5.1, the graph suggests that FDI's marginal effect on growth of manufacture VAD is significantly positive for institutional development up to moderate levels for ethnic tensions and internal conflict, but insignificant across all levels for socioeconomic conditions.

For the income level assessment on growth of manufacturing VAD, Tables 3C.11 and 3C.12, the coefficient on FDI is insignificant in both OLS-fixed effects and system GMM. With the exception of the full model specifications that include socioeconomic conditions for the low income group as well as religious tensions for the high income category, the coefficient on FDI is insignificant but largely positive. Further, for the low income group, socioeconomic condition is the only variable that significantly influences growth of manufacturing VAD (Table 3C.11). The negative value of the interactive term indicates that improvements in the socioeconomic conditions among low income group of countries significantly diminishes the positive effect of FDI on manufacturing growth. However, it is only for developments in socioeconomic conditions beyond a value of 3.3 that the overall marginal effect of FDI on manufacturing growth is insignificant (Figure 3C.5.2). This is opposite of the results for growth of agriculture VAD for the comparable income category (see Figure 3C.4.2). Looking at the high income group, the interaction term is only significant for FDI and religious tensions, with the negative coefficient indicating that FDI and developments in religious tensions are substitutes in the growth of manufacturing VAD (Table 3C.12). That is, the overall marginal effect of FDI on growth of manufacturing is only positive and significant when the action to diffuse religious tensions is below moderate levels (Figure 3C.5.3). This is an indication that governments' intervention in religious matters or deep cultural factors should be at a minimum, given the possible implication for growth.

3.5 Discussion

Given the number of tables, I provide a summary of the findings in Tables 3.1 to 3.3 below. These tables highlight the terms that have a statistically significant coefficient in the full model (3.1) from system GMM. That is, Tables 3C.13.1, 3C.13.2 and 3.1 highlight from equation (3.1) where the coefficient on FDI, the variables of interest (remittances, foreign aid and institutions) and the interaction terms are statistically significant, respectively. Using Table 3.1 below as an example, a $(-)$ at the intersection of the democratic accountability variable and column (1), means that FDI and democratic accountability are significant substitutes in the growth process for the full country sample.

Overall, FDI's contribution in the growth process tends to be positive and significant for the full model cases using system GMM, in particular for the full country sample where the dependent variable is aggregate growth and growth of manufacturing VAD (Table 3C.13.1). On the other hand, foreign aid and most of the institution measures have a significant direct effect predominantly on growth, in the full country sample (Table 3C.13.2). This is an indication that foreign aid and institutional developments are more effective at the aggregate level to enhance growth, when compared to the institutional measures being more critical in influencing FDI's marginal effect on growth at the sectoral level (Table 3.1). It is important to incorporate the interaction terms in the model, as remittances, foreign aid and institutions play critical roles in influencing the marginal effect of FDI in the growth process at the aggregate and sectoral levels, with possible heterogeneous effects across income groups.

Although foreign aid in the form of official development assistance does not significantly influences the marginal effect of FDI on growth at the aggregate, sectoral or the income group levels, the coefficient on the ODA term is for the most part negative and in line with expectations. My results are in contrast to Arndt et al. (2015)'s and Selaya and Sunesen (2012)'s arguments that that foreign aid significantly affects the FDI-growth connection. The negative and significant contribution of ODA to economic growth, as shown in column 6 of Table 3C.4, is in line with the strand of literature on foreign aid and economic growth that finds that higher levels of foreign aid inflows can be detrimental to growth (Arndt et al., 2015).

Table 3.1. Summary Highlights of Statistically Significant Interaction terms in System GMM

	Growth			Growth in Value-Added					
				Agriculture			Manufacturing		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variables	Full	Low	High	Full	Low	High	Full	Low	High
Net remittance inflows				(+)					
Foreign aid									
Democratic accountability	(−)					(−)			
Ethnic tensions				(−)[a]			(−)		
Internal conflict					(−)[a]		(−)		
Investment profile		(+)	(+)			(−)			
Religious tensions									(−)
Socioeconomic conditions					(−)		(−)[a]	(−)	

Notes: 'Full', 'Low' and 'High' represent the full, low income and high income sample groupings of the countries. (−) and (+) indicate that the interaction term is negatively and positively statistically significant, respectively. The symbol 'a' indicates that overall marginal effect of FDI on growth of the sector VAD is insignificant across all levels of institution development. The empty cells indicate that the interaction with FDI is insignificant.

For the findings on the role of remittances in the growth process, I make two key observations. First, it is only among the high income group of countries that remittance inflows contribute significantly to the growth process, but in a negative way (Table 3C.6). Second, another contribution is made to the literature in terms of the complementary relationship between FDI and remittances only in the growth of agriculture VAD (column 4 of Table 3C.7). In that, the result suggests that FDI inflows would boost agriculture VAD as long as there are higher levels of remittances. This is slightly in contrast to Driffield and Jones (2013) where the complementary relationship between FDI and remittance is not significant, although their finding is in relation to economic growth. The ability of remittance inflows to influence the FDI and growth of agriculture

VAD connection, resides in idea that remittance inflows serve as an external or another source of disposable income for individuals in EMDE countries (such as in the Latin American (Garcia-Fuentes et al., 2016). This extra income could increase the demand for FDI related goods and services (Basnet and Upadhyaya, 2014) and by extension increases the marginal productivity of external capital in growth of agriculture VAD.

With the exception of the investment profile institution measure which serves as a complement for FDI in the growth process for the low income as well as high income group of countries, the other significant institutional quality measures and FDI are substitutes in the overall growth process as well as in the growth of the sectoral VAD (Table 3.1). My results are supported by the findings of earlier studies such as Driffield and Jones (2013), Solomon (2011) and Iamsiraroj (2016, for LAC economies) that find that higher institutional developments dampen FDI's marginal effect on growth. Driffield and Jones (2013) also find that investment profile has a positive influence on the FDI and growth connection. Interestingly, the significant negative interaction between FDI and each institution measure is fairly distributed between the growth of agriculture and manufacturing VAD. The findings suggest that if EMDEs are experiencing adverse or weak economic growth in response to changes to foreign direct investment, it would be beneficial to raise the country's investment profile as an institutional policy aimed at reducing risks to investment. This is needed in order to negate (as is the case for the low income group) or overcome (as is the case for the high income group) any hindrances stemming from the marginal effect of FDI having a negative effect on economic growth.[46] However, even in the face of higher levels of development in investment

[46] The results can be viewed in the context of Alvararado et al. (2017)'s findings where FDI has a positive effect among the high income countries, negative effect for the low income countries and insignificant effect among the upper middle income group.

profile, the overall marginal effect of FDI on economic growth could be insignificant. Iamsiraroj (2016) suggests that such an occurrence can be partly attributed to inadequate absorptive capacity in developing countries.

There are two arguments that can support the significant negative interaction between FDI and institutions in the growth process. The first argument relates to foreign direct investment being associated with human know-hows as well as high institutional spillovers associated with the source or developed countries (Aghion et al., 2016). In this case, governments in EMDE countries would not need to place too much emphasis on raising the level of a particular institution measure beyond a moderate value. This would be the case for democratic accountability. Further, since FDI and financial developments are significant complements in economic development (Alfaro and Chauvin, 2017), then the functions that are important to finance and growth (or FDI and growth) are similar to the ones provided by high quality institutions (Levine, 2005). The second argument resides in the fact that external capital flows in the form of FDI has an impact on the domestic economy through the contraction and expansion of some sectors. It is in this context that institutional developments serve to recompense areas of the domestic economy (both economic and social) that would have been negatively affected by FDI which is in line with McCloud et al. (2018). This would in turn dampen the marginal productivity of FDI on growth, in favour of constant or higher marginal productivity of domestic capital in the growth process. For instance, where FDI may have resulted in the crowding out of domestic investment in the agriculture sector, an institutional policy to moderately improve the investment profile for an average low income EMDE country would only partly constrain FDI’s effect on the growth of agriculture VAD.

From the perspective of policymakers in emerging markets and developing countries, any attempt to affect growth via its response to FDI being influence by remittances, foreign aid and institutions must be informed by economic theory and empirical evidence. The findings show that the influence of institutions on FDI's marginal effect on economic growth or growth of VAD of a particular sector is heterogeneous even at two income levels. For example, FDI and democratic accountability are substitutes in the overall growth process, but they are independent of one another when looking at growth of manufacturing VAD. Further, the magnitude of the influence of any of the considered institutional measures on FDI marginal effect varies by income level of the country as well as the sector of interest. The results also suggest that EMDE countries can have moderate levels of institutional quality and still achieve an overall marginal effect of FDI that is positive and significant. This is in the context where higher institutional development diminishes the marginal effect of FDI on economic growth or growth of sectoral value added.

3.6 Conclusion

This study examines the influence of remittances, foreign aid and institutions on the marginal effect of foreign direct investment on growth among a group of 45 emerging markets and developing economies. The study uses 5-year period averages for data variables over the period 1985 to 2014. The analysis extends to ascertain the influence of the said factors on FDI's marginal effect on VAD growth at the sectoral level, specifically for agriculture and manufacturing sectors. I also perform the assessment across income levels. Estimations are carried out using panel OLS with fixed effects as the benchmark case as well as with system generalized method of moments. The system GMM controls for any potential endogeneity problems that may arise in the regressions.

The findings of the study indicate that the marginal effect of FDI on economic growth is only significantly influenced by the institutional quality measure democratic accountability, with FDI and democratic accountability acting as substitutes in the growth process. In the income group assessment, FDI and investment profile are complements in the growth process, a relationship that significantly boosts the overall marginal effect of FDI. For both agriculture and manufacturing, the interaction terms between FDI and most of the institutions are negative and significant in the growth of agriculture and manufacturing VAD. The significance of the interaction between FDI and institutions varies across both sectors as well as across the income levels. With the exception of investment profile in the growth model, FDI's positive effect on economic growth diminishes as the level of all institutions improve. This is due to FDI and institutions substitutionary relationship as well as higher levels of institutions protecting areas of the domestic economy that would have been negatively affected by FDI. As it relates to remittances and FDI, they are complements only in the growth of agriculture VAD. With higher levels of remittances (at or above two percent of GDP) significantly improving the overall marginal effect of FDI on growth of agriculture VAD in emerging markets and developing economies. Unlike remittances and institutions, FDI's effect on economic growth or growth of sectoral VAD is independent of foreign aid and should be treated as such.

In terms of understanding economic growth among EMDEs, democratic accountability and investment profile (conditional on income level) are two institutions that are of significant importance in influencing FDI's marginal effect. At the sectoral level, institutions influence on the marginal effect of FDI is balanced across both agriculture and manufacturing sectors. The results suggest that both sectors have deep economic linkages within EMDEs. From a policy perspective, it is important for policymakers to be cognizant of the extent to which institutions or remittances may serve as complements or substitutes for FDI in their respective economy, as this relationship will have implications for the FDI-growth connection, at the aggregate and sectoral levels.

The results highlight two interesting issues that deserve further examination. Firstly, the use of disaggregated FDI flows by sector could highlight different sector-level contribution of FDI on growth as well as how remittances, foreign aid and institutions would influence sector-level FDI's marginal effect in the growth process. The use of aggregated FDI data can overshadow the different sector–level FDI effects in the growth process and lead to inconclusive results. Secondly, it would be useful to explore if the expected conditional effect of remittances, foreign aid and institutions on FDI is more suitable to understand the cross-country differences in income level or growth rate. As the factors influencing FDI's effect in the growth process could just be a short-run transition to a new income level and not a permanent change.

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Appendix 3

Table 3C.1. Income Groups for the 45 Developing Countries

	Low Income Group (Sample =25)		High Income Group (Sample =20)	
	Low income	Lower Middle	Upper middle	High income
	Mali	Cameroon	Algeria	Chile
	Mozambique	Congo, Republic	Argentina	Israel
	Senegal	Cote d'Ivoire	Bangladesh	Trinidad &
	Sierra Leone	Egypt	Botswana	Tobago
	Togo	El Salvador	Brazil	
	Zimbabwe	Ghana	China	
		Guatemala	Colombia	
		Honduras	Costa Rica	
		India	Dominican	
		Indonesia	Republic	
		Jordan	Gabon	
		Kenya	Jamaica	
		Morocco	Mexico	
		Pakistan	Panama	
		Papua New	Peru	
		Guinea	Thailand	
		Philippines	Turkey	
		Sri Lanka	Venezuela, RB	
		Sudan		
		Tunisia		
Number	6	19	17	3

Notes: The income categories of low, lower middle, upper middle and high income are based on the World Bank categorization. The aggregation of the sample into two groups, low and high income groups is my decision to ensure the sub samples are not smaller than 20.

Table 3C.2. Data Description

Variable	Measure	Source
Growth	Constructed as log difference of real GDP per capita (constant 2010 US$)	World Bank WDI
Initial GDP per capita	Real GDP per capita at the beginning of the respective sample period (constant 2010 US$)	World Bank WDI
Manufacturing growth	Percent change in manufacturing value added in decimal form.	World Bank WDI
Agriculture growth	Percent change in agriculture value added in decimal form.	World Bank WDI
Education	Average years of schooling in total population 25+	Barro and Lee (2013)
Inflation	Percent change in the consumer price index	World Bank WDI
Trade	Sum of exports and imports to GDP	World Bank WDI
FDI	Net foreign direct investment inflows to GDP. It is the direct investment equity flows in the reporting economy.	World Bank WDI
Remittances	Personal remittances received to GDP. Personal remittances comprise personal transfers and compensation of employees.	World Bank WDI
Foreign aid	Constructed as the net official development assistance to GDP. It consists of disbursements of loans made on concessional terms (net of repayments of principal) and	World Bank WDI
Democratic Accountability	6-point scale (larger values imply better democracy) which captures the responsiveness of the government to its people on the basis that the less responsive it is, the more likely it is that the government will fall, peacefully in a democratic society, but possibly violently in a non-democratic one.	ICRG
Ethnic Tensions	6-point scale (larger values imply less tension), assesses the degree of tension within a country arising from cultural factors such as racial, nationality or language divisions.	ICRG
Internal Conflict	12-point scale (larger values imply less political violence) captures the impact of political violence on governance.	ICRG
Investment Profile	12-point scale (larger values imply less investment risk) measures risk factors, outside of market and political risks that are likely to affect investment in a country.	ICRG

Religious Tension	6-point scale (larger values imply less religious domination) capture the impact on society and governance from the takeover by a single religious group.	ICRG
Socioeconomic Conditions	12-point scale (larger values implies less socioeconomic pressure) captures the societal pressures that could constrain the government's action or fuel social dissatisfaction.	ICRG

Table 3C.3.4. Summary Statistics for 5-Year Panel Data - Full Sample

	Mean	Standard deviation	Minimum	Maximum
Growth	0.020	0.028	-0.077	0.109
Manufacturing Growth	0.035	0.042	-0.104	0.287
Agriculture Growth	0.030	0.028	-0.069	0.128
Initial GDP per capita	7.768	1.056	4.907	10.330
Education	5.322	2.488	0.540	12.760
Inflation	0.665	5.466	-0.001	86.033
Trade	0.661	0.302	0.134	1.492
FDI	0.025	0.031	-0.053	0.301
Remittances	0.033	0.043	0	0.216
ODA	0.038	0.055	-0.001	0.457
Democratic Accountability	3.528	1.272	0.608	6
Ethnic Tensions	3.550	1.479	0	6
Internal Conflict	7.913	2.138	0.350	12
Investment Profile	6.820	1.942	1.150	11.5
Religious Tension	4.229	1.459	0.017	6
Socioeconomic Conditions	4.900	1.546	0.608	8.350
Observations	270			

Table 3C.3.5. Summary Statistics for 5-Year Panel Data – Low Income Group Sample

	Mean	Standard Deviation	Minimum	Maximum
Growth	0.017	0.027	-0.077	0.087
Manufacturing Growth	0.035	0.039	-0.104	0.178
Agriculture Growth	0.032	0.029	-0.067	0.128
Initial GDP per capita	7.115	0.687	4.907	8.328
Education	4.145	2.103	0.540	9.830
Inflation	0.694	7.018	-0.001	86.033
Trade	0.681	0.289	0.134	1.430
FDI	0.023	0.035	-0.053	0.301
Remittances	0.045	0.049	0	0.216
ODA	0.062	0.064	0	0.457
Democratic Accountability	3.147	1.252	0.608	6
Ethnic Tensions	3.145	1.489	0	6
Internal Conflict	7.469	2.207	0.350	11.483
Investment Profile	6.468	1.860	1.150	10.067
Religious Tension	3.858	1.508	0.150	6
Socioeconomic Conditions	4.358	1.493	0.608	7.617
Observations	150			

Table 3C.3.6. Summary Statistics for 5-Year Panel Data - High Income Group Sample

	Mean	Standard Deviation	Minimum	Maximum
Growth	0.025	0.028	-0.043	0.109
Manufacturing Growth	0.035	0.045	-0.067	0.287
Agriculture Growth	0.027	0.026	-0.069	0.102
Initial GDP per capita	8.583	0.849	5.936	10.330
Education	6.793	2.127	2.400	12.760
Inflation	0.628	2.425	0.005	16.672
Trade	0.637	0.317	0.156	1.492
FDI	0.027	0.024	-0.042	0.101
Remittances	0.018	0.029	0.000	0.160
ODA	0.008	0.013	-0.001	0.065
Democratic Accountability	4.004	1.132	1	6
Ethnic Tensions	4.056	1.304	1.167	6
Internal Conflict	8.468	1.918	3	12
Investment Profile	7.260	1.961	2.783	11.5
Religious Tension	4.693	1.253	0.017	6
Socioeconomic Conditions	5.578	1.333	2.092	8.350
Observations	120			

Table 3C.2. Estimation results for FDI, Remittances, ODA and Growth – Full Country Sample

	(1)	(2)	(3)	(4)	(5)	(6)
Estimation method	OLS	SYS-GMM	OLS	SYS-GMM	OLS	SYS-GMM
FDI	0.144*	0.031	0.140	0.460*	0.252**	-0.125
	(0.085)	(0.305)	(0.104)	(0.233)	(0.100)	(0.369)
Remittances			-0.032	0.100		
			(0.085)	(0.121)		
ODA					0.014	-0.445**
					(0.094)	(0.196)
Interaction			0.094	-2.302	-1.244	1.257
			(0.822)	(1.516)	(1.224)	(3.436)
ln_gdp_pc	-0.040***	-0.029***	-0.041***	-0.010	-0.040***	-0.045***
	(0.011)	(0.006)	(0.011)	(0.011)	(0.011)	(0.009)
Education	-0.003	0.011**	-0.003	0.006	-0.004	0.011**
	(0.003)	(0.004)	(0.003)	(0.005)	(0.003)	(0.005)
Inflation	-0.001***	-0.002	-0.001***	-0.003	-0.001***	-0.001
	(0.000)	(0.002)	(0.000)	(0.002)	(0.000)	(0.002)
Trade	0.019	-0.060**	0.020	-0.053**	0.020	-0.072***
	(0.015)	(0.029)	(0.015)	(0.022)	(0.014)	(0.023)
Constant	0.315***	0.224***	0.322***	0.086	0.316***	0.373***
	(0.088)	(0.045)	(0.091)	(0.067)	(0.090)	(0.073)
Obs.	270	270	270	270	268	268
R-Squared	0.30		0.30		0.31	
AB(1)		0.051		0.107		0.082
AB(2)		0.724		0.646		0.642
# Instruments		16		43		20
Hansen p-value		0.196		0.193		0.495
Lag 1 only		X				X
Collapsed		X		X		X

Notes: Dependent variable is the average growth of real GDP per capita over a period of 5 years (i.e. 1985-1989, 1990-1994, etc.). Robust standard errors are in parentheses. Time dummies are included but are not reported for brevity. The interaction variable represents the multiplicative interactive term of FDI and key variable of interest (ex. for this Table it is the interaction between FDI and remittances).

The policy control variables are log of initial GDP per capita and education (i.e. 1985, 1990, etc.) as well as inflation and trade (1985-1989, 1990-1994, etc.). *, ** and *** indicate significance at the 10, 5 and 1% level, respectively. 'AB' represents Arellano-Bond test for autocorrelation of order 1 and 2 in first differences. Hansen p-value indicates the Hansen (1982) test of overidentifying restrictions with a chi-square distribution and the corresponding probability value (p-value). 'Lag 1 only' and 'collapsed' indicate the available approach used to get the instrument count for the system GMM model with Windmeijer small-sample correction for the two-step standard errors. The full instrument set is not used in an order to reduce bias in the system GMM model. 'X' indicates the approach used for the instrument count. Remittances refers to net remittance inflows to the recipient countries.

Table 3C.4. Estimation results for FDI, Institutions and Growth – Full Country Sample (Continued)

	(7)	(8)	(9)	(10)	(11)	(12)
Estimation method	OLS	SYS-GMM	OLS	SYS-GMM	OLS	SYS-GMM
FDI	0.178	0.810**	0.228	0.845*	0.558	0.506
	(0.187)	(0.364)	(0.233)	(0.496)	(0.377)	(0.579)
Democratic accountability	0.002	0.013**				
	(0.003)	(0.006)				
Ethnic Tensions			0.003*	0.011*		
			(0.002)	(0.006)		
Internal Conflict					0.003**	0.004*
					(0.001)	(0.002)
Interaction	-0.012	-0.154*	-0.023	-0.167	-0.047	-0.041
	(0.055)	(0.089)	(0.056)	(0.121)	(0.041)	(0.056)
ln_gdp_pc	-0.040***	-0.043***	-0.041***	-0.019*	-0.041***	-0.019*
	(0.012)	(0.012)	(0.011)	(0.010)	(0.013)	(0.009)
Education	-0.003	0.017***	-0.002	0.006	-0.002	0.008
	(0.003)	(0.005)	(0.003)	(0.005)	(0.003)	(0.005)
Inflation	-0.001***	-0.002	-0.001***	-0.003	-0.001***	-0.002
	(0.000)	(0.001)	(0.000)	(0.002)	(0.000)	(0.001)
Trade	0.016	-0.077***	0.021	-0.070**	0.017	-0.057***
	(0.015)	(0.027)	(0.014)	(0.028)	(0.014)	(0.020)
Constant	0.307***	0.270***	0.307***	0.127*	0.299***	0.131**
	(0.096)	(0.073)	(0.091)	(0.064)	(0.096)	(0.056)
Obs.	270	270	270	270	270	270
R-Squared	0.31		0.31		0.33	
AB(1)		0.028		0.062		0.056
AB(2)		0.884		0.855		0.699
# Instruments		43		43		43
Hansen p-value		0.404		0.189		0.172
Lag 1 only						
Collapsed		X		X		X

Table 3C.4. Estimation results for FDI, Institutions and Growth – Full Country Sample (Continued)

	(13)	(14)	(15)	(16)	(17)	(18)
Estimation method	OLS	SYS-GMM	OLS	SYS-GMM	OLS	SYS-GMM
FDI	0.386	1.125*	0.626***	0.148	0.159	0.476
	(0.338)	(0.653)	(0.219)	(1.580)	(0.194)	(0.338)
Investment profile	0.004**	0.006*				
	(0.002)	(0.003)				
Religious tensions			0.001	0.000		
			(0.002)	(0.007)		
Socioeconomic					0.005**	0.009
					(0.002)	(0.008)
Interaction	-0.034	-0.106	-0.093**	0.002	-0.007	-0.085
	(0.047)	(0.072)	(0.044)	(0.283)	(0.046)	(0.084)
ln_gdp_pc	-0.043***	-0.027	-0.038***	-0.032***	-0.049***	-0.047***
	(0.014)	(0.016)	(0.011)	(0.006)	(0.013)	(0.016)
Education	-0.002	0.012*	-0.003	0.011*	-0.003	0.014**
	(0.003)	(0.007)	(0.003)	(0.005)	(0.003)	(0.006)
Inflation	-0.001***	-0.001	-0.001***	-0.002	-0.001***	-0.002*
	(0.000)	(0.001)	(0.000)	(0.002)	(0.000)	(0.001)
Trade	0.019	-0.055**	0.019	-0.052*	0.022	-0.039
	(0.015)	(0.021)	(0.015)	(0.029)	(0.016)	(0.030)
Constant	0.311***	0.163	0.297***	0.238***	0.360***	0.292***
	(0.105)	(0.101)	(0.081)	(0.060)	(0.100)	(0.066)
Obs.	270	270	270	270	270	270
R-Squared	0.32		0.31		0.33	
AB(1)		0.003		0.074		0.009
AB(2)		0.632		0.651		0.716
# Instruments		43		20		43
Hansen p-value		0.230		0.212		0.328
Lag 1 only				X		
Collapsed		X		X		X

Table 3C.5. Estimation Results for FDI, Remittances, ODA and Growth – Low Income Group Sample

	(1)	(2)	(3)	(4)	(5)	(6)
Estimation method	OLS	SYS-GMM	OLS	SYS-GMM	OLS	SYS-GMM
FDI	0.137*	0.225	0.132	0.137	0.162	-0.289
	(0.080)	(0.206)	(0.098)	(0.380)	(0.099)	(0.585)
Remittances			0.000	0.030		
			(0.082)	(0.245)		
ODA					-0.005	-0.216
					(0.092)	(0.223)
Interaction			0.154	-0.018	-0.238	3.778
			(0.686)	(2.673)	(1.182)	(4.530)
ln_gdp_pc	-0.050***	-0.038	-0.050***	-0.038***	-0.050***	-0.039***
	(0.012)	(0.026)	(0.012)	(0.009)	(0.014)	(0.013)
Education	0.001	0.017*	0.001	0.012**	0.001	0.013**
	(0.003)	(0.009)	(0.004)	(0.004)	(0.003)	(0.006)
Inflation	-0.001***	-0.002*	-0.001***	-0.002***	-0.001***	-0.002***
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)
Trade	0.002	-0.074	0.002	-0.050	0.002	-0.067*
	(0.013)	(0.046)	(0.014)	(0.047)	(0.012)	(0.033)
Constant	0.352***	0.269	0.352***	0.266***	0.353***	0.298***
	(0.089)	(0.167)	(0.091)	(0.052)	(0.101)	(0.107)
Obs.	150	150	150	150	150	150
R-Squared	0.36		0.36		0.36	
AB(1)		0.033		0.003		0.029
AB(2)		0.362		0.282		0.479
# Instruments		16		20		20
Hansen p-value		0.193		0.066		0.806
Lag 1 only		X		X		X
Collapsed		X		X		X

Note: See notes of Table 3C.4.

Table 3C.3. Estimation Results for FDI, Institutions and Growth – Low Income Group Sample (Continued)

	(7)	(8)	(9)	(10)	(11)	(12)
Estimation method	OLS	SYS-GMM	OLS	SYS-GMM	OLS	SYS-GMM
FDI	0.126	1.255	0.049	0.108	0.316	-0.827
	(0.214)	(1.115)	(0.111)	(0.818)	(0.340)	(2.292)
Democratic accountability	0.005	0.014				
	(0.003)	(0.018)				
Ethnic Tensions			0.004**	-0.004		
			(0.002)	(0.011)		
Internal Conflict					0.006***	0.001
					(0.001)	(0.005)
Interaction	-0.003	-0.335	0.023	-0.053	-0.022	0.076
	(0.063)	(0.326)	(0.032)	(0.175)	(0.039)	(0.241)
ln_gdp_pc	-0.053***	-0.042*	-0.055***	-0.026	-0.059***	-0.024
	(0.014)	(0.021)	(0.013)	(0.044)	(0.014)	(0.035)
Education	0.001	0.015*	0.001	0.009	0.001	0.008
	(0.003)	(0.007)	(0.003)	(0.016)	(0.003)	(0.010)
Inflation	-0.001***	-0.002**	-0.001***	-0.002**	-0.001***	-0.002*
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)
Trade	-0.001	-0.059	0.003	-0.048	-0.005	-0.072
	(0.014)	(0.056)	(0.013)	(0.064)	(0.012)	(0.057)
Constant	0.363***	0.252*	0.375***	0.207	0.391***	0.196
	(0.093)	(0.122)	(0.093)	(0.273)	(0.100)	(0.179)
Obs.	150	150	150	150	150	150
R-Squared	0.38		0.38		0.46	
AB(1)		0.018		0.015		0.038
AB(2)		0.579		0.286		0.262
# Instruments		20		20		20
Hansen p-value		0.340		0.117		0.405
Lag 1 only		X		X		X
Collapsed		X		X		X

Table 3C.5. Estimation Results for FDI, Institutions and Growth – Low Income Group Sample (Continued)

	(13)	(14)	(15)	(16)	(17)	(18)
Estimation method	OLS	SYS-GMM	OLS	SYS-GMM	OLS	SYS-GMM
FDI	0.642*	-1.629*	0.582***	-1.028	0.210	0.829
	(0.348)	(0.854)	(0.202)	(1.408)	(0.206)	(0.798)
Investment Profile	0.005**	-0.007				
	(0.002)	(0.004)				
Religious Tension			0.003	-0.005		
			(0.003)	(0.005)		
Socioeconomic					0.008**	-0.008
					(0.003)	(0.013)
Interaction	-0.068	0.199*	-0.088**	0.264	-0.024	-0.226
	(0.045)	(0.104)	(0.036)	(0.293)	(0.055)	(0.191)
ln_gdp_pc	-0.053***	-0.006	-0.048***	-0.016	-0.070***	0.021
	(0.015)	(0.022)	(0.013)	(0.034)	(0.018)	(0.033)
Education	0.002	0.000	-0.000	0.010	0.000	0.006
	(0.003)	(0.006)	(0.004)	(0.011)	(0.004)	(0.010)
Inflation	-0.001***	-0.002***	-0.001***	-0.002*	-0.001***	-0.002***
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)
Trade	0.002	-0.063*	0.004	-0.092	0.007	-0.167*
	(0.014)	(0.034)	(0.013)	(0.059)	(0.016)	(0.082)
Constant	0.350***	0.124	0.332***	0.157	0.454***	-0.027
	(0.103)	(0.137)	(0.087)	(0.202)	(0.123)	(0.159)
Obs.	150	150	150	150	150	150
R-Squared	0.40		0.38		0.42	
AB(1)		0.005		0.047		0.005
AB(2)		0.185		0.300		0.775
# Instruments		20		20		20
Hansen p-value		0.591		0.159		0.407
Lag 1 only		X		X		X
Collapsed		X		X		X

Table 3C.6. Estimation Results for FDI, Remittances, ODA and Growth – High Income Group Sample

	(1)	(2)	(3)	(4)	(5)	(6)
Estimation method	OLS	SYS-GMM	OLS	SYS-GMM	OLS	SYS-GMM
FDI	0.284**	0.292	0.309*	0.231	0.271	0.613
	(0.131)	(0.406)	(0.155)	(0.194)	(0.161)	(0.369)
Remittances			0.029	-0.390**		
			(0.214)	(0.179)		
ODA					0.301	-0.693
					(0.382)	(0.701)
Interaction			-1.638	1.379	4.838	-80.303
			(2.932)	(2.737)	(9.577)	(78.035)
ln_gdp_pc	-0.036**	-0.044*	-0.036**	-0.030*	-0.034**	-0.037**
	(0.016)	(0.025)	(0.016)	(0.016)	(0.015)	(0.013)
Education	-0.010*	0.004	-0.010*	0.006	-0.010*	0.007
	(0.005)	(0.012)	(0.005)	(0.006)	(0.005)	(0.007)
Inflation	-0.002**	-0.000	-0.002**	-0.002	-0.001*	-0.003*
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)
Trade	0.047	-0.021	0.045	-0.026	0.036	-0.036
	(0.035)	(0.026)	(0.035)	(0.027)	(0.033)	(0.030)
Constant	0.339**	0.377	0.335**	0.255*	0.319**	0.325**
	(0.150)	(0.229)	(0.154)	(0.133)	(0.145)	(0.122)
Obs.	120	120	120	120	118	118
R-Squared	0.35		0.36		0.38	
AB(1)		0.071		0.053		0.148
AB(2)		0.550		0.316		0.398
# Instruments		16		20		20
Hansen p-value		0.086		0.068		0.276
Lag 1 only		X		X		X
Collapsed		X		X		X

Note: See notes of Table 3C.4.

Table 3C.4. Estimation Results for FDI, Institutions and Growth – High Income Group Sample (Continued)

	(7) OLS	(8) SYS-GMM	(9) OLS	(10) SYS-GMM	(11) OLS	(12) SYS-GMM
FDI	0.491	-1.092	0.909*	1.393	0.759	1.338
	(0.377)	(1.229)	(0.483)	(1.960)	(0.442)	(2.199)
Democratic Accountability	-0.001	-0.012				
	(0.004)	(0.015)				
Ethnic Tensions			0.004	0.018		
			(0.004)	(0.017)		
Internal Conflict					-0.000	0.007
					(0.002)	(0.008)
Interaction	-0.045	0.341	-0.150	-0.359	-0.048	-0.107
	(0.088)	(0.274)	(0.111)	(0.457)	(0.044)	(0.242)
ln_gdp_pc	-0.036**	-0.035*	-0.034**	-0.053*	-0.033**	-0.046**
	(0.014)	(0.018)	(0.015)	(0.027)	(0.014)	(0.019)
Education	-0.011**	0.003	-0.010*	0.001	-0.011*	-0.000
	(0.005)	(0.008)	(0.005)	(0.012)	(0.006)	(0.010)
Inflation	-0.002**	-0.002	-0.001***	-0.001	-0.002**	0.000
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)
Trade	0.049	-0.023	0.045	-0.024	0.042	-0.006
	(0.034)	(0.021)	(0.035)	(0.055)	(0.036)	(0.036)
Constant	0.351**	0.339*	0.306*	0.389	0.324**	0.347*
	(0.137)	(0.178)	(0.147)	(0.308)	(0.138)	(0.179)
Obs.	120	120	120	120	120	120
R-Squared	0.36		0.39		0.36	
AB(1)		0.059		0.044		0.053
AB(2)		0.532		0.572		0.330
# Instruments		20		20		20
Hansen p-value		0.268		0.140		0.271
Lag 1 only		X		X		X
Collapsed		X		X		X

Table 3C.6. Estimation Results for FDI, Institutions and Growth – High Income Group Sample (Continued)

	(13)	(14)	(15)	(16)	(17)	(18)
Estimation method	OLS	SYS-GMM	OLS	SYS-GMM	OLS	SYS-GMM
FDI	0.060	-1.845*	0.145	1.499	1.146**	-1.107
	(0.612)	(0.992)	(0.777)	(2.070)	(0.510)	(1.433)
Investment Profile	0.001	-0.009				
	(0.003)	(0.007)				
Religious Tension			-0.004	0.008		
			(0.004)	(0.011)		
Socioeconomic					0.004	-0.002
					(0.003)	(0.012)
Interaction	0.024	0.263**	0.030	-0.300	-0.152*	0.209
	(0.080)	(0.101)	(0.153)	(0.408)	(0.080)	(0.258)
ln_gdp_pc	-0.038*	-0.052*	-0.036**	-0.040**	-0.033*	-0.051***
	(0.020)	(0.028)	(0.015)	(0.017)	(0.016)	(0.018)
Education	-0.010*	-0.000	-0.012**	0.011*	-0.011**	-0.001
	(0.005)	(0.006)	(0.005)	(0.006)	(0.005)	(0.013)
Inflation	-0.002***	-0.003	-0.002**	-0.001	-0.001**	-0.001
	(0.001)	(0.003)	(0.001)	(0.002)	(0.001)	(0.003)
Trade	0.049	-0.024	0.041	-0.009	0.050	-0.036
	(0.036)	(0.027)	(0.037)	(0.036)	(0.033)	(0.037)
Constant	0.351*	0.521**	0.367**	0.263*	0.298*	0.474**
	(0.178)	(0.230)	(0.143)	(0.149)	(0.152)	(0.168)
Obs.	120	120	120	120	120	120
R-Squared	0.36		0.36		0.37	
AB(1)		0.017		0.071		0.081
AB(2)		0.561		0.662		0.457
# Instruments		20		20		20
Hansen p-value		0.293		0.211		0.143
Lag 1 only		X		X		X
Collapsed		X		X		X

Table 3C.5. FDI, Remittances, ODA and Growth in Agriculture Value-Added – Full Country Sample[47]

	(1)	(2)	(3)	(4)	(5)	(6)
Estimation method	OLS	SYS-GMM	OLS	SYS-GMM	OLS	SYS-GMM
FDI	-0.046	0.089	-0.084	0.164	-0.038	0.294
	(0.050)	(0.230)	(0.057)	(0.134)	(0.109)	(0.274)
Remittances			-0.018	0.003		
			(0.101)	(0.119)		
ODA					-0.033	-0.113
					(0.113)	(0.154)
Interaction			1.225	1.985*	-0.180	-4.371
			(0.841)	(1.143)	(0.894)	(3.364)
ln_gdp_pc	-0.022**	-0.024***	-0.021**	-0.002	-0.022**	-0.033
	(0.010)	(0.007)	(0.010)	(0.011)	(0.010)	(0.020)
Education	-0.006*	0.005	-0.007	-0.002	-0.006	0.005
	(0.003)	(0.004)	(0.004)	(0.005)	(0.004)	(0.009)
Inflation	-0.001***	-0.002	-0.001***	-0.000	-0.001***	-0.001
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)
Trade	0.007	-0.013	0.006	-0.030	0.006	-0.042
	(0.016)	(0.038)	(0.017)	(0.022)	(0.017)	(0.032)
Constant	0.219***	0.203***	0.219**	0.074	0.225***	0.296**
	(0.077)	(0.058)	(0.085)	(0.063)	(0.081)	(0.138)
Obs.	270	270	270	270	268	268
R-Squared	0.12		0.12		0.12	
AB(1)		0.006		0.007		0.016
AB(2)		0.520		0.846		0.497
# Instruments		16		43		20
Hansen p-value		0.245		0.351		0.185
Lag 1 only		X				X
Collapsed		X		X		X

[47] Notes: See notes of Tables 3C.4. Dependent variable is the average growth of the agriculture value added over a period of 5 years (i.e. 1985-1989, 1990-1994, etc.).

Table 3C.7. FDI, Institutions and Growth in Agriculture Value-Added – Full Country Sample (Continued)

Estimation method	(7) OLS	(8) SYS-GMM	(9) OLS	(10) SYS-GMM	(11) OLS	(12) SYS-GMM
FDI	0.141	0.061	-0.242	0.778	-0.093	0.909
	(0.234)	(1.177)	(0.222)	(0.478)	(0.307)	(0.820)
Democratic accountability	0.000	-0.002				
	(0.003)	(0.015)				
Ethnic tensions			-0.000	0.010		
			(0.002)	(0.007)		
Internal conflict					0.002	0.004
					(0.001)	(0.003)
Interaction	-0.048	-0.009	0.051	-0.224*	0.003	-0.098
	(0.061)	(0.295)	(0.056)	(0.130)	(0.032)	(0.085)
ln_gdp_pc	-0.020**	-0.016	-0.023**	-0.012	-0.023**	-0.024***
	(0.009)	(0.025)	(0.011)	(0.012)	(0.011)	(0.006)
Education	-0.006*	0.003	-0.006*	-0.003	-0.005*	0.005
	(0.003)	(0.011)	(0.003)	(0.005)	(0.003)	(0.004)
Inflation	-0.001***	-0.001	-0.001***	-0.002	-0.001***	-0.001
	(0.000)	(0.002)	(0.000)	(0.001)	(0.000)	(0.001)
Trade	0.006	-0.015	0.007	-0.002	0.006	-0.014
	(0.017)	(0.029)	(0.016)	(0.033)	(0.015)	(0.035)
Constant	0.206***	0.160	0.232***	0.104	0.218**	0.176***
	(0.073)	(0.119)	(0.084)	(0.070)	(0.087)	(0.054)
Obs.	270	270	270	270	270	270
R-Squared	0.12		0.12		0.13	
AB(1)		0.018		0.005		0.004
AB(2)		0.551		0.225		0.181
# Instruments		20		20		20
Hansen p-value		0.193		0.426		0.684
Lag 1 only		X		X		X
Collapsed		X		X		X

Table 3C.7. FDI, Institutions and Growth in Agriculture Value-Added – Full Country Sample. (Continued)

Estimation method	(13) OLS	(14) SYS-GMM	(15) OLS	(16) SYS-GMM	(17) OLS	(18) SYS-GMM
FDI	0.558	0.634	0.361	0.604	0.092	0.256
	(0.449)	(1.816)	(0.299)	(0.762)	(0.144)	(0.433)
Investment profile	0.003	0.000				
	(0.002)	(0.010)				
Religious tension			-0.002	0.003		
			(0.003)	(0.003)		
Socioeconomic					0.003	-0.002
					(0.002)	(0.009)
Interaction	-0.079	-0.072	-0.076	-0.093	-0.039	-0.038
	(0.059)	(0.234)	(0.055)	(0.131)	(0.041)	(0.090)
ln_gdp_pc	-0.018*	-0.021	-0.019**	-0.005	-0.026**	-0.003
	(0.011)	(0.020)	(0.009)	(0.012)	(0.012)	(0.017)
Education	-0.005	0.005	-0.007*	-0.004	-0.006*	-0.001
	(0.003)	(0.010)	(0.004)	(0.004)	(0.003)	(0.007)
Inflation	-0.001***	-0.001	-0.001***	-0.001	-0.001***	-0.002
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.002)
Trade	0.003	-0.018	0.004	-0.014	0.007	-0.035
	(0.017)	(0.027)	(0.015)	(0.029)	(0.017)	(0.049)
Constant	0.178**	0.178**	0.215***	0.080	0.234**	0.088
	(0.081)	(0.078)	(0.072)	(0.063)	(0.089)	(0.078)
Obs.	270	270	270	270	270	270
R-Squared	0.14		0.13		0.13	
AB(1)		0.007		0.012		0.031
AB(2)		0.544		0.736		0.663
# Instruments		20		20		20
Hansen p-value		0.272		0.607		0.129
Lag 1 only		X		X		
Collapsed		X		X		X

Table 3C.6. FDI, Remittances, ODA and Growth in Agriculture Value-Added – Low Income Group Sample

	(1)	(2)	(3)	(4)	(5)	(6)
Estimation method	OLS	SYS-GMM	OLS	SYS-GMM	OLS	SYS-GMM
FDI	-0.020	0.131	-0.050	0.006	0.101	0.096
	(0.059)	(0.188)	(0.075)	(0.152)	(0.124)	(0.536)
Remittances			0.017	0.048		
			(0.128)	(0.158)		
ODA					-0.061	-0.121
					(0.124)	(0.217)
Interaction			0.946	0.075	-1.208	-1.555
			(1.038)	(1.648)	(0.940)	(4.107)
ln_gdp_pc	-0.025**	-0.031***	-0.024*	-0.029**	-0.027**	-0.031
	(0.011)	(0.008)	(0.012)	(0.011)	(0.012)	(0.025)
Education	-0.003	0.009**	-0.004	0.007	-0.004	0.003
	(0.004)	(0.003)	(0.006)	(0.005)	(0.005)	(0.005)
Inflation	-0.001***	-0.001***	-0.001***	-0.002***	-0.001***	-0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Trade	0.013	-0.039	0.011	0.000	0.014	-0.026
	(0.021)	(0.046)	(0.025)	(0.025)	(0.022)	(0.035)
Constant	0.219**	0.248***	0.210**	0.219***	0.234**	0.266
	(0.080)	(0.055)	(0.089)	(0.062)	(0.088)	(0.171)
Obs.	150	150	150	150	150	150
R-Squared	0.16		0.16		0.17	
AB(1)		0.015		0.018		0.042
AB(2)		0.923		0.971		0.860
# Instruments		16		20		20
Hansen p-value		0.651		0.606		0.453
Lag 1 only		X		X		X
Collapsed		X		X		X

Note: See notes of Tables 3C.4 and 3C.10.

Table 3C.8. FDI, Institutions and Growth in Agriculture Value-Added – Low Income Group Sample (Continued)

	(7)	(8)	(9)	(10)	(11)	(12)
Estimation method	OLS	SYS-GMM	OLS	SYS-GMM	OLS	SYS-GMM
FDI	-0.042	1.865	-0.191	0.683	-0.209	1.079*
	(0.259)	(1.159)	(0.112)	(0.526)	(0.233)	(0.621)
Democratic Accountability	0.000	0.015				
	(0.003)	(0.013)				
Ethnic tensions			0.000	0.003		
			(0.002)	(0.005)		
Internal conflict					0.003	0.003
					(0.002)	(0.003)
Interaction	0.005	-0.494	0.046	-0.187	0.019	-0.119*
	(0.069)	(0.302)	(0.033)	(0.117)	(0.025)	(0.061)
ln_gdp_pc	-0.026**	-0.031***	-0.027**	-0.034***	-0.033***	-0.024*
	(0.011)	(0.011)	(0.012)	(0.008)	(0.012)	(0.013)
Education	-0.003	0.008	-0.004	0.008*	-0.003	0.004
	(0.004)	(0.005)	(0.004)	(0.004)	(0.003)	(0.005)
Inflation	-0.001***	-0.001***	-0.001***	-0.002***	-0.001***	-0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Trade	0.012	-0.021	0.012	-0.021	0.007	-0.013
	(0.021)	(0.049)	(0.021)	(0.047)	(0.018)	(0.025)
Constant	0.222***	0.200***	0.235***	0.249***	0.254***	0.173**
	(0.079)	(0.059)	(0.083)	(0.041)	(0.080)	(0.068)
Obs.	150	150	150	150	150	150
R-Squared	0.16		0.16		0.20	
AB(1)		0.028		0.018		0.016
AB(2)		0.534		0.572		0.516
# Instruments		20		20		20
Hansen p-value		0.442		0.594		0.680
Lag 1 only		X		X		X
Collapsed		X		X		X

Table 3C.8. FDI, Institutions and Growth in Agriculture Value-Added – Low Income Group Sample (Continued)

	(13)	(14)	(15)	(16)	(17)	(18)
Estimation method	OLS	SYS-GMM	OLS	SYS-GMM	OLS	SYS-GMM
FDI	-0.167	0.841	0.151	0.266	-0.070	1.181**
	(0.398)	(1.790)	(0.327)	(0.762)	(0.159)	(0.559)
Investment profile	0.001	0.003				
	(0.003)	(0.006)				
Religious tension			-0.003	-0.001		
			(0.004)	(0.005)		
Socioeconomic					0.002	-0.003
					(0.003)	(0.010)
Interaction	0.019	-0.112	-0.032	-0.074	0.015	-0.372**
	(0.051)	(0.229)	(0.057)	(0.136)	(0.053)	(0.162)
ln_gdp_pc	-0.030*	-0.031	-0.022*	-0.011	-0.033*	0.002
	(0.016)	(0.021)	(0.012)	(0.020)	(0.017)	(0.022)
Education	-0.003	0.009	-0.004	-0.003	-0.004	0.005
	(0.004)	(0.007)	(0.004)	(0.006)	(0.004)	(0.008)
Inflation	-0.001***	-0.001***	-0.001***	-0.001	-0.001***	-0.001
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)
Trade	0.013	-0.009	0.015	0.003	0.016	-0.096
	(0.022)	(0.032)	(0.020)	(0.047)	(0.023)	(0.067)
Constant	0.247**	0.217	0.209**	0.120	0.262**	0.079
	(0.103)	(0.140)	(0.082)	(0.114)	(0.107)	(0.096)
Obs.	150	150	150	150	150	150
R-Squared	0.16		0.16		0.16	
AB(1)		0.015		0.024		0.014
AB(2)		0.555		0.600		0.219
# Instruments		20		20		20
Hansen p-value		0.603		0.278		0.514
Lag 1 only		X		X		X
Collapsed		X		X		X

Table 3C.7. FDI, Remittances, ODA and Growth in Agriculture Value-Added - High Income Group Sample

	(1)	(2)	(3)	(4)	(5)	(6)
Estimation method	OLS	SYS-GMM	OLS	SYS-GMM	OLS	SYS-GMM
FDI	-0.194	0.175	-0.233	0.209	-0.449***	0.243
	(0.121)	(0.159)	(0.142)	(0.332)	(0.116)	(0.450)
Remittances			-0.132	0.281		
			(0.221)	(0.236)		
ODA					-0.297	0.462
					(0.373)	(0.813)
Interaction			2.692	-7.081	51.423***	-13.944
			(3.775)	(6.158)	(7.442)	(76.998)
ln_gdp_pc	-0.026	0.008	-0.027	0.012	-0.012	-0.003
	(0.018)	(0.008)	(0.019)	(0.009)	(0.013)	(0.009)
Education	-0.014**	0.001	-0.015**	0.000	-0.008*	0.000
	(0.006)	(0.008)	(0.007)	(0.008)	(0.004)	(0.010)
Inflation	-0.001**	-0.002	-0.001**	-0.002	-0.001*	-0.001
	(0.001)	(0.002)	(0.001)	(0.003)	(0.001)	(0.001)
Trade	-0.001	-0.061*	0.000	-0.073*	-0.025	-0.043
	(0.027)	(0.029)	(0.025)	(0.040)	(0.028)	(0.035)
Constant	0.322*	-0.006	0.333*	-0.029	0.188	0.071
	(0.164)	(0.079)	(0.173)	(0.070)	(0.113)	(0.096)
Obs.	120	120	120	120	118	118
R-Squared	0.10		0.11		0.29	
AB(1)		0.046		0.041		0.098
AB(2)		0.230		0.262		0.379
# Instruments		16		20		20
Hansen p-value		0.743		0.617		0.578
Lag 1 only		X		X		X
Collapsed		X		X		X

Note: See notes of Tables 3C.4.

Table 3C.9. FDI, Institutions and Growth in Agriculture Value-Added - High Income Group Sample (Continued)

	(7)	(8)	(9)	(10)	(11)	(12)
Estimation method	OLS	SYS-GMM	OLS	SYS-GMM	OLS	SYS-GMM
FDI	0.946**	2.256*	-0.514	0.169	-0.064	-2.118
	(0.449)	(1.120)	(0.735)	(0.822)	(0.913)	(2.677)
Democratic accountability	0.005	0.019				
	(0.006)	(0.012)				
Ethnic tensions			-0.002	0.013		
			(0.003)	(0.010)		
Internal conflict					0.000	-0.005
					(0.002)	(0.005)
Interaction	-0.268**	-0.483*	0.077	-0.085	-0.014	0.230
	(0.100)	(0.252)	(0.169)	(0.216)	(0.090)	(0.259)
ln_gdp_pc	-0.024	-0.004	-0.027	-0.002	-0.026	0.017
	(0.014)	(0.008)	(0.020)	(0.007)	(0.020)	(0.013)
Education	-0.019**	0.003	-0.014*	0.002	-0.014**	-0.001
	(0.007)	(0.009)	(0.007)	(0.009)	(0.007)	(0.006)
Inflation	-0.001	0.001	-0.001**	-0.001	-0.001*	-0.001
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)
Trade	-0.009	-0.012	0.001	-0.044	-0.001	-0.048*
	(0.031)	(0.038)	(0.025)	(0.037)	(0.025)	(0.026)
Constant	0.314**	-0.025	0.338*	0.011	0.317*	-0.033
	(0.133)	(0.072)	(0.186)	(0.085)	(0.178)	(0.115)
Obs.	120	120	120	120	120	120
R-Squared	0.15		0.11		0.10	
AB(1)		0.051		0.027		0.051
AB(2)		0.215		0.145		0.478
# Instruments		20		20		20
Hansen p-value		0.348		0.479		0.854
Lag 1 only		X		X		X
Collapsed		X		X		X

Table 3C.9. FDI, Institutions and Growth in Agriculture Value-Added - High Income Group Sample (Continued)

	(13)	(14)	(15)	(16)	(17)	(18)
Estimation method	OLS	SYS-GMM	OLS	SYS-GMM	OLS	SYS-GMM
FDI	1.834***	1.939*	1.662***	1.114	0.831	0.507
	(0.552)	(0.945)	(0.473)	(1.431)	(0.569)	(1.163)
Investment profile	0.007**	0.005				
	(0.003)	(0.005)				
Religious tension			0.002	-0.006		
			(0.004)	(0.009)		
Socioeconomic					0.007**	0.000
					(0.003)	(0.008)
Interaction	-0.250***	-0.212*	-0.358***	-0.163	-0.185*	-0.072
	(0.055)	(0.112)	(0.101)	(0.292)	(0.103)	(0.179)
ln_gdp_pc	-0.013	0.003	-0.021	0.006	-0.024	0.007
	(0.013)	(0.007)	(0.015)	(0.010)	(0.019)	(0.007)
Education	-0.013**	0.006	-0.014	-0.001	-0.014**	0.005
	(0.006)	(0.003)	(0.008)	(0.007)	(0.006)	(0.005)
Inflation	-0.001	-0.001	-0.002***	-0.001	-0.001	-0.001
	(0.000)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)
Trade	-0.020	-0.046	-0.019	-0.073*	0.002	-0.050
	(0.029)	(0.032)	(0.028)	(0.036)	(0.026)	(0.035)
Constant	0.180	-0.028	0.285*	0.056	0.269	-0.025
	(0.119)	(0.076)	(0.153)	(0.102)	(0.171)	(0.065)
Obs.	120	120	120	120	120	120
R-Squared	0.29		0.17		0.13	
AB(1)		0.028		0.065		0.046
AB(2)		0.174		0.256		0.185
# Instruments		20		20		20
Hansen p-value		0.515		0.677		0.723
Lag 1 only		X		X		X
Collapsed		X		X		X

Table 3C.8. Estimation Results for FDI, Remittances, ODA and Growth in Manufacturing Value-Added – Full Country Sample[48]

	(1)	(2)	(3)	(4)	(5)	(6)
Estimation method	OLS	SYS-GMM	OLS	SYS-GMM	OLS	SYS-GMM
FDI	0.072	0.483**	0.029	0.582**	0.178	0.352
	(0.105)	(0.209)	(0.141)	(0.238)	(0.175)	(0.344)
Remittances			-0.248**	0.123		
			(0.111)	(0.152)		
ODA					-0.131	0.148
					(0.118)	(0.223)
Interaction			0.895	-2.914	-1.494	-0.882
			(1.432)	(1.842)	(1.393)	(2.689)
ln_gdp_pc	-0.040**	-0.004	-0.046***	-0.000	-0.041**	-0.004
	(0.016)	(0.005)	(0.017)	(0.007)	(0.016)	(0.021)
Education	-0.011*	0.000	-0.013*	-0.000	-0.011	0.004
	(0.006)	(0.005)	(0.007)	(0.004)	(0.007)	(0.005)
Inflation	-0.001***	-0.001*	-0.001***	-0.001	-0.001***	-0.002
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.002)
Trade	0.032	-0.020	0.039	-0.029	0.038	-0.024
	(0.025)	(0.030)	(0.026)	(0.031)	(0.025)	(0.027)
Constant	0.363***	0.076**	0.418***	0.051	0.375***	0.060
	(0.127)	(0.032)	(0.137)	(0.044)	(0.133)	(0.153)
Obs.	264	264	264	264	262	262
R-Squared	0.09		0.10		0.10	
AB(1)		0.014		0.016		0.012
AB(2)		0.744		0.726		0.849
# Instruments		33		43		43
Hansen p-value		0.446		0.618		0.351
Lag 1 only						
Collapsed		X		X		X

[48] Notes: See notes of Tables 3C.4. Dependent variable is the average growth of the manufacturing sector value added over a period of 5 years (i.e. 1985-1989, 1990-1994, etc.).

Table 3C.10. Estimation Results for FDI, Institutions and Growth in Manufacturing Value-Added – Full Country Sample (Continued)

	(7)	(8)	(9)	(10)	(11)	(12)
Estimation method	OLS	SYS-GMM	OLS	SYS-GMM	OLS	SYS-GMM
FDI	0.256	0.615	0.316	2.127***	1.026	3.666**
	(0.424)	(0.605)	(0.378)	(0.769)	(1.000)	(1.638)
Democratic Accountability	0.004	0.002				
	(0.005)	(0.007)				
Ethnic Tensions			0.007**	0.012		
			(0.003)	(0.009)		
Internal Conflict					0.004*	0.004
					(0.002)	(0.005)
Interaction	-0.052	-0.047	-0.066	-0.473**	-0.105	-0.361**
	(0.114)	(0.141)	(0.082)	(0.197)	(0.103)	(0.157)
ln_gdp_pc	-0.038**	-0.006	-0.041**	-0.006	-0.039**	-0.003
	(0.018)	(0.010)	(0.016)	(0.008)	(0.017)	(0.008)
Education	-0.011	-0.001	-0.010	0.005	-0.011*	0.002
	(0.007)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Inflation	-0.001***	-0.001	-0.001***	-0.001	-0.001***	-0.002
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)
Trade	0.027	-0.037	0.036	-0.065**	0.029	-0.057*
	(0.028)	(0.046)	(0.025)	(0.031)	(0.026)	(0.034)
Constant	0.342**	0.092	0.339**	0.056	0.326**	0.047
	(0.140)	(0.071)	(0.128)	(0.053)	(0.133)	(0.044)
Obs.	264	264	264	264	264	264
R-Squared	0.09		0.10		0.11	
AB(1)		0.018		0.021		0.010
AB(2)		0.748		0.683		0.472
# Instruments		43		20		20
Hansen p-value		0.576		0.995		0.973
Lag 1 only				X		X
Collapsed		X		X		X

Note: See notes of Table 3C.4.

Table 3C.10. Estimation Results for FDI, Institutions and Growth in Manufacturing Value-Added – Full Country Sample (Continued)

	(13)	(14)	(15)	(16)	(17)	(18)
Estimation Method	OLS	SYS-GMM	OLS	SYS-GMM	OLS	SYS-GMM
FDI	0.233	1.338	0.523	1.374*	0.054	1.139*
	(0.566)	(1.522)	(0.359)	(0.716)	(0.253)	(0.593)
Investment Profile	0.008***	0.001				
	(0.003)	(0.003)				
Religious Tension			0.011***	0.000		
			(0.003)	(0.008)		
Socioeconomic					0.003	0.009
					(0.003)	(0.009)
Interaction	-0.027	-0.106	-0.095	-0.209	0.002	-0.222**
	(0.077)	(0.166)	(0.065)	(0.166)	(0.068)	(0.109)
ln_gdp_pc	-0.049**	0.003	-0.039**	0.007	-0.047***	-0.008
	(0.021)	(0.022)	(0.016)	(0.013)	(0.017)	(0.016)
Education	-0.010*	0.000	-0.010	-0.004	-0.012*	0.002
	(0.006)	(0.007)	(0.006)	(0.009)	(0.007)	(0.004)
Inflation	-0.000**	-0.001	-0.001***	-0.002	-0.001***	-0.002
	(0.000)	(0.001)	(0.000)	(0.002)	(0.000)	(0.002)
Trade	0.035	-0.045	0.036	-0.029	0.035	-0.005
	(0.026)	(0.040)	(0.023)	(0.043)	(0.027)	(0.033)
Constant	0.383**	0.033	0.307**	0.017	0.400***	0.049
	(0.162)	(0.130)	(0.128)	(0.102)	(0.135)	(0.076)
Obs.	264	264	264	264	264	264
R-Squared	0.13		0.12		0.09	
AB(1)		0.005		0.015		0.014
AB(2)		0.878		0.734		0.711
# Instruments		38		43		43
Hansen p-value		0.672		0.522		0.323
Lag 1 only						
Collapsed		X		X		X

Note: See notes of Table 3C.4.

Table 3C.9. Estimation Results for FDI, Remittances, ODA and Growth in Manufacturing Value-Added – Low Income Group Sample

	(1)	(2)	(3)	(4)	(5)	(6)
Estimation method	OLS	SYS-GMM	OLS	SYS-GMM	OLS	SYS-GMM
FDI	0.013	0.307	-0.084	0.410	0.040	-0.140
	(0.097)	(0.193)	(0.116)	(0.448)	(0.179)	(0.883)
Remittances			-0.284*	0.039		
			(0.145)	(0.341)		
ODA					-0.188*	0.078
					(0.107)	(0.288)
Interaction			1.923*	-0.029	-0.534	3.304
			(1.123)	(3.784)	(1.450)	(6.612)
ln_gdp_pc	-0.025	0.002	-0.032*	-0.011	-0.031	0.011
	(0.017)	(0.009)	(0.016)	(0.023)	(0.019)	(0.020)
Education	-0.008	0.004	-0.012	0.005	-0.008	0.005
	(0.007)	(0.004)	(0.007)	(0.006)	(0.007)	(0.007)
Inflation	-0.001***	-0.001***	-0.001***	-0.001*	-0.000***	-0.001
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)
Trade	0.032	-0.080*	0.046*	-0.048	0.038*	-0.100*
	(0.023)	(0.046)	(0.025)	(0.053)	(0.022)	(0.050)
Constant	0.213*	0.053	0.272**	0.117	0.265*	-0.004
	(0.113)	(0.060)	(0.118)	(0.134)	(0.133)	(0.155)
Obs.	150	150	150	150	150	150
R-Squared	0.08		0.10		0.10	
AB(1)		0.004		0.009		0.011
AB(2)		0.328		0.286		0.285
# Instruments		16		20		20
Hansen p-value		0.569		0.228		0.326
Lag 1 only		X		X		X
Collapsed		X		X		X

Note: See notes of Tables 3C.4 and 3C.10.

Table 3C.11. Estimation Results for FDI, Institutions and Growth in Manufacturing Value-Added – Low Income Group Sample (Continued)

Estimation method	(7) OLS	(8) SYS-GMM	(9) OLS	(10) SYS-GMM	(11) OLS	(12) SYS-GMM
FDI	0.324	1.459	-0.018	1.124	0.713	1.403
	(0.533)	(1.436)	(0.125)	(0.703)	(0.944)	(1.637)
Democratic accountability	0.007	0.009				
	(0.006)	(0.014)				
Ethnic tensions			0.008*	-0.004		
			(0.004)	(0.010)		
Internal conflict					0.008**	0.001
					(0.003)	(0.009)
Interaction	-0.092	-0.296	0.007	-0.195	-0.079	-0.112
	(0.146)	(0.348)	(0.033)	(0.181)	(0.100)	(0.171)
ln_gdp_pc	-0.024	-0.003	-0.032*	-0.000	-0.035*	-0.002
	(0.019)	(0.011)	(0.017)	(0.010)	(0.018)	(0.010)
Education	-0.008	0.005	-0.008	0.009*	-0.009	0.004
	(0.008)	(0.005)	(0.007)	(0.005)	(0.007)	(0.006)
Inflation	-0.000**	-0.001**	-0.001***	-0.001*	-0.000***	-0.001*
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)
Trade	0.028	-0.086**	0.033	-0.104**	0.023	-0.107**
	(0.024)	(0.034)	(0.023)	(0.037)	(0.027)	(0.044)
Constant	0.193	0.064	0.242**	0.074	0.249*	0.084
	(0.131)	(0.065)	(0.112)	(0.071)	(0.121)	(0.082)
Obs.	150	150	150	150	150	150
R-Squared	0.10		0.10		0.16	
AB(1)		0.076		0.04		0.003
AB(2)		0.304		0.372		0.362
# Instruments		20		20		20
Hansen p-value		0.727		0.670		0.520
Lag 1 only		X		X		X
Collapsed		X		X		X

Note: See notes of Tables 3C.4 and 3C.10.

Table 3C.11. Estimation Results for FDI, Institutions and Growth in Manufacturing Value-Added – Low Income Group Sample (Continued)

	(13)	(14)	(15)	(16)	(17)	(18)
Estimation method	OLS	SYS-GMM	OLS	SYS-GMM	OLS	SYS-GMM
FDI	0.120	-0.248	0.436	-1.562	0.069	2.168**
	(0.682)	(1.777)	(0.326)	(2.051)	(0.227)	(0.912)
Investment profile	0.010***	-0.002				
	(0.003)	(0.008)				
Religious tension			0.010***	-0.005		
			(0.004)	(0.006)		
Socioeconomic					0.008*	0.016
					(0.004)	(0.022)
Interaction	-0.017	0.058	-0.088	0.352	-0.019	-0.540*
	(0.090)	(0.223)	(0.055)	(0.396)	(0.077)	(0.270)
ln_gdp_pc	-0.046*	0.002	-0.027*	0.004	-0.046*	0.002
	(0.023)	(0.019)	(0.015)	(0.011)	(0.026)	(0.025)
Education	-0.008	0.004	-0.010	0.005	-0.009	0.008
	(0.006)	(0.005)	(0.007)	(0.007)	(0.007)	(0.007)
Inflation	-0.000	-0.001*	-0.000***	-0.001***	-0.000***	-0.000
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)
Trade	0.033	-0.076***	0.030	-0.107	0.037	-0.090
	(0.027)	(0.024)	(0.023)	(0.068)	(0.027)	(0.121)
Constant	0.307*	0.065	0.198*	0.068	0.323*	-0.030
	(0.153)	(0.097)	(0.102)	(0.070)	(0.165)	(0.123)
Obs.	150	150	150	150	150	150
R-Squared	0.16		0.12		0.11	
AB(1)		0.003		0.021		0.100
AB(2)		0.409		0.397		0.836
# Instruments		20		20		20
Hansen p-value		0.691		0.586		0.188
Lag 1 only		X		X		X
Collapsed		X		X		X

Note: See notes of Tables 3C.4 and 3C.10.

Table 3C.10. Estimation Results for FDI, Remittances, ODA and Growth in Manufacturing Value-Added – High Income Group Sample

	(1)	(2)	(3)	(4)	(5)	(6)
Estimation method	OLS	SYS-GMM	OLS	SYS-GMM	OLS	SYS-GMM
FDI	0.225	0.582	0.319	0.868	0.051	-0.271
	(0.207)	(0.448)	(0.224)	(0.552)	(0.296)	(0.511)
Remittances			0.196	0.243		
			(0.236)	(0.462)		
ODA					0.345	-1.696
					(0.492)	(2.008)
Interaction					37.637**	220.427
					(17.352)	(175.514)
ln_gdp_pc	-0.064*	0.015	-0.062	0.002	-0.051	0.000
	(0.036)	(0.029)	(0.036)	(0.019)	(0.032)	(0.025)
Education	-0.021**	-0.003	-0.020*	-0.012	-0.014*	0.003
	(0.010)	(0.018)	(0.010)	(0.013)	(0.008)	(0.009)
Inflation	-0.000	-0.003	0.000	-0.002	0.000	-0.000
	(0.001)	(0.003)	(0.001)	(0.002)	(0.001)	(0.003)
Trade	0.048	-0.076	0.044	-0.080	0.021	-0.003
	(0.050)	(0.056)	(0.053)	(0.073)	(0.044)	(0.028)
Constant	0.650*	-0.032	0.629*	0.113	0.497*	0.006
	(0.318)	(0.278)	(0.322)	(0.123)	(0.275)	(0.208)
Obs.	114	114	114	114	112	112
R-Squared	0.16		0.17		0.21	
AB(1)		0.069		0.093		0.198
AB(2)		0.205		0.248		0.946
# Instruments		16		20		20
Hansen p-value		0.818		0.865		0.728
Lag 1 only		X		X		X
Collapsed		X		X		X

Note: See notes of Tables 3C.4 and 3C.10.

Table 3C.12. Estimation Results for FDI, Institutions and Growth in Manufacturing Value-Added – High Income Group Sample (Continued)

Estimation method	(7) OLS	(8) SYS-GMM	(9) OLS	(10) SYS-GMM	(11) OLS	(12) SYS-GMM
FDI	1.462**	1.472	1.821***	1.577	1.958**	2.313
	(0.685)	(2.042)	(0.405)	(1.054)	(0.712)	(3.938)
Democratic accountability	0.006	0.000				
	(0.009)	(0.040)				
Ethnic tensions			0.014*	0.013		
			(0.008)	(0.017)		
Internal conflict					-0.002	-0.007
					(0.004)	(0.009)
Interaction	-0.292*	-0.109	-0.383***	-0.274	-0.177**	-0.131
	(0.155)	(0.566)	(0.098)	(0.285)	(0.074)	(0.394)
ln_gdp_pc	-0.062**	0.006	-0.059*	0.015	-0.055*	0.015
	(0.029)	(0.039)	(0.033)	(0.031)	(0.030)	(0.016)
Education	-0.026***	-0.009	-0.021**	0.006	-0.022**	-0.016
	(0.009)	(0.021)	(0.010)	(0.018)	(0.010)	(0.010)
Inflation	0.000	-0.001	0.000	-0.004	-0.000	-0.000
	(0.001)	(0.006)	(0.001)	(0.003)	(0.001)	(0.004)
Trade	0.041	-0.068	0.050	-0.102	0.030	-0.058**
	(0.049)	(0.062)	(0.054)	(0.096)	(0.053)	(0.027)
Constant	0.647**	0.053	0.555*	-0.116	0.601**	0.073
	(0.265)	(0.317)	(0.291)	(0.312)	(0.271)	(0.177)
Obs.	114	114	114	114	114	114
R-Squared	0.18		0.23		0.20	
AB(1)		0.084		0.050		0.075
AB(2)		0.193		0.250		0.157
# Instruments		20		20		20
Hansen p-value		0.569		0.698		0.724
Lag 1 only		X		X		X
Collapsed		X		X		X

Note: See notes of Tables 3C.4 and 3C.10.

Table 3C.12. Estimation Results for FDI, Institutions and Growth in Manufacturing Value-Added – High Income Group Sample (Continued)

Estimation method	(13) OLS	(14) SYS-GMM	(15) OLS	(16) SYS-GMM	(17) OLS	(18) SYS-GMM
FDI	0.591	1.320	2.190*	7.325**	1.833**	-1.245
	(0.949)	(3.699)	(1.093)	(2.567)	(0.744)	(4.019)
Investment profile	0.004	0.001				
	(0.005)	(0.016)				
Religious tension			0.025**	0.038***		
			(0.011)	(0.010)		
Socioeconomic					0.002	-0.008
					(0.005)	(0.023)
Interaction	-0.051	-0.057	-0.391*	-1.367***	-0.272**	0.337
	(0.132)	(0.379)	(0.204)	(0.421)	(0.123)	(0.671)
ln_gdp_pc	-0.063	-0.001	-0.056	0.004	-0.056	0.009
	(0.040)	(0.041)	(0.039)	(0.019)	(0.037)	(0.027)
Education	-0.021**	-0.020	-0.008	0.004	-0.024**	-0.016
	(0.010)	(0.018)	(0.011)	(0.012)	(0.010)	(0.011)
Inflation	0.000	-0.002	0.001	-0.003	-0.000	-0.002
	(0.001)	(0.006)	(0.001)	(0.001)	(0.001)	(0.003)
Trade	0.045	-0.034	0.069	-0.055	0.057	-0.089**
	(0.053)	(0.049)	(0.047)	(0.063)	(0.050)	(0.039)
Constant	0.616*	0.159	0.391	-0.179	0.576	0.129
	(0.339)	(0.352)	(0.346)	(0.193)	(0.333)	(0.197)
Obs.	114	114	114	114	114	114
R-Squared	0.17		0.20		0.19	
AB(1)		0.091		0.084		0.087
AB(2)		0.215		0.275		0.271
# Instruments		20		20		20
Hansen p-value		0.104		0.903		0.646
Lag 1 only		X		X		X
Collapsed		X		X		X

Note: See notes of Tables 3C.4 and 3C.10.

Table 3C.13.1. Summary Highlights of FDI's Statistically Significant Effect in System GMM

	Growth			Growth in Value-Added					
				Agriculture			Manufacturing		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variables	Full	Low	High	Full	Low	High	Full	Low	High
Net remittance inflows	(+)						(+)		
Foreign aid									
Democratic accountability	(+)					(+)			
Ethnic tensions	(+)						(+)		
Internal conflict					(+)		(+)		
Investment profile	(+)	(-)	(-)			(+)			
Religious tensions							(+)		(+)
Socioeconomic conditions					(+)		(+)	(+)	

Notes: 'Full', 'Low' and 'High' represent the full, low income and high income sample groupings of the countries. (−) and (+) indicate that the effect of FDI is negatively and positively statistically significant in the full model, respectively. The empty cells indicate an insignificant FDI effect.

Table 3C.13.2. Summary Highlights of Remittances, Foreign Aid and Institutions Statistically Significant Effects in System GMM

	Growth			Growth in Value-Added					
				Agriculture			Manufacturing		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variables	Full	Low	High	Full	Low	High	Full	Low	High
Net remittance inflows			(-)						
Foreign aid	(-)								
Democratic accountability	(+)								
Ethnic tensions	(+)								
Internal conflict	(+)								
Investment profile	(+)								
Religious tensions									(+)
Socioeconomic conditions									

Notes: 'Full', 'Low' and 'High' represent the full, low income and high income sample groupings of the countries. (−) and (+) indicate that the effect of the variable is negatively and positively statistically significant, respectively. The empty cells indicate an insignificant FDI effect.

Figure 3C.1. Foreign Direct Investment to GDP Ratio by Income Group

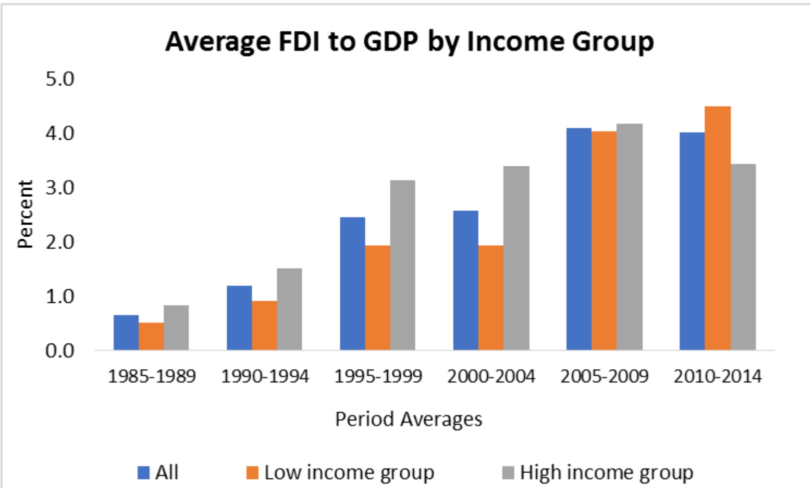


Figure 3C.2.1. Average Sectoral VAD Share of GDP, 1984 to 2014

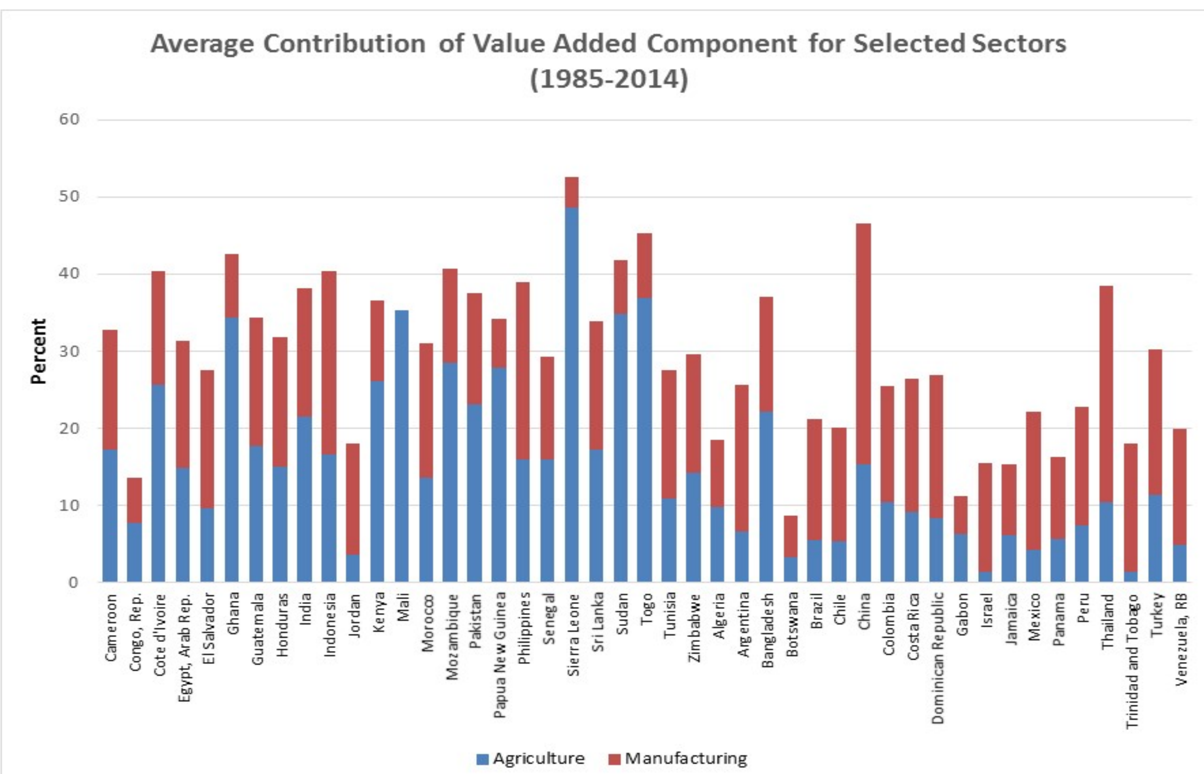
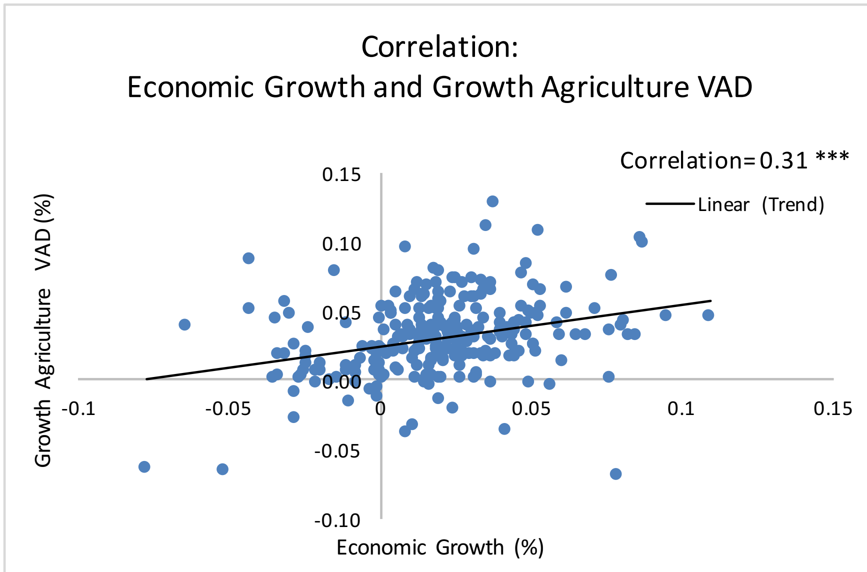
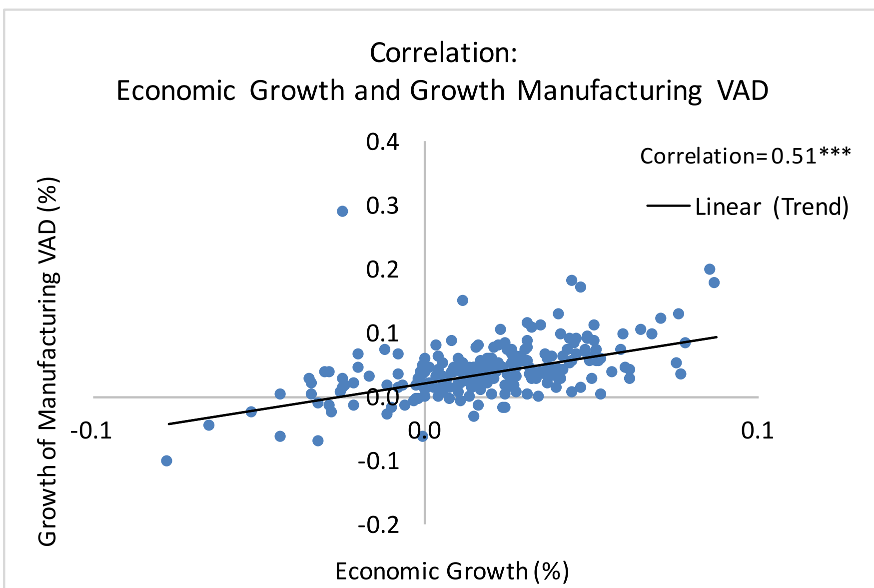


Figure 3C.2.2. Correlation between Economic Growth and Sector Value Added





Note: *** indicates significance at the 1% level

Figure 3C.3.1. FDI, Interaction and Growth – Full Sample

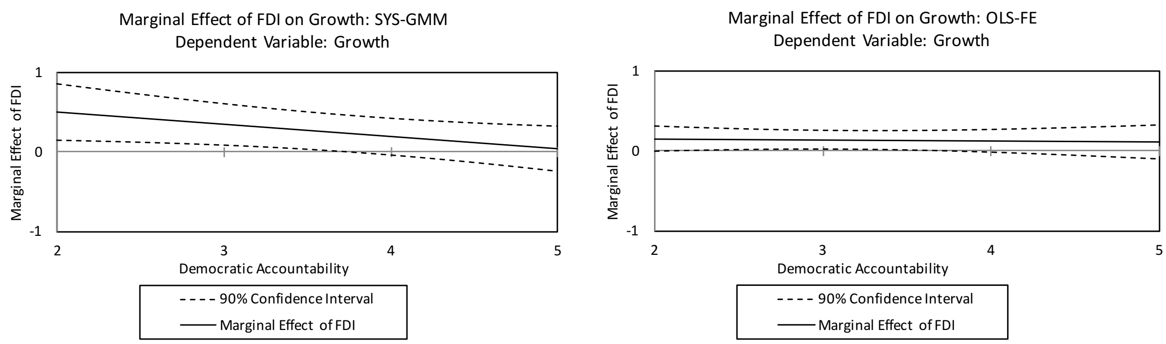


Figure 3C.3.2. FDI, Interaction and Growth – Low Income Group

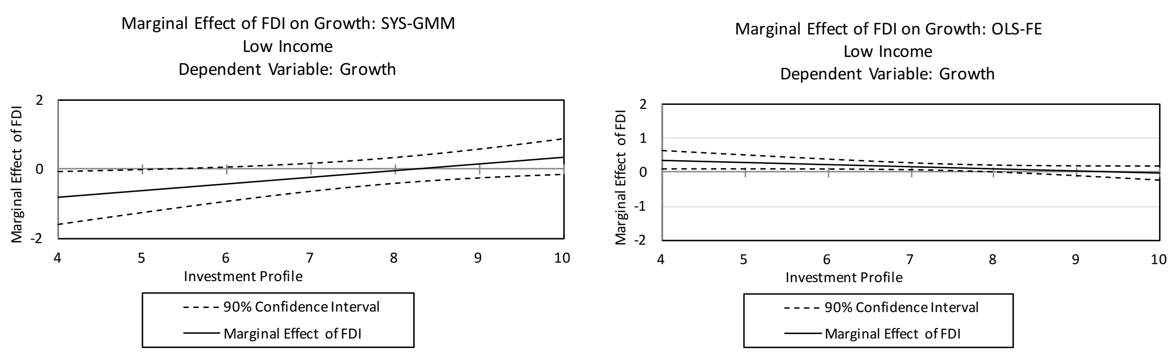


Figure 3C.3.3. FDI, Interaction and Growth – High Income Group

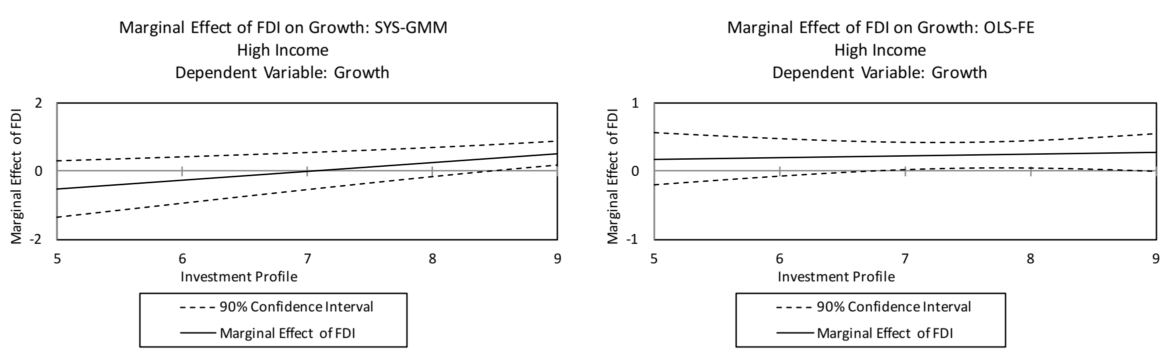
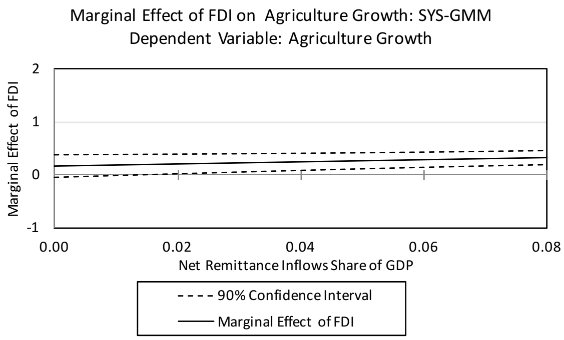
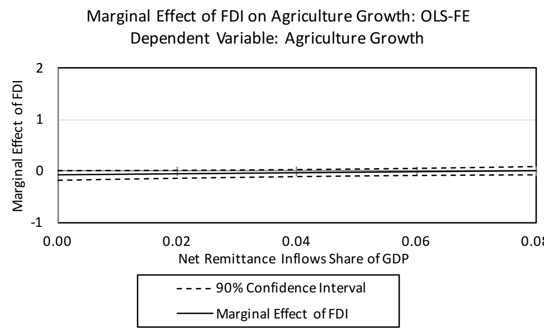
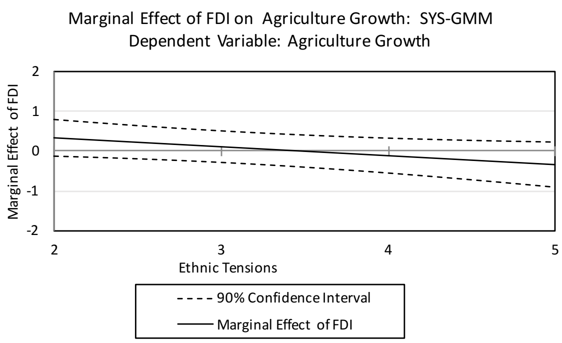


Figure 3C.4.1. FDI, Interaction and Agriculture Growth – Full Sample







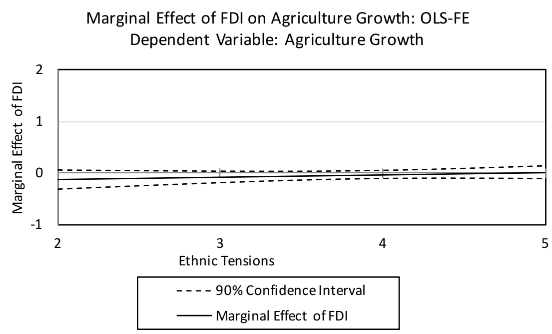
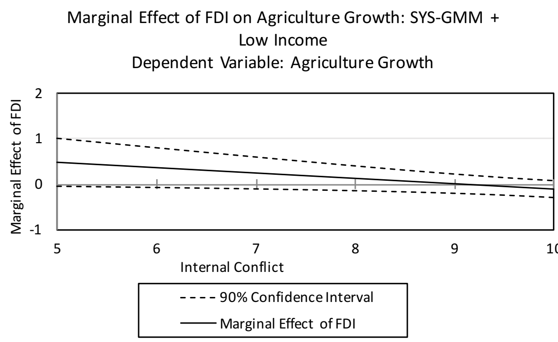
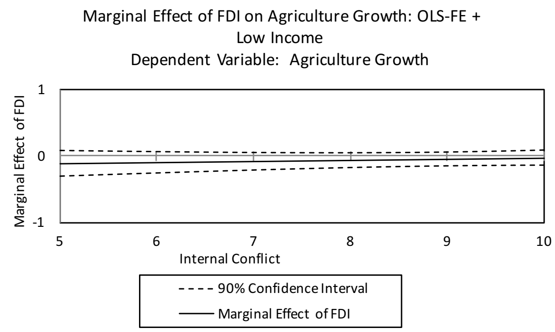
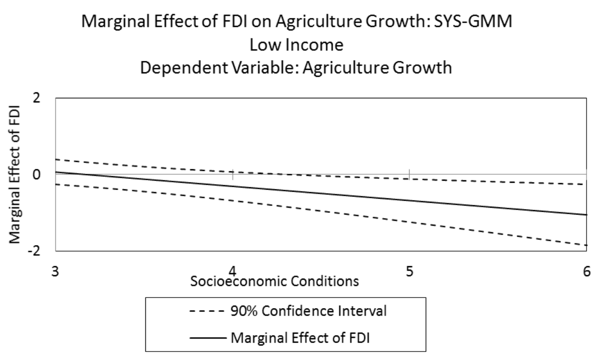


Figure 3C.4.2. FDI, Interaction and Agriculture Growth – Low Income Group







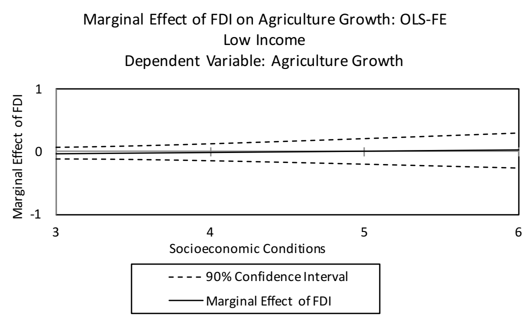


Figure 3C.4.3. FDI, Interaction and Agriculture Growth – High Income Group

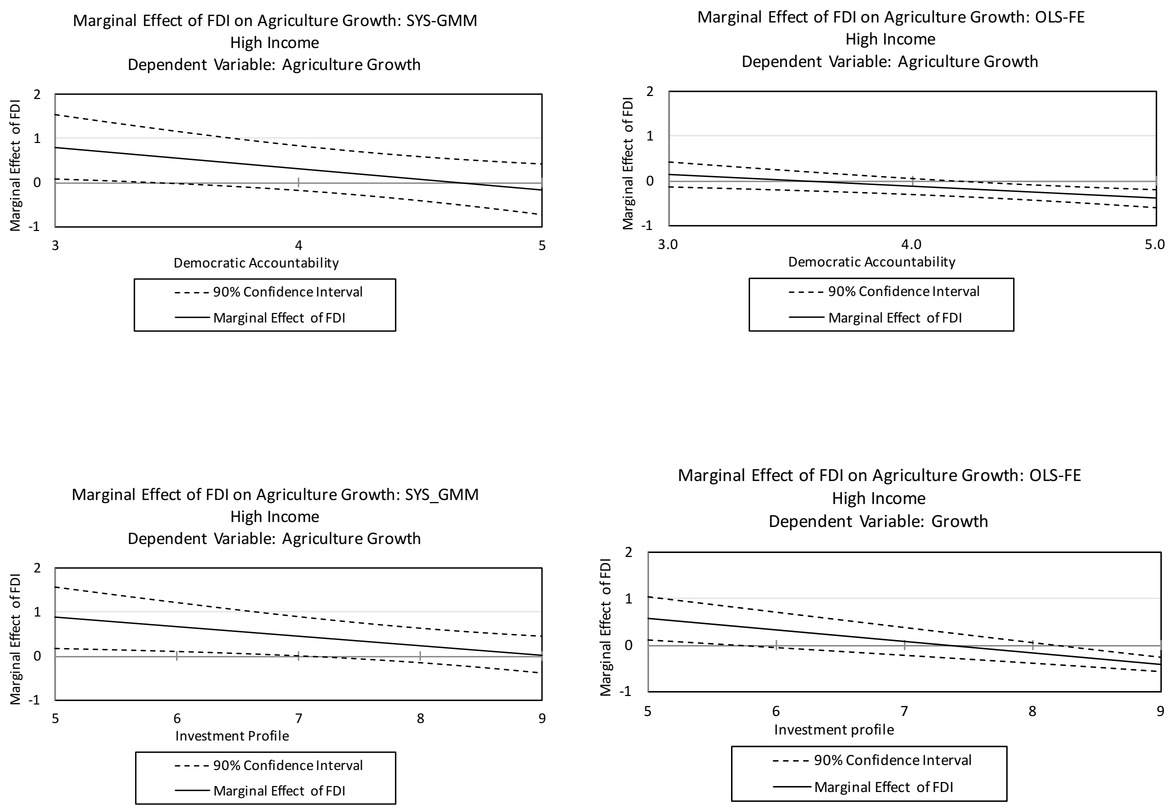


Figure 3C.5.1. FDI, Interaction and Manufacturing Growth – Full Sample

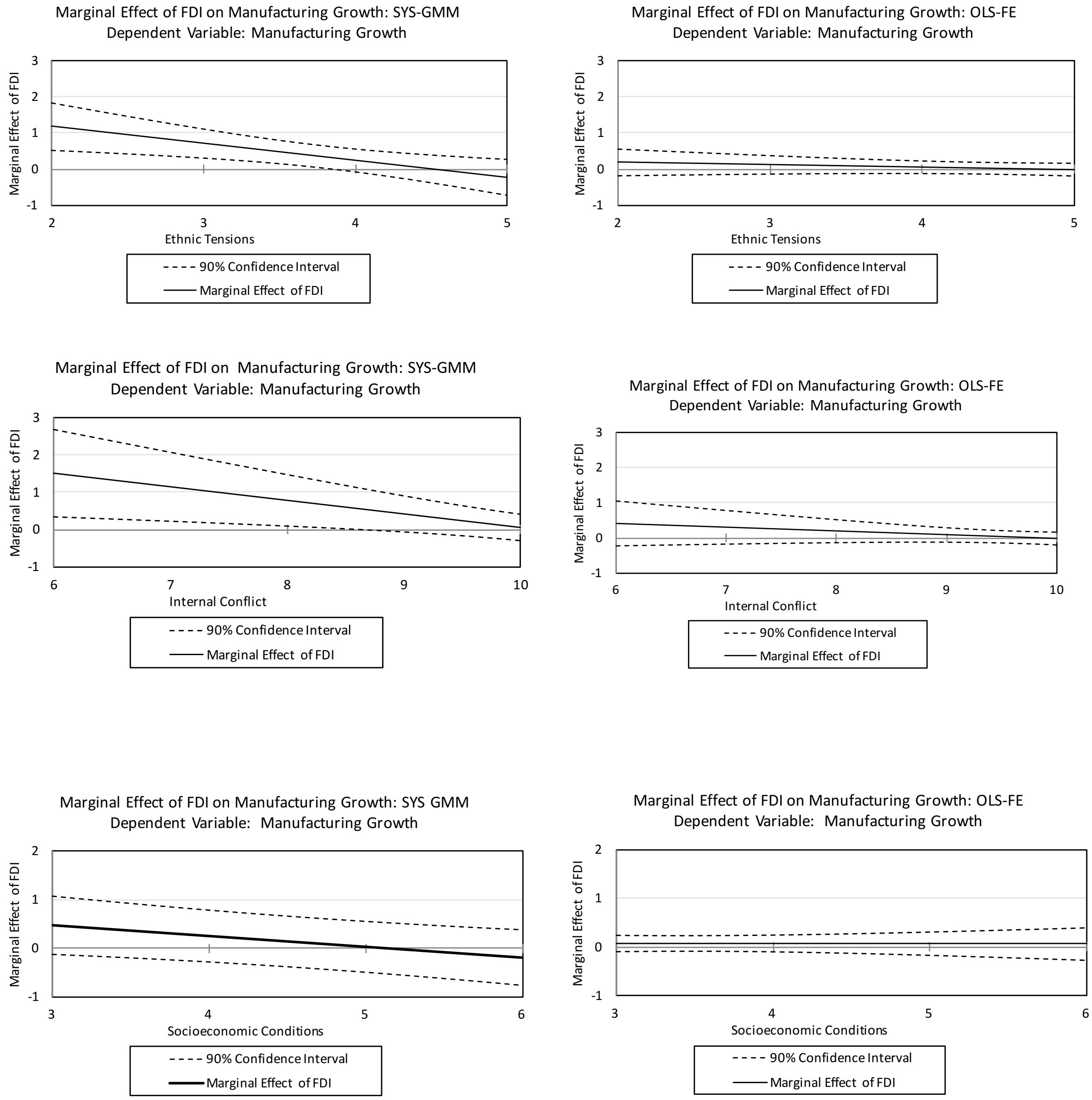


Figure 3C.5.2. FDI, Interaction and Manufacturing Growth – Low Income Group

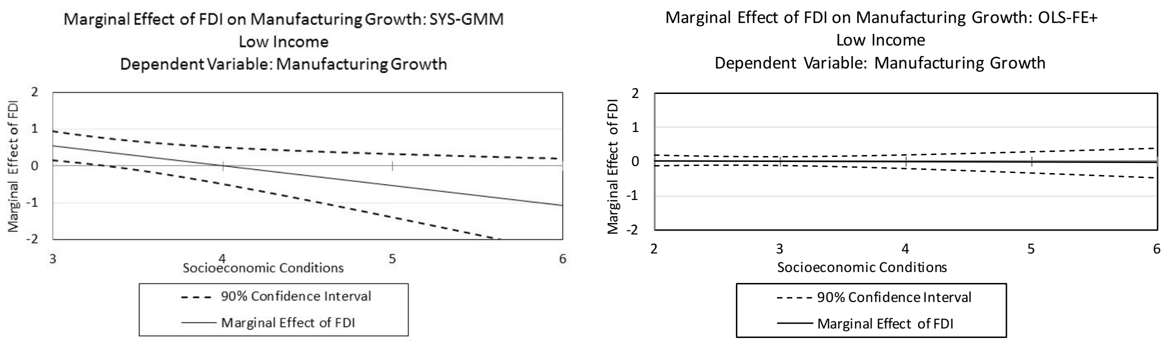
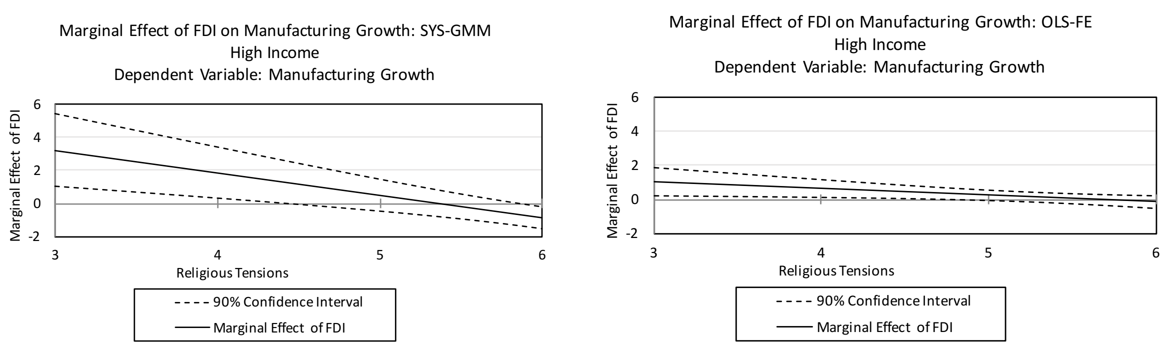


Figure 3C.5.3. FDI, Interaction and Manufacturing Growth – High Income Group



4. Summary and Conclusions

The thesis empirically assesses three strands of literature that fall under the area of international economics. In this regard, the first essay examines the importance of remittance and tourism as additional channels via which economic shocks are transmitted from the U.S. to Caribbean economies. The second essay explores the short-run and long-run dynamics in the real exchange rate and bilateral trade balance relationship. While, the final essay analyzes how remittances, foreign aid and institutions influence FDI's marginal effect on growth, in the long-run among EMDEs.

My first essay addresses the importance of remittances and tourism in the transmission of three U.S. economic shocks (real GDP, inflation and interest rate) to Caribbean economies. In addition to the traditional channels of transmission (namely interest rate, exchange rate, inflation rate and trade), remittances and tourism play an important role in Caribbean economies with significant output effects. The findings show that of all three U.S. economic shocks, the positive U.S. real GDP shock has the greatest influence on economic fluctuations in a typical Caribbean economy. On average, the U.S. real GDP shock is responsible for approximately 17.0 percent of the fluctuation in the macroeconomic variables, primarily by propagation through the interest rate and the tourism channels. If the remittance and tourism channels, which are integral part of the Caribbean economies, are not included in the assessment, the effect of a positive U.S. real GDP shock on real GDP will be lower. In the quarterly assessment, where Jamaica is treated as a representative case for other Small Island States, shutting down the remittance and tourism channels also result in lower output effect. For Jamaica, remittance, tourism and real exchange rate channels are the main avenues by which the U.S. disturbances are propagated. The overall assessment shows that the inclusion of the tourism and remittance channels unearth measurement bias previously attributed to the other channels. Notably, the correlation between the U.S. and the Caribbean's macroeconomic variables are stronger, consequent on a U.S. shock, relative to the stylized facts. In response to economic disturbances originating from the U.S., Caribbean governments should consider both the tourism and remittance channels when designing effective countercyclical policies.

In the second essay, I test if evidence in favour of the J-curve phenomenon is unique to a country's trade with the U.S. or their largest trading partner as well as, if there is evidence of cross-country J-curve relationship. The results suggest that the real exchange rate has asymmetric effect on a country's bilateral trade balance, regardless of the data frequency. There is greater evidence of the J-curve using the non-linear ARDL model, relative to linear framework. The findings also indicate that the lower a country's cost of production relative to that of the U.S., the greater the magnitude of long-run improvement in the bilateral trade balance following a real depreciation. Unlike in the quarterly analysis, cross-country support for the J-curve is present in the annual assessment. The cross-country J-curve evidence, using the non-linear ARDL framework, is only present among the euro area and emerging & developing group of countries bilateral trade with their largest trading partner, subject to the real exchange rate measure. The findings have implication for a country's bilateral trade policy strategy with the U.S. or its largest trading partner, in both the short-run and long-run.

For the third essay, I investigate if remittances, foreign aid and institutions influence FDI's effect on economic growth in the long-run among EMDEs. The study finds that FDI's marginal effect on economic growth as well as on the growth of agriculture and manufacturing value added diminishes with higher levels of institution development. In this regard, FDI and institutions serve as either substitute in the growth process or the institutions in place protect areas of the domestic economy that are vulnerable to FDI. Further, the institutions at work have heterogeneous effect on FDI's effect in the growth process at both the aggregated and sectoral levels. The results suggest that higher remittance inflows as a share of GDP improves the marginal effect of FDI only in the growth of agriculture VAD. While FDI's effect on economic growth and growth of sectoral VAD is independent of foreign aid, and should be treated as such. It is important for policymakers to recognize that institutions and to a lesser extent remittances influence on FDI's effect is more pronounced in the growth of the sectoral VAD.