A Causal Structural Model for the Analysis of Desired Family Size

by

Rhonda K. D. Kowalchuk

A thesis

presented to the University of Manitoba

in partial fulfilment of the requirements

for the degree of

Master of Arts

Department of Psychology

National Library of Canada

Acquisitions and Bibliographic Services Branch

395 Wellington Street
Ottawa, Ontario
K1A 0N4

Bibliothèque nationale du Canada

Direction des acquisitions et des services bibliographiques

395, rue Wellington
Ottawa (Ontario)
K1A 0N4

Your file Votre référence

Our file Notre référence

ISBN 0-315-85925-3

Canada

Name

Dissertation Abstracts International is arranged by broad, general subject categories. Please select the one subject which most nearly describes the content of your dissertation. Enter the corresponding four-digit code in the spaces provided.

Psychology - experimental

SUBJECT TERM

623

SUBJECT CODE

U·M·I

Subject Categories

THE HUMANITIES AND SOCIAL SCIENCES

COMMUNICATIONS AND THE ARTS
Architecture 0729
Art History 0377
Cinema 0900
Dance 0378
Fine Arts 0357
Information Science 0723
Journalism 0391
Library Science 0399
Mass Communications 0708
Music 0413
Speech Communication 0459
Theater 0465

EDUCATION
General 0515
Administration 0514
Adult and Continuing 0516
Agricultural 0517
Art 0273
Bilingual and Multicultural 0282
Business 0688
Community College 0275
Curriculum and Instruction 0727
Early Childhood 0518
Elementary 0524
Finance 0277
Guidance and Counseling 0519
Health 0680
Higher 0745
History of 0520
Home Economics 0278
Industrial 0521
Language and Literature 0279
Mathematics 0280
Music 0522
Philosophy of 0998
Physical 0523
Psychology 0525
Reading 0535
Religious 0527
Sciences 0714
Secondary 0533
Social Sciences 0534
Sociology of 0340
Special 0529
Teacher Training 0530
Technology 0710
Tests and Measurements 0288
Vocational 0747

LANGUAGE, LITERATURE AND LINGUISTICS
Language
- General 0679
- Ancient 0289
- Linguistics 0290
- Modern 0291

Literature
- General 0401
- Classical 0294
- Comparative 0295
- Medieval 0297
- Modern 0298
- African 0316
- American 0591
- Asian 0305
- Canadian (English) 0352
- Canadian (French) 0355
- English 0593
- Germanic 0311
- Latin American 0312
- Middle Eastern 0315
- Romance 0313
- Slavic and East European 0314

PHILOSOPHY, RELIGION AND THEOLOGY
Philosophy 0422
Religion
- General 0318
- Biblical Studies 0321
- Clergy 0319
- History of 0320
- Philosophy of 0322

Theology 0469

SOCIAL SCIENCES
American Studies 0323
Anthropology
- Archaeology 0324
- Cultural 0326
- Physical 0327

Business Administration
- General 0310
- Accounting 0272
- Banking 0770
- Management 0454
- Marketing 0338

Canadian Studies 0385
Economics
- General 0501
- Agricultural 0503
- Commerce-Business 0505
- Finance 0508
- History 0509
- Labor 0510
- Theory 0511

Folklore 0358
Geography 0366
Gerontology 0351
History
- General 0578
- Ancient 0579
- Medieval 0581
- Modern 0582
- Black 0328
- African 0331
- Asia, Australia and Oceania 0332
- Canadian 0334
- European 0335
- Latin American 0336
- Middle Eastern 0333
- United States 0337

History of Science 0585
Law 0398
Political Science
- General 0615
- International Law and Relations 0616
- Public Administration 0617

Recreation 0814
Social Work 0452
Sociology
- General 0626
- Criminology and Penology 0627
- Demography 0938
- Ethnic and Racial Studies 0631
- Individual and Family Studies 0628
- Industrial and Labor Relations 0629
- Public and Social Welfare 0630
- Social Structure and Development 0700
- Theory and Methods 0344

Transportation 0709
Urban and Regional Planning 0999
Women's Studies 0453

THE SCIENCES AND ENGINEERING

BIOLOGICAL SCIENCES
Agriculture
- General 0473
- Agronomy 0285
- Animal Culture and Nutrition 0475
- Animal Pathology 0476
- Food Science and Technology 0359
- Forestry and Wildlife 0478
- Plant Culture 0479
- Plant Pathology 0480
- Plant Physiology 0817
- Range Management 0777
- Wood Technology 0746

Biology
- General 0306
- Anatomy 0287
- Biostatistics 0308
- Botany 0309
- Cell 0379
- Ecology 0329
- Entomology 0353
- Genetics 0369
- Limnology 0793
- Microbiology 0410
- Molecular 0307
- Neuroscience 0317
- Oceanography 0416
- Physiology 0433
- Radiation 0821
- Veterinary Science 0778
- Zoology 0472

Biophysics
- General 0786
- Medical 0760

EARTH SCIENCES
Biogeochemistry 0425
Geochemistry 0996
Geodesy 0370
Geology 0372
Geophysics 0373
Hydrology 0388
Mineralogy 0411
Paleobotany 0345
Paleoecology 0426
Paleontology 0418
Paleozoology 0985
Palynology 0427
Physical Geography 0368
Physical Oceanography 0415

HEALTH AND ENVIRONMENTAL SCIENCES
Environmental Sciences 0768
Health Sciences
- General 0566
- Audiology 0300
- Chemotherapy 0992
- Dentistry 0567
- Education 0350
- Hospital Management 0769
- Human Development 0758
- Immunology 0982
- Medicine and Surgery 0564
- Mental Health 0347
- Nursing 0569
- Nutrition 0570
- Obstetrics and Gynecology 0380
- Occupational Health and Therapy 0354
- Ophthalmology 0381
- Pathology 0571
- Pharmacology 0419
- Pharmacy 0572
- Physical Therapy 0382
- Public Health 0573
- Radiology 0574
- Recreation 0575
- Speech Pathology 0460
- Toxicology 0383

Home Economics 0386

PHYSICAL SCIENCES
Pure Sciences
Chemistry
- General 0485
- Agricultural 0749
- Analytical 0486
- Biochemistry 0487
- Inorganic 0488
- Nuclear 0738
- Organic 0490
- Pharmaceutical 0491
- Physical 0494
- Polymer 0495
- Radiation 0754

Mathematics 0405
Physics
- General 0605
- Acoustics 0986
- Astronomy and Astrophysics 0606
- Atmospheric Science 0608
- Atomic 0748
- Electronics and Electricity 0607
- Elementary Particles and High Energy 0798
- Fluid and Plasma 0759
- Molecular 0609
- Nuclear 0610
- Optics 0752
- Radiation 0756
- Solid State 0611

Statistics 0463

Applied Sciences
Applied Mechanics 0346
Computer Science 0984
Engineering
- General 0537
- Aerospace 0538
- Agricultural 0539
- Automotive 0540
- Biomedical 0541
- Chemical 0542
- Civil 0543
- Electronics and Electrical 0544
- Heat and Thermodynamics 0348
- Hydraulic 0545
- Industrial 0546
- Marine 0547
- Materials Science 0794
- Mechanical 0548
- Metallurgy 0743
- Mining 0551
- Nuclear 0552
- Packaging 0549
- Petroleum 0765
- Sanitary and Municipal 0554
- System Science 0790

Geotechnology 0428
Operations Research 0796
Plastics Technology 0795
Textile Technology 0994

PSYCHOLOGY
General 0621
Behavioral 0384
Clinical 0622
Developmental 0620
Experimental 0623
Industrial 0624
Personality 0625
Physiological 0989
Psychobiology 0349
Psychometrics 0632
Social 0451

Nom ____________________

Dissertation Abstracts International est organisé en catégories de sujets. Veuillez s.v.p. choisir le sujet qui décrit le mieux votre thèse et inscrivez le code numérique approprié dans l'espace réservé ci-dessous.

______________________________ SUJET

☐☐☐☐ CODE DE SUJET

U·M·I

Catégories par sujets

HUMANITÉS ET SCIENCES SOCIALES

COMMUNICATIONS ET LES ARTS
- Architecture 0729
- Beaux-arts 0357
- Bibliothéconomie 0399
- Cinéma 0900
- Communication verbale 0459
- Communications 0708
- Danse 0378
- Histoire de l'art 0377
- Journalisme 0391
- Musique 0413
- Sciences de l'information 0723
- Théâtre 0465

ÉDUCATION
- Généralités 515
- Administration 0514
- Art 0273
- Collèges communautaires 0275
- Commerce 0688
- Économie domestique 0278
- Éducation permanente 0516
- Éducation préscolaire 0518
- Éducation sanitaire 0680
- Enseignement agricole 0517
- Enseignement bilingue et multiculturel 0282
- Enseignement industriel 0521
- Enseignement primaire. 0524
- Enseignement professionnel 0747
- Enseignement religieux 0527
- Enseignement secondaire 0533
- Enseignement spécial 0529
- Enseignement supérieur 0745
- Évaluation 0288
- Finances 0277
- Formation des enseignants 0530
- Histoire de l'éducation 0520
- Langues et littérature 0279
- Lecture 0535
- Mathématiques 0280
- Musique 0522
- Orientation et consultation 0519
- Philosophie de l'éducation 0998
- Physique 0523
- Programmes d'études et enseignement 0727
- Psychologie 0525
- Sciences 0714
- Sciences sociales 0534
- Sociologie de l'éducation 0340
- Technologie 0710

LANGUE, LITTÉRATURE ET LINGUISTIQUE
- Langues
  - Généralités 0679
  - Anciennes 0289
  - Linguistique 0290
  - Modernes 0291
- Littérature
  - Généralités 0401
  - Anciennes 0294
  - Comparée 0295
  - Mediévale 0297
  - Moderne 0298
  - Africaine 0316
  - Américaine 0591
  - Anglaise 0593
  - Asiatique 0305
  - Canadienne (Anglaise) 0352
  - Canadienne (Française) 0355
  - Germanique 0311
  - Latino-américaine 0312
  - Moyen-orientale 0315
  - Romane 0313
  - Slave et est-européenne 0314

PHILOSOPHIE, RELIGION ET THÉOLOGIE
- Philosophie 0422
- Religion
  - Généralités 0318
  - Clergé 0319
  - Études bibliques 0321
  - Histoire des religions 0320
  - Philosophie de la religion 0322
- Théologie 0469

SCIENCES SOCIALES
- Anthropologie
  - Archéologie 0324
  - Culturelle 0326
  - Physique 0327
- Droit 0398
- Économie
  - Généralités 0501
  - Commerce-Affaires 0505
  - Économie agricole 0503
  - Économie du travail 0510
  - Finances 0508
  - Histoire 0509
  - Théorie 0511
- Études américaines 0323
- Études canadiennes 0385
- Études féministes 0453
- Folklore 0358
- Géographie 0366
- Gérontologie 0351
- Gestion des affaires
  - Généralités 0310
  - Administration 0454
  - Banques 0770
  - Comptabilité 0272
  - Marketing 0338
- Histoire
  - Histoire générale 0578
  - Ancienne 0579
  - Médiévale 0581
  - Moderne 0582
  - Histoire des noirs 0328
  - Africaine 0331
  - Canadienne 0334
  - États-Unis 0337
  - Européenne 0335
  - Moyen-orientale 0333
  - Latino-américaine 0336
  - Asie, Australie et Océanie 0332
- Histoire des sciences 0585
- Loisirs 0814
- Planification urbaine et régionale 0999
- Science politique
  - Généralités 0615
  - Administration publique 0617
  - Droit et relations internationales 0616
- Sociologie
  - Généralités 0626
  - Aide et bien-àtre social 0630
  - Criminologie et établissements pénitentiaires 0627
  - Démographie 0938
  - Études de l' individu et de la famille 0628
  - Études des relations interethniques et des relations raciales 0631
  - Structure et développement social 0700
  - Théorie et méthodes 0344
  - Travail et relations industrielles 0629
- Transports 0709
- Travail social 0452

SCIENCES ET INGÉNIERIE

SCIENCES BIOLOGIQUES
- Agriculture
  - Généralités 0473
  - Agronomie. 0285
  - Alimentation et technologie alimentaire 0359
  - Culture 0479
  - Élevage et alimentation 0475
  - Exploitation des péturages 0777
  - Pathologie animale 0476
  - Pathologie végétale 0480
  - Physiologie végétale 0817
  - Sylviculture et faune 0478
  - Technologie du bois 0746
- Biologie
  - Généralités 0306
  - Anatomie 0287
  - Biologie (Statistiques) 0308
  - Biologie moléculaire 0307
  - Botanique 0309
  - Cellule 0379
  - Écologie 0329
  - Entomologie 0353
  - Génétique 0369
  - Limnologie 0793
  - Microbiologie 0410
  - Neurologie 0317
  - Océanographie 0416
  - Physiologie 0433
  - Radiation 0821
  - Science vétérinaire 0778
  - Zoologie 0472
- Biophysique
  - Généralités 0786
  - Medicale 0760

SCIENCES DE LA TERRE
- Biogéochimie 0425
- Géochimie 0996
- Géodésie 0370
- Géographie physique 0368
- Géologie 0372
- Géophysique 0373
- Hydrologie 0388
- Minéralogie 0411
- Océanographie physique 0415
- Paléobotanique 0345
- Paléoécologie 0426
- Paléontologie 0418
- Paléozoologie 0985
- Palynologie 0427

SCIENCES DE LA SANTÉ ET DE L'ENVIRONNEMENT
- Économie domestique 0386
- Sciences de l'environnement 0768
- Sciences de la santé
  - Généralités 0566
  - Administration des hipitaux 0769
  - Alimentation et nutrition 0570
  - Audiologie 0300
  - Chimiothérapie 0992
  - Dentisterie 0567
  - Développement humain 0758
  - Enseignement 0350
  - Immunologie 0982
  - Loisirs 0575
  - Médecine du travail et thérapie 0354
  - Médecine et chirurgie 0564
  - Obstétrique et gynécologie 0380
  - Ophtalmologie 0381
  - Orthophonie 0460
  - Pathologie 0571
  - Pharmacie 0572
  - Pharmacologie 0419
  - Physiothérapie 0382
  - Radiologie 0574
  - Santé mentale 0347
  - Santé publique 0573
  - Soins infirmiers 0569
  - Toxicologie 0383

SCIENCES PHYSIQUES

Sciences Pures
- Chimie
  - Genéralités 0485
  - Biochimie 487
  - Chimie agricole 0749
  - Chimie analytique 0486
  - Chimie minérale 0488
  - Chimie nucléaire 0738
  - Chimie organique 0490
  - Chimie pharmaceutique 0491
  - Physique 0494
  - PolymÇres 0495
  - Radiation 0754
- Mathématiques 0405
- Physique
  - Généralités 0605
  - Acoustique 0986
  - Astronomie et astrophysique 0606
  - Electronique et électricité 0607
  - Fluides et plasma 0759
  - Météorologie 0608
  - Optique 0752
  - Particules (Physique nucléaire) 0798
  - Physique atomique 0748
  - Physique de l'état solide 0611
  - Physique moléculaire 0609
  - Physique nucléoire 0610
  - Radiation 0756
- Statistiques 0463

Sciences Appliqués Et Technologie
- Informatique 0984
- Ingénierie
  - Généralités 0537
  - Agricole 0539
  - Automobile 0540
  - Biomédicale 0541
  - Chaleur et ther modynamique 0348
  - Conditionnement (Emballage) 0549
  - Génie aérospatial 0538
  - Génie chimique 0542
  - Génie civil 0543
  - Génie électronique et électrique 0544
  - Génie industriel 0546
  - Génie mécanique 0548
  - Génie nucléaire 0552
  - Ingénierie des systämes 0790
  - Mécanique navale 0547
  - Métallurgie 0743
  - Science des matériaux 0794
  - Technique du pétrole 0765
  - Technique minière 0551
  - Techniques sanitaires et municipales 0554
  - Technologie hydraulique 0545
- Mécanique appliquée 0346
- Géotechnologie 0428
- Matières plastiques (Technologie) 0795
- Recherche opérationnelle 0796
- Textiles et tissus (Technologie) 0794

PSYCHOLOGIE
- Généralités 0621
- Personnalité 0625
- Psychobiologie 0349
- Psychologie clinique 0622
- Psychologie du comportement 0384
- Psychologie du développement 0620
- Psychologie expérimentale 0623
- Psychologie industrielle 0624
- Psychologie physiologique 0989
- Psychologie sociale 0451
- Psychométrie 0632

A CAUSAL STRUCTURAL MODEL FOR THE ANALYSIS OF DESIRED FAMILY SIZE

BY

RHONDA K.D. KOWALCHUK

A Thesis submitted to the Faculty of Graduate Studies of the University of Manitoba in partial fulfillment of the requirements for the degree of

MASTER OF ARTS

Acknowledgements

I would like to thank my advisor, Dr. Cam-Loi Huynh for his encouragement and guidance through all phases of this thesis. His contribution of time, hours of editing and valuable advice were greatly appreciated. The committee members, Dr. Jim Nickels and Dr. Dexter Harvey are thanked for their participation, comments and helpful suggestions.

In addition, I would like to thank my friends and family for their moral support and encouragement. I am particularly grateful to my mother, Ella Kowalchuk whose support facilitated my working towards this degree.

Abstract

The determinants of Desired family size (DFS) in developing countries were examined by path analysis. It was a secondary analysis of the World Fertility Survey data for 10 selected countries. The model being tested was a modified version of Easterlin's theoretical framework. It was expected that Educational background (EB) would effect Desired family size (DFS) through Marriage duration (MD), Biological supply factors (CN), Actual family size (AFS), and Contraceptive knowledge and use (CK, NCU). Significance of the effects in the causal model were evaluated using a one-tailed test at the .05 level. Comparisons were made across countries, with implications for explaining and predicting reproductive preferences. As expected, an increase in educational background was associated with lower Desired family size, whereas an increase in Marriage duration and Actual family size was associated with higher Desired family size. It was also found that the paths from Contraceptive knowledge (CK) and Non-contraceptive use (NCU) to Desired family size (DFS) were not significant; implying that either the causal direction of the paths and/or the ordering of the variables could be different from the one specified in the structural model.

Table of Contents

List of Tables

List of Figures

Introduction

Over the past 20 years, there has been an increased awareness and interest in the growth of world populations. This is especially true in developing countries where resources to support or improve living standards are limited. An understanding of Desired family size and its determinants may help to explain and predict reproductive preferences and also aid in implementing family planning programs. A change directed at those determinants influencing attitudes (desires) may be a means of fertility reduction, if preferences can be translated into behaviour change. In most countries, if preferences were implemented fertility would decline, however the levels would still imply a high rate of population growth (Lightbourne, 1985).

In the subsequent paragraphs, the following will be discussed: (a) the data source for fertility and other related measures; (b) the meaning of Desired family size and how it is estimated; (c) Easterlin's synthesis framework explaining the determinants of fertility; and (d) path analysis as a technique to estimate the magnitude of direct and indirect effects of certain variables on certain other variables.

<u>World Fertility Survey</u>

The World Fertility Study is a cross-national data set measuring fertility and related factors for 41 developing countries and 19 developed countries. The objective of the study was to provide internationally comparable data. It was sponsored by the International Statistical Institute. Test-retest reliability of the fertility preference variables varied from .40 for Peru to .60 for Fiji; the percentage giving identical responses for the number of children desired (Lightbourne, 1985; Lightbourne & MacDonald, 1982). Support for the validity of the WFS preference data include the following: (a) fertility "preferences vary greatly between countries in a reasonably plausible manner that strongly supports the notion that the responses are real, and not the product of random answering"; and (b) an expected inverse relationship exists between the desire for additional children and desire for last birth, with the number of children actually living (Lightbourne, 1985, p. 168). An analysis of 19 Asian, Caribbean and Latin American countries found the number of non-response was less than 3% in most countries and never more than 5%, while non-numeric responses were below 5% for 18 of the 19 countries examined (Lightbourne, 1985).

Desired Family Size

The measurement of Desired family size (DFS) is a basic component of most fertility surveys. Knowledge of reproductive preferences can be helpful in explaining and predicting fertility levels or completed family size. However no coherent, systematic universally agreed-upon definition as well as estimation method of DFS exists in the literature.

First, the lack of a commonly accepted definition of DFS can cause conceptualization difficulties for both researchers and respondents. In the World Fertility Survey (WFS) the following question was used to measure Desired family size, "If you could choose exactly the number of children to have in your whole life, how many children would that be?" (Lightbourne & MacDonald, 1982, p. 13). Alternatively, Desired family size has been defined as existing parity (i.e., number of children born) plus additional children desired (Ware, 1974). In theory, the two measures should yield the same estimate of DFS.

The concept of DFS can be confused with other concepts such as Wanted family size (Bongaarts, 1990; Lightbourne & MacDonald, 1982; Udry, Bauman & Chase, 1973), Expected family size (Berent, 1983; Freedman, Baumert & Bolte, 1959) and Ideal family size (Blake, 1966; Scott & Morgan, 1983; Ware, 1974). In the literature, the measurement of these concepts is based on the wording of various questions, such as the following; "How many children in all do you want to have?" (Lightbourne & MacDonald, 1982, p. 20), "How many children do you expect to have altogether?" (Freedman et al., 1959, p. 139), and "What do you consider is the ideal size of a family, a husband, a wife and how many children?" (Blake, 1966, p. 160).

Most DFS questions have a face validity problem - 'whose desire is being measured?' (McClelland, 1983). The questions are usually directed toward the wife. Studies in developing countries have shown that responses of husbands and wives frequently differ when both are interviewed (Coombs & Fernandez, 1978; Knodel & Prachuabmoh, 1976; Mott & Mott, 1985). Researchers usually attempt to interview couples separately to avoid biased responding, however, this may not always be feasible.

A respondent's interpretation of Desired family size may be influenced by: (a) Demographic factors - age, duration of marriage, number of children ever born, and number of surviving children; (b) Economic factors - income, social class, education, and profession; (c) Cultural factors - religion, social and legal norms, life style, and contraceptive and birth prevention practices; and (d) Psychological factors - quality of marital relationship and family satisfaction.

It is difficult to know the many considerations the respondent may or may not be taking into account. With no conditions or points of reference specified, the respondent is free to answer in whatever terms seem relevant to her/him and this may not necessarily be similar for all respondents (Blake, 1966). A researcher may not know what is influencing or motivating an individual's answer to a Desired family size question. Desired family size may change with actual child bearing experiences as well as with changing life circumstances (Lightbourne & MacDonald, 1982).

Given that the question represents the survey designer's objective and the respondent interprets it correctly, the following problems still need to be dealt with in the analysis of self-reported Desired family size: (a) rationalization, (b) non-numerical responses, (c) gender preferences, (d) mortality replacement and insurance, (e) fertility restriction, and (f) fertility spacing (Bongaarts, 1990).

The relationship between family size desires and fertility behaviour may be the result of rationalization or post hoc justification of actual family size (Calhoun, 1991; Knodel & Prachuabmoh, 1973; McClelland, 1983). A respondent's actual family size may positively affect Desired family size responses, because children unwanted before the fact are often reported as desired after the fact (Easterlin & Crimmins, 1982). Conversely, a respondent who has fewer children than anticipated may tend to rationalize by retrospectively reducing desired family size (Pullum, 1983).

When asked about fertility desires, a substantial proportion of women provide non-numerical responses such as it's 'up to God' (Jensen, 1985; Lightbourne & MacDonald, 1982; McCarthy & Oni, 1987). These missing observations would not be a significant problem if they were a random sample of surveyed women. However, it is likely that women who provide such fatalistic answers actually have family size preferences that exceed the population average (Bongaarts, 1990). A study of Nigerian women (McCarthy & Oni, 1987) found that younger women, women with fewer children, women in polygamous marriages, women residing in low socioeconomic areas, women with little education, women in traditional occupations, women with no knowledge of contraception, and no preference for a particular sex composition were more likely to provide non-numerical responses.

Widmer, McClelland, and Nickerson (1981) found two effects of gender preferences for children on desired family size; some respondents adjusted their desired family size upward if their most preferred gender composition was not achieved, while others adjusted their desires downward when dealing with a less than optimal gender composition. These differences tended to be more prominent for all-boy or all-girl compositions. The tendency for son preference was common in many groups (a woman is more likely to desire another child if she has all girls than if she has all boys). However, this pattern was reversed in some Central and South American groups (Knodel & Prachuabmoh, 1976; United Nations, 1981, cited in Pullum, 1983). The preference for balance (at least one son and at least one daughter) was usually stronger than for a son over a daughter (United Nations, 1981, cited in Pullum, 1983).

Pebley, Delgado & Brinemann, (1979) found a significant positive association between the number of prior child deaths and the desire for additional children. This association may depend on the sex composition of existing children and tends to be stronger at lower than at higher parities (Heer, 1983).

Fertility restriction, whether it is voluntary or involuntary can have positive effects on Desired family size. Because of economic, social, health or other factors, a couple may not have any more children, even though they report a desire for more children (Bongaarts, 1990). Infecundity, marital disruption, and non-marriage can also place restraints on reproduction.

Finally, fertility spacing could influence Desired family size both negatively and positively. A woman's later age at first birth and wider spacing between children, may eventually result in her reported Desired family size not being attainable. On the contrary, a woman having a first birth at an early age and close spacing of children, may eventually see her reported Desired family size being surpassed.

Secondly, besides the conceptual problems mentioned above, there are methodological issues such as data collection and estimation methods to consider when predicting Desired family size. Different methodologies of analyzing and estimating DFS have provided varied responses and estimates of DFS.

The method of data collection has been shown to influence responses to Desired family size questions. When two methods were compared in China, a confidential questionnaire versus a face-to-face interview, under reporting of DFS occurred in the latter procedure (Hermalin & Liu, 1990). The respective questions measuring Desired family size for the two methods were; "If there were no limits set by the family planning policy, you and your spouse would like to have __ children?" and "If the present government policy had not existed, how many children would you personally like to have, in your whole life?" (pp. 342-343). Even though the wording of the questions were different the intent of measuring DFS was similar.

Estimation Methods. The methods of estimating Desired family size can be conceptually divided into three groups: (a) Method 1 - Self-reported responses; (b) Method 2 - Wanted Total Fertility Rate (WTFR); and (c) Method 3 - Stopping Point approach (used in the cohort, synthetic, stationary model, denoted as the 'Cohort model').

Self-reported responses (R) to fertility questions are the most common method to measure Desired family size. However, as discussed previously, there are many considerations to take into account when interpreting respondents' answers.

The Wanted Total Fertility Rate (WTFR) approach estimates Desired family size by responses to certain fertility questions (Lightbourne, 1985). A k^{th} child is 'unwanted' if: (a) the actual number of children (k) is greater than one's self-reported desired family size (R); or (b) a respondent said "No" to the following Wanted family size question "Thinking back to the time before you became pregnant with your child number k, had you wanted to have any more children?". If the respondent's answer is "Yes" to the above question then the Wanted family size can be computed as WFS1 = k + WM, where k is the number of living children, counting a current pregnancy as a living child and WM is a number specified in responding to the following Wanted family size question "How many more do you want to have (after the one you are expecting, if being pregnant)?". Another way to estimate Wanted family size is WFS2 = WFS1 - Unwanted child(ren) (as defined above) (Lightbourne & MacDonald, 1982). Some weaknesses of this method include: (a) it estimates number of births wanted, not number of living children wanted; (b) the possibility of 'undecided' or missing responses to the WFS questions; and (c) the meaning of the variable Wanted family size is indeterminate because it combines a factual component (actual number of living children) and an attitudinal component (number of additional children wanted) (Ryder, 1973).

Assuming that women in the sample become infertile after 45 years old, a modified version of the estimation of WTFR in Method 2 was suggested by Bongaarts (1990) as WTFR = WMTFR + 1 - WM_{40-44}, where WMTFR equals the proportion of the total fertility rate attributable to births among women who want more children at the time of the survey and WM_{40-44} is a correction factor representing the proportion of all married women in age group 40 to 44 who want more children. The reason for the plus one in the equation is that every woman has precisely one last wanted birth at some time during her reproductive life. Since this desire can not be realized in the last cohort group (aged 40-44), WM_{40-44} is subtracted from the equation.

The Stopping Point approach (or the 'Cohort model') estimates Desired family size by parity specific proportions of women who want more children and of women who want their last child, based on answers to such questions as: "Do you want to have another child sometime?", and "Thinking back to the time before you became pregnant with your last child, had you wanted to have any more children?" (Lightbourne & MacDonald, 1982, p. 53). These proportions generate synthetic cohort estimates of Desired family size that would result if each parity group is considered as an artificial cohort passing through the family building process. Even though the questions used are from one point in time, the DFS estimate that results from the computational formula, represents a value for women of a given parity level as if they had completed their family building. The estimates are expected to remain stable across time and represent the number of children women would have if they ceased having children at the point where they say they want no additional children. The following assumptions characterize the Cohort Model: (a) a cohort consists of a new group of women of equal size (N) entering the fertile population; (b) each time period represents a parity level, with all time periods having equal intervals; (c) the maximum family size in the fertile population is finite; and (d) all women in a country are homogeneous with respect to the implementation of Desired family size.

The following variables are used in the Cohort Models: (a) Y = estimated value of Desired family size; (b) E = the fertility implementation index (proportion of women in the population who have fully implemented their fertility preferences); (c) i = 1,...,k = parity levels; (d) N_i = number of women of parity i; (e) L_i = number of women of parity i who wanted their last child; and (f) M_i = number of women of parity i who want more children. The objective is to estimate the mean of Desired family size.

The following four probability models have been developed to estimate P_i, which is inserted into a general equation (see Appendix A): (a) Model 1 (Udry et al., 1973): $P_1 = M_i / N_i$; (b) Model 2 (Pullum, 1979): $P_2 = M_i / L_i$; (c) Model 3 (Lightbourne, 1977): $P_3 = (M_i / N_i) - (M_{i-1} / N_{i-1})$; (d) Model 4 (Rodriguez & Trussell, 1981):

$$P_4 = \frac{\sum_{j=i}^{k} M_j}{\sum_{j=i}^{k} L_j}, \quad i=0,\ldots,k$$

The fifth model (Nour, 1983) estimates DFS directly from an equation (see Appendix A).

The limitations of the first four estimation models have been discussed (e.g., overestimation of the assumed distribution for low parity levels and underestimation for higher parity levels) (Huynh & Schwarz, 1991; Nour, 1983). An improvement of the Nour model has been proposed by Huynh and Xiong (1991) and Huynh and Schwarz (1991). The estimation of average Desired Family Size by means of probability models is an improvement over self-reported DFS (i.e., unbiased by rationalization effects). The next stage in the analysis of DFS is the understanding of the variables that simultaneously influence DFS, directly or indirectly and the relationships among them.

Easterlin's Synthesis Framework

It is important to know what variables influence respondents' Desired family size and ultimately the number of children they will have, or their completed family size, in order to better understand and implement fertility planning programs. Easterlin (1975, 1978) proposed a synthesis framework of fertility determination, incorporating both the economic and sociology views of fertility. It is formalized in terms of three concepts: (a) demand for children (Cd) defined as the number of surviving children parents would want if fertility regulation were costless; (b) potential supply of children (Cn) defined as the number of surviving children parents would want if they did not deliberately limit their fertility; and (c) costs of fertility regulation (RC) which includes both subjective (psychological) costs and objective costs (time and money required to learn and use specific techniques).

Demand for children is determined by income, price (of children relative to other goods) and tastes or preferences (for children compared with goods). According to Easterlin (1978) demand for children probably corresponds to the measure of reported Desired family size on surveys. McClelland (1983) also agrees that measures of family size desires can be treated as measures of demand, however the data suggest that 'how-many-more' formats are better than 'over-again' questions as measures of Desired family size. For example, Desired family size may be defined as current number of children plus the respondent's answer to the following question, "If you could have just what you want, how many more children would you like to have?" (McClelland, 1983, p. 296). Over again questions ask the respondent to state the number of children desired if one were to begin childbearing over again.

Potential supply of children is determined by natural (non-controlled) fertility (N) and child survival rate (s). Therefore Cn = N s. The role of natural fertility has been found to be more important than differences in survival rates with regards to the sources of household differences in the supply of children (Easterlin & Crimmins, 1982). Biological (genetic effects on fecundity, the effect of disease and malnutrition on coital frequency, the ability to carry a fetus to term) and cultural factors (various social customs or events that may inadvertently affect coital frequency, fecundity or fetal mortality) can affect natural fertility. The determinants of natural fertility include: "(a) frequency of intercourse, as affected by sexual desire and involuntary abstinence due to such factors as impotence or illness, (b) fecundity or infecundity as affected by involuntary causes, and (c) fetal mortality from involuntary causes" (Easterlin, 1975, pp. 55-56).

When Cn < Cd there is an excess demand situation, therefore there is no desire to limit fertility. More children are demanded or desired than one can supply or produce. However when Cn > Cd, there is an excess supply situation and one may be motivated to regulate fertility. Fertility regulation costs would be taken into account. The greater the motivation, the greater is the expected use of fertility control. Both Cn and Cd contribute to household differences in motivation but demand (desire) plays a more important role in determining whether fertility control methods will be implemented (Easterlin & Crimmins, 1982).

Costs of fertility regulation can be grouped into two types: (a) psychological costs - displeasure associated with the idea or practice of fertility control; and (b) market costs - time and money necessary to learn about and use specific techniques. These costs depend upon attitudes toward and access to fertility control. The duration of use of fertility control is expected to vary inversely with the costs of fertility control adoption (Easterlin & Crimmins, 1982). Ideally, empirical data should reflect subjective attitudes towards the use of fertility control, information about methods of control and the economic costs of obtaining additional knowledge and of purchasing supplies or services needed for control (Easterlin & Crimmins, 1982).

If the difference between Cn and Cd is positive, the number represents unwanted children a couple would have if fertility were unregulated. Another measure of unwanted children is the actual number of living children (C) over the demand for children (C - Cd). If the cost of fertility regulation is high and motivation (Cn - Cd) is low, then a couple may feel that the disadvantages of unwanted children are less than those associated with deliberately controlling fertility. The couple weighs the cost of an unwanted child against the cost of fertility control. The effectiveness of a given method of fertility control tends to increase as desired family size is reached (Easterlin & Crimmins, 1982). The success of fertility control is measured by the excess of potential supply of children over actual family size (Cn - C) which represents children averted.

A study (Easterlin & Crimmins, 1982) empirically investigated the 'synthesis framework' of fertility determination using World Fertility Survey data for two countries (Colombia & Sri Lanka). The study population was restricted to currently married females close to the end of their reproductive careers (aged 35-44) who have been married only once, are still married and who have had at least two live births. One section of the study examined how ten years difference in education of the wife would affect fertility. The more educated have lower marriage duration, lower secondary sterility, shorter breastfeeding duration, reduced child mortality, lower natural fertility, reduced potential family size, reduced desired family size, an increase in the number of fertility control methods known, an increase in motivation for fertility control (Cn - Cd) and more years use of fertility control.

A common finding in research is the negative association between female education and fertility levels. However, the effect may vary according to whether all or only married women and men are included in the analysis (Cochrane, 1983; Singh & Casterline, 1985). Female education has been found to be more inversely related to fertility than male education (Cochrane, 1983).

Easterlin's synthesis framework has been influential in guiding the thinking and research of demographers and economists (Boulier & Mankiw, 1986; DeGraff, 1991; Montgomery, 1987). The National Academy of Sciences' 2-volume book, (Bulatao & Lee, 1983) used Easterlin's framework to organize and present research evidence on the determinants of fertility in developing countries.

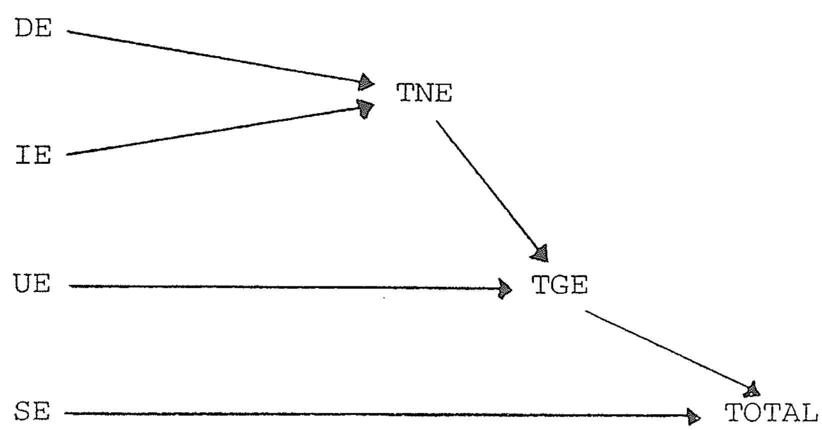
A critical assessment of Easterlin's model, by Schultz (1986) concluded that the "analytical framework needs to be reformulated and then applied to better household and community data using a statistically consistent estimation method" to more accurately capture the relationships determining fertility (p. 129). Schultz suggested the use of a "simultaneous or, ideally, fully dynamic framework" to implement Easterlin's model (p. 138).

Path Analysis

Path analysis is a technique based on a sequence of simple and multiple regression analyses to estimate the magnitude of direct and indirect effects of certain variables on other variables, according to a hierarchical causal ordering of the variables in the model. The variables are either considered to be exogenous or endogenous. Exogenous variables are measured variables not determined by, but may affect succeeding variables in the model. Endogenous variables are measured by at least one other variable in the model. Each of them may be considered as a dependent variable with reference to exogenous variables or an independent variable with reference to other endogenous variables.

The paths in the causal model are estimated by unstandardized regression coefficients. The Total effect of one variable on another is estimated by an unstandardized beta coefficient from a simple regression model with an intercept. The Total effect can be decomposed into the following subcomponents: (a) Direct effect (DE), (b) Indirect effect (IE), (c) Unexplained effect (UE), and (d) Spurious effect (SE). The sum of the Direct and Indirect effects is the Total net effect (TNE), and the sum of the Direct, Indirect, and Unexplained effect is the Total gross effect (TGE). These effects represent the decomposition of a hypothetical causal relationship between two variables (see Figure 1). A SAS computer program (SASPA) is available to analyze and decompose the Total effects in

Figure 1. Decomposition of Total effect.



the causal model (Huynh, 1992).

The independent variable(s) (IV) or assumed cause is represented by X_i and the dependent variable (DV) or assumed effect is represented by Y. Direct effects are estimated by the partial regression coefficients of Y on X_i, computed for the multiple regression model that contains all assumed causes of Y as its independent variables. The latter are the variables that have arrows pointed to Y. When a variable is an assumed effect of some variable(s) and also an assumed cause of one or more other variable(s), the model will have indirect effects. Indirect effects are estimated by the product of Direct effects from the estimates that form a causal path from one variable to another. If there is more than one pathway to the effect, then the Indirect effect is the sum of the products of Direct effects that form the sequence of causal estimates from a cause to an effect (Cohen & Cohen, 1983). The Total net effect is the sum of Direct and Indirect effects. The Unexplained effect represents systematic error one cannot explain or a non-causal component of the model (Fox, 1980). It can be used as a measure of misspecification of the model. If it is too large (i.e., if Unexplained effect greater than Direct effect), the model may have to be changed (i.e., a path deleted) and reanalysed. The Total gross effect is the sum of Direct, Indirect, and Unexplained effects. The Spurious effect is estimated by the difference between the Total effect and Total gross effect. It represents residual or random error, an element of sampling fluctuation. As with UE, if the Spurious effect is larger than the Direct effect, a path may have to be deleted and the model reanalysed.

Objective of the Present Study

Existing studies of Easterlin's framework are at the micro level with individual respondents as subjects. The focus of Easterlin's synthesis is on the determinants of fertility or completed family size, therefore the sample of women is restricted to those near the end of their reproductive 'life.' In this thesis, a modified version of Easterlin's theoretical framework, using the World Fertility Survey data, was used to simultaneously assess the determinants influencing DFS among developing countries. Once significant variables for each country had been selected, they were studied at the macro level, with country as the analytical unit. The relation of Educational background and other variables specified in the model were examined. The present study examined the determinants of DFS, with one of the determinants being Actual family size, for women from 15 to 49 years of age. Actual family size is the number of living children at the time of data collection, hence it is temporary and may not be the same as completed family size. Therefore, Easterlin's framework had to be modified, with some variables being redefined and measured differently, in order to incorporate it into a causal structural model that could be tested at a macro level.

The demand for children was measured by Desired family size (Easterlin & Crimmins, 1982). DFS was estimated in the framework of the Cohort Model (Nour, 1983). The DFS estimates were obtained from a table in Huynh & Schwarz (1991).

Potential supply of children was measured by the following proximate determinants: (a) duration of marriage in years; (b) birth intervals in months; (c) female fecundity; (d) duration of breastfeeding in months; (e) infant mortality rate; (f) toddler mortality rate; and (g) child mortality rate (Easterlin & Crimmins, 1985). Before testing for statistical significance, the form of data for each variable was determined by the availability of data and the interpretation of the results. To maintain consistency across countries, only those variables common to all countries were included in the analyses.

Costs of fertility regulation were measured by contraceptive knowledge of any modern method (e.g., pill, IUD, condom, female sterilization, male sterilization, or injection) and the non-use of contraceptives (Easterlin & Crimmins, 1982). The reason for using non-contraceptive use as opposed to use of contraceptives is the comparability and consistency across countries. Reporting no use of contraception is a clear response which is not biased by what type of contraceptive was used (i.e., efficient vs. inefficient methods).

An analysis of Educational background (EB) as an exogenous variable influencing demand for children (Desired family size), through marriage duration, actual family size, potential supply of children (biological factors), and fertility regulation costs (knowledge and use of contraception) was examined. The data available for Educational background refers to no attendance at an educational institution at any time. The variable to be analyzed for Educational background is one minus the percent of No educational background, representing the effect of education.

Hypotheses

Different variables may be more important for one country than another when explaining the influence of various determinants on Desired family size. It is not possible to develop precise hypotheses to predict any such differences between countries. The Direct and Indirect effects of the following variables on DFS were tested separately for each country by a causal model: (a) Educational background (EB), (b) Marriage duration (MD), (c) Biological supply factor (CN), (d) Actual family size (AFS), (e) Contraceptive knowledge (CK), and (f) Non-contraceptive use (NCU).

The same negative relationship was found between education and Actual family size as well as between education and self-reported Desired family size (Easterlin & Crimmins, 1982). It was proposed as hypothesis 1 in this study. The rationalization effect of Actual family size, (i.e., Children unwanted before the fact are often reported as desired after the fact. Easterlin & Crimmins, 1982; Pullum, 1983), led to the proposal of hypothesis 3 which assumes that there is a positive relationship between Actual family size (AFS) and Desired family size (DFS). The negative relationship between education and Marriage duration (Easterlin & Crimmins, 1982) along with the assumed negative relationship between education and both Actual family size and Desired family size (hypothesis 1), resulted in hypothesis 2, about the predicted positive relationship between Marriage duration (MD) and both Actual family size (AFS) and Desired family size (DFS). In hypothesis 4, a negative relationship between Actual family size (AFS) and Contraceptive knowledge (CK) was assumed. It was proposed on the basis of the positive relationship between education and contraceptive knowledge as well as the negative relationship between education and Actual family size (Easterlin & Crimmins, 1982). Because of the natural contradiction between Contraceptive knowledge (CK) and Non-use of contraceptives (NCU), an assumed positive relationship between Actual family size (AFS) and Non-contraceptive use (NCU) was proposed (hypothesis 4).

The hypotheses mentioned above can be summarized as follows:

1. The higher the Educational background (EB) of a country, the lower will be the Actual family size (AFS) and Desired family size (DFS) levels of that country.

2. The longer the Marriage duration (MD), the higher the Actual family size (AFS) and Desired family size (DFS).

3. Actual family size (AFS) will positively influence Desired family size (DFS).

4. An increase in Actual family size (AFS) will be

related to a decrease in Contraceptive knowledge (CK) and an increase in Non-contraceptive use (NCU).

Method

Data

Forty-one developing countries are reported in the World Fertility Study. Use of the Nour cohort model is restricted to 14 developing countries. The data are from currently or ever married women aged 15 to 49. The analyses were based on the available WFS data for ten countries (i.e., Bangladesh, Columbia, Costa Rica, Dominican Republic, Jamaica, Jordan, Republic of Korea, Panama, Peru, Philippines). Separate analyses were done for each country, with the results being compared across countries. All computer programs were performed by using SAS (SAS Institute Inc., 1990).

Variables

For each country there are only 10 data points, representing the Number of surviving children or Actual family size (AFS) ($k = 0,1,...,9+$). With so few observations, the number of variables that can enter a multiple regression model with sum of squares of reasonable size is limited. To overcome this difficulty, Factor analysis was used to reduce the number of original variables to be used in the path analysis. See Table 1 for a list of the variables, their measurement scale and definition and Table 2 for the source of the variables. The variables were measured in relation to the Number of surviving children, representing means or proportions of the variable of interest. Since some of the original variables were based on Children ever born (e.g., No educational background, Marriage duration, and Female fecundity) as opposed to the Number of surviving children, an adjustment was made to make all variables correspond to the same measurement scale (i.e., Number of surviving children). However, the Nour estimate of DFS, by definition, is based on Children ever born and no adjustment was made on this variable. A description of the calculation of each variable is provided (see Appendix B).

The factor labelled Supply (CN) consisted of the following biological variables: (a) Birth interval (BI); (b) duration of Breastfeeding (BF); (c) Female fecundity (FF); (d) Infant mortality rate (IM); (e) Toddler mortality rate (TM); and (f) Child mortality rate (CM). A principal factor extraction was performed to obtain a single set of factor scores for Supply (CN). For this purpose, prior communality estimates were set to SMC (squared multiple correlations of each variable with all other variables) as the starting

Table 1

Variables, Scale of Measurement and Definition

Variable	Scale	Definition
Desired family size (DFS)	mean	Nour estimate
Actual family size (AFS)	(0,1,...,9+)	parity or number of surviving children
Educational Background (EB)	percent	one minus percentage of women with no schooling
Marriage duration (MD)	mean	marriage duration in years
Contraceptive knowledge (CK)	percent	knowledge of any modern method of contraception
Non-contraceptive use (NCU)	percent	no use of contraception

Biological supply factor (CN)		
Birth interval (BI)	mean	birth interval in months
Breastfeeding (BF)	mean	duration in months
Female fecundity (FF)	percent	currently married fecund women
Infant mortality (IM)	rate per 1000 births	between birth and first birthday
Toddler mortality (TM)	rate per 1000 births	between first and second birthdays
Child mortality (CM)	rate per 1000 births	between second and fifth birthdays

Table 2

Source of the Data for the Original Variables

Factor	Source
Desired family size (DFS)	Table 6 (Huynh & Schwarz, 1991)
Educational background (EB)	Table A17 (Zoughlami & Allsopp, 1985, p. 60)
	Appendix C (Lutz, 1989, pp. 239-258)
	Table 15 (Hodgson & Gibbs, 1980, p. 24)
	Table 4 (Singh, 1982, p. 17)[a]
Marriage duration (MD)	Appendix C (Lutz, 1989, pp. 239-258)
	Table 17 (Hodgson & Gibbs, 1980, p. 26)
Contraceptive knowledge (CK)	Table 25 (Vaessen, 1980, p. 40)
Non-contraceptive use (NCU)	Table A4 (Sathar & Chidambaram, 1984, p. 36)

Biological supply factor (CN)	
Birth interval (BI)	Table 5 (Hobcraft & MacDonald, 1984, p. 19)
Breastfeeding (BF)	Table 5 (Ferry & Smith, 1983, p. 22)
Female fecundity (FF)	Table B2 (Vaessen, 1984, pp. 41-44)
	Appendix C (Lutz, 1989, pp. 239-258)
	Table 15 (Hodgson & Gibbs, 1980, p. 24)
Infant mortality (IM)	Table 13 (Rutstein, 1984, p. 32)
Toddler mortality (TM)	
Child mortality (CM)	

Note. [a] Data for Jamaica only.

values for the iteration, with only one factor being retained by the Nfactor criterion (SAS Institute Inc., 1990). This decision turned out to be correct since, from the Factor analysis results, most factor loadings were larger than .90 and the eigenvalues for the factors indicated large differences between the first and second factors and small differences between the second and remaining factors. The factor scores of Supply (CN) were then used to estimate the effects in the causal model. See Table 3 for the factor loadings of the variables comprising the Biological supply factor (CN) for each country.

Model Specification and Estimation

Path analysis was used to test a structural model based on a modified version of Easterlin's theoretical model (Easterlin & Crimmins, 1985). The model is recursive (all causal links move in one direction i.e., no reciprocal causation or feedback loops) and fully saturated (all variables are determined by all prior causal variables). The only exogenous variable in the model is the Educational background (EB) variable, with the remaining variables namely, Marriage duration (MD), Biological supply factor (CN), Actual family size (AFS), Contraceptive knowledge (CK), Non-contraceptive use (NCU) and Desired family size (DFS), being

Table 3

Factor Loadings for the Variables that Constitute the Biological Supply Factor for Each Country

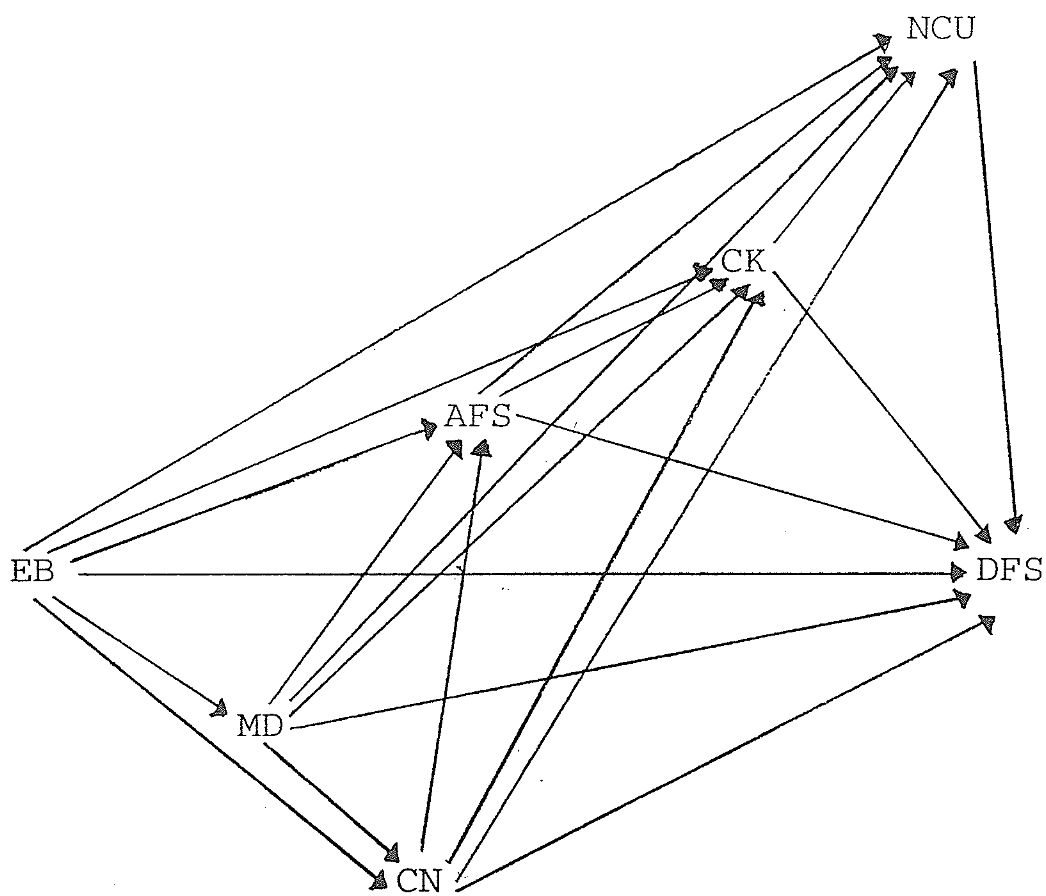
Country	BF	BI	FF	IM	TM	CM
Bangladesh	.9978	.9709	-.6096	.8472	.9704	.9571
Columbia	.9776	.9788	-.7139	.9479	.8566	.9968
Costa Rica	.9724	.7071	-.8735	.9777	.9882	.9822
Dominican Republic	.9608	.9177	-.7020	.9649	.9631	.8429
Jamaica	.9132	.8243	-.7437	.9799	.9129	.9427
Jordan	.9855	.9841	-.6563	.9196	.9496	.7629
Korea Rep.of	.9739	.9199	-.8246	.9765	.9672	.7693
Panama	.9759	.8309	-.8629	.9740	.7222	.9230
Peru	.9783	.9523	-.8234	.9791	.9792	.9903
Philippines	.9608	.9684	-.6979	.9674	.9906	.9821

endogenous variables (see Figure 2). DFS also represents the ultimate outcome (dependent variable) in the causal model.

Since directional tests are more powerful and meaningful for causal analysis, the tests of significance for Total, Direct, and Indirect effects were based on a one-tailed test at the .05 level. The significance of an effect indicates that its value (Beta coefficient) is different from zero and this difference is not due to chance alone. The original data collected for a country was from a sample of individual respondents (sample size varying between countries). The data used in the present causal analysis is based on means and proportions from the original data. Since the actual sample sizes were larger than 200, they were assumed to be taken from normal populations, thus validating the use of the Z-statistics and their p-values as tests of significance (Sobel, 1986).

The first model to be analyzed for each country is referred to as the primary model. It contains all causal paths. Based on the analyses of this fully saturated model, any path (representing effects between two variables) with either the Unexplained effect or Spurious effect being greater, in absolute value, than

Figure 2. Causal structural model.



the corresponding Direct effect, was deleted and an additional model was analyzed for each country. This process was repeated, if necessary, until all paths in the model were valid. The last reduced model for each country is referred to as the valid model. It is important to note that all variables remain in this model, although all invalid paths have been deleted.

Results

The decomposition of each causal path for the primary and reduced models for each country are presented in Appendix C. The following countries required: (a) one reduced model - Columbia, Dominican Republic, Jordan, Peru, Philippines; (b) two reduced models - Bangladesh, Costa Rica, Jamaica, Panama; and (c) three reduced models - Korea (Rep.of). The last reduced model for each country is the valid model as explained previously.

The Pearson correlation coefficients between the factor and variables used in the causal structural model are presented in Appendix D.

Tests of the significance of the hypotheses focus on the valid models for each country. A summary of the Direct, Indirect and Total effects for the causal paths from the valid model for each country is presented in Table 4. For interpretation purposes, if a research

Table 4

Summary of Direct, Indirect, and Total Effects for the Valid Model for each Country

	DV	IV	Effect	Bang.	Columbia	C-R	D-R	Jamaica	Jordan	Korea	Panama	Peru	Phi.
1	MD	EB	DE	-1.15''	-1.75''	-2.89''	-1.73''	-.61''	-.42''	-.75''	-3.26''	-.82''	-3.94''
			IE										
			Total	-1.15''	-1.75''	-2.89''	-1.73''	-.61''	-.42''	-.75''	-3.26''	-.82''	-3.94''
2	CN	MD	DE		.66''	.31''	.33''			.38	.65''	.61''	.60''
			IE										
			Total		.13''	.14''	.12''			.10''	.15''	.14''	.12''
3	CN	EB	DE	-.11''	.93'	.49'	.39'	-.09''	-.05''	.21	1.64''	.39'	1.92''
			IE		-1.15''	-.90''	-.57''			-.28	-2.11''	-.50''	-2.35''
			Total	-.11''	-.22''	-.41''	-.18''	-.09''	-.05''	-.07''	-.47''	-.11''	-.43''
4	AFS	MD	DE	1.15''		.64''	.43''	.53''			.44''	.62'	
			IE										
			Total	.40''		.46''	.48''	.53''			.49''	.46''	
5	AFS	CN	DE										
			IE										
			Total										
6	AFS	EB	DE	.87''	-.83''	.53	-.08	-.003	-.19''	-.26''	-.15	.13	-1.72''
			IE	-1.33''		-1.86''	-.75''	-.32''			-1.44''	-.50'	
			Total	-.46''	-.83''	-1.33''	-.83''	-.32''	-.19''	-.26''	-1.59''	-.37''	-1.72''

	DV	IV	Effect	Bang.	Columbia	C-R	D-R	Jamaica	Jordan	Korea	Panama	Peru	Phi.
7	CK	MD	DE				-.20	-.57''					
			IE				.15	.63''					
			Total				.03	-.04'					
8	CK	CN	DE	3.52''	2.56''		-.58''		1.66''	2.52''		4.36''	6.57''
			IE										
			Total	4.01''	1.25''		.02		1.49''	.62'		-.14	.72
9	CK	AFS	DE			.52''	.79''	1.19''			1.23''	-.91	-4.86''
			IE										
			Total			.06'	.07'	-.07			-.04	-.33	-.04
10	CK	EB	DE	-.10	.46''	.64''	.14	.07'	.01	.19''	2.07''	.28	-5.33'
			IE	-.40''	-.56''	-.69''	-.20	-.04	-.08''	-.18''	-1.96''	-.14	5.55'
			Total	-.50''	-.10	-.05	-.06'	.03'	-.07''	.01	.11	.14	.21
11	NCU	MD	DE			-14.79''	-5.43''						
			IE			1.46	.34						
			Total			-.96'	-.99''						
12	NCU	CN	DE		-15.91''	-28.46''	-10.91''		-8.32''	24.19''	-21.96''	-16.05''	-15.77''
			IE							-36.17''			
			Total		-8.78''	-9.39''	-8.90''		-8.06''	-8.50''	-9.54''	-5.33''	-9.97''
13	NCU	AFS	DE			16.03''	9.17''						
			IE										
			Total			-2.15'	-1.98''						
14	NCU	CK	DE							-14.37''			
			IE										
			Total							-5.78''			

	DV	IV	Effect	Bang.	Columbia	C-R	D-R	Jamaica	Jordan	Korea	Panama	Peru	Phi.
15	NCU	EB	DE	.54**	-2.48**	-30.99**	-2.46**	.80**	-.02	2.40**	-7.39**	-1.52**	-4.53**
			IE		3.45**	33.11**	3.78**		.42**	-1.87**	10.33**	1.79**	6.85**
			Total	.54**	.97	2.12	1.32*	.80**	.40**	.53*	2.94*	.27	2.32
16	DFS	MD	DE	-.49	.30**	-.56**		.10**		.04	.22		
			IE	.37	-.27**	.40**		-.12**			-.24		
			Total	.09**	.05**	.11**		.03**		.03**	.09**		
17	DFS	CN	DE				-.56**		-.32		.93**		
			IE								-1.30**		
			Total				.21		.05		.45**		
18	DFS	AFS	DE	.32		.61**	.48**	-.22**	.52			-.18**	
			IE										
			Total	.21**		.23**	.15**	.05**	.05			.12**	
19	DFS	CK	DE		-.16**								
			IE										
			Total		-.07								
20	DFS	NCU	DE								.06**	.02**	.04**
			IE										
			Total								-.01	.01	.001
21	DFS	EB	DE	-.52*	.42**	-1.12**	.17**	-.03**	.07	.01	.71	-.12**	-.81**
			IE	.42*	-.51**	.80**	-.30**	.01**	-.08	-.03	-.99	.07**	.09
			Total	-.10**	-.09**	-.32**	-.13**	-.02**	-.01	-.02**	-.28**	-.05**	-.72**

Note. *$p < .10$ **$p < .05$ (one tailed) hypothesis was not supported (i.e., not significant), the directional nature of the hypothesis was checked in the primary model for its agreement with the predicted direction.

<u>Hypothesis 1a</u>

The first part of hypothesis one predicted that the higher the educational attainment of a country, the lower would be the Actual family size of that country. Per country analyses indicated that

(a) Bangladesh: significant negative Indirect effect and Total effect, significant positive Direct effect;

(b) Columbia: significant negative Direct effect and Total effect;

(c) Costa Rica: significant negative Indirect effect and Total effect;

(d) Dominican Republic: significant negative Indirect effect and Total effect;

(e) Jamaica: significant negative Indirect effect and Total effect;

(f) Jordan: significant negative Direct effect and Total effect;

(g) Korea: significant negative Direct effect and Total effect;

(h) Panama: significant negative Indirect effect and Total effect;

(i) Peru: significant negative Total effect; and

(j) Philippines: significant negative Direct effect and Total effect.

Based on the Total effect, this hypothesis was supported at the .05 level, for the valid model for each of the ten countries. Educational background had a significant negative Total effect on Actual family size. For those countries with a significant negative Indirect effect, it was found that the significance represents the extent of the influence of Marriage duration.

Hypothesis 1b

The second part of hypothesis one predicted that the higher the educational attainment of a country, the lower would be the Desired family size of that country. Per country analyses indicated that

(a) Bangladesh: significant negative Total effect;

(b) Columbia: significant negative Indirect effect and Total effect, significant positive Direct effect;

(c) Costa Rica: significant negative Direct effect and Total effect, significant positive Indirect effect;

(d) Dominican Republic: significant negative Indirect effect and Total effect, significant positive Direct effect;

(e) Jamaica: significant negative Direct effect and Total effect, significant positive Indirect effect;

(f) Jordan: no significant effects;

(g) Korea: significant negative Total effect;

(h) Panama: significant negative Total effect;

(i) Peru: significant negative Direct effect and Total effect, significant positive Indirect effect; and

(j) Philippines: significant negative Direct effect and Total effect.

On the basis of the Total effect, this hypothesis was supported at the .05 level, for the valid model of nine countries. The exception was Jordan. However, the sign of the Total effect between EB and DFS for Jordan was in the appropriate direction. An increase in the proportion of the population with an education resulted in lower Desired family size (DFS) levels. The following countries had a significant negative and valid Direct effect between EB and DFS: Bangladesh, Costa Rica, Jamaica, Peru, and Philippines. Moreover, the Indirect effects were negative and significant for

Columbia, through Marriage duration, the Biological supply factor and Contraceptive knowledge and for Dominican Republic, through Marriage duration, the Biological supply factor and Actual family size.

Hypothesis 2a

The first part of hypothesis two predicted that the longer the Marriage duration, the higher the Actual family size. Per country analyses indicated that

(a) Bangladesh: significant positive Direct effect and Total effect;

(b) Columbia: invalid path;

(c) Costa Rica: significant positive Direct effect and Total effect;

(d) Dominican Republic: significant positive Direct effect and Total effect;

(e) Jamaica: significant positive Direct effect and Total effect;

(f) Jordan: invalid path;

(g) Korea: invalid path;

(h) Panama: significant positive Direct effect and Total effect;

(i) Peru: significant positive Direct effect and Total effect; and

(j) Philippines: invalid path.

Based on the Total effect, this hypothesis was supported at the .05 level for six countries. Moreover, in each of these countries the Direct effect between Marriage duration (MD) and Actual family size (AFS) was positive and significant. On the other hand, this path was not valid for four countries (Columbia, Jordan, Korea, and Philippines).

Hypothesis 2b

The second part of hypothesis two predicted that a longer Marriage duration would be associated with higher Desired family size levels. Per country analyses indicated that

(a) Bangladesh: significant positive Total effect;

(b) Columbia: significant positive Direct effect and Total effect, significant negative Indirect effect;

(c) Costa Rica: significant positive Indirect effect and Total effect, significant negative Direct effect;

(d) Dominican Republic: invalid path;

(e) Jamaica: significant positive Direct effect and Total effect, significant negative Indirect effect;

(f) Jordan: invalid path;

(g) Korea: significant positive Total effect;

(h) Panama: significant positive Total effect;

(i) Peru: invalid path; and

(j) Philippines: invalid path.

This path was not valid for four countries (Dominican Republic, Jordan, Peru, and Philippines). For the remaining six countries, the hypothesis was supported at the .05 level for the valid model, based on the Total effect. An increase in Marriage duration (MD) is associated with an increase in Desired family size (DFS). Columbia and Jamaica had a significant positive Direct effect while Costa Rica had a significant positive Indirect effect through Actual family size.

The directional nature assumed in hypotheses 2a and 2b was appropriate for all countries. For those countries with an invalid path, the Total effect was in the hypothesized direction in the primary model. Each hypothesis was supported (i.e., significant) for those countries with a valid path.

Hypothesis 3

It was expected that Actual family size would positively influence Desired family size. Per country analyses indicated that

(a) Bangladesh - significant positive Total effect;

(b) Columbia - invalid path;

(c) Costa Rica - significant positive Direct effect and Total effect;

(d) Dominican Republic - significant positive Direct effect and Total effect;

(e) Jamaica - significant negative Direct effect, significant positive Total effect;

(f) Jordan - no significant effects;

(g) Korea - invalid path;

(h) Panama - invalid path;

(i) Peru - significant negative Direct effect, significant positive Total effect; and

(j) Philippines - invalid path.

It was observed that in the primary model an increase in Actual family size (AFS) was associated with an increase in Desired family size (DFS) for all countries, based on the Total effect. The path remained valid for six countries, with a significant positive Total effect found for five of the six countries, the exception being Jordan. The path was not valid for the following four countries; Columbia, Korea, Panama, and Philippines.

Hypothesis 4a

The first part of hypothesis four predicted an increase in Actual family size would be associated with a decrease in Contraceptive knowledge. Per country analyses indicated that

(a) Bangladesh: invalid path;

(b) Columbia: invalid path;

(c) Costa Rica: significant positive Direct effect;

(d) Dominican Republic: significant positive Direct effect;

(e) Jamaica: significant positive Direct effect;

(f) Jordan: invalid path;

(g) Korea: invalid path;

(h) Panama: significant positive Direct effect;

(i) Peru: no significant effects; and

(j) Philippines: significant positive Direct effect.

Based on the Total effect, this hypothesis was not supported. This path was not valid for four countries (Bangladesh, Columbia, Jordan, and Korea). Of the remaining six countries only one (Philippines) had a significant effect (Direct) in the appropriate direction at the .05 level. In the primary model, only four countries (Jamaica, Panama, Peru, and Philippines) had the sign in the hypothesized direction, based on the Total effect.

Hypothesis 4b

The second part of hypothesis four predicted a positive relationship between Actual family size (AFS) and Non-contraceptive use (NCU). This path was invalid for all but two countries (Costa Rica and Dominican Republic). Both countries had a significant positive Direct effect for the valid model. However, the Total effect for Dominican Republic indicated a significant negative association between AFS and NCU. The directional nature of the hypothesis may not be appropriate since the primary model for each country indicated a negative association (Total effect) between Actual family size (AFS) and Non-contraceptive use (NCU).

Variables that Explain Desired Family Size

The variables expected to effect Desired family size are listed from paths 16 to 21 in Table 5. According to the average Total effect for all countries with the respective path remaining valid, the magnitude of the influence indicated CN (highest), EB, AFS, and the rest with less than 10 percent. The Biological supply factor (CN) and Non-contraceptive use (NCU) remained in the valid model for three countries, (Dominican Republic, Jordan, and Panama for CN and Panama, Peru, and Philippines for NCU) while

Contraceptive knowledge (CK) remained in the valid model for only one country (Columbia). Of the six variables expected to affect Desired family size in the path model, only three paths consistently remained in the valid model for most countries. The variables were Educational background (EB), Marriage duration (MD), and Actual family size (AFS). Of the three, Educational background (EB) had the strongest influence on Desired family size (average Total effect = -.17) (see Table 5). EB was the only variable to remain in the valid model for all countries, with a negative Total effect on DFS. MD remained in the valid model for six countries (Bangladesh, Columbia, Costa Rica, Jamaica, Korea, and Panama) with a positive Total effect on DFS. AFS remained in the valid model for six countries (Bangladesh, Costa Rica, Dominican Republic, Jamaica, Jordan, and Peru) with a positive Total effect on DFS.

Across Country Comparisons

A comparison across the 10 countries based on the frequency with which a path remained in the valid model revealed 13 paths occurring with a frequency count of 6 or more countries (see Table 5). Six paths remained for all 10 countries, 1 path remained for 8 countries, 2 paths remained for 7 countries, and 4 paths remained for 6 countries. The other eight paths remained in the valid model for three or fewer countries. Out of the 21 possible paths (variable pairs linked by an arrow) in the primary model, most countries had a range of 10 to 16 paths remaining in the valid model, with most countries having 10, 11 or 13 valid paths.

Included in Table 5 is the average for the Direct, Indirect and Total effects for each path, based on the valid model. These values were computed from Table 4, by averaging the variable pair effects across countries. The predicted direction of the hypotheses, based on the averages for the effects indicated that: (a) for hypotheses 1a, 1b, 2a, 3, 4a, the sign was in the appropriate direction as predicted; (b) for hypothesis 2b, the signs of the Indirect and Total effect averages were in the appropriate direction as predicted, however, the sign of the Direct effect was not; and (c) for hypothesis 4b, the sign of the Direct effect was in the appropriate direction as predicted, however the sign of the Total effect was not.

A comparison of the predicted direction of the hypotheses between the average Total effect across countries to the primary model Total effects for each individual country, indicated agreement for hypotheses 1a, 1b, 2a, 2b, and 3, with the sign in the appropriate

Table 5

Frequency Count of Valid Paths and the Average Direct, Indirect and Total effects Across Countries

	DV	IV	Number of Countries	Average DE	Average IE	Average Total Effect
1	MD	EB	10	-1.73		-1.73
2	CN	MD	7	.51		.13
3	CN	EB	10	.57	-1.12	-.21
4	AFS	MD	6	.64		.47
5	AFS	CN	0			
6	AFS	EB	10	-.17	-1.03	-.79
7	CK	MD	2	-.39	.39	-.01
8	CK	CN	7	2.94		1.14
9	CK	AFS	6	-.34		-.06
10	CK	EB	10	-.16	.13	-.03
11	NCU	MD	2	-10.11	.90	-.98
12	NCU	CN	8	-11.65	-36.17	-8.56
13	NCU	AFS	2	12.60		-2.07
14	NCU	CK	1	-14.37		-5.78
15	NCU	EB	10	-4.57	7.23	1.22
16	DFS	MD	6	-.07	.03	.07
17	DFS	CN	3	.02	-1.30	.24
18	DFS	AFS	6	.26		.14
19	DFS	CK	1	-.16		-.07
20	DFS	NCU	3	.04		.0003
21	DFS	EB	10	-.12	-.05	-.17

direction as predicted. For hypothesis 4a, only four countries had the sign for the Total effect in the appropriate direction in the primary model, which also agreed with the sign for the average Total effect. Whereas, in hypothesis 4b, no country had the sign for the Total effect in the appropriate direction in the primary model, and the same sign was found for the average Total effect. Summary (average) results for the predicted direction of the hypotheses were similar to the results from the primary models, based on the Total effect.

Discussion

The objective of the present study was to simultaneously assess the determinants influencing Desired family size for ten developing countries, using Path analysis. The purpose of the specification and quantification of the path model was to decompose the relationship between Educational background (EB) and Desired family size (DFS), with the inclusion of intermediate (endogenous) variables (i.e., Marriage duration (MD), Biological supply variables (CN), Actual family size (AFS), Contraceptive knowledge (CK) and Non-contraceptive use (NCU)) to enhance the understanding of the relationship. In order to provide relevant information about the determinants of DFS, the variables included in the model were conceptualized, selected and transformed in a standard fashion for the comparative analyses among countries.

From the proposed causal model, it was found that only three variable paths to Desired family size (DFS) consistently remained valid and significant across the developing countries under consideration. The variables were Educational background (EB), Marriage duration (MD), and Actual family size (AFS). The variables of Biological supply factor (CN), Contraceptive knowledge (CK) and Non-contraceptive use (NCU) often became ultimate outcomes or final dependent variables in the valid path models. As expected, an increase in Educational background (EB) was associated with lower Desired family size (DFS), whereas an increase in Marriage duration (MD) and Actual family size (AFS) was associated with higher Desired family size (DFS).

The positive association between Actual family size (AFS) and Desired family size (DFS) can be explained as follows; "First, where preferences are successfully implemented, women who initially desired a large family will eventually have one, ... Second, where implementation is poor, women may tend to rationalize an actual large family by reporting it as their preference" (Pullum, 1983, pp. 346-347). It is not clear if Desired family size (DFS) determines Actual family size (AFS) through fertility control or if Actual family size determines Desired family size (Knodel & Prachuabmoh, 1973). Our results show that AFS influences DFS but it may be that the relationship operates in both directions.

Educational attainment was found to have a negative Total effect on Marriage duration (MD) and Actual family size (AFS). These results were also expected. The comparability of the education variable is complicated by the diversity and quality of educational systems from one developing country to another (Zoughlami & Allsopp, 1985). The data show much smaller negative Total effects of Educational background (EB) on Desired family size (DFS) than Educational background (EB) on Actual family size (AFS) for each country. Lightbourne and MacDonald (1982) found that when the number of living children were controlled for, there was no evidence of divergence in preferred numbers of children between cohorts of women. This is a reason why DFS was chosen rather than AFS as the ultimate outcome variable in the path model, since it's more stable and more useful for prediction and policy making. If the average variation in Desired family size among women is less than that of Actual family size, it may be that less educated women are less effective in translating their preferences into appropriate behaviour. Education may reduce the demand or desire for children and thus increases one's ability to regulate fertility, resulting in lower Actual family size.

Marriage is nearly universal for women in developing countries (McDonald, 1985). As expected an increase in Marriage duration (MD) was associated with an increase in Actual family size (AFS) and Desired family size (DFS) for the countries where the respective paths remained in the valid model. Mean age at marriage ranges from age 16 to 25 across the 10 developing countries. "Timing of entry into marriage is linked to sexual exposure in most societies and constitutes an important potential force for fertility reduction" (Cleland & Hobcraft, 1985, p. 4). Implementing a delay of marriage for women beyond a certain age would imply considerable structural change, with the emergence of new roles for single women. One new role may be employment outside the family (McDonald, 1985). Marriage duration (MD) was shown to decrease with increased education for all countries.

Three variable paths to Desired family size did not consistently remain valid among the developing countries under consideration. They were the Biological supply factor (CN), Contraceptive knowledge (CK) and Non-contraceptive use (NCU) variables. It may be that the underlying causal link (i.e., directional arrow) between these variables and Desired family size (DFS) is in the reverse direction as proposed in the present path model or the causal ordering of the endogenous variables could be different from the one specified in the path model. Tsui (1985) stated that as "more women use contraception, desire for more children declines" (p. 127), implying a positive relationship between Non-contraceptive use (NCU) and Desired family size (DFS). However, based on the Total effect from the primary model, NCU had a small nonsignificant association with DFS for all but two countries in this study (Bangladesh and Jamaica). Greater knowledge of and access to family planning methods results in more salient fertility preferences and smaller Desired family size (Pullum, 1983). Based on the Total effect from the primary model, Contraceptive knowledge (CK) and Desired family size (DFS) were negatively associated for six countries in this study (Columbia, Jamaica, Korea, Panama, Peru and Philippines). However, the causal direction of the association between Contraceptive knowledge and use with Desired family size is unclear (McCarthy & Oni, 1987).

Both parts of the fourth hypothesis were not supported, based on the Total effect. The first part of the hypothesis predicted an increase in Actual family size (AFS) would be associated with a decrease in Contraceptive knowledge (CK). The second part of the hypothesis predicted an increase in Actual family size (AFS) would be associated with an increase in the proportion of the population not using contraceptives (NCU). The directional nature of these hypotheses was not supported. Based on the Total effect from the primary model, the signs were not in the hypothesized direction; for hypothesis 4a, six of the ten countries had the sign for the Total effect indicating a positive relationship between AFS and CK, whereas for hypothesis 4b, all countries had the sign for the Total effect indicating a negative relationship between AFS and NCU. The data suggested that an increase in Actual family size was associated with an increase in Contraceptive knowledge and a decrease in the proportion not using contraceptives (NCU). Even though these results were unexpected, they provide insight and encouraging information to the developing countries considered. As

Actual family size increases, there becomes more awareness in the knowledge of contraceptives and an increase in the use of contraceptives. According to Sathar and Chidambaram (1984), Asian and African countries report highest use of contraceptives among women with four or more children, while in the Americas, highest use is reported by women with only two children. Knowledge of contraception methods has been found to be relatively unaffected by the number of living children. However, in developing countries women with no children generally have a lower level of knowledge, while women with one or more children have similar levels (Vaessen, 1980).

The supported hypotheses (i.e., hypotheses one, two and three) were expected, whereas, the non-supported hypothesis (i.e., hypothesis four) was somewhat unexpected and thus may need more research. The data indicated that an increase in the proportion of the population with an education will (directly and/or indirectly) lower Marriage duration (MD), Actual family size (AFS) and Desired family size (DFS). A reduction in Marriage duration will (directly and/or indirectly) lower Actual family size (AFS) and Desired family size (DFS). Therefore, in general, to restrict population growth, governments should encourage educational pursuits and delay entry to marriage.

From the World Fertility Survey (WFS), the summary data at the country level is readily available as compared to the full data for individuals within a country. The macro approach to path analysis allowed comparisons to be made across several countries. However, with country as the analytical unit there was a limit to the number of variables that could be used in the causal model. Only variables common to all countries were analyzed in order to make cross-national comparisons meaningful. The variables considered in the path model were measured in a uniform way across countries in the WFS. The sampling procedures employed by the World Fertility Survey were sophisticated and the samples can be considered representative of the population in each country. A variety of developing countries were considered in the analyses, differing with respect to location, population, culture and economics.

As mentioned before, the preliminary steps of Path analysis consist of a series of simple and multiple regressions. Therefore, Path analysis can be considered as a refinement of the regression approach. Moreover, Path analysis has advantages over regression as a method of data analysis. Path analysis enables one to test hypotheses simultaneously. In Path analysis, the variables are causally ordered in the model and the causal directions between variable pairs are indicated by arrows. Therefore, Path analysis is an appropriate methodology to decompose the complex causal links that exist between variables and classify them into Total, Direct and Indirect effects.

A limitation of the data set is that it is based on one point in time and may not necessarily apply to changes over a long period. The World Fertility Survey (WFS) data was originally collected in the late 1970s. However, it is expected that fertility levels and trends of the selected countries would not have changed dramatically over the past 15 years. This study did not include such countries with impelling population problems like China and India. A limitation to the generalization of results is the difficulty associated with breaking the variables down into meaningful categories that could be analyzed using Path analysis. A complete understanding of the determinants of Desired family size may be hampered due to this constraint. In the future, this restriction could be overcome by an in-depth study of a smaller number of countries for which the WFS provided much more detailed data breakdowns. In relation to the number of developing countries reported in the WFS (41), comparable data was available for only 10 countries. This may be considered too few countries to make broad generalizations to all developing countries.

An extension of the present research may be to consider other variables not included in the present causal model that may effect Desired family size (DFS). For example, income levels or occupation could have been used instead of Educational background (EB) as the exogenous variable in the model. Similarly, a distinction between urban and rural women may be an important classification to justify analyzing separate path models to test how place of residence influences the determinants of Desired family size (Ahmed, 1981; Bailey & Weller, 1987).

If our objectives were not related to the factors that influence Desired family size (DFS), a change in the model such as a reverse in the positions of Desired family size (DFS) and Actual family size (AFS) could provide different information on the determinants of the family size. However, it is expected that the determinants of both AFS and DFS would be similar (Pullum, 1983).

As mentioned earlier, after the analyses have been done at the country level, future research may include per country studies to get a clearer understanding of the determinants of Desired family size at an individual level. A comprehensive review of this topic may be done, looking at more variables and considering more developing countries. This review may take on the form of a meta-analysis, incorporating moderator variables such as education, income, occupation, and urbanization along with other social, psychological and economic variables expected to influence Desired family size.

References

Ahmed, B. (1981). Differential fertility in Bangladesh: A path analysis. Social Biology, 28, 102-110.

Bailey, M. & Weller, R. H. (1987). Fertility differentials in rural Sierra Leone: A path analysis. The Journal of Developing Areas, 21, 191-208.

Berent, J. (1983). Family size preferences in Europe and USA: Ultimate expected number of children. WFS comparative studies, No. 26. Voorberg, Netherlands:International Statistical Institute.

Blake, J. (1966). Ideal family size among white Americans: A quarter of a century's evidence. Demography, 3, 154-173.

Bongaarts, J. (1990). The measurement of wanted fertility. Population and Development Review. 16, 487-506.

Boulier, B. L., & Mankiw, N. G. (1986). An econometric investigation of Easterlin's 'synthesis framework': The Philippines and the United States. Population Studies, 40, 473-486.

Bulatao, R. A., & Lee, R. D. (1983). Determinants of fertility in developing countries (Vols. 1-2). New York: Academic Press.

Calhoun, C. A. (1991). Desired and excess fertility in Europe and the United States: Indirect estimates from World Fertility Survey data. European Journal of Population, 7, 29-57.

Cleland, J. & Hobcraft, J. (1985). Reproductive change in developing countries. New York: Oxford University Press.

Cochrane, S. H. (1983). Effects of education and urbanization on fertility. In R. A. Bulatao & R. D. Lee (Eds.), Determinants of fertility in developing countries, Vol. 2. (pp. 587-626). New York: Academic Press.

Cohen, J., & Cohen, P. (1983). Applied multiple regression/correlation analysis for the behavioral sciences (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.

Coombs, L. C., & Fernandez, D. (1978). Husband-wife agreement about reproductive goals. Demography, 15, 57-73.

DeGraff, D. S. (1991). Increasing contraceptive use in Bangladesh: The role of demand and supply factors. Demography, 28, 65-81.

Easterlin, R. A. (1975). An economic framework for fertility analysis. Studies in Family Planning, 6, 54-63.

Easterlin, R. A. (1978). The economics and sociology of fertility: A synthesis. In C. Tilly (Ed.), Historical studies of changing fertility (pp. 57-133). Princeton, NJ: Princeton University Press.

Easterlin, R. A., & Crimmins, E. M. (1982). An exploratory study of the 'synthesis framework' of fertility determination with World Fertility Survey data. WFS scientific reports, No. 40. Voorberg, Netherlands: International Statistical Institute.

Easterlin, R. A., & Crimmins, E. M. (1985). The fertility revolution a supply - demand analysis. Chicago: The University of Chicago Press.

Ferry, B., & Smith, D. P. (1983). Breastfeeding differentials. WFS scientific reports, No. 23. Voorberg, Netherlands: International Statistical Institute.

Fox, J. (1980). Effect analysis in structural equation models. Sociological Methods and Research, 9, 3-28.

Freedman, R., Baumert, G., & Bolte, M. (1959). Expected family size and family size values in West Germany. Population Studies, 13, 136-150.

Heer, D. M. (1983). Infant and child mortality and the demand for children. In R. A. Bulatao & R. D. Lee (Eds.), Determinants of fertility in developing countries, Vol. 1. (pp. 369-387). New York:

Academic Press.

Hermalin, A. I., & Liu, X. (1990). Gauging the validity of responses to questions on family size preferences in China. Population and Development Review, 16, 337-354.

Hobcraft, J., & McDonald, J. (1984). Birth intervals. WFS scientific reports, No. 28. Voorberg, Netherlands: International Statistical Institute.

Hodgson, M., & Gibbs, J. (1980). Children ever born. WFS scientific reports, No. 12. Voorberg, Netherlands: International Statistical Institute.

Huynh, C-L. (1992). SASPA: A SAS computer program for path analysis. Unpublished manuscript.

Huynh, C-L., & Schwarz, C. J. (1991). Distribution functions of cross-national desired family size: A comparative analysis. Manuscript submitted for publication.

Huynh, C-L., & Xiong, Z. X. (1991). Estimation and limiting distribution of desired family size in cross-national fertility surveys. Manuscript submitted for publication.

Jensen, E. (1985). Desired fertility, the "up to God" response, and sample selection bias. Demography, 22, 445-454.

Kendall, M. G., & O'Muircheartaigh, C. A. (1977). Path analysis and model building. WFS Technical Bulletin, No. 2. Voorberg, Netherlands: International Statistical Institute.

Knodel, J., & Prachuabmoh, V. (1973). Desired family size in Thailand: Are the responses meaningful? Demography, 10, 619-637.

Knodel, J., & Prachuabmoh, V. (1976). Preferences for sex of children in Thailand: A comparison of husbands and wives' attitudes. Studies in Family Planning, 7, 137-143.

Lightbourne, R. (1977). Family size desires and the birth rates they imply. (Doctoral dissertation, University of California at Berkeley). Dissertation Abstracts International, 38, 5069A.

Lightbourne, R. E. (1985). Individual preferences and fertility behaviour. In J. Cleland & J. Hobcraft (Eds.), Reproductive change in developing countries (pp. 165-198). New York: Oxford University Press.

Lightbourne, R. E., & MacDonald, A. L. (1982). Family size preferences. WFS comparative studies, No. 14. Voorberg, Netherlands: International Statistical Institute.

Lutz, W. (1989). Distributional aspects of human fertility: A global comparative study. New York: Academic Press.

McCarthy, J., & Oni, G. A. (1987). Desired family size and its determinants among urban Nigerian women: A two stage analysis. Demography, 24, 279-290.

McClelland, G. H. (1983). Family size desires as measures of demand. In R. A. Bulatao & R. D. Lee (Eds.), Determinants of fertility in developing countries, Vol. 1. (pp. 288-343). New York: Academic Press.

McDonald, P. (1985). Social organization and nuptiality in developing societies. In J. Cleland & J. Hobcraft (Eds.), Reproductive change in developing countries (pp. 87-114). New York: Oxford University Press.

Montgomery, M. R. (1987). A new look at the Easterlin "synthesis" framework. Demography, 24, 481-496.

Mott, F. L., & Mott, S. H. (1985). Household fertility decisions in West Africa: A comparison of male and female results. Studies in Family Planning, 16, 88-99.

Nour, E. S. (1983). On the distribution of desired family size for a synthetic cohort. Population Studies, 37, 315-322.

Pebley, A. R., Delgado, H., & Brinemann, E. (1979). Fertility desires and child mortality experience among Guatemalan women. Studies in Family Planning, 10, 129-136.

Pullum, T. W. (1979, April). Adjusting stated fertility preferences for the effect of actual family size with applications to World Fertility Survey data. Presented at the annual meeting of the Population Association of America.

Pullum, T. W. (1983). Correlates of family-size desires. In R. A. Bulatao & R. D. Lee (Eds.), Determinants of fertility in developing countries, Vol. 1. (pp. 344-368). New York: Academic Press.

Rodriguez, G., & Trussell, T. J. (1981). A note on synthetic cohort estimates of average desired family size. Population Studies, 35, 321-328.

Rutstein, S. O. (1984). Infant and child mortality: Levels, trends and demographic differentials. WFS scientific reports, No. 43. Voorberg, Netherlands: International Statistical Institute.

Ryder, N. B. (1973). A critique of the National Fertility Study. Demography, 10, 495-506.

SAS Institute Inc. (1990). SAS/STAT User's guide, version 6 (Vol. 1). Cary, NC: Author.

Sathar, Z. A., & Chidambaram, V. C. (1984). Differentials in contraceptive use. WFS scientific reports, No. 36. Voorberg, Netherlands: International Statistical Institute.

Schultz, T. P. (1986). [Review of The fertility revolution: A supply - demand analysis]. Population and Development Review, 12, 127-140.

Scott, W. J., & Morgan, C. S. (1983). An analysis of factors affecting traditional family expectations and perceptions of ideal fertility. Sex Roles, 9, 901-914.

Singh, S. (1982). Evaluation of the Jamaica fertility survey 1975-76. WFS scientific reports, No. 34. Voorberg, Netherlands: International Statistical Institute.

Singh, S., & Casterline, J. (1985). The socio-economic determinants of fertility. In J. Cleland & J. Hobcraft (Eds.), Reproductive change in developing countries (pp. 199-222). New York: Oxford University Press.

Sobel, M. E. (1986). Some new results on indirect effects and their standard errors in covariance structure models. In N. B. Tuma (Ed.), Sociological Methodology (Vol. 16). Washington, DC: American Sociological Association.

Tsui, A. O. (1985). The rise of modern contraception. In J. Cleland & J. Hobcraft (Eds.), Reproductive change in developing countries (pp. 115-138). New York: Oxford University Press.

Udry, J. R., Bauman, K. E., & Chase, C. L. (1973). Population growth rates in perfect contraceptive populations. Population Studies, 27, 365-371.

Vaessen, M. (1980). Knowledge of contraceptive methods. WFS scientific reports, No. 8. Voorberg, Netherlands: International Statistical Institute.

Vaessen, M. (1984). Childlessness and infecundity. WFS scientific reports, No. 31. Voorberg, Netherlands: International Statistical Institute.

Ware, H. (1974). Ideal family size. WFS occasional papers, No. 13. Voorberg, Netherlands: International Statistical Institute.

Widmer, K. R., McClelland, G. H., & Nickerson, C. A. (1981). Determining the impact of sex preferences on fertility: A demonstration study. Demography, 18, 27-37.

Zoughlami, Y., & Allsopp, D. (1985). The demographic characteristics of household populations. WFS scientific reports, No. 45. Voorberg, Netherlands: International Statistical Institute.

Appendix A

Cohort Model Equations

The mean of Desired family size is:

$$\mu_Y = \sum_{i=0}^{k} i \cdot P(Y=i)$$

where P(Y=i) is the probability to have Y=i.

A general form of estimating P(Y=i) is:

$$P(Y=i) = (1-P_i)\prod_{j=0}^{i-1} P_j,\ \ i=0,\ldots,k,\ \ where \prod P_j = P_0\ P_1 \ldots P_{i-1}$$

where $P_i = P[(Y > i) \mid (Y \geq i)]$ is the conditional probability that Y is greater than i given that Y is at least as large as i.

The Nour (1983) model equation is:

$$P_5(Y=i) = \frac{(k+1)}{1+E(k-i)} \frac{(L_i - M_i)}{\sum_{i=0}^{k} N_i},\quad i=0,\ldots,k$$

where E is the unique solution to the following recursive equation system

$$\sum_{i=0}^{k} \frac{L_i - M_i}{1 + E(k-1)} - \frac{1}{k+1} (\sum_{i=0}^{k} N_i) .$$

Appendix B

Calculation of Variables

The following is a description of the calculation of the variables used in the analyses. The age groups were: 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, and 45-49. The parity levels or the number of surviving children ranged from zero to nine plus. The values in Appendix C of Lutz (1989, pp. 239-258) representing percent of the female population; by age and children ever born, and by marriage duration and children ever born were adjusted by using Tables 15 and 17 from Hodgson and Gibbs (1980, pp. 24, 26) to represent percent of the female population by the number of surviving children.

Educational background

Percent of female population with no schooling by age group multiplied by the total number of women by age group and parity level. The total number of women with no education across all age groups for a certain parity level divided by the total number of women across all age groups for a certain parity level. This gives the percentage of women with no education by parity level. Educational background was calculated by one minus the percent of women with no education. *Assumption* - education level within an age group remains constant across parity levels.

DFS, Nour estimate

An estimate of DFS by children ever born among currently married fecund women. This variable could not be adjusted for the number of surviving children because the Nour definition and estimate of DFS is based on children ever born.

Marriage duration

The duration of marriage in years was grouped into seven ranges; 0-4, 5-9, 10-14, 15-19, 20-24, 25-29, and over 30. The mean for each grouping was set to; 0, 5, 10, 15, 20, 25, and 30 respectively. The number of women for a given parity level and marriage duration was calculated and multiplied by the preset means for marriage duration, and then summed across the marriage durations for a given parity level. This was divided by the total number of women across marriage durations for a given parity level, giving the average marriage duration for women of a given parity level.

Birth interval

The table provides the mean birth interval in months for one to eight births, inclusive. The mean is based on a trimean (T), zero to five years before the survey, $T = (q_1 + 2q_2 + q_3)/4$. The quartiles (q_1, q_2, q_3) are defined by the "durations by which 25, 50, and

75 percent of the women who have a subsequent birth within five years have done so" (Hobcraft & McDonald, 1984, p. 10).

Breastfeeding

The table provides the mean duration of breastfeeding in months by mother's parity, for surviving children.

Female fecundity

A women was considered fecund if both the self-reported and behavioral measures agreed. Self-reported fecundity was measured by the following question "As far as you know, is it physically possible for you and your husband to have a child, supposing you wanted one?" (Vaessen, 1984, p. 12). Women who responded 'yes' or 'don't know' were classified as fecund. The behavioral measure was based on contraception use, exposure time, and interval since last birth. "Women with an open interval of five or more years who did not use contraception during that interval and were continuously married for the last five years are classified as infecund. All others are classified as fecund" (Vaessen, 1984, p. 12).

Percent of female population who are fecund by age group (< 25, 25-34, 35-44, 45+) multiplied by the number of women by age group and parity level. For overlapping age groups the same value (percent) was used. The total number of women who are fecund across all age groups for a certain parity level was divided by the total number of women across all age groups for a certain parity level. This gives the percentage of currently married women who are fecund by parity level. *Assumption* - fecundity level within an age group remains constant across parity levels.

Infant / Toddler / Child mortality rates

The table provides infant, toddler, and child mortality rates by order of birth (1, 2-3, 4-6, 7+). For overlapping parity levels the same rate was used.

Contraceptive knowledge

The table provides the percent of ever-married women reporting knowledge of any modern method by number of living children.

Non-contraceptive use

The table provides the percent of currently married women who do not use contraception by number of living children.

Appendix C

Decomposition of each Causal Path for the Primary, Reduced and Valid Models for each Country

*$p < .10$ **$p < .05$ (one tailed)

BANGLADESH - Primary Model

	DV	IV	DE	IE	UE	SE	TNE	TGE	TOTAL
1	MD	EB	-1.15**				-1.15	-1.15	-1.15**
2	CN	MD	-.32		.42		-.32	.10	.10**
3	CN	EB	-.48	.37			-.11	-.11	-.11**
4	AFS	MD	1.12**	.03	-.75		1.15	.40	.40**
5	AFS	CN	-.09		-2.87	4.94	-.09	-2.96	1.98**
6	AFS	EB	.82**	-1.28**			-.46	-.46	-.46**
7	CK	MD	.25	-2.23	2.40		-1.98	.42	.42**
8	CK	CN	3.20**	.09	-.99	1.71	3.29	2.30	4.01**
9	CK	AFS	-1.04		.55	1.41	-1.04	-.49	.92**
10	CK	EB	-.32	-.18			-.50	-.50	-.50**
11	NCU	MD	.17	.58	-1.21		.75	-.46	-.46**
12	NCU	CN	-1.56**	.93	3.14	-5.41	-.63	2.51	-2.90**
13	NCU	AFS	.58	-.31	-.37	-.97	.27	-.10	-1.07**
14	NCU	CK	.30		-.66	-.36	.30	-.36	-.72**
15	NCU	EB	.96*	-.42			.54	.54	.54**
16	DFS	MD	-.43**	.31*	.21		-.12	.09	.09**
17	DFS	CN	-.27	-.11	-1.01	1.74	-.38	-1.39	.35*
18	DFS	AFS	.18	.02	.002	.01	.20	.20	.21**
19	DFS	CK	-.04	-.03	.01	.15	-.07	-.06	.09**
20	DFS	NCU	-.09		-.06	-.03	-.09	-.15	-.18**
21	DFS	EB	-.53**	.43**			-.10	-.10	-.10**

BANGLADESH - Reduced Model

	DV	IV	DE	IE	UE	SE	TNE	TGE	TOTAL
1	MD	EB	-1.15**				-1.15	-1.15	-1.15**
2	CN	MD							
3	CN	EB	-.11**				-.11	-.11	-.11**
4	AFS	MD	1.15**		-.75		1.15	.40	.40**
5	AFS	CN							
6	AFS	EB	.87**	-1.33**			-.46	-.46	-.46**
7	CK	MD							
8	CK	CN	3.52**		.49		3.52	4.01	4.01**
9	CK	AFS							
10	CK	EB	-.10	-.40**			-.50	-.50	-.50**
11	NCU	MD							
12	NCU	CN							
13	NCU	AFS							
14	NCU	CK							
15	NCU	EB	.54**				.54	.54	.54**
16	DFS	MD	-.52*	.29	.32		-.23	.09	.09**
17	DFS	CN							
18	DFS	AFS	.25		-.01	-.02	.25	.23	.21**
19	DFS	CK							
20	DFS	NCU	.15		-.33	-.004	.15	-.18	-.18**
21	DFS	EB	-.67**	.57*			-.10	-.10	-.10**

BANGLADESH - Valid Model

	DV	IV	DE	IE	UE	SE	TNE	TGE	TOTAL
1	MD	EB	-1.15^{**}				-1.15	-1.15	-1.15^{**}
2	CN	MD							
3	CN	EB	$-.11^{**}$				-.11	-.11	$-.11^{**}$
4	AFS	MD	1.15^{**}		-.75		1.15	.40	$.40^{**}$
5	AFS	CN							
6	AFS	EB	$.87^{**}$	-1.33^{**}			-.46	-.46	$-.46^{**}$
7	CK	MD							
8	CK	CN	3.52^{**}		.49		3.52	4.01	4.01^{**}
9	CK	AFS							
10	CK	EB	-.10	$-.40^{**}$			-.50	-.50	$-.50^{**}$
11	NCU	MD							
12	NCU	CN							
13	NCU	AFS							
14	NCU	CK							
15	NCU	EB	$.54^{**}$				.54	.54	$.54^{**}$
16	DFS	MD	-.49	.37	.21		-.12	.09	$.09^{**}$
17	DFS	CN							
18	DFS	AFS	.32		-.03	-.08	.32	.29	$.21^{**}$
19	DFS	CK							
20	DFS	NCU							
21	DFS	EB	$-.52^{*}$	$.42^{*}$			-.10	-.10	$-.10^{**}$

COLUMBIA - Primary Model

	DV	IV	DE	IE	UE	SE	TNE	TGE	TOTAL
1	MD	EB	-1.75**				-1.75	-1.75	-1.75**
2	CN	MD	.66**		-.53		.66	.13	.13**
3	CN	EB	.93*	-1.15**			-.22	-.22	-.22**
4	AFS	MD	-.23	.27*	.43		.04	.47	.47**
5	AFS	CN	.41**		.47	1.61	.41	.88	2.49**
6	AFS	EB	-1.14**	.31			-.83	-.83	-.83**
7	CK	MD	-.11	1.82**	-1.64		1.71	.07	.07
8	CK	CN	2.79**	-.24	-.29	-1.01	2.55	2.26	1.25**
9	CK	AFS	-.60		1.70	-.95	-.60	1.10	.15
10	CK	EB	-.18	.08			-.10	-.10	-.10
11	NCU	MD	1.30	-12.14**	10.22		-10.84	-.62	-.62
12	NCU	CN	-15.20**	-.47	1.56	5.33	-15.67	-14.11	-8.78**
13	NCU	AFS	7.65**	.85	-18.42	8.64	8.50	-9.92	-1.28
14	NCU	CK	-1.42**		-3.88	-.38	-1.42	-5.30	-5.68**
15	NCU	EB	6.14**	-5.17*			.97	.97	.97
16	DFS	MD	.36**	-.33*	.02		.03	.05	.05**
17	DFS	CN	-.30	-.11	.13	.45	-.41	-.28	.17
18	DFS	AFS	.29	-.01	-.36	.19	.28	-.08	.11**
19	DFS	CK	-.16	.02	.01	.06	-.14	-.13	-.07
20	DFS	NCU	-.01		.03	-.01	-.01	.02	.01
21	DFS	EB	.71*	-.80*			-.09	-.09	-.09**

COLUMBIA - Valid Model

	DV	IV	DE	IE	UE	SE	TNE	TGE	TOTAL
1	MD	EB	-1.75**				-1.75	-1.75	-1.75**
2	CN	MD	.66**		-.53		.66	.13	.13**
3	CN	EB	.93*	-1.15**			-.22	-.22	-.22**
4	AFS	MD							
5	AFS	CN							
6	AFS	EB	-.83**				-.83	-.83	-.83**
7	CK	MD							
8	CK	CN	2.56**		-.30	-1.01	2.56	2.26	1.25**
9	CK	AFS							
10	CK	EB	.46**	-.56**			-.10	-.10	-.10
11	NCU	MD							
12	NCU	CN	-15.91**		1.61	5.52	-15.91	-14.30	-8.78**
13	NCU	AFS							
14	NCU	CK							
15	NCU	EB	-2.48**	3.45**			.97	.97	.97
16	DFS	MD	.30**	-.27**	.02		.03	.05	.05**
17	DFS	CN							
18	DFS	AFS							
19	DFS	CK	-.16**		.01	.08	-.16	-.15	-.07
20	DFS	NCU							
21	DFS	EB	.42**	-.51**			-.09	-.09	-.09**

COSTA RICA - Primary Model

	DV	IV	DE	IE	UE	SE	TNE	TGE	TOTAL
1	MD	EB	-2.89**				-2.89	-2.89	-2.89**
2	CN	MD	.31**		-.17		.31	.14	.14**
3	CN	EB	.49*	-.90**			-.41	-.41	-.41**
4	AFS	MD	.50	.14	-.18		.64	.46	.46**
5	AFS	CN	.45		.84	1.61	.45	1.29	2.90**
6	AFS	EB	.31	-1.64			-1.33	-1.33	-1.33**
7	CK	MD	.23*	.16	-.37		.39	.02	.02
8	CK	CN	-.14	.14	.07	.13		.07	.20*
9	CK	AFS	.31		-.12	-.13	.31	.19	.06*
10	CK	EB	.99**	-1.04*			-.05	-.05	-.05
11	NCU	MD	-14.98**	1.64	12.37		-13.34	-.96	-.96*
12	NCU	CN	-28.36**	7.04	4.11	7.82	-21.32	-17.21	-9.39**
13	NCU	AFS	15.80**	.24	-9.24	-8.95	16.04	6.80	-2.15*
14	NCU	CK	.77		30.74	-54.14	.77	31.51	-22.63**
15	NCU	EB	-31.76**	33.88			2.12	2.12	2.12
16	DFS	MD	-.54	.38	.27		-.16	.11	.11**
17	DFS	CN	-.26	.16	.24	.47	-.10	.14	.61**
18	DFS	AFS	.58	.19	-.26	-.28	.77	.51	.23**
19	DFS	CK	.38	.003	1.37	-1.36	.38	1.75	.39
20	DFS	NCU	.004		.03	-.03	.004	.03	-.004
21	DFS	EB	-1.22	.90			-.32	-.32	-.32**

COSTA RICA - Reduced Model

	DV	IV	DE	IE	UE	SE	TNE	TGE	TOTAL
1	MD	EB	-2.89**				-2.89	-2.89	-2.89**
2	CN	MD	.31**		-.17		.31	.14	.14**
3	CN	EB	.49*	-.90**			-.41	-.41	-.41**
4	AFS	MD	.64**		-.18		.64	.46	.46**
5	AFS	CN							
6	AFS	EB	.53	-1.86**			-1.33	-1.33	-1.33**
7	CK	MD							
8	CK	CN	-.08		.09	.19	-.08	.01	.20*
9	CK	AFS	.55**		-.21	-.28	.55	.34	.06*
10	CK	EB	.65**	-.70**			-.05	-.05	-.05
11	NCU	MD	-14.79**	1.46	12.37		-13.33	-.96	-.96*
12	NCU	CN	-28.46**		6.35	12.72	-28.46	-22.11	-9.39**
13	NCU	AFS	16.03**		-7.63	-10.55	16.03	8.40	-2.15*
14	NCU	CK							
15	NCU	EB	-30.99**	33.11**			2.12	2.12	2.12
16	DFS	MD	-.56**	.40**	.27		-.16	.11	.11**
17	DFS	CN							
18	DFS	AFS	.61**		-.16	-.22	.62	.45	.23**
19	DFS	CK							
20	DFS	NCU							
21	DFS	EB	-1.12**	.80**			-.32	-.32	-.32**

COSTA RICA - Valid Model

	DV	IV	DE	IE	UE	SE	TNE	TGE	TOTAL
1	MD	EB	-2.89**				-2.89	-2.89	-2.89**
2	CN	MD	.31**		-.17		.31	.14	.14**
3	CN	EB	.49*	-.90**			-.41	-.41	-.41**
4	AFS	MD	.64**		-.18		.64	.46	.46**
5	AFS	CN							
6	AFS	EB	.53	-1.86**			-1.33	-1.33	-1.33**
7	CK	MD							
8	CK	CN							
9	CK	AFS	.52**		-.19	-.27	.52	.33	.06*
10	CK	EB	.64**	-.69**			-.05	-.05	-.05
11	NCU	MD	-14.79**	1.46	12.37		-13.33	-.96	-.96*
12	NCU	CN	-28.46**		6.35	12.72	-28.46	-22.11	-9.39**
13	NCU	AFS	16.03**		-7.63	-10.55	16.03	8.40	-2.15*
14	NCU	CK							
15	NCU	EB	-30.99**	33.11**			2.12	2.12	2.12
16	DFS	MD	-.56**	.40**	.27		-.16	.11	.11**
17	DFS	CN							
18	DFS	AFS	.61**		-.16	-.22	.62	.45	.23**
19	DFS	CK							
20	DFS	NCU							
21	DFS	EB	-1.12**	.80**			-.32	-.32	-.32**

DOMINICAN REPUBLIC - Primary Model

	DV	IV	DE	IE	UE	SE	TNE	TGE	TOTAL
1	MD	EB	-1.73**				-1.73	-1.73	-1.73**
2	CN	MD	.33**		-.21		.33	.12	.12**
3	CN	EB	.39*	-.57**			-.18	-.18	-.18**
4	AFS	MD	.28**	.15*	.05		.43	.48	.48**
5	AFS	CN	.45**		.75	1.17	.45	1.20	2.37**
6	AFS	EB	-.26*	-.57**			-.83	-.83	-.83**
7	CK	MD	-.20	.15	.08		-.05	.03	.03
8	CK	CN	-.58**	.36*	.09	.15	-.22	-.13	.02
9	CK	AFS	.79**		-.44	-.28	.79	.35	.07*
10	CK	EB	.14	-.20			-.06	-.06	-.06*
11	NCU	MD	-6.10**	1.01	4.10		-5.09	-.99	-.99**
12	NCU	CN	-12.84**	6.09**	-.84	-1.31	-6.75	-7.59	-8.90**
13	NCU	AFS	11.82**	-2.65*	-6.93	-4.22	9.17	2.24	-1.98**
14	NCU	CK	-3.34**		13.98	-7.64	-3.34	10.64	3.00
15	NCU	EB	-1.98**	3.30**			1.32	1.32	1.32*
16	DFS	MD	-.03	.02	.08		-.01	.07	.07**
17	DFS	CN	-.44	.17	.19	.29	-.27	-.08	.21
18	DFS	AFS	.59	.06	-.31	-.19	.65	.34	.15**
19	DFS	CK	-.15	-.06	.98	-.08	-.21	.77	.69**
20	DFS	NCU	.02		.03	-.06	.02	.05	-.01
21	DFS	EB	.19	-.32**			-.13	-.13	-.13**

DOMINICAN REPUBLIC - Valid Model

	DV	IV	DE	IE	UE	SE	TNE	TGE	TOTAL
1	MD	EB	-1.73**				-1.73	-1.73	-1.73**
2	CN	MD	.33**		-.21		.33	.12	.12**
3	CN	EB	.39*	-.57**			-.18	-.18	-.18**
4	AFS	MD	.43**		.05		.43	.48	.48**
5	AFS	CN							
6	AFS	EB	-.08	-.75**			-.83	-.83	-.83**
7	CK	MD	-.20	.15	.08		-.05	.03	.03
8	CK	CN	-.58**		.19	.41	-.58	-.39	.02
9	CK	AFS	.79**		-.38	-.34	.79	.41	.07*
10	CK	EB	.14	-.20			-.06	-.06	-.06*
11	NCU	MD	-5.43**	.34	4.10		-5.09	-.99	-.99**
12	NCU	CN	-10.91**		.23	1.78	-10.91	-10.68	-8.90**
13	NCU	AFS	9.17**		-5.81	-5.34	9.17	3.36	-1.98**
14	NCU	CK							
15	NCU	EB	-2.46**	3.78**			1.32	1.32	1.32*
16	DFS	MD							
17	DFS	CN	-.56**		.27	.50	-.56	-.29	.21
18	DFS	AFS	.48**		-.17	-.16	.48	.31	.15**
19	DFS	CK							
20	DFS	NCU							
21	DFS	EB	.17**	-.30**			-.13	-.13	-.13**

JAMAICA - Primary Model

	DV	IV	DE	IE	UE	SE	TNE	TGE	TOTAL
1	MD	EB	-.61**				-.61	-.61	-.61**
2	CN	MD	.002		.14		.002	.14	.14**
3	CN	EB	-.09	-.001			-.09	-.09	-.09**
4	AFS	MD	.53**	.001	.005		.53	.53	.53**
5	AFS	CN	.45**		2.08	.02	.45	2.53	2.55**
6	AFS	EB	.04	-.36**			-.32	-.32	-.32**
7	CK	MD	-.50	.56	-.10		.06	-.04	-.04*
8	CK	CN	.08	.47	-.61	-.007	.55	-.06	-.06
9	CK	AFS	1.06		-.54	-.59	1.06	.52	-.07
10	CK	EB	.08	-.05			.03	.03	.03*
11	NCU	MD	-1.65	2.76	-2.22		1.11	-1.11	-1.11**
12	NCU	CN	-1.71	-.10	-4.60	-.05	-1.81	-6.41	-6.46**
13	NCU	AFS	5.80	-5.12	-1.32	-1.45	.68	-.64	-2.09**
14	NCU	CK	-4.82**		5.55	3.41	-4.82	.73	4.14
15	NCU	EB	1.67**	-.87*			.80	.80	.80**
16	DFS	MD	.07**	-.09**	.05		-.02	.03	.03**
17	DFS	CN	-.02	-.09**	.21	.002	-.11	.10	.10**
18	DFS	AFS	-.20**	.04	.10	.11	-.16	-.06	.05**
19	DFS	CK	.03	-.06*	-.13	-.07	-.03	-.16	-.23**
20	DFS	NCU	.01**		-.16	.13	.01	-.15	-.02**
21	DFS	EB	-.05**	.03**			-.02	-.02	-.02**

JAMAICA - Reduced Model

	DV	IV	DE	IE	UE	SE	TNE	TGE	TOTAL
1	MD	EB	-.61**				-.61	-.61	-.61**
2	CN	MD							
3	CN	EB	-.09**				-.09	-.09	-.09**
4	AFS	MD	.53**		.004		.53	.53	.53**
5	AFS	CN							
6	AFS	EB	-.003	-.32**			-.32	-.32	-.32**
7	CK	MD	-.57**	.63**	-.10		.06	-.04	-.04*
8	CK	CN							
9	CK	AFS	1.19**		-.64	-.62	1.19	.55	-.07
10	CK	EB	.07*	-.04			.03	.03	.03*
11	NCU	MD							
12	NCU	CN							
13	NCU	AFS	1.62*		-1.87	-1.84	1.62	-.25	-2.09**
14	NCU	CK							
15	NCU	EB	1.33**	-.53*			.80	.80	.80**
16	DFS	MD	.10**	-.12**	.05		-.02	.03	.03**
17	DFS	CN							
18	DFS	AFS	-.22**		.14	.13	-.22	-.08	.05**
19	DFS	CK							
20	DFS	NCU							
21	DFS	EB	-.03**	.01**			-.02	-.02	-.02**

JAMAICA - Valid Model

	DV	IV	DE	IE	UE	SE	TNE	TGE	TOTAL
1	MD	EB	-.61**				-.61	-.61	-.61**
2	CN	MD							
3	CN	EB	-.09**				-.09	-.09	-.09**
4	AFS	MD	.53**		.004		.53	.53	.53**
5	AFS	CN							
6	AFS	EB	-.003	-.32**			-.32	-.32	-.32**
7	CK	MD	-.57**	.63**	-.10		.06	-.04	-.04*
8	CK	CN							
9	CK	AFS	1.19**		-.64	-.62	1.19	.55	-.07
10	CK	EB	.07*	-.04			.03	.03	.03*
11	NCU	MD							
12	NCU	CN							
13	NCU	AFS							
14	NCU	CK							
15	NCU	EB	.80**				.80	.80	.80**
16	DFS	MD	.10**	-.12**	.05		-.02	.03	.03**
17	DFS	CN							
18	DFS	AFS	-.22**		.14	.13	-.22	-.08	.05**
19	DFS	CK							
20	DFS	NCU							
21	DFS	EB	-.03**	.01**			-.02	-.02	-.02**

JORDAN - Primary Model

	DV	IV	DE	IE	UE	SE	TNE	TGE	TOTAL
1	MD	EB	-.42**				-.42	-.42	-.42**
2	CN	MD	-.54**		.65		-.54	.11	.11**
3	CN	EB	-.28**	.23**			-.05	-.05	-.05**
4	AFS	MD	.28**	-.26**	.43		.02	.45	.45**
5	AFS	CN	.48**		-1.19	3.22	.48	-.71	2.51**
6	AFS	EB	-.05	-.14**			-.19	-.19	-.19**
7	CK	MD	-.24	-.77*	1.16		-1.01	.15	.15**
8	CK	CN	1.43**	.06	.001	-.003	1.49	1.49	1.49**
9	CK	AFS	.12		.03	.23	.12	.15	.38**
10	CK	EB	-.08	.006			-.07	-.07	-.07**
11	NCU	MD	1.38	3.73*	-6.00		5.11	-.89	-.89**
12	NCU	CN	-7.33*	-.07	.38	-1.04	-7.40	-7.02	-8.06**
13	NCU	AFS	-.74	.02	-.27	-1.17	-.72	-.99	-2.16**
14	NCU	CK	.19		-7.26	2.35	.19	-7.07	-4.72**
15	NCU	EB	.48	-.08			.40	.40	.40**
16	DFS	MD	.13	.07	-.18		.20	.02	.02
17	DFS	CN	-.75	.70	-.06	.16	-.05	-.11	.05
18	DFS	AFS	.41	.04	-.22	-.18	.45	.23	.05
19	DFS	CK	.23	-.004	-.59	.40	.23	-.36	.04
20	DFS	NCU	-.02		.09	-.08	-.02	.07	-.01
21	DFS	EB	.11	-.12			-.01	-.01	-.01

JORDAN - Valid Model

	DV	IV	DE	IE	UE	SE	TNE	TGE	TOTAL
1	MD	EB	$-.42^{**}$				-.42	-.42	$-.42^{**}$
2	CN	MD							
3	CN	EB	$-.05^{**}$				-.05	-.05	$-.05^{**}$
4	AFS	MD							
5	AFS	CN							
6	AFS	EB	$-.19^{**}$				-.19	-.19	$-.19^{**}$
7	CK	MD							
8	CK	CN	1.66^{**}		-.17		1.66	1.49	1.49^{**}
9	CK	AFS							
10	CK	EB	.01	$-.08^{**}$			-.07	-.07	$-.07^{**}$
11	NCU	MD							
12	NCU	CN	-8.32^{**}		.26		-8.32	-8.06	-8.06^{**}
13	NCU	AFS							
14	NCU	CK							
15	NCU	EB	-.02	$.42^{**}$			.40	.40	$.40^{**}$
16	DFS	MD							
17	DFS	CN	-.32		.32	.05	-.32	.004	.05
18	DFS	AFS	.52		-.47	-.003	.52	.05	.05
19	DFS	CK							
20	DFS	NCU							
21	DFS	EB	.07	-.08			-.01	-.01	-.01

KOREA - Primary Model

	DV	IV	DE	IE	UE	SE	TNE	TGE	TOTAL
1	MD	EB	-.75**				-.75	-.75	-.75**
2	CN	MD	.38		-.28		.38	.10	.10**
3	CN	EB	.21	-.28			-.07	-.07	-.07**
4	AFS	MD	-.11	.18	.27		.07	.34	.34**
5	AFS	CN	.48**		.57	1.62	.48	1.05	2.67**
6	AFS	EB	-.31*	.05			-.26	-.26	-.26**
7	CK	MD	.74**	.76	-1.51		1.50	-.01	-.01
8	CK	CN	1.83**	.48*	-.44	-1.25	2.31	1.87	.62*
9	CK	AFS	1.00**		-.80	-.18	1.00	.20	.02
10	CK	EB	.95**	-.94**			.01	.01	.01
11	NCU	MD	-12.57**	-8.16**	19.96		-20.73	-.77	-.77**
12	NCU	CN	14.40**	-20.17**	-.70	-2.03	-5.77	-6.47	-8.50**
13	NCU	AFS	2.08	-9.18**	5.14	-.25	-7.10	-1.96	-2.21**
14	NCU	CK	-9.17**		6.34	-2.95	-9.17	-2.83	-5.78**
15	NCU	EB	-7.21*	7.74**			.53	.53	.53*
16	DFS	MD	.26	-.22	-.01		.04	.03	.03**
17	DFS	CN	-.44	.23	.10	.27	-.21	-.11	-.16*
18	DFS	AFS	-.77**	.15	.79	-.10	-.62	.17	.07**
19	DFS	CK	.32	-.21	-.13	-.08	.11	-.02	-.10
20	DFS	NCU	.02		-.01	-.02	.02	.01	-.01
21	DFS	EB	-.07	.05			-.02	-.02	-.02**

KOREA - Reduced Model

	DV	IV	DE	IE	UE	SE	TNE	TGE	TOTAL
1	MD	EB	-.75**				-.75	-.75	-.75**
2	CN	MD	.38		-.28		.38	.10	.10**
3	CN	EB	.21	-.28			-.07	-.07	-.07**
4	AFS	MD							
5	AFS	CN							
6	AFS	EB	-.26**				-.26	-.26	-.26**
7	CK	MD							
8	CK	CN	2.14**		-.42	-1.10	2.14	1.72	.62*
9	CK	AFS	.86**		-.87	.03	.86	-.01	.02
10	CK	EB	.39**	-.38**			.01	.01	.01
11	NCU	MD							
12	NCU	CN	24.19**	-30.72**	-.12	-1.84	-6.53	-6.65	-8.50**
13	NCU	AFS							
14	NCU	CK	-14.37**		10.10	-1.51	-14.37	-4.27	-5.78**
15	NCU	EB	2.40**	-1.87**			.53	.53	.53*
16	DFS	MD	.48	-.06	-.39		.42	.03	.03**
17	DFS	CN	.56	-.72	.09	.23	-.16	-.07	-.16*
18	DFS	AFS							
19	DFS	CK	-.31	-.13	.33	.01	-.44	-.11	-.10
20	DFS	NCU	.009		.02	-.03	.009	.02	-.01
21	DFS	EB	.38	-.40			-.02	-.02	-.02**

KOREA - Reduced Model

	DV	IV	DE	IE	UE	SE	TNE	TGE	TOTAL
1	MD	EB	-.75**				-.75	-.75	-.75**
2	CN	MD	.38		-.28		.38	.10	.10**
3	CN	EB	.21	-.28			-.07	-.07	-.07**
4	AFS	MD							
5	AFS	CN							
6	AFS	EB	-.26**				-.26	-.26	-.26**
7	CK	MD							
8	CK	CN	2.52**		-.49	-1.41	2.52	2.03	.62*
9	CK	AFS							
10	CK	EB	.19**	-.18**			.01	.01	.01
11	NCU	MD							
12	NCU	CN	24.19**	-36.17**	.90	2.58	-11.98	-11.08	-8.50**
13	NCU	AFS							
14	NCU	CK	-14.37**		8.83	-.24	-14.37	-5.54	-5.78**
15	NCU	EB	2.40**	-1.87**			.53	.53	.53*
16	DFS	MD	.12	-.08	-.01		.04	.03	.03**
17	DFS	CN	-.21		.10	.27	-.21	-.11	-.16*
18	DFS	AFS							
19	DFS	CK							
20	DFS	NCU							
21	DFS	EB	.05	-.07			-.02	-.02	-.02**

KOREA - Valid Model

	DV	IV	DE	IE	UE	SE	TNE	TGE	TOTAL
1	MD	EB	-.75**				-.75	-.75	-.75**
2	CN	MD	.38		-.28		.38	.10	.10**
3	CN	EB	.21	-.28			-.07	-.07	-.07**
4	AFS	MD							
5	AFS	CN							
6	AFS	EB	-.26**				-.26	-.26	-.26**
7	CK	MD							
8	CK	CN	2.52**		-.49	-1.41	2.52	2.03	.62*
9	CK	AFS							
10	CK	EB	.19**	-.18**			.01	.01	.01
11	NCU	MD							
12	NCU	CN	24.19**	-36.17**	.90	2.58	-11.98	-11.08	-8.50**
13	NCU	AFS							
14	NCU	CK	-14.37**		8.83	-.24	-14.37	-5.54	-5.78**
15	NCU	EB	2.40**	-1.87**			.53	.53	.53*
16	DFS	MD	.04		-.01		.04	.03	.03**
17	DFS	CN							
18	DFS	AFS							
19	DFS	CK							
20	DFS	NCU							
21	DFS	EB	.01	-.03			-.02	-.02	-.02**

PANAMA - Primary Model

	DV	IV	DE	IE	UE	SE	TNE	TGE	TOTAL
1	MD	EB	-3.26**				-3.26	-3.26	-3.26**
2	CN	MD	.65**		-.50		.65	.15	.15**
3	CN	EB	1.64**	-2.11**			-.47	-.47	-.47**
4	AFS	MD	-.29	.73**	.05		.44	.49	.49**
5	AFS	CN	1.13**		.36	1.35	1.13	1.49	2.84**
6	AFS	EB	-2.00**	.41			-1.59	-1.59	-1.59**
7	CK	MD	-.37	.92*	-.58		.55	-.03	-.03
8	CK	CN	.86	.93	-.37	-1.36	1.79	1.42	.06
9	CK	AFS	.83		-.37	-.50	.83	.46	-.04
10	CK	EB	.61	-.50			.11	.11	.11
11	NCU	MD	-2.66	-12.90**	14.53		-15.56	-1.03	-1.03**
12	NCU	CN	-23.44**	6.03	1.68	6.19	-17.41	-15.73	-9.54**
13	NCU	AFS	4.30	.54	-13.61	6.61	4.84	-8.77	-2.16**
14	NCU	CK	.66		-12.04	5.95	.66	-11.38	-5.43
15	NCU	EB	-10.00	12.94			2.94	2.94	2.94*
16	DFS	MD	.23	-.32	.18		-.09	.09	.09**
17	DFS	CN	1.02	-1.12	.12	.43	-.10	.02	.45**
18	DFS	AFS	-.18	.36	-.11	.10	.18	.07	.17**
19	DFS	CK	.08	.04	-.22	-.07	.12	-.10	-.17
20	DFS	NCU	.06**		-.05	-.02	.06	.01	-.01
21	DFS	EB	.46	-.74			-.28	-.28	-.28**

PANAMA - Reduced Model

	DV	IV	DE	IE	UE	SE	TNE	TGE	TOTAL
1	MD	EB	-3.26**				-3.26	-3.26	-3.26**
2	CN	MD	.65**		-.50		.65	.15	.15**
3	CN	EB	1.64**	-2.11**			-.47	-.47	-.47**
4	AFS	MD	.44**		.05		.44	.49	.49**
5	AFS	CN							
6	AFS	EB	-.15	-1.44**			-1.59	-1.59	-1.59**
7	CK	MD							
8	CK	CN							
9	CK	AFS	1.23**		-.67	-.60	1.23	.56	-.04
10	CK	EB	2.07**	-1.96**			.11	.11	.11
11	NCU	MD							
12	NCU	CN	-21.96**		2.65	9.77	-21.96	-19.31	-9.54**
13	NCU	AFS							
14	NCU	CK							
15	NCU	EB	-7.39**	10.33**			2.94	2.94	2.94*
16	DFS	MD	.20	-.21	.10		-.01	.09	.09**
17	DFS	CN	1.10*	-1.35**	.15	.55	-.25	-.10	.45**
18	DFS	AFS	-.12		.15	.14	-.12	.03	.17**
19	DFS	CK							
20	DFS	NCU	.06**		-.05	-.02	.06	.01	-.01
21	DFS	EB	.51	-.79			-.28	-.28	-.28**

PANAMA - Valid Model

	DV	IV	DE	IE	UE	SE	TNE	TGE	TOTAL
1	MD	EB	-3.26**				-3.26	-3.26	-3.26**
2	CN	MD	.65**		-.50		.65	.15	.15**
3	CN	EB	1.64**	-2.11**			-.47	-.47	-.47**
4	AFS	MD	.44**		.05		.44	.49	.49**
5	AFS	CN							
6	AFS	EB	-.15	-1.44**			-1.59	-1.59	-1.59**
7	CK	MD							
8	CK	CN							
9	CK	AFS	1.23**		-.67	-.60	1.23	.56	-.04
10	CK	EB	2.07**	-1.96**			.11	.11	.11
11	NCU	MD							
12	NCU	CN	-21.96**		2.65	9.77	-21.96	-19.31	-9.54**
13	NCU	AFS							
14	NCU	CK							
15	NCU	EB	-7.39**	10.33**			2.94	2.94	2.94*
16	DFS	MD	.22	-.24	.11		-.02	.09	.09**
17	DFS	CN	.93**	-1.30**	.17	.65	-.37	-.20	.45**
18	DFS	AFS							
19	DFS	CK							
20	DFS	NCU	.06**		-.04	-.03	.06	.02	-.01
21	DFS	EB	.71	-.99			-.28	-.28	-.28**

PERU - Primary Model

	DV	IV	DE	IE	UE	SE	TNE	TGE	TOTAL
1	MD	EB	-.82**				-.82	-.82	-.82**
2	CN	MD	.61**		-.47		.61	.14	.14**
3	CN	EB	.39*	-.50**			-.11	-.11	-.11**
4	AFS	MD	.45	.17	-.16		.62	.46	.46**
5	AFS	CN	.28		.53	1.94	.28	.81	2.75**
6	AFS	EB	.02	-.39			-.37	-.37	-.37**
7	CK	MD	.75	1.81	-2.72		2.56	-.16	-.16
8	CK	CN	4.05**	-.30	-.84	-3.05	3.75	2.91	-.14
9	CK	AFS	-1.09		.58	.18	-1.09	-.51	-.33
10	CK	EB	.79	-.65			.14	.14	.14
11	NCU	MD	-2.63	-8.30	10.56		-10.93	-.37	-.37
12	NCU	CN	-10.00**	-5.21	2.14	7.74	-15.21	-13.07	-5.33**
13	NCU	AFS	3.27**	1.78	-3.70	-2.13	5.05	1.35	-.78
14	NCU	CK	-1.63**		-2.36	1.83	-1.63	-3.99	-2.16**
15	NCU	EB	-1.56	1.83			.27	.27	.27
16	DFS	MD	-.14	-.25*	.45		-.39	.06	.06**
17	DFS	CN	.20	-.42*	.11	.38	-.22	-.11	.27**
18	DFS	AFS	-.19**	.11	.09	.11	-.08	.01	.12**
19	DFS	CK	-.06*	-.01	.03	-.07	-.07	-.04	-.11**
20	DFS	NCU	.009		-.002	.003	.009	.007	.01
21	DFS	EB	-.21**	.16**			-.05	-.05	-.05**

PERU - Valid Model

	DV	IV	DE	IE	UE	SE	TNE	TGE	TOTAL
1	MD	EB	-.82**				-.82	-.82	-.82**
2	CN	MD	.61**		-.47		.61	.14	.14**
3	CN	EB	.39*	-.50**			-.11	-.11	-.11**
4	AFS	MD	.62*		-.16		.62	.46	.46**
5	AFS	CN							
6	AFS	EB	.13	-.50*			-.37	-.37	-.37**
7	CK	MD							
8	CK	CN	4.36**		-.97	-3.53	4.36	3.39	-.14
9	CK	AFS	-.91		.24	.34	-.91	-.67	-.33
10	CK	EB	.28	-.14			.14	.14	.14
11	NCU	MD							
12	NCU	CN	-16.05**		2.32	8.40	-16.05	-13.73	-5.33**
13	NCU	AFS							
14	NCU	CK							
15	NCU	EB	-1.52**	1.79**			.27	.27	.27
16	DFS	MD							
17	DFS	CN							
18	DFS	AFS	-.18**		.13	.17	-.18	-.05	.12**
19	DFS	CK							
20	DFS	NCU	.02**			-.01	.02	.02	.01
21	DFS	EB	-.12**	.07**			-.05	-.05	-.05**

PHILIPPINES - Primary Model

	DV	IV	DE	IE	UE	SE	TNE	TGE	TOTAL
1	MD	EB	-3.94**				-3.94	-3.94	-3.94**
2	CN	MD	.60**		-.48		.60	.12	.12**
3	CN	EB	1.92**	-2.35**			-.43	-.43	-.43**
4	AFS	MD	.12	.46**	-.14		.58	.44	.44**
5	AFS	CN	.78**		.43	1.40	.78	1.21	2.61**
6	AFS	EB	-.91**	-.81**			-1.72	-1.72	-1.72**
7	CK	MD	.25	.92	-1.20		1.17	-.03	-.03
8	CK	CN	6.64**	-4.05**	-.44	-1.43	2.59	2.15	.72
9	CK	AFS	-5.20**		4.10	1.06	-5.20	-1.10	-.04
10	CK	EB	-4.90	5.11*			.21	.21	.21
11	NCU	MD	-4.06**	-6.33**	9.66		-10.39	-.73	-.73*
12	NCU	CN	-17.74**	3.97	.89	2.91	-13.77	-12.88	-9.97**
13	NCU	AFS	10.58**	8.59*	-17.02	-4.07	19.17	2.15	-1.92**
14	NCU	CK	-1.65**		-2.20	-.58	-1.65	-3.85	-4.43**
15	NCU	EB	-2.78	5.10			2.32	2.32	2.32
16	DFS	MD	-.16	-.25	.59		-.41	.18	.18**
17	DFS	CN	-.005	-.25	.23	.74	-.26	-.03	.71**
18	DFS	AFS	.84*	1.15**	-1.23	-.37	1.99	.76	.39**
19	DFS	CK	.07	-.13**	-.27	.03	-.06	-.33	-.30*
20	DFS	NCU	.08**		-.003	-.08	.08	.08	.001
21	DFS	EB	-.12	-.60			-.72	-.72	-.72**

PHILIPPINES - Valid Model

	DV	IV	DE	IE	UE	SE	TNE	TGE	TOTAL
1	MD	EB	-3.94**				-3.94	-3.94	-3.94**
2	CN	MD	.60**		-.48		.60	.12	.12**
3	CN	EB	1.92**	-2.35**			-.43	-.43	-.43**
4	AFS	MD							
5	AFS	CN							
6	AFS	EB	-1.72**				-1.72	-1.72	-1.72**
7	CK	MD							
8	CK	CN	6.57**		-.92	-4.93	6.57	5.65	.72
9	CK	AFS	-4.86**		4.54	.28	-4.86	-.32	-.04
10	CK	EB	-5.33*	5.55*			.21	.21	.21
11	NCU	MD							
12	NCU	CN	-15.77**		1.36	4.44	-15.77	-14.41	-9.97**
13	NCU	AFS							
14	NCU	CK							
15	NCU	EB	-4.53**	6.85**			2.32	2.32	2.32
16	DFS	MD							
17	DFS	CN							
18	DFS	AFS							
19	DFS	CK							
20	DFS	NCU	.04**		-.005	-.03	.04	.03	.001
21	DFS	EB	-.81**	.09			-.72	-.72	-.72**

Appendix D

Correlations of the Causal Model Factor and Variables for Each Country.

$^{*}p < .10$ $^{**}p < .05$ (one tailed)

If standardized scores were used in the causal analysis, the Total effect of one variable on another in the primary model would equal the correlation coefficient between the two variables (Kendall & O'Muircheartaigh, 1977). The test of the correlation coefficient and the test of the corresponding Total effect from the primary model, if standardized scores were used, should yield the same results. Since raw scores were used in this study, these results can not be exactly the same.

A comparison between p-values for the Total effect from the primary model and the corresponding correlation coefficient indicated some discrepancies between the statistical programs (SASPA vs SAS). With alpha set at .05, the following variable pairs, noted by country had a p-value of less than .05 for the Total effect, and a p-value of less than .10 for the correlation coefficient: (a) Korea MD → NCU and AFS → NCU; (b) Panama MD → NCU and AFS → NCU; and (c) Philippines AFS → NCU, and CN → DFS. The dissimilar p-values may be due to rounding differences in the statistical programs (i.e., SASPA vs SAS) (Huynh, 1992; SAS Institute Inc., 1990).

Bangladesh

	MD	CN	AFS	CK	NCU	DFS
EB	-.99**	-.73**	-.97**	-.78**	.98**	-.92**
MD		.72**	.98**	.76**	-.96**	.91**
CN			.65**	.96**	-.82**	.48*
AFS				.67**	-.91**	.88**
CK					-.85**	.55**
NCU						-.88**

Columbia

	MD	CN	AFS	CK	NCU	DFS
EB	-.99**	-.79**	-.99**	-.20	.33	-.79**
MD		.81**	.99**	.24	-.37	.79**
CN			.82**	.71**	-.82**	.39
AFS				.25	-.36	.76**
CK					-.93**	-.27
NCU						.13

Costa Rica

	MD	CN	AFS	CK	NCU	DFS
EB	-.99**	-.91**	-.98**	-.26	.31	-.90**
MD		.94**	.99**	.37	-.41	.86**
CN			.96**	.47*	-.62**	.76**
AFS				.44*	-.43*	.87**
CK					-.63**	.20
NCU						-.02

Dominican Republic

	MD	CN	AFS	CK	NCU	DFS
EB	$-.97^{**}$	$-.65^{**}$	$-.97^{**}$	-.42	$.46^{*}$	$-.83^{**}$
MD		$.75^{**}$	$.99^{**}$	.37	$-.61^{**}$	$.80^{**}$
CN			$.78^{**}$	.05	$-.87^{**}$	.37
AFS				.42	$-.59^{**}$	$.82^{**}$
CK					.14	$.59^{**}$
NCU						-.11

Jamaica

	MD	CN	AFS	CK	NCU	DFS
EB	$-.96^{**}$	$-.83^{**}$	$-.95^{**}$	$.49^{*}$	$.91^{**}$	$-.90^{**}$
MD		$.80^{**}$	$.99^{**}$	-.42	$-.80^{**}$	$.81^{**}$
CN			$.84^{**}$	-.11	$-.83^{**}$	$.56^{**}$
AFS				-.36	$-.81^{**}$	$.77^{**}$
CK					.30	$-.73^{**}$
NCU						$-.77^{**}$

Jordan

	MD	CN	AFS	CK	NCU	DFS
EB	$-.99^{**}$	$-.80^{**}$	$-.99^{**}$	$-.70^{**}$	$.76^{**}$	-.30
MD		$.75^{**}$	$.99^{**}$	$.64^{**}$	$-.70^{**}$	.33
CN			$.83^{**}$	$.93^{**}$	$-.96^{**}$	.10
AFS				$.72^{**}$	$-.78^{**}$	.31
CK					$-.90^{**}$	.15
NCU						-.10

Korea

	MD	CN	AFS	CK	NCU	DFS
EB	$-.99^{**}$	$-.85^{**}$	$-.99^{**}$	.06	$.48^{*}$	$-.68^{**}$
MD		$.86^{**}$	$.99^{**}$	-.03	$-.52^{*}$	$.68^{**}$
CN			$.88^{**}$	$.44^{*}$	$-.66^{**}$	$.44^{*}$
AFS				.04	$-.52^{*}$	$.57^{**}$
CK					$-.64^{**}$	-.38
NCU						-.17

Panama

	MD	CN	AFS	CK	NCU	DFS
EB	$-.99^{**}$	$-.89^{**}$	$-.99^{**}$	.26	$.44^{*}$	$-.83^{**}$
MD		$.92^{**}$	$.99^{**}$	-.22	$-.51^{*}$	$.82^{**}$
CN			$.93^{**}$	.07	$-.76^{**}$	$.70^{**}$
AFS				-.14	$-.52^{*}$	$.82^{**}$
CK					-.34	-.20
NCU						-.11

Peru

	MD	CN	AFS	CK	NCU	DFS
EB	$-.99^{**}$	$-.89^{**}$	$-.98^{**}$	.38	.24	$-.85^{**}$
MD		$.90^{**}$	$.99^{**}$	-.35	-.28	$.82^{**}$
CN			$.91^{**}$	-.05	$-.60^{**}$	$.59^{**}$
AFS				-.35	-.27	$.78^{**}$
CK					$-.71^{**}$	$-.73^{**}$
NCU						.20

Philippines

	MD	CN	AFS	CK	NCU	DFS
EB	-.99**	-.75**	-.98**	.18	.34	-.93**
MD		.80**	.99**	-.12	-.42	.89**
CN			.86**	.36	-.84**	.53*
AFS				-.05	-.49*	.87**
CK					-.75**	-.45*
NCU						-.01