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Modeling aggregate trade flow and measuring openness to international trade

Sari, Osman, Ph.D.

City University of New York, 1993

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MODELING AGGREGATE TRADE FLOW AND MEASURING OPENNESS TO INTERNATIONAL TRADE

by

OSMAN SARI

A dissertation submitted to the Graduate Faculty in Economics in partial fulfillment of the requirements for the degree of Doctor of Philosophy, The City University of New York

1993

This manuscript has been read and accepted for the Graduate Faculty in Economics in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

April 28, 1993
Date

Robert E. Lipsey
Robert E. Lipsey,
Chair of Examining Committee

April 28, 1993
Date

Michael Grossman
Michael Grossman,
Executive Officer

Robert E. Lipsey
Michael Grossman
Salih Neftçi
Supervisory Committee

THE CITY UNIVERSITY OF NEW YORK

Abstract

MODELING AGGREGATE TRADE FLOW AND MEASURING OPENNESS TO INTERNATIONAL TRADE

by

OSMAN SARI

Adviser: Professor Robert Edward Lipsey

The effects of openness to international trade have been increasingly emphasized in the literature of international trade, macro analysis and development economics. However, there is no general agreement as to: (i) what openness is; (ii) how to measure it and; (iii) how it is linked to other economic variables. The primary purpose of this dissertation is to present a framework in which we can deal with these three questions simultaneously. I define openness of a country as its trade intensity relative to a norm. The norm is the predicted trade intensity under the assumption that the height of artificial barriers of the given country is the same with the height of artificial barriers of the base country. This dissertation contains four chapters. The first chapter is introduction. In the second chapter, the concept of openness, its use in international trade, macro analysis and development economics and the existing indicators of openness is discussed. In the third chapter, first three

theoretical models implying gravity equations are presented, then a search theoretical model of aggregate trade flows that supports the variable selection in gravity equations is introduced. In the last chapter, first, the empirical model and findings are discussed. Secondly, an openness index that is continuos, objective, interpretable, implementable, and comparable among countries and over time is introduced. Lastly, the openness index is compared with existing indicators of openness. The openness index is highly correlated with other indicators of openness.

Preface

iBRAHiM KAPTAN VE SAMi USTA'NIN ANISIYLA

ÖNCELiKLE PROFESÖR LIPSEY VE RESAT HOCA'YA

During my Ph.D. education I took fellowships and scholarships from the Graduate School and University Center of the City University of New York. I am grateful for this support in the absence of which I could not finish my Ph.D.

I am indebted to all of my professors at Bogaziçi University, the City University of New York, and Colombia University. They have been shaping my understanding of economics.

I thank R. Erzan, G. Evcimen, M. Grossman, S. Neftçi, S. Özmucur, R. Kayali and other participants of seminars at the City University of New York (3/31/1992) and at Bogaziçi University (4/7/1993).

The comments of M. Grossman, especially on the theoretical part of my dissertation and its link to the empirical results, and the comments of S. Neftçi, especially on the statistical properties of the model, have been very helpful. I thank them.

Working at the New York Office of the National Bureau of Economic Research has been a wonderful experience. I thank

the friends at NBER: without their help and understanding my dissertation would take longer time.

At most I want to thank R. E. Lipsey whose help has not been limited by my dissertation. His comments have always been like the light at the end of the tunnel; his critiques have been fruitful; and his patience combined with his excellence in the field has been encouraging.

Translating is betraying the original. Considering science as a translation of reality into statements, I accept all responsibility of treachery.

Osman SARI

Flushing, April 27th 1993

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I. Introduction

The effects of openness to international trade have been increasingly emphasized in the literature of international trade, macro analysis and development economics. In the development economics literature it is often said that the rate of growth of an economy is affected by its degree of openness to international trade. In macroeconomic analysis, it is argued that the level and time-series variability of macroeconomic variables, e.g., GNP, employment, and inflation, are a function of openness. Static and dynamic effects of openness have been always part of the agenda of international economics. However, there is no general agreement as to: (i) what openness is; (ii) how to measure it and; (iii) how it is linked to other economic variables. My first purpose is to present a framework in which we can deal with these three questions simultaneously.

I define openness of a country as its trade propensity[1] relative to a norm. The norm is the predicted trade propensity under the assumption that the height of artificial barriers of given country is the same with that of the base country. Accordingly, openness is the trade propensity of the base country if it has the same natural

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[1]The trade propensity is the aggregate trade flow as a percent of national income.

barriers to international trade as the given country. Natural barriers to trade are barriers that are independent Of economic activity. Artificial barriers to trade, on the other hand, are a consequence of the actions of economic agents of a country. Hence, openness, as I define it, measures the height of the artificial barriers to international trade. I will consentrate on the overall openness of a country rather than openness of an industry or sector to international trade. Consequently, the focus here is on the aggregate trade flow scaled by national income.

Gravity models, which do not have a strong theoretical basis, have been used to explain bilateral trade flows. However, to my knowledge, there is no model, the primary purpose of which is to explain aggregate trade flows. I introduce a search theoretic model of aggregate trade flow that will allow us to explain aggregate trade flow.

Conventional theories of international trade, e.g., models in the Heckscher-Ohlin tradition or Ricardian models of comparative advantage, predict that two countries will trade less with each other as factor endowments and demand structures become more similar. Furthermore, based on these theories it can be said that convergence in the cultural characteristics and factor composition of countries will cause world trade to decline, implying a decrease in the trade propensity of countries on average. However, what

empirical studies suggest is different: countries with similar factor endowments and demand conditions trade more; and convergence in the conditions of production and demand structures causes world trade to increase.

The reason for the differences between the theory and empirical evidence is basically that the predictions of the models are based on the assumption that there will be no two-way trade on the commodity level. However intra-industry trade is observed persistently and the proportion of intra-industry trade in total trade is large enough to be considered as a regular feature of modern international trade.

Deardorff(1984) divided explanations of intra-industry trade into two different kinds: "those dealing with homogeneous products and those dealing with differentiated products."[2] In either case, domestic markets are characterized by imperfect competition.

Two-way trade when there is product differentiation can be explained readily, especially, in the case of increasing returns to scale.[3] Intra-industry trade in homogeneous

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[2] Deardorff(1984) p. 506.

[3]Dixit and Norman(1980), Helpman(1981), Krugman(1980), Grossman and Helpman(1989)

products is explained, mainly, in models of oligopoly. In these models, domestic price differs from marginal cost in autarky as a result of market imperfections.[4] If trade becomes open, firms of different countries will have incentives to enter each others' markets even if demand and cost functions are the same and even if there are transportation costs.

Deardorff mentioned three other sources of intra-industry trade in homogeneous products. The first one is border trade. "If a country is geographically large enough and transport costs for a particular good are high enough, then depending on where the resources needed for its production happen to be located it is rather obvious that it might be imported across one section of the border and exported across another."[5] The second source is re-export trade. If a country has specialized in services of international trade, it will export the imported good.[6] The third source is cyclical trade. " [F]or some products there are natural cycles over time for either supply or demand. If these cycles are out of phase between two countries and if storage

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[4] Brander and Krugman(1983), Ben-Zvi and Helpman(1992).

[5]Deardorff(1984, p. 506).

[6]Deardorff(1984, p. 507).

costs are large relative to transportation costs they can give rise to intra-industry trade."[7]

The existence of intra-industry trade suggests that explaining aggregate trade flow requires a model that covers more than net exports and the direction of trade. Furthermore, even though heterogeneous product explanations of intra-industry trade clarify some important features of intra-industry trade; they are not helpful to explain two-way trade in homogeneous products. In these models (i) countries are treated as dots on the world map; (ii) the period of analysis is assumed to be a point in time; (iii) consumers are assumed to be able to monitor the whole world market. The first of these assumptions ignores border-trade. The second assumption ignores cyclical trade. The third assumption ignores intra-industry trade as a result of imperfect information about existing products in the national market and world markets. The marketing power and the strategy of suppliers and the structure of distribution channels through which products are carried from supplier to consumer play important roles if information is imperfect.

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[7]Deardorff(1984, p. 507).

This paper contains four chapters: (i) introduction; (ii) background; (iii) a theoretical model of aggregate trade flows; and (iv) an empirical study of openness.

In the following chapter, first, I show the use of openness in development economics, macro analysis and international economics. Secondly, I discuss the concepts of openness and the measures of openness in the existing literature.

In the third chapter, I first discuss Gravity Models. Secondly I introduce a search theoretic model of international trade. The implications of this model are somewhat different from those of factor proportions trade theory and of trade models based on product differentiation. I suggest that factor proportions theory is not suitable for the analysis of openness as I defined it, because openness is related to the volume of aggregate international trade flows rather than the commodity composition of net trade flows or the direction of trade. Even though factor proportions theory can be helpful to explain the barriers to trade affecting the relation between net exports and factor endowment, it can not explain barriers to trade that affect the volume of trade. Within the framework of factor proportions theory, differences in demand structure, technological level, and composition of nontradable goods

will be misinterpreted as barriers.[8] Models with differentiated products are used mainly to explain the level of intra-industry trade of heterogeneous products. Heterogeneity of product is not assumed in the search theoretic model I introduce.

In the last chapter, I explain the data and the empirical methods I used. I introduce an index for world trade conditions and an openness index which is comparable over time and among countries. A brief discussion of the properties of openness indexes and the index of world trade conditions will be followed by a comparison of my results with the existing measures of openness.

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[8]Leamer(1984, 1988) showed that under very restrictive assumption problems related with demand structure and composition of nontradable goods disappear. It is doubtful that a model with such restrictive assumptions will be empirically useful.

II. Background

The world economy has been characterized as a global economy. The importance of trade for modern market economies has steadily increased in the post war period. The integration of national economies into the global economy have been increasing. This increasing integration stimulates the use of measures of openness in analyses of international trade, macro analysis and development economics. I will discuss the use of openness measures in the first section of this chapter.

Tariffs are easier to monitor than non-tariff barriers to trade. Multilateral trade agreements such as those negotiated under GATT have reduced tariffs and, in the process, increased the importance of non-tariff restrictions, which are usually quantitative restrictions. This motivates the search for measures of openness which do not depend on tariff structure.

The policy of national governments is not the only source of artificial barriers to international trade. For example, as mentioned by Lawrence(1991a, 1991b) corporate policy also may create barriers. Therefore looking only at the international trade policy of national governments is not enough for determination of the degree of openness.

There are also natural barriers to trade that are exogenous to economic agents. These natural barriers can not be changed by human activity. A country's distance from world markets is an example of a natural barrier to trade. For some cross-country structural analyses the effect of overall openness, including natural barriers, may be relevant. However, for time-series analysis, and for most cross-country analyses, the effects of natural and artificial barriers should be evaluated separately. In short, there is a need for a measure of openness based on artificial barriers to trade.

I will discuss the concept of openness in the second section of this chapter and existing measures of openness in the last section of this chapter.

One should not expect a single statistic measure to explain every feature of trade. There are measures for different features of the trade of a country, such as protection, intervention, liberalization, product orientation, and market orientation that are closely related to openness. However all of them are distinctively different from openness and I will not discuss them except as they relate to openness.

II.1. The Use of Openness

Concepts of openness have been used frequently in the literature on international trade, macroeconomic and development economics. In this section I will discuss some of the uses of openness or of concepts related to openness.

II.1.1. The Use of Openness in Development Economics

Openness is used widely in development economics, e.g., in the discussion of the success of East Asian newly industrialized countries (NICs) and in the convergence debate.

In 1970's some countries from the Mediterranean, Latin America and East Asia began to enter the group of industrial economies characterized by high shares of manufacturing industry in national product. However, in the beginning of 1980's, most Latin American NICs had difficulty in servicing their international debt whereas East Asian NICs had no need for rescheduling debt payments. This contrast raised the question of what was different between these two groups of countries. After comparing the two groups of countries, Sachs(1985) concluded that the basic difference was in elements of openness, e.g., exchange rate and trade policy: (i) East Asian NICs did not overvalue the exchange rate whereas Latin American NICs used overvaluation widely as a tool to protect domestic industries. (ii) Even though both

groups of NICs protected import competing industries, East Asian NICs also rewarded foreign exchange earning export activity, whereas Latin American NICs did not promote exports. Sachs' analysis was based on market orientation rather than openness, but the same issue can be analyzed in terms of openness. As I show in the last chapter, Eastern Asian NICs are at the top of the list of countries sorted by the degree of openness and Latin American NICs are in the lower parts of the list.

The idea of anti-export bias of exchange rate and trade policy was widely used in the NBER project on foreign trade regimes and economic development in the mid 1970's. The project, directed by Anne Krueger and Jagdish N. Bhagwati, contained detailed analysis of ten developing countries.[9] The synthesis of this extensive project was published in two volumes, Krueger(1978) and Bhagwati(1978). They introduced five phases of Exchange Control Regimes. As I discuss in the next section in more detail, these phases are an ordering of the restrictiveness of exchange rate and trade policy, where phase I is most restrictive and phase V is most open. They analyzed economic performance in each phase and the transition between phases. I show, in the last chapter, that

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[9]Countries included in this project were Brazil, Chile, Colombia, Ghana, India, Israel, Korea, Philippines and Turkey.

there is a close link between the openness index I introduce and the phases of exchange rate control regimes.

Hong(1988) studied the linkage between savings behavior and a measure of openness. He tested the hypothesis "that under free trade a country may save less than under autarky or limited trade". His results suggests that there is a positive relation between openness and saving propensity in developing countries.

Alam(1991) studied the effect of trade orientation on macroeconomic performance in developing countries, using the trade orientation classification of The World Bank, which I will discuss in the next section. He first derived a cardinal ranking from the trade orientation classification where 1 corresponds to strongly outward oriented, 2 to moderately outward oriented, 3 to moderately inward oriented and 4 to strongly inward oriented. He showed that the correlations between this orientation measure and the growth rate of GDP, the growth rate of exports, the saving propensity and the investment propensity were positive. Secondly, he computed a GDP growth rate regression. Trade orientation dummies used in this regression had positive signs and were significant, implying that the more outward oriented a country is, the higher is growth.

Dollar(1992) studied the effect of inward orientation on the growth of developing economies. He introduced two measures of openness that I will analyze in the next section: real exchange rate distortion, and real exchange rate variability. The regressions of the per capita GDP growth rate on investment and two orientation indicators showed a negative relation between growth and both measures of orientation. Considering inward orientation as the opposite of openness, the results confirms the positive openness-growth relationship, too.

Developments in the endogenous growth theory[10] suggest that accumulation of human capital is at least as important as accumulation of physical capital in the development process.[11] In this model, dynamic or static increasing returns in the human capital intensive sector may cause a positive relation of growth and openness. Helliwell(1992) studied this issue empirically in the context of differences between Asian and OECD countries. He used three different measures of openness supplied by the World Bank: the frequency of non-tariff barriers, the black market exchange premium and total duty collected as a percent of total merchandise imports. The sample size he used was extremely

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[10]For a detailed discussion of endogenious growth theory see Romer(1989).

[11]The empirical findings of Blomström, Lipsey and Zejan(1992) confirm this hypothesis.

small because of data limitation in the openness indicators; however the results support the openness-growth relation.

Edwards(1989, 1991) used a learning-by-doing model to show the relation of openness and growth. In the empirical study he used trade intervention indexes developed by Leamer(1988) that I will discuss in the last section. His empirical results are in accordance with others.

In his review of the literature on testing trade theory Leamer(1992) discussed other empirical studies on openness and growth. In addition to cross-sectional comparisons, he discussed also models analyzing the direction of causality in openness-growth analysis.

II.1.2. The Use of Openness in Macroeconomic Analysis

The Openness of a country may affect the level and variance of macroeconomic variables, such as inflation, national income and employment. Openness also influences the effectiveness of monetary and fiscal policy. The use of openness in macroanalysis is relatively limited and new. In this part I will give two recent examples.

The first example is Romer(1991). He suggests that " the more open an economy is, the smaller is the incentive to expand, and so the lower is the equilibrium rate of

inflation. Thus models of inefficiently high inflation arising from the absence of precommitment predict an inverse relationship between openness and inflation." Within the framework of a monetary model where there was a continuum of differentiated goods a fraction of which was imported Romer interpreted the import fraction as the measure of openness introduced. The magnitude of the effect of monetary shocks on income, price level of domestically produced product and consumer price inflation depended on openness. In the empirical part, he found a significant negative relation between openness and inflation.

The second example is Razin and Rose(1992). They tested the effects of openness in international trade and mobility of capital on the volatility of output, consumption and investment over business cycles. The theoretical conclusion was that openness will not effect the volatility of these three variables if shocks are permanent or common to most countries. If shocks are country specific and temporary the models used suggest: (i) "*enhanced capital mobility should be associated, ceteris paribus, with smoother consumption and more volatile investment,*"[12] and (ii) "*increased goods mobility should be associated, ceteris paribus, with increased output volatility.*"[13] I think that their measure

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[12]Razin and Rose(1992, p. 4)

[13]Razin and Rose(1992, p. 5)

of openness is inappropriate. The value of their "openness factor" for a country indicates how usual the structure of its trade regime is.

II.1.2. The Use of Openness in The Analysis of International Trade

Openness, or the height of trade barriers, is one of the main issues analyzed in international trade, rather than being a tool or a variable in the analysis. The use of general measures of openness is very limited in international trade literature; instead, specific measures of different kinds of barriers are used.

A recent discussion of openness in connection with trade is in the debate over the degree of openness of Japan. The basic question in this debate is whether Japan is deliberately interfering with trade using artificial barriers that are difficult to detect.[14]

Saxonhouse(1990) argued that Japanese manufacturing imports fit both the Heckscher-Ohlin interindustry trade framework and Grossman-Helpman's intraindustry trade framework. Saxonhouse(1988) predicted levels of Japanese imports using import equations, the parameters of which were estimated in

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[14]Takeuchi(1988) reviewed the literature on this issue.

a cross-country regression excluding Japan. Actual imports were below the expected level for only a few items and he concluded that Japanese trade behavior was not distinctive. The results of Leamer(1988) are also in accordance with Saxonhouse's findings.

On the other hand, Lawrence(1991a, 1991b) argued that Japanese manufacturing imports were extremely low and that the low level could not be explained by quality differences or extraordinary factor endowments. Although the interindustry trade was normal and the trade policy of government was not restrictive, Lawrence argued that Japanese corporate policy hindered the entrance of foreign products competing with Japanese products. The organization of Japanese distribution channels plays a critical role in his explanation.

Kreinin(1988) studied the purchasing behavior of Australian subsidiaries of American, European and Japanese companies. He found strong evidence that, unlike European and American companies, Japanese companies purchasing decisions were biased in favor of Japanese products. This support Lawrance's suspicions that the Japanese cooperations may interfere withtrade and create artificial barriers to trade.

Ito and Maruyama(1991) studied the Japanese distribution system and found that it was not less efficient than U. S.

counterparts. However, they mentioned, also, that the links between Japanese manufacturing corporations and the distribution system give the corporations the power to create barriers to imports of foreign competitors.

Even though the debate is not settled, it has important implications from the perspective of openness. Considering trade policy is not enough for an analysis of openness. The cooperative behaviors of firms and consumers can work, also, as a barrier to trade.

Openness indicators have been used in other aspects of the international trade literature. For example, Lipsey, Kravis and Weinblatt(1979) calculated and used openness measures when analyzing the location of production by US multinational enterprises. Their justification for the use of an openness indicator was that the cost of internationally traded materials is a function of the degree of openness in international trade. The openness measure they used is trade intensity net of the effects of population and population density. They, also, used a variable for the degree of price isolation which shows the deviation of the price index of the countries from the price index of the world.

II.2. The Concept of Openness

There is no consensus on the definition of openness in the literature. In the first part of this section I explain the concern I share with other authors writing on openness: We need a conceptual framework.

A distinction can be made between natural barriers and artificial barriers to trade. Artificial barriers can be further classified by whether they are a consequence of policy tools. In the second part, I discuss barriers to trade and define openness in relation to artificial barriers.

Existing openness indicators can be classified as qualitative indicators and quantitative indicators. Qualitative indicators are ordinal ranking of restrictiveness of the trade regimes. There are two kinds of quantitative measures: quantity based openness indicators and price based openness indicators. In the last part of this section I discuss existing openness indicators in this categorical framework.

II.2.1. The Need for a Conceptual Framework

Edwards expressed his concern over the lack of consensus on the concepts related to the openness of economies in his paper(1989) dealing with the role of trade regimes in

determining economic performance and growth in the developing countries. Referring to the debate over the role of trade liberalization in NICs, he mentioned that some economists explain the success of East Asian NICs in development by trade liberalization, whereas others interpret the same phenomena as lack of liberalization:" For some (i.e., for World Bank 1987) Korea is the best example of an outward oriented liberalized economy, while for others (Collins and Park 1988, Sachs 1987) Korea is a prime example that in order for a small developing economy to grow (very) fast it should avoid an abrupt liberalization."[15] Hence, he saw the need for the indicators having certain properties. The first property he mentioned is objectivity, i.e., the indicators should be acceptable by every researcher regardless of the subjective value judgments of researcher[16].

The second property is continuity. "As a result of the ideologization of the policy debate, more and more people are discussing these issues as if they were either 'black' or 'white', with no room for different shades of gray in between."[17] He suggested that continuous rather than discrete indicators should be calculated so that we can

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[15] Edwards (1989, p. 2)

[16] Edwards (1989, p. 14)

[17] Edwards (1989, p. 2)

observe the effect of the degree of intensity of a policy on the economic outcome.

Lastly, these indicators should be comparable across countries. For example an indicator of the liberalization of a country over time relative to a base year may not be suitable for comparing the liberalization processes of different countries. The indicators should allow a researcher the possibility of cross-country comparisons.

In a paper(1991) where she tried to introduce a conceptual measure of openness Krishna added two more properties to the ones suggested by Edwards(1989): conceptuality and implementability.

I will suggest that an openness indicator need not be based on a model. I, rather, think it is sufficient that it can be interpreted within the frameworks of models used widely in empirical studies. There are several competing models in the theory of international trade. All of them emphasize one aspect or a few aspects of the same problem while ignoring other aspects. If an openness indicator is based strictly on a specific model, its use will be very limited.

The implementability of an indicator refers to the possibility of implementing it empirically with existing

data. In other words, even if an indicator is conceptually well defined, it is of no use if we can not calculate it.

Before discussing openness and related concepts I comment on the relative nature of some measures and on the quantification of opennness.

Discussing the openness indicator suggested by Chenery and Syrquin (1975)[18] Krishna(1991) considered its relative nature to be a deficiency. In fact, all such measures are relative to a norm. Developing an objective approach to a problem that is essentially normative requires a norm for the indicator that is acceptable to almost all researchers. If we select the US as the base of an openness index, and the index number for Germany is bigger than unity this does not mean that Germany is absolutely open. The only information we can get is that Germany is more open than USA. The principle of continuous indicators that are comparable across countries requires this relativist approach.

The cross-country comparison and time series movement of the indicator should be insensitive to the selection of the norm. For example, the time-series movements of an openness indicator calculated assuming autarky as the norm should not

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[18] I will discuss this openness indicator later in this section.

be different from the movement of an indicator for which free trade or a given year's level of openness is the norm.

My second remark is about how to quantify openness or related concepts. There are two basic variables related to trade: quantity and price. There is only one value for quantity traded; i.e., the export of A to B is equal to the import of B from A. However, import price as the average expenditure of importing consumers, P_M, differs from the export price as the average revenue of exporting supplier, P_X^*[19]. An indicator of openness and related concepts can be based on the quantity traded or on the difference between P_M and P_X^*. The answer to the question whether quantity based measures or price based measures are preferable depends on the indicator calculated and on the way it is used in the empirical analysis.

Assuming a negative relation between the quantity traded and the price difference we can expect indicators based on either of these to have the same qualitative characteristics and deliver the same information. The fact that the functional form or the parameters of the relation between quantity traded and the price difference may change over time or across countries weakens this argument to some

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[19]Both P_M and P_X^* are measured in terms of a common currency.

extend. However, if quantity based measures are not available or if price based measures are more accurate, price based measures may be used in the empirical work even if quantity based measures are ideal; or vice versa.

Krishna(1991) argued that there are also welfare based indicators of openness. Unlike quantity traded, trade volume or prices, "welfare" is not a quantitative feature of the trade transaction. Furthermore, openness is a normative concept in the sense that it requires a norm. Unless the norm is an objective one, the openness measure cannot be **objective** and there is no objective, self-evident measure of welfare.

Real domestic income or real domestic expenditure is usually used as a measure of welfare.[20] The effect of openness on income or on expenditure is an interesting empirical question by itself. Therefore I find any attempt to define an openness indicator based on income or expenditure counterproductive.[21] [22]

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[20]For example Baldwin(1970) defined non-tariff distortion policy as follows:" A nontariff trade-distorting policy is any measure (public or private) that causes internationally traded goods and services, or resources devoted to the production of these goods and services, to be allocated in such a way as to reduce potential real world income." p. 5.

[21]This does not mean that indicators of the effect of trade barriers on real income or expenditure, like social cost of protection, are useless. However the same level of protection may have a higher social cost in some countries than others. Hence social cost of protection is related to protection, but it is not a measure of level of protection.

II.2.2. Trade Barriers and Concept of Openness

Although there is no consensus on the definition of openness in the literature, there are some common denominators: a trade propensity diverges from a *normal state* due to some *barriers* to international trade; Openness is actual trade propensity relative to the *normal* one.

What are barriers to trade? First, and traditionally, there are tariffs. Because the aim of tariffs is generally considered to be protection of domestic industry, tariffs are used to measure the level of protectionism.

The effective rate of protection is a direct measures of this kind of distortion. The effective rate of protection,

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[22]Anderson and Neary(1992) attempted to develop a new approach to evaluating trade policy base on welfare consideration. They critized Average Tariff Equivalents(ATE) as follows: "[T]hese have no welfare foundation and suffer from the problem that highly restricted imports which 'should' get a high weight in the index have low levels of imports and so get a low weight." I agree that ATE **underestimates** a high level of protection or an increase in the level of protection and **overestimates** a low level of protection or a decrease in the level of protection. However the absolute values of the percentage changes of their Trade Restrictiveness Indexes (TRI) are usually bigger than that of ATE if there is a decrease and the absolute values of the percentage changes of TRI are usually lower than that of ATE if there is an increase. This fact suggests that the bias of ATE gets stronger with the new TRI. Considering that their only argument against ATE is this bias, the results are puzzling.

ERP, measures the divergence of value added after protection, VA_p from the value added under free trade, VA_f: $\frac{VA_p - VA_f}{VA_f}$.[23] Under certain assumptions $\frac{VA_p - VA_f}{VA_f}$ can be expressed as a function of nominal tariff rates and input-output coefficients: $ERP_j = \frac{\tau_j - \sum_i \tau_i a_{ji}}{1 - \sum_i a_{ji}}$, where τ_j is the nominal tariff rate for good j, τ_i is the nominal tariff rate for input i, and a_{ji} is input i required to produce output j.

A subsidy to the domestic production of import substitutes will work as well as tariff, if the primary goal is protectionism; i.e. we should take into account not only policy intervention on foreign trade, but other interventions in the economy. The main problem with this measure of protection arises in the interpretation of this variable, because it should contain some implicit or explicit assumptions on the structure of domestic production. For example, Leontief-type production functions are assumed in these calculations. This can be a good approximation for narrow ranges of production. However it

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[23] see Corden(1971) for a detailed analysis of the ERP.

will overestimate the effect of a major tariff reduction, if factors are substitutable.[24]

Besides tariffs, there exist other policy-dependent distortions, e.g. quantitative restrictions such as quotas and voluntary export restraints. Distortions due to these kinds of interventions are difficult to measure. In the absence of free trade it is impossible to calculate the effect of a QR on quantity traded. On the other hand, the divergence of price may be calculated as the difference between the world price, corrected for transport cost, and the internal price. The accuracy of this calculation is limited by the existence and quality of the price data.

Another sort of policy-dependent trade barriers is regulations. For example, "Catch-22 limitations apply to the vast public-construction market, where only firms with 'experience in Japan' are allowed to bid on projects and there is no way for foreign firms to gain such experience."[25]

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[24] The hope that ERP would indicate the effect of a tariff structure on outputs " was somewhat dashed even for a model with only two final goods by a counter-example of Rammaswami and Srinivasan (1971). For a given tariff structure they show how, in an economy with one set of factor endowments, outputs and resources are pulled in a direction opposite to that in another economy with a different set of factor endowments." Jones and Neary(1984, p. 32)

[25]Kreinin (1988,p.529)

Structural/institutional/behavioral distortions exist also. Differences in standards are examples of structural distortions.[26] The structure of distribution channels making entrance of foreign suppliers difficult is one of the institutional barriers.[27] The cultural and intellectual environment can also cause divergences from potential trade. Another example of a behavioral obstacle is the "use the national product" principle, or more precisely, the effect of "made in label" on consumption decision.[28]

Another source of divergence of actual trade propensity from the "normal" trade propensity is the exchange rate over- or undervaluation. Exchange rate over- or undervaluation

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[26]Because of differences in video standards, a television or VCR produced for the US market can not be used in Europe. An exporter first must learn the system used in the foreign country and then make necessary adjustments. Existing video standards are NTSC, used in North America, Central America, and Japan, PAL, used in Europe, Australia, and New Zealand, SECAM, used in Iran, Poland, Russia and Saudi Arabia and a version of SECAM (which broadcasts 819 lines every 1/25 second), used in France.

[27]It is argued that one of the reasons why prices are high in Japan is that the cost of distribution is high because of the structure of Japanese distribution channels. This characteristic of the Japanese market is a trade distortion, because it hinders the entrance of foreign product into the Japanese market. For example, Ito and Maruyama (1991), Kreinin (1988), Lawrance(1991a, 1991b).

[28]In the Armington model, the nationality of a product is an indicator of certain qualities; therefore different samples of the same product can be perceived as heterogenous products that are not highly substitutable. This can be a reason why the "made in" label matters. However, it is possible that the national product is preferred although it is of the same quality as foreign versions, because of nationalist propaganda.

affects foreign trade by changing the domestic currency price of imports and exports.

The last type of barrier to trade I want to mention is the geographical distance between countries. The geographic distance between two countries affects the volume of trade between them in several ways.

First, transportation cost is lower, the nearer two countries are. Distance is only one of the factors determining transportation cost. For example, Lipsey and Weiss(1974) showed that the ocean transportation cost as a percent of value is a function of value per unit of weight, stowage (the ratio of volume to weight), the fragility of the product, whether a shipment is less than one ton and whether the product is shipped by tanker. Even though there are other determinants of transportation cost, distance can not be ignored. There are four types of transportation: highways, rail, air and sea. The distance between two countries may differ depending on types of transportation. Furthermore, in the transportation of a good, more than one method may be used as in the case of an inland country with no sea port. It would be ideal to use a different measure for each type of transportation. However different measures of distance based on different transportation types may be highly correlated. Therefore their contributions to the explanatory power of a model may be small.

The cost of communication is also an increasing function of distance. As a result of this, monitoring foreign markets and marketing a good in foreign markets will be more costly if the distance from the market is larger.

The cost of transportation and communication affects the differential between the export price and the import price of a traded good. The differential between import and export prices is an increasing function of distance. In other words, internal price differs from world prices more if the distance from world markets is larger, everything else constant.

Historical relations and cultural similarities of countries that are near to each other are another dimension of the impact of distance on trade. Two countries that are geographically close to each other will have had more interaction in the past than two distant countries, other things equal. This will enable the economic agents of these countries to know the markets of each other closely. Even though technological improvements lowering the costs of the telecommunication weaken the effect of historical relations, they do not eliminate the effect of history totally.

Cultural similarities in the form of similar consumption habits may also be source of high trade levels between

geographically close countries. In the standard neoclassical trade theory with constant or decreasing returns to scale, similarity of consumption patterns will decrease the need for trade and therefore is a trade decreasing factor if countries geographically close to each other will have similar factor endowments. However, if the two countries are similar in culture, they will have some products that have little or no use in other cultures. Similarity in culture may stimulate addition trade between two countries.[29]

Distance is used in gravity models, discussed more fully in the next chapter, as a resistance factor. Linnemann(1966) used geographical distance as a *natural trade impediment*. Distance is related to transport costs, transport time and the economic horizon. He mentioned that transport costs depends on the type of good carried. However, unless a country's trade contains a few items with abnormal transport costs[30], the transport cost for total trade will be "normal" because he assumes that divergences from a "normal" transport cost at the commodity level will sum up to zero.

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[29]Deardorff (1984) refers to this as the Linder hypothesis: "The idea is that manufactured goods are produced where they are most demanded, and only then are available for export. But of course they will be exported only to countries where they are also demanded in some amount. Therefore countries with similar demand conditions will end up producing a similar range of goods and will trade them with each other. Countries with dissimilar demands on the other hand will each produce little that is of interest to the other and will trade little." p.504.

[30]What is meant by a normal transportation cost is an average cost of transportation per mile for each unit of value of trasported product.

Transport time may effect the decisions of exporting firms for other reasons. Interest cost will be higher the longer time it takes to sell an already existing product, and a long transport time will increase the import price of the good. The long distance transportation of perishable goods is very costly. Lastly, If the transport time is long, the exporting firm cannot react to short term fluctuations at the importing market. The economic horizon component of his explanation is related to the idea that economic agents of a country will have better information about a geographically closer foreign market.

The barriers discussed above may be classified as natural and artificial barriers to trade. Natural barriers are barriers which can not be changed by human effort. The geographical distance from other countries is one of the natural barriers to trade.

Artificial barriers are barriers that can be changed with human effort. There are two kinds of artificial barriers. The first kind is policy dependent barriers that are caused by political authority. Examples of this kind of barriers are tariffs, quantitative restrictions and restrictive regulations. On the other hand, examples of policy-independent artificial barriers are behavioral, structural and institutional barriers.

I define the openness of a given country as its trade propensity relative to a norm. The trade propensity of a country is measured as the ratio of aggregate trade flow to a measure of the size of the economic activity in the country, e.g., GDP. The norm is the predicted trade propensity of the given country under the assumption that the height of artificial barriers is the same with that of the base country. In other words, openness is measuring the height of artificial barriers of the given country to trade as a percentage of the height of those of the base country.

II.2.3. Existing Indicators of Openness

Existing openness indicators can be divided between qualitative indicators and quantitative indicators.

Qualitative indicators are ordinal rankings based on expert evaluations or the comparison of combinations of trade barriers. Two examples of openness indicators are the "Phases of Exchange Control Regimes" of Krueger(1978) and Bhagwati(1978) and the "Orientation Classification" of The World Bank(1987).

As mentioned earlier, Krueger(1978) and Bhagwati(1978) synthesized the NBER project on foreign trade regimes and economic development in the mid 1970's. They analyzed 10

countries for the period 1950-1972. Using information from country studies, they constructed phases of exchange rate control regimes. They explained the phases as follows:

"To achieve comparability of analysis among different countries, each author of a country study was asked to identify the chronological development of his country's payments regime through the following phases.
There was no presumption that a country would necessarily pass through all the phases in chronological sequence.

Phase I: During this period, quantitative restrictions on international transactions are imposed and then intensified. They generally are initiated in response to an unsustainable payments deficit and then, for a period, are intensified. During the period when reliance upon quantitative restrictions as a means of controlling the balance of payments is increasing, the country is said to be in Phase I.

Phase II: During this phase, quantitative restrictions are still intense, but various price measures are taken to offset some of the undesired results of the system. Heightened tariffs, surcharges on imports, rebates for exports, special tourist exchange rates, and other price interventions are used in this phase. However, primary

reliance continues to be placed on quantitative restrictions.

Phase III: This phase is characterized by an attempt to systematize the changes which take place during Phase II. It generally starts with a formal exchange-rate change and may be accompanied by removal of some of the surcharges, etc., imposed during Phase II and by reduced reliance upon quantitative restrictions. Phase III may be little more than a tidying-up operation (in which case the likelihood is that the country will re-enter Phase II), or it may signal the beginning of withdrawal from reliance upon quantitative restrictions.

Phase IV: If the changes in Phase III result in adjustments within the country, so that liberalization can continue, the country is said to enter Phase IV. The necessary adjustments generally include increased foreign-exchange earnings and gradual relaxation of quantitative restrictions. The latter relaxation may take the form of changes in the nature of quantitative restrictions or of increased foreign-exchange allocations, and thus reduced premiums, under the same administrative system.

Phase V: This is a period during which an exchange regime is fully liberalized. There is full convertibility on current account, and quantitative restrictions are not

employed as a means of regulating the ex ante balance of payments."[31]

In this classification every phase is characterized by a specific combination of policy tools. There may be other combinations of policy tools. Even though phases analysis cannot be generalized for all market economies, the countries in the study, except Egypt in the 1962-72 period, fitted into one of these 5 phases in the light of the historical evidence on 1950-72 they supplied. Therefore within the sample of countries covered by the NBER project, phases represent a ranking of trade regimes from most restrictive to less restrictive. Furthermore, because phases describe trade and exchange rate regimes for different countries by the same criteria, they are suitable for cross-country analysis. Therefore we can interpret phases as an ordinal ranking of the openness of countries.

A second example of a qualitative openness measures is the World Bank(1987)'s trade orientation classification. The orientation classification is constructed for forty-one countries and for two periods (1963-73 and 1973-83) using 4 indicators: (i) the effective rate of protection, (ii) the

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[31]Bhagwati(1978, pp. 220-221) and Krueger(1978, pp. 302-303). For more detailed discussion see Krueger(1978, pp.22-28) and Bhagwati(1978, pp.56-59) and for phases for specific countries see Krueger(1978, 28-40).

use of direct controls such as quotas and import-licensing schemes, (iii) the use of export incentives, and (iv), the degree of exchange rate overvaluation. This classification is explained as follows:

"STRONGLY OUTWARD ORIENTED: Trade controls are either nonexistent or very low in the sense that any disincentives to export resulting from import barriers are more or less counterbalanced by export incentives. There is little or no use of direct controls and licensing arrangements, and the exchange rate is maintained so that the effective exchange rates for importables and exportables are roughly equal.

MODERATELY OUTWARD ORIENTED: The overall incentive structure is biased toward production for domestic rather than export markets. But the average rate of effective protection for the home market is relatively low and the range of effective protection rates relatively narrow. The use of direct controls and licensing arrangements is limited, and although some direct incentives to export may be provided, these do not offset protection against imports. The effective exchange rate is higher for imports than for exports, but only slightly.

MODERATELY INWARD ORIENTED: The overall incentive structure distinctly favors production for the domestic market. The average rate of effective protection for home markets is

relatively high and the range of effective protection rates relatively wide. The use of direct import controls and licensing is extensive, and although some direct incentives to exports may be provided, there is a distinct bias against exports, and the exchange rate is clearly overvalued.

STRONGLY INWARD ORIENTED: The overall incentive structure strongly favors production for the domestic market. The average rate of effective protection for home markets is high and the range of effective protection rates relatively wide. Direct controls and licensing disincentives to the traditional export sector are pervasive, positive incentives to nontraditional exportables are few or non-existent, and the exchange rate is significantly overvalued."[32]

Market orientation and openness are distinct concepts although they are related. At least theoretically, an export-oriented country with an effective exchange rate for exports higher than the effective exchange rate for imports may trade less than a country without policy intervention. However we can expect that outward oriented countries trade more than inward oriented countries. Therefore, this classification may be used as a ordinal ranking of openness.

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[32]World Bank(1987, p.82)

Quantitative indicators are indirect measures of openness based on trade propensity or price.

Two examples of openness indicators based on price are the "Price Isolation Index" of Lipsey and Kravis(1979) and the "Real Exchange Rate Distortion" of Dollar(1992).

The idea behind the openness measures based on prices is that the internal prices of a closed country will diverge from world prices because of the isolation of the domestic market resulting from barriers. Hence for a closed economy prices will be different from world prices and their movements over time will not be similar to those of world prices. Lipsey and Kravis(1979) constructed a "Price Isolation Index" with this justification. The price isolation measure "is based on the similarity in time to time movements over a period of years between the price level of the given country and the movements over the same time period of 'world prices."[33]

The second example of price based openness indicators is Dollar(1992). Using the Summers-Heston(1988) data set, he calculated price distortion indexes. He used a regression analysis to eliminate the effect of income and population density from the national price level (NPL) defined as

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[33]Lipsey and Kravis(1979, p. 65)

purchasing power parity translated into common currency units for the 1976-1985 period and 117 countries. The 1976-1985 average of the ratio of predicted NPL to the actual NPL for each country was interpreted as price distortion index. The coefficient of variation of price distortion index over ten years is interpreted as the real exchange rate variability.

The calculation of openness indicators using price comparisons has two problems. The first one is related to the commodity weights of price indexes compared in the calculation of NPL. Lipsey and Kravis(1979) noticed that "the price isolation measure should, ideally, be derived from prices of identical goods in different countries. The present measures reflect not only the extent of policies (or natural characteristics of a country) which isolate its domestic prices from world economic developments, but also by the commodity composition of GDP. A country with no trade restrictions and all individual prices identical to 'world' prices, but with an atypical composition of GDP (e.g., heavily weighted with petroleum products), might appear to be isolated because its GDP deflator would have risen during the 1970's in reflection of the rise in oil prices."[34] Using the same weights may cause problems for countries having extremely abnormal consumption pattern.

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[34]Lipsey and Kravis(1979, p. 66)

That is a possibility for some African countries in the Summers-Heston data set.

The second problem is related to the linkage between trade barriers and NPL. It has been widely accepted that national price levels are equalized. However, national price levels can differ even in the long run as shown by Kravis and Lipsey(1983, 1987, 1988). The existence of non-tradable products, or the use of non-tradable services in the process of transfer of the exported product to final domestic consumers are main sources of long run differences in the national price levels. The abnormalities in the results of Dollar(1992) and my results in the last chapter suggest that real income and population density do not capture the long-run component of NPL sufficiently.

Quantity-based measures of openness are measures of trade propensity. A raw measure of trade propensity is the trade intensity: import intensity (imports measured as a percentage of income) plus export intensity (exports measured as a percentage of income). In some studies only import intensity or only export intensity is used as a measure of openness. In the case of balanced trade, in which import is equal to export, these three measures are proportional to each other. If the trade deficit or surplus is a small percent of total trade, the differences between the three intensities can be ignored. Hence studies using

import intensity, export intensity, or total trade intensity, reach almost identical results.

Quant and Rauch(1990) showed that the trade intensity is a decreasing function of tariffs within the learning model of Lucas(1988) assuming that the elasticity of substitution between human capital intensive and labor intensive goods is less than one and that the only barrier is a uniform ad valorem tariff barrier. However, because other variables affecting the trade intensity are not constant over time or across countries at a given time, I do not agree that the model of Quant and Rauch(1990) implies that the trade intensity is a measure of openness in a comparison of openness over time or across countries.

As Kuznets(1964) showed, the trade ratio is related to income and the level of development (measured as per capita income). Kuznets concentrated on the relation between trade intensity and the size of economy and between trade intensity and the level of development. The main argument for the relation between trade intensity and size is that internal, interregional trade substitutes for foreign trade in a large country. That is illustrated mechanically by the effect of the union of two previously separated countries, even if there are no economic consequences - all production and consumption remain the same. The argument for a trade-per capita income relation is less conclusive. Kuznets

argued that per capita income is negatively correlated with institutional and structural barriers and, accordingly, higher income per capita means higher trade intensity.

An openness indicator attempting to measure artificial barriers to trade should eliminate the effects of natural barriers. An openness indicator within this framework was calculated by Lipsey and Kravis(1979). They ran a double logarithmic regression of trade intensity on population and population density. They interpreted the residual of this regression as an openness indicator. One shortcoming of this indicator is that it is based on one year's, namely 1970's, observation. If 1970 is an extra-ordinary year for some countries in the sample, using this indicator for a different year may be misleading. Secondly, this measure can be improved by using a measure of distance from world markets. However Lipsey and Kravis' openness measure satisfies all properties required for an openness measure: it is objective, continuous, suitable for cross-country comparison, implementable. Furthermore it can be interpreted as the divergence of trade propensity from the normal trade propensity based on factor endowments, land and labor.

A similar measure is developed by Chenery and Syrquin(1975). They called their measure export level and described it as follows: "The level of exports is readily measured by the

ratio of the actual export level in the country to the value predicted for the country's size and income level."

The most important attempt to build a theoretical basis for empirical measures of openness is Leamer(1988). Leamer's explanation originates from a version of the Heckscher-Ohlin-Vanek model. Because the Heckscher-Ohlin model can not determine the gross flow of trade and only explains the direction of trade and value of net trade in each product, Leamer used net exports as the dependent variable in a regression where independent variables are capital stock, numbers of workers at three different skill levels, land variables for four different climate types, oil production, coal production, mineral production, a measure of distance from world markets and the trade balance. He estimated the model using 1982 three-digit SITC data in two different ways; (i) an unscaled model using ordinary least squares and (ii) a scaled model using weighted least squares where weights are squares of GNPs. The estimated values of net exports are normal values of net exports. Normal value of net exports of a specific three-digit SITC group of commodities for a given country can be interpreted as the value of net exports if the intervention in the given country is equal to the world average, so that the divergence of actual net exports from the normal level is a measure of intervention. Leamer introduced two different

kind of openness indicators: (i) the "openness measure" and (ii) the intervention rate.[35]

The "Openness measure" he suggested is the ratio of the difference between the summations of absolute values of actual and normal net exports to GNP: $\frac{\sum_j |N_{ij}| - \sum_j |N^*_{ij}|}{GNP_i}$, where i is index for given country, j is the index for three-digit SITC groups, N is actual net export and N^* is normal net export.[36] The Intervention rate is the ratio of the summation of individual product divergences to income: $\frac{\sum_j |N_{ij} - N^*_{ij}|}{GNP_i}$.

Pritchett(1991) evaluate critically the litarature on the measures of openness. After he had compared trade intensity based openness indexes, Leamer's intervention rate, a price distortion index similar to the one of Dollar(1992) and the average tariff and coverage ratios of non-tariff policy intervention to international trade, his conclusion was that "[t]he hope that a reasonably straightforward (although not

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[35]He used both GNP and estimated total interindustry trade to eliminate scale problems. I will discuss measures using GNP (for which I listed the results) as scale variable here.

[36]$|x|$ is the absolute value of x, where x is any variable.

cheap or simple, as the NTB, price distortion, and Leamer's measures are the result of a massive empirical effort) measure can produce a 'correct' ranking of countries has always been treated skeptically, and, disappointingly, rightly so." The ranking of countries is not a good criterion for comparison of objective, continuous measures of openness[37] and I show in fourth chapter that openness measures are closely correlated. Therefore I do no agree with Pritchett's conclusion: the existance of usefull indirect measures of openness is something more than a hope

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[37]Suppose two different measures of openness are compared among ten countries, first five of which are very open and last five of which are very close. If within-group differences in the heights of trade barriers are small, and if the within-group rankings based on two different measures of openness is different, two measures may yield almost the same result in the empirical studies although the rank correlation is very small.

III. Modeling Aggregate Trade Flow

Gravity models explain bilateral aggregate trade flows as a function of "(i) factors indicating total potential supply of the exporting country on the world market, (ii) factors indicating total potential demand of the importing country on the world market" and "(iii) factors representing the resistance to a trade flow between the two countries concerned."[38] Although the selection of explanatory variables has been criticized as being ad hoc[39], the gravity models produce strong empirical results.

There have been several attempts to develop theoretical foundations to gravity equations. Linnemann(1964) derived gravity equations within a quasi-Walrasian framework. Bergstrand(1985) derived log-linear gravity equations with additional price variables, using a model of product differentiation. Both Linnemann and Bergstrand assumed that the demand function for a good depends on the country of origin. Leamer and Stern (1970) developed a probabilistic model of aggregate trade flows which yields a gravity equation.

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[38]Linnemann(1966, p. 34)

[39]For example, Deardorff(1984, p.503)

After discussing these three models in section III.1 I introduce a search theoretic model of aggregate trade flows in Section III.2. This model does not assume that products of different countries are differentiated. Aggregate trade flows are determined by the productive capacities and distribution systems of the countries, intertemporal preferences, and expectations about future price movements. Even though this model justifies the selection of variables in the typical gravity equation, it does not support specific functional form used in empirical gravity models. A linear approximation may not be suitable if the range of the explanatory variables is large.

III.1. Gravity Models

Gravity models explain bilateral trade flows as a function of geographical distances of the trading partners and the variables characterizing their demand and supply conditions. The demand and supply variables used in the estimation are size measures, e.g., population or GNP (either real or nominal). Although these models have high explanatory power, they have been criticized because the selection of explanatory variables is ad hoc. Linemann(1966) made an extensive analysis of bilateral trade flows based on gravity equations. He also introduced a model based on export supply and import demand functions to explain gravity equations.

In Linneman's (1966) model, a given country has a different import demand function for each partner country:

$$X_{ij}^{d} = X_{ij}^{d}(W_j, p_i, t_{ij})$$

Here X_{ij}^{d} is the demand of country j for the products of country i, W_j is a set of variables affecting the demand of country j, p_i the price of the product of country i expressed in a common currency, and t_{ij} is the variable for the resistance to trade between countries i and j.[40]

This set of demand equations assumes that products are differentiated by country of origin and that the parameters of the demand function are the same for all demand functions.

Export supply is the difference between total supply and demand at home for the domestic product, so that the export supply is a function of W_i, and the price:

$$X_i^{SF} = X_i^{SF}(W_i, p_i)$$

In equilibrium the supply of goods by a country is equal to the summation of the demands for its goods by others:

$$X_i^{SF} = \sum_j X_{ij}^{D}$$

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[40]The geographical distance between two countries is the resistance factor in this model. A detailed discussion of distance as a factor affecting trade flows is in Chapter 2 above.

The variables affecting demand are domestic income and population. The variable affecting supply is domestic product, as an indicator of production capacity. Linnemann assume proportionality between income and production capacity so that the arguments of the export supply function are the same with those of import demand functions for a country.

In the long run, both domestic income and production capacity are endogenous. However, in the short run, only price is endogenous. As price is eliminated from the system of equations consisting of equilibrium conditions, X_i^{SF}'s and X_{ij}^{d}'s, the trade flows are functions of income, population and distance.

Using a log-linear functional form for both export supply functions and import demand functions, with the same parameters for all countries, Linneman arrives at reduced form equations of this model that are gravity equations.

Bergstrand(1985) urged the necessity of a model in order to interpret the results of estimation and prediction. He represented a general equilibrium model. He assumed that products of different nationality are imperfect substitutes and he used CES utility function to summarize demand system. If there are N countries, utility maximization will result in N^2 demand equations. The supply side is characterized by

the endowment of an internationally immobile resource for each country and by the constant elasticity of transformation joint production surface. N^2 supply functions can be derived from first order conditions of profit maximization. In equilibrium, supply is equal to demand in each country for all products. This corresponds to N^2 equilibrium conditions.

In the reduced form of this equation system, trade flows are expressed as a function of the resource endowment of the exporting country, trade policy and transportation cost.

By assuming that the parameters of demand functions are the same for each product and that no country can affect the price and income of other countries, Bergstrand derived a gravity equation from his model with additional price variables.

Leamer and Stern(1970) obtained a gravity equation in three steps. First, they expressed total exports of a country to the world and total imports of a country from the world as a function of income, population and general resistance to trade.

In the second step, they portrayed world trade " as being generated by thousands of small independent transactions. Each transaction will be of a certain size β and will

involve one exporting country and one importing country."[41] Defining T as the total world trade, $f_i=F_i/T$ is the transactions of country i as a percent of total transactions. If the exports of a country are randomly distributed among other countries, the probability that a given transaction occurred between countries i and j is equal to $f_i f_j$. This probability times total world trade is the expected value of trade between two countries. Because F_i is a function of the income and population of country i, trade between two countries will be a function of the populations and incomes of both of them.

In the last step, Leamer and Stern asserted that the resistance to trade between two countries will decrease the probability that a transaction will occur between them. Therefore, the trade between two countries is $V_{ij} = \frac{F_i F_j g(R_{ij})}{T}$, where R_{ij} is resistance to trade and V_{ij} is the trade flow between countries i and j. In the cross-sectional double logarithmic regression, total world trade will be captured by the constant term, F_i and F_j are functions of income and population and R_{ij} is the distance between countries i and j. Hence, this equation is a gravity model.

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[41]Leamer and Stern(1970, p.158-159)

III.2. A Search Theoretic Model of Aggregate Trade Flow

In the previous section I showed three alternative approaches to explaining aggregate trade flows. The first two are based on product differentiation. The last one is derived from a probabilistic approach. All three of them yield gravity equations as their result.

In this section I introduce a search theoretical model of aggregate trade flow that supports the selection of variables for gravity equations.

There are several reasons why I select this model. The first one is that it permits two-way trade in homogeneous products. The second is that this model with one good is more suitable for analysis of aggregate trade

Conventional trade models, such as those in the tradition of Heckscher-Ohlin or Ricardian models, estimate net exports of specific goods. However, if world trade is in equilibrium, internal and international prices will equalize in the absence of transportation costs. Under these conditions a country may export and import the same product without contradicting the predictions of the model. However, the cost of international transactions reduces the probability of two-way trade in these models. As explained by Deardorff(1984) two-way trade in homogeneous goods is

possible in the case of border trade, re-export trade, cyclical trade and strategic trade. Informational imperfections may also cause two-way trade. In this case, the marketing power of firms and the distribution system play a key role.

With respect to the second advantage I assume that at a given period, the factor endowment of a country is given and both national income and national product depend on the endowment of factors. If production is efficient, national product or income is an indicator of endowments. Therefore, in this static model, income and product are assumed given.

Price, corresponding to the national price level, is determined independently from the rest of the endogenous variables by the saving behavior of the nation. Hence we do not have a simultaneity problem in this model.

I describe the model in subsection III.2.1 below and discuss the implications of the model in subsectin III.2.2.

III.2.1. The Description of the Model

In the model I present here there are two countries: domestic and foreign. Each of them has its own market for a homogeneous good, its own suppliers and demanders. This

model is a static profile of a dynamic global economy. The production decisions precede exchange. The income that consumers can spend at a given period depends on the factor endowment, so that at a given period, the quantity supplied and incomes of consumers are determined by decisions taken in the previous periods.

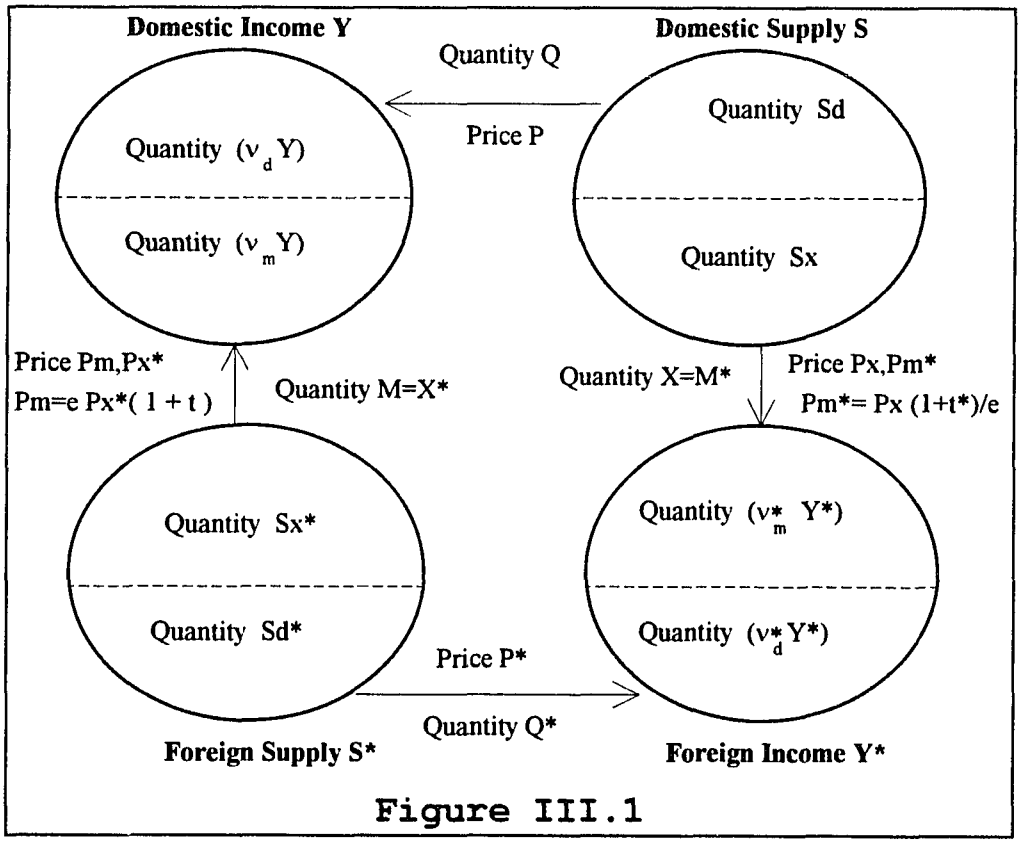

Figure III.1

The stocks and flows are depicted in the above Figure III.1. The stocks are represented by circles and the flows by lines with arrows. Stocks are divided between those offered to domestic market and those those offered to foreign market. Dashed lines in the circles represent this division. The

direction of the arrows shows the direction of the flow of goods.

In this model, first, both suppliers and consumers go to the market. Suppliers offer their products and consumers search for suppliers. Second, some of the suppliers find consumers and some do not. Some consumers find suppliers and some do not. Third, if a consumer and supplier have found each other or matched, the supplier announces the price and the consumer buys an amount from the supplier based on the price the supplier charged, her income, her expectation of the price at which she can buy the product in the future periods, her attitude toward risk, and her intertemporal preferences.

The stock of product in the hands of domestic producers is S and the foreign counterpart of this variable is S^*.[42] Domestic income is Y and foreign income is Y*. Domestic suppliers supply some part of their product, S_d, to their own country and the other part, S_x, to the foreign country. Because there is only one good in this model the stock of product corresponds to the national product. In a model with more than one good, the factor endowments are constant rather than the stocks of the products. Assuming full

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[42] A symbol with an asterisk as a superscript indicates that it is the foreign counterpart of the same symbol without asterisk.

employment and efficient production, in the one-good model national product is a good summary statistic for the factor endowments. Therefore, in this model of aggregate trade flow, the assumption of constant stock of product is not as restrictive as it is in models of disaggregate trade flow.

If the probability that a domestic consumer matches with a domestic product at the market place is ν_d, domestic consumers matched with suppliers of domestic product have ν_d percent of domestic income. ν_d is a function of the quantity supplied to the domestic market by domestic suppliers, S_d, the quantity supplied to the domestic market by foreign suppliers, S_x^*, and the number of consumers, N. To see this, first assume that consumers do not sample prices. The possibility that a consumer will buy from a domestic supplier is $\sigma = S_d / (S_d + S_x^*)$ if there is no marketing bias or increasing returns in marketing[43] and every consumer matches with a supplier.

Secondly, assume consumers sample prices from two suppliers and buy from the one with lower price. If prices of all domestic suppliers are higher than those of all foreign suppliers, the possibility that a consumer will match with a

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[43]I will define and discuss marketing bias and increasing returns in marketing below in this section.

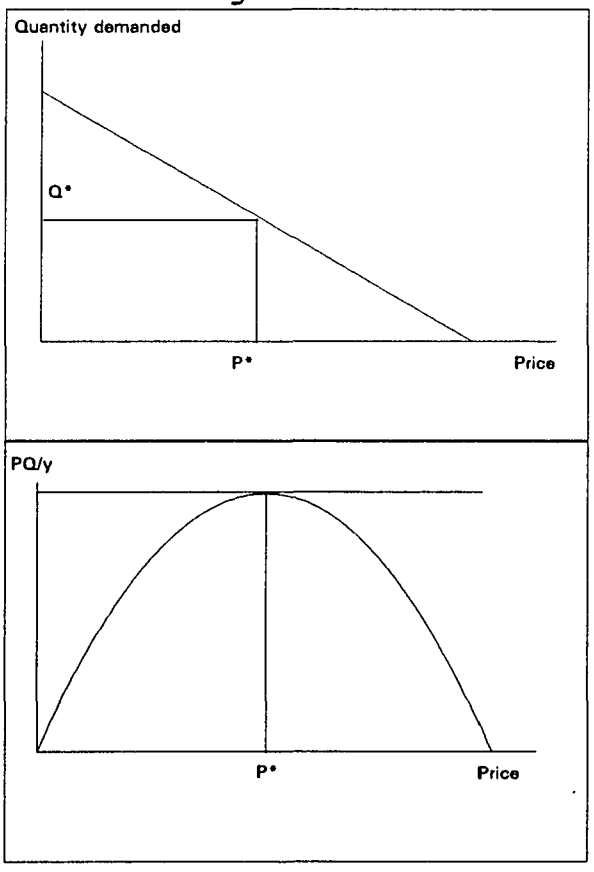
domestic supplier and buy the product is σ^2 which is the possibility that a consumer will match with two domestic suppliers. This approach can be extended to the case where consumers' sample sizes are greater than two. In a similar way, it can be shown that the probability that a domestic consumer matches with a foreign product, ν_m, is equal to share of this group of domestic consumers in total domestic income and is a function of S_x^*, S_d, and N.

The assumption that every consumer will match with at least one supplier is implicit in the previous paragraph. However, the probability that a consumer will match with a supplier who has unsold product is a decreasing function of the number of consumers and an increasing function of the total stock supplied to the domestic market.

There can be a marketing bias or increasing returns in marketing. Increasing returns exist in marketing if a greater share in the total supply in a market increases a supplier's marketing efficiency. In that case, the probability that a consumer will match with a larger supplier is higher than the supplier's share in total supply. Marketing bias in a distribution system in favor of a group of suppliers exists if the probability that a consumer will match with a supplier belonging this group is higher than its share in total supply.

Once matched with a product, a consumer decides how much of her income she will spend, depending on the price of the product. If price is p and the income of the consumer is y, she will spend $n(p,y)$ percent of her income. $n(p,y)$ is the expenditure propensity that is arithmetically equal to the expenditure divided by income. Because there is only one good in this model, the expenditure is the product of the price level and aggregate demand. Aggregate demand is measured in physical unit of the product. The price, and consequently the expenditure, is measured in domestic currency. $n(p,y)$ is between zero and unity and decreasing in price.

Figure III.2



To clarify the expenditure propensity function, assume that the linear demand function, the inverse of which is depicted in the upper graph of Figure III.2, is for an individual who has no idea about market price and does not consider shopping. Under the assumption of no price sampling, this consumer will buy the product at the first shop she enters. How much she will buy will be determined by

the price of the product at that shop and the demand function. For example, if the price is P* the consumer will buy Q* units of product. Using the information from this demand function we can drive the expenditure/income ratio as a function of price as is depicted in the lower graph. This expenditure function is increasing in price up to the price level P* and decreasing thereafter. At price P* expenditure is at its maximum. This is the point where price elasticity is unity. As I will discuss below this is the price the producers will charge in the absence of intertemporal considerations. If income elasticity is not unity, the expenditure propensity will also depend on income.

If the consumers matched with domestic product are identical, we can drop the second argument of the expenditure propensity function: $n_d(P)=n(P,y_d)$ where P is the price of the domestic product in domestic markets in terms of domestic currency and y_d is the per capita income of the consumers matched with domestic product. In a similar manner, we can derive an expenditure propensity function for imported products: $n_m(P_m)$. $n_d(P)$ and $n_m(P_m)$ may differ not only because per capita incomes differ between consumer groups matched with domestic product and those matched with foreign product, but also if consumers treat domestic and imported products differently. In other words, if the "made in" label is interpreted as a sign of quality, the two percentage expenditure functions may also differ. The

difference in the parameters of $n(p,y)$ for domestic and imported products may be the reason for different expenditure propensity functions $n_d(P)$ and $n_m(P_m)$.

The total expenditure on domestic products is $PQ = n_d(P)\nu_d Y$ and the total expenditure on imported products is $P_m M = n_m(P_m)\nu_m Y$.

The price of the imported good P_m is equal to $P_x^* e\tau$, i.e., the product of the foreign currency price of the foreign export, P_X^* and the exchange rate, defined as the domestic currency price of the foreign currency, e, and one plus tariff equivalent of barriers to trade. These include restrictive trade policy and distance from world production,

A domestic firm, indexed as i, has a fixed stock of product s_i. A part of this, s_{di}, is supplied to domestic markets and the other part s_{xi} will be exported. If, for an average firm, there is no marketing bias, the expected value of income of domestic consumers matched with this supplier's product is $\frac{s_{di}}{S_d}\nu_d Y$. If this firm charges P in domestic markets, the domestic sales of firm i will be $n_d(P)\frac{s_{di}}{S_d}\nu_d Y$. In a similar way, we can derive the foreign sales of the firm as $n_m^*(P_m^*)\frac{s_{xi}}{S_x}\nu_m^* Y^*$. In a static setup where unsold product

perishes, revenue will be $n_d(P)\frac{s_{di}}{S_d}v_dY+\frac{P_x}{P_m^*}n_m^*(P_m^*)\frac{s_{xi}}{S_x}v_m^*Y^*$, where

$P_m^*=\frac{P_x\tau^*}{e}$ and $s_i=s_{di}+s_{xi}$. Because all costs are fixed, maximizing revenue will yield the same result as maximizing profits. Decision variables for the firm are P, P_X, s_{di}, s_{xi}. The profit maximizing solution for the firm's optimum is characterized by the following three equations:

$$\frac{\partial n_d(P)}{\partial P}=0$$

$$\frac{\partial n_m^*(P_m^*)}{\partial P_m^*}=0$$

$$\frac{n_d(P)v_dY}{S_d}=\frac{n_m^*(P_m^*)v_m^*Y^*\,e/\tau^*}{S_x}$$

The first two of these equations imply that any firm will charge a price at which the slope of the expenditure propensity function is zero. P will be the same for each firm, and so will be P_X. Therefore the last equation implies that $\frac{PQ}{S_d}=\frac{P_xX}{S_x}$.

If the assumption that total stock of product is fixed for each firm is relaxed, marginal cost will be equal to the expected marginal revenue in each markets, $\frac{PQ}{S_d}=\frac{P_xX}{S_x}=MC_i$.

If the present value of unsold product, V,[44] is independent of a firm's decision in the current period, the first two equations of the profit maximization solution become:

$$\frac{\partial \ln n_d(P)}{\partial \ln P} = \frac{V}{V-P}$$

$$\frac{\partial \ln n_m^*(P_m^*)}{\partial \ln P_m^*} = \frac{V}{V-P_x}$$

As seen in this two equation, the static optimization is a special case of this dynamic framework where V is equal to zero.Prices in this model are determined with these two equations.

III.2.2. Implications of the Model

The first implication of the model is that the price level is determined, basically by per capita income of the nation. The difference between the national price level, P, and the price level of the rest of the world, P^* is basically determined by barriers to trade. However, if expectations about future prices are constructed from historical data,

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[44] Pindyck(1992) discuss the detetmination of the present value of astorable good. In my one-good model, the product represents a composite good. If part of this composite good is perishable, the present value of this part is zero.

historical differences also can affect the price level divergences.

Because there is only one good and the supply of this good is fixed, the supply side is characterized by the decision about how to distribute the product between domestic and foreign markets. This distribution decision is summarized by the following four equations:

$$S_d = \frac{PQ}{PQ + P_X X} S$$

$$S_x = \frac{P_X X}{PQ + P_X X} S$$

$$S_d^* = \frac{P^*Q^*}{P^*Q^* + P_X^*X^*} S^*$$

$$S_x^* = \frac{P_X^*X^*}{P^*Q^* + P_X^*X^*} S^*$$

The demand side is characterized by the matching functions, ν_d, ν_M, ν_d^*, ν_M^*, and the expenditure propensity functions, $n(\cdot,\cdot)$, $n^*(\cdot,\cdot)$. The demand side is characterized by the following four equations:

$$P_X X = \frac{e}{\tau^*} Y^* f_X\left(\overset{-}{S_d^*}, \overset{+}{S_X}, \overset{+}{N^*}, \overset{?}{y^*}\right) = \frac{e}{\tau^*} P_M^* M^*$$

$$P_X^* X^* = \frac{1}{e\tau} Y f_X^*\left(\overset{-}{S_X}, \overset{+}{S_X^*}, \overset{+}{N}, \overset{?}{y}\right) = \frac{1}{e\tau} P_M M$$

$$PQ = \frac{1}{e\tau} Y f_d\left(\overset{+}{S_X}, \overset{-}{S_X^*}, \overset{+}{N}, \overset{?}{y}\right)$$

$$P^*Q^* = \frac{e}{\tau^*} Y^* f_d^* \left(\overset{+}{S_d^*}, \overset{-}{S_x}, \overset{+}{N^*}, \overset{?}{y^*} \right)$$

where $f_d = \nu_d(S_d, S_x^*, N)n(P, y)$ and $f_x = \nu_d(S_x^*, S_d, N)n(P, y)$. The signs above a variable is the signs of first partial derivatives of the corresponding function with respect to that variable.

These equations imply that trade flows, $P_X X$ and $P_M M$, are a function of domestic supply (in effect, the productive capacity of the country), foreign supply (the productive capacity of the rest of the world), the distribution of total supply between domestic and foreign markets, population (a variable for the size of domestic market), per capita income, domestic income, and barriers to trade. Even though this model supports the gravity models, in the reduced form of this model the trade flow equations are neither linear nor log-linear. This implies that in the estimation of this model there may be a non-linearity if the range of explanatory variables is not small enough.

IV. Measuring Openness to International Trade

In the second chapter, I showed possible uses of an indicator of openness and mentioned that there is no commonly accepted indicator of openness. Existing measures do not fit conceptual characteristics required from an openness indicator.

In the third chapter, I discussed the three existing models of aggregate trade implying gravity equations in their reduced form. I then introduced a search theoretic model of aggregate trade flows. This model supports the selection of variables in the gravity equations, but suggests that non-linearities may be encountered in the empirical study.

In this chapter, I estimate trade intensity[45] equation which is equavelent of a gravity equation of each country's total trade with the rest of the world with cross-country and time series pooled data. I also estimate the same model for total exports and total imports seperately. I then identify the component of trade intensity that is not explained by the variables of the model, as a measure of openness. I construct both cross-country openness index for the period 1961-1988 and a time series openness index for each country.

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[45]Trade intensity is the ratio of total trade to GDP.

National price levels also are used in construction of openness indicators.[46] I estimate equations similar to gravity equation with national price level as the dependent variable and discuss the short-commings of openness indicators based on national price levels.

In the second section of this chapter the openness index is compared with the existing indicators of openness. I finished the chapter with concluding remarks.

IV.1. Empirical Model and Findings

In the empirical study, the following variables are used : nominal exports, measured in national currency units (EXP), nominal imports, measured in national currency units (IMP), nominal gross domestic product measured in national currency units (GDP), real per capita gross domestic product in 1985 international prices (RGDPCH), population (POP), national price level index for which US=100 for each year (P), the national price level index for which US=100 for 1985 (P0), and a distance measure (Dis_rY). The variables P, RGDPCH are from Summers-Heston (1990) data set. The variables, EXP, IMP, GDP and POP are from World Bank. P0 is P times the US

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[46]For example, Dollar(1992)

GDP deflator for which base year is 1985. Dis_rY is a measure for the distance from the world production.[47]

The openness equation, that is estimated for 105 market economies for the period 1961-1988, is a double logarithmic regression equation. The selection criterion for countries and sample period is the availability of sufficient data.

The dependent variable is the logarithm of trade intensity $T = \frac{EXP + IMP}{GDP}$. The independent variables are ln(RGDPCH), ln(POP), ln(Dis_rY), country dummies ($cDummy_i$) for all countries except the US, the base country, and year dummies ($yDummy_t$) for all years except 1961:

$$\begin{aligned} \ln(T) = {} & \text{Constant} + \alpha_1 \ln(RGDPCH) + \\ & \alpha_2 \ln(POP) + \alpha_3 \ln(Dis\_rY) + \\ & \sum_i \beta_i \; cDummy_i + \\ & \sum_t \gamma_t \; yDummy_t + \\ & \varepsilon_{it} \end{aligned} \qquad \text{(III.1)}$$

where ε_{it} is the residual for country i and year t.

This empirical model corresponds to the following equation:

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[47] The method of calculation of Dis_rY is described in appendix 1.

$$T = (RGDPCH)^{\alpha_1}(POP)^{\alpha_2}(Dis\_rY)^{\alpha_3} A\ C\ W\ \Omega, \qquad \text{(III.2)}$$

where $A = e^{constant}$, $C = e^{\beta_i}$, $W = e^{\gamma_t}$, $\Omega = e^{\varepsilon_{it}}$, and β_i is the coefficient of the dummy for country i, and γ_t is the coefficient of the dummy for the year t.

Equation (III.2) is equivalent to a gravity equation for aggregate trade flow if the dependent variable is not total trade intensity but either import intensity or export intensity. To see this define X as exports, M as imports, Y as national product, N as population, D as distance, and W as an index summarizing world trade conditions. Ignoring the constant term, country dummies and residuals, the above equation is:

$$(X + M) = Y^{\alpha_1+1}N^{\alpha_2-\alpha_1}D^{\alpha_3}W. \qquad \text{(III.3)}$$

Here Y and N correspond to the real output and population variables of the home country in the gravity model. D corresponds to the distance variable. W corresponds to the variable for the characteristics of the rest of the world.

Assuming that all countries are small countries, the characteristics of the rest of the world is the same for each country. If this is a cross-sectional regression the characteristics of the rest of world will be embodied in the constant term. In the pooled data regression, the level of W

for the base year (for which there is no year dummy) continues to be embodied in the constant term. However dummies for years other than the base year will capture year to year changes in the trade conditions of the world, i.e., the characteristics of the rest of the world every country is facing.

If per capita output, population and distance from the world output capture determinants of trade other than artificial barriers, equation (III.1) with estimated parameters will show the "normal" level of trade for each country in the absence of artificial barriers. However if the explanatory variables are correlated with the artificial barriers, some part of the effect of barriers will be absorbed by the estimated parameters. In particular, the effect of the average level of artificial barriers will cause the constant term to be higher than in a case where there were no artificial barriers to trade. Because there is more than one year in the sample, and the average level of artificial barriers to trade changes over time, the constant term includes the average effect of the artificial barriers for the base year, and time dummies will absorb annual changes in the effect of average level of artificial barriers.

The dummy for a country shows the average deviation of openness from the base country's average openness within the sample period. The residuals show the annual movements of a

given country's openness relative to its period average openness.

The base country is the US and base year is 1961. The estimation of indexes described below is not sensitive to the selection of base country or base year. The criterion in the selection of base is convenience.

Three different indexes can be constructed using the results of regression equation (III.1); (i) a world trade condition index, (ii) an average index of openness for 1961-1988, where US=100, and (iii) an index of openness for particular years where the 1961-1988 average is equal to 100.0 for each country.

The world trade conditions index is equal to 100 e^{γ_t}, where γ_t is the year dummy for year t from equation (III.1). γ_{1965} is implicitly assumed zero in the regression model. Therefore the world trade conditions index shows changes in the average trade intensity of all countries, aside from those accounted for by changes in real per capita output, population and distance.

The openness index for 1961-1988 average of country i is equal to 100 e^{β_i}, where β_i is the country dummy for country i

from equation (III.1)[48]. β_{US} is implicitly assumed zero in the regression model. Therefore the openness index for a country shows its average trade intensity relative to that of the US, aside from the effects of its real per capita output, population, distance and the world trade conditions.

The Openness index for country i in the year t is equal to 100 $e^{\varepsilon_{it}}$. The sum of residuals of a country over the period 1961-1985 is equal to zero in the regression equation (III.1). Therefore the index number for a country for a year is the trade intensity of the country aside from what is accounted for by its real per capita output, population, distance and world trade conditions, as a percentage of the average openness for the period 1961-1985.

To detect possible non-linearity that is not captured by the log-linear equation (III.1) I estimated two extensions of the basic equation. First I introduced the square of the logarithm of the real per capita output:

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[48]This cross-country index of openness requires further refinements as discussed below in this section.

(III.1')

$$\ln(T) = \text{Constant} + \alpha_1 \ln(RGDPCH) + \alpha_2 \ln(POP) + \alpha_3 \ln(Dis\_rY) + \alpha_4 (\ln(RGDPCH))^2 + \sum_i \beta_i \, cDummy_i + \sum_t \gamma_t \, yDummy_t + \varepsilon_{it}$$

Secondly, I also added the square of the logarithm of the population:

(III.1'')

$$\ln(T) = \text{Constant} + \alpha_1 \ln(RGDPCH) + \alpha_2 \ln(POP) + \alpha_3 \ln(Dis\_rY) + \alpha_4 [\ln(RGDPCH)]^2 + \alpha_5 [\ln(POP)]^2 + \sum_i \beta_i \, cDummy_i + \sum_t \gamma_t \, yDummy_t + \varepsilon_{it}$$

I also tried these equations with three other dependent variables. Gravity models estimate imports and exports separately. Therefore I estimated these equations separately with the logarithm of export intensity, $X = \frac{EXP}{GDP}$, as

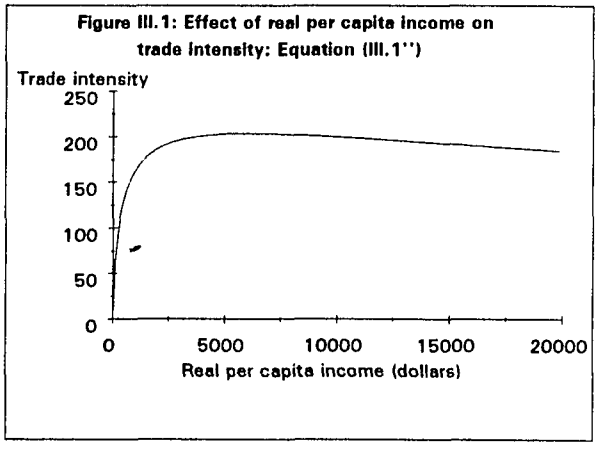
dependent variable and with the logarithm of import intensity, $M = \frac{IMP}{GDP}$, as dependent variable.

Besides total trade intensity, export intensity, import intensity, I run the three regression equations with national price level index, P0, as the dependent variable. The justification for this national price level equation is the assumption that the differences in real per capita income, population and distance from world markets are enough to determine the divergence in national price levels mentioned by Kravis and Lipsey(1983, 1987, 1988) and predicted by the search theoric model introduced in the third chapter. The index calculated using year dummies shows movements in the average price level of the world, net of the effects of the explanatory variables. The index calculated using the dummy for country i is the average price divergence of country i for the period 1961-88 relative to the average price divergence of the US. The index calculated using the residual of country i for year t shows the price divergence of the country in year t relative to the average price divergence of the country for the period 1961-1988.

The results of three regression equations for four dependent variables are listed on Appendix 2.

As expected, distance from world markets is negatively related to trade intensity. The coefficient is significantly less than zero at %1 in all three total trade intensity equations (III.1), (III.1') and (III.1'') .

The first important feature of the regression analysis is that the relation between trade intensity and per capita output is not log-linear. The coefficient of the square of the logarithm of real per capita output is significantly different from zero at %1. To see the relation between per capita output and trade intensity, I plot estimated trade intensity assuming other variables to be constant at unity in the Figure III.1. Trade intensity increases sharply up to a per capita output around 4000 US dollars[49]. Trade intensity decreases slowly as per capita output increases beyond this turning point.



The turning point is consistent with the classification of countries as developed country, DC, and less developed country, LDC. For LDCs trade intensity is an increasing function of real per capita

[49]Real GDP per capita is measured at 1985 international prices.

output, whereas for DCs it is slidely decreasing in per capita output.

Whether or not the square term for population is used, in the plausible range of population the relation between population and trade intensity is negative. The coefficient of the square of the logarithm of population is not significant at %5: the Student's t ratio is 1.51. However introducing a squared term for population makes results for countries with large population, like India, more reasonable. Therefore, I used equation (III.1'') in the calculation of indexes.

Export intensity and import intensity equations yield almost the same results as total trade intensity equations. The most important distinction is that the distance variable is not significant in export intensity equation, whereas the coefficients of the distance measure are significant in import equations and have larger t ratios than t ratios in total trade equations. This result seems to be odd given the high correlation between export intensity and import intensity. However, if countries near to world market have mostly trade deficit and countries far away from world markets have mostly trade surplus in the sample period 1961-1988, the coeficient of distance measure may be insignificant in export intensity equation even thoug it is negative and significant in import intensity equation.

In the national price level equations, price level is a decreasing function of population. In equation (III.1), with the logarithm of national price level as dependent variable the coefficient of logarithm of population is negative and significantly less than zero at %1. Interpreting population as a proxy for labor abundance this result support the Lipsey-Kravis argument. They showed that national price level will be low in labor abundant countries even in the long run. The relation between population and national price level is not log-linear. The coefficient of the squared term for population in equation (III.1'') is significant at %1. However, this does not change the negative relation in the plausible range of population. The plot of price level estimated from the parameters of equation (III.1'') assuming other variables to be constant at unity is in Figure III.2. This graph shows the percentage contribution of population to the national price level.

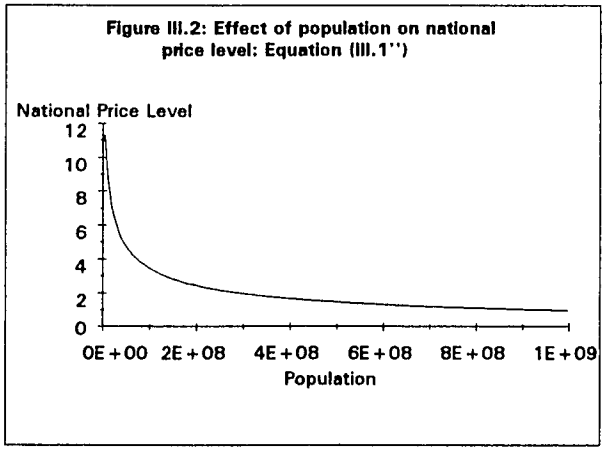
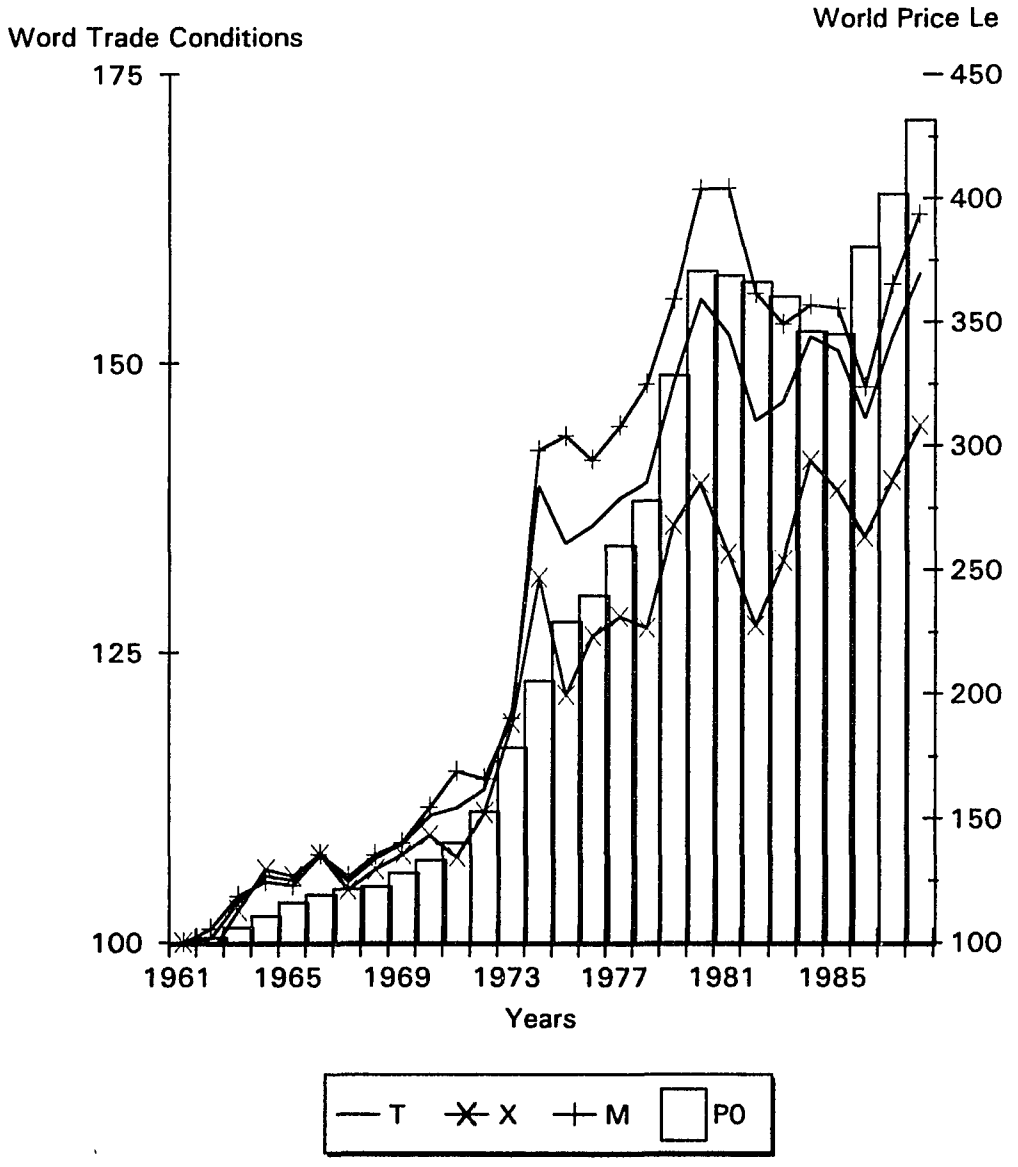


Figure III.2: Effect of population on national price level: Equation (III.1'')

The relation between distance and the national price level is also negative and significant. This suggests that the closer a country get to the world markets, the lower become its national price level. However the coefficient of real

per capita income is not significant. I will discuss this issue at the end of this part.

Figure III.3: Trade Conditions and The World Price Level
(1961 = 100)



The time-series movement of the index of world trade conditions based on total trade, import and export and index

of the world net price level are listed in appendix 3 and they are depicted in Figure III.3.

The world price level is the geometric average price level of countries in the sample, net of the effects of population, real per capita output and distance. Furthermore all prices are expressed in US dollars. Therefore this index should be interpreted with caution as an indicator of world price level. It shows the purchasing power of dollar in world market net of the effects of explanatory variables.

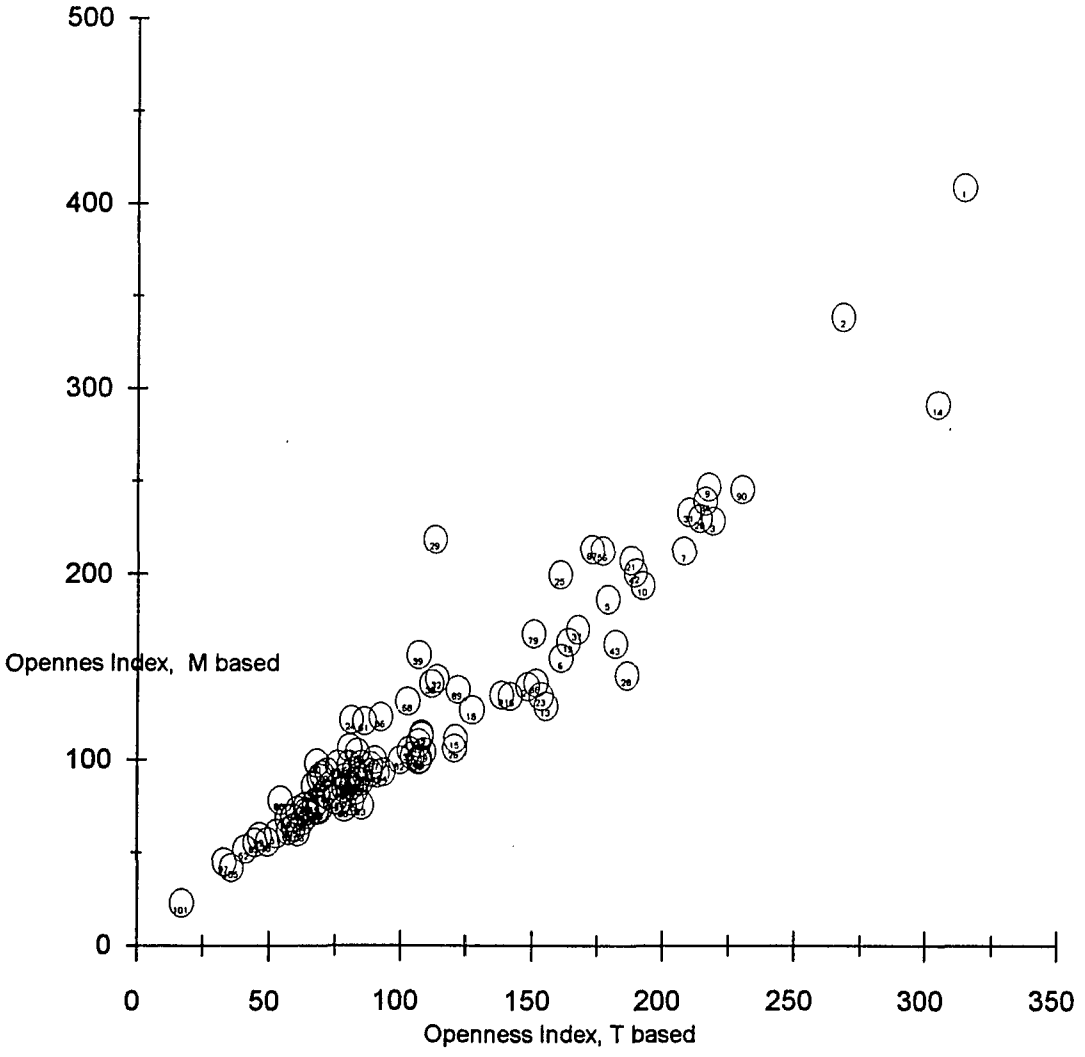
The net world price level increased sharply in the period 1961-1980 at an increasing rate. Then, it decreased slowly in the period 1981-1985. In the last three years of the sample the increase was resumed.

In Figure III.3, there are three different versions of the world trade conditions index: (i) based on the total trade intensity regression (T), (ii) based on the export intensity regression (X), and (iii) based on the import intensity regression (M). Their time-series movements are almost always in the same direction. The exception years are 1971, 1974-1976 and 1978. The import-based index is always above the export-based index. This may be interpreted as follows: The artificial barriers to imports for a dominant part of countries in the sample was high at the beginning of the period. In the period 1961-1988, some of these barriers are

eliminated and average import propensity converge to average export propensity.

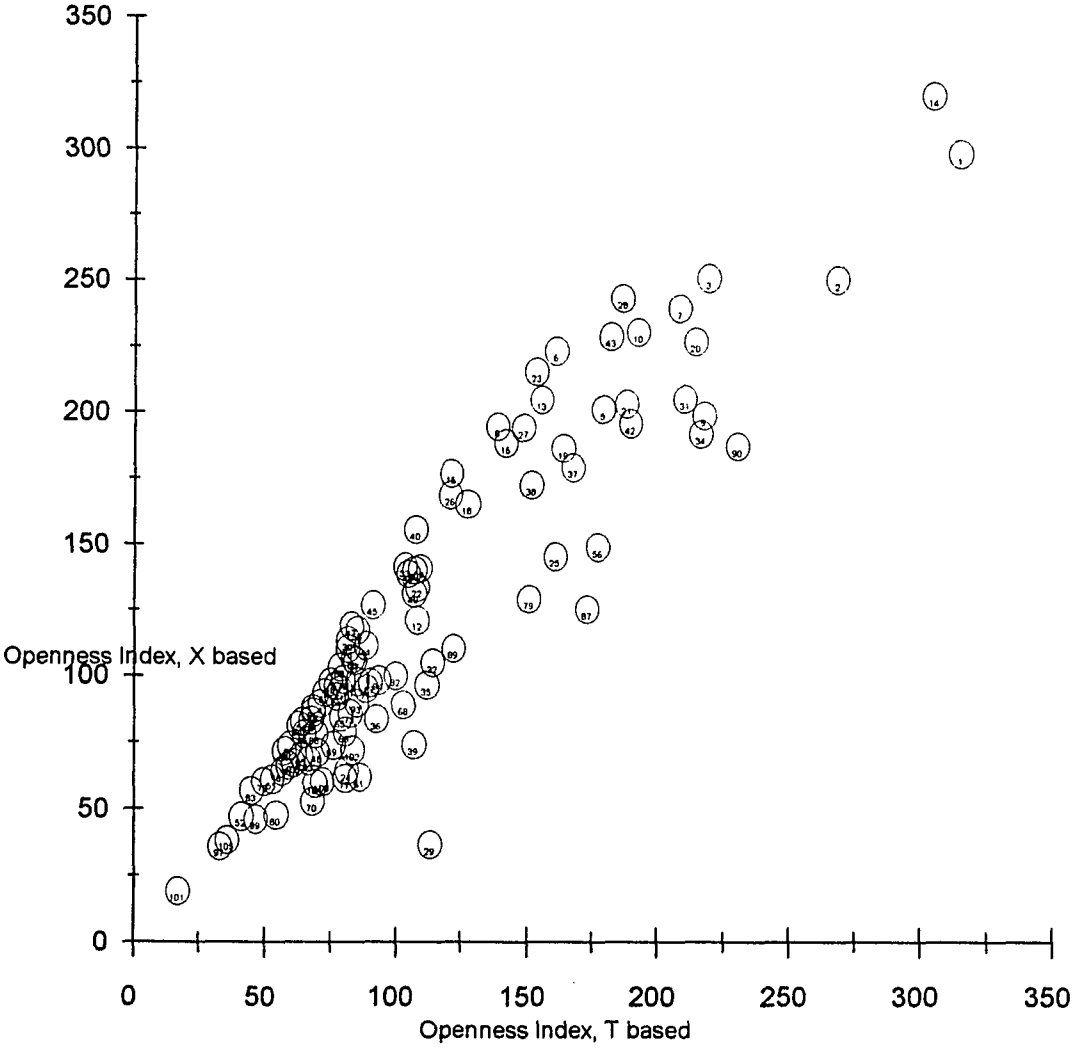
Even though there are annual ups and downs of all three trade condition indexes, the overall picture indicates a dramatic increase in the average propensity to trade. Three periods of decrease in average propensity to trade are 1974-1976, 1980-1982 and 1984-1986.

Figure III.4: Openness Indexes, T vs. M based, US(1961-1988 Average)=100



Figures III.4, III-5, III-6 show the relation between three kinds of openness indexes for 105 countries, average over 1961-1988.[50]

Figure III.5: Openness Index, T vs. X base, US(1961-1988 Average)=100



[50]Country codes in the circles in the Figure is from Appendix 10.

Figure III.6: Openness Index, M vs. X based
US(1961-1988 Average)=100

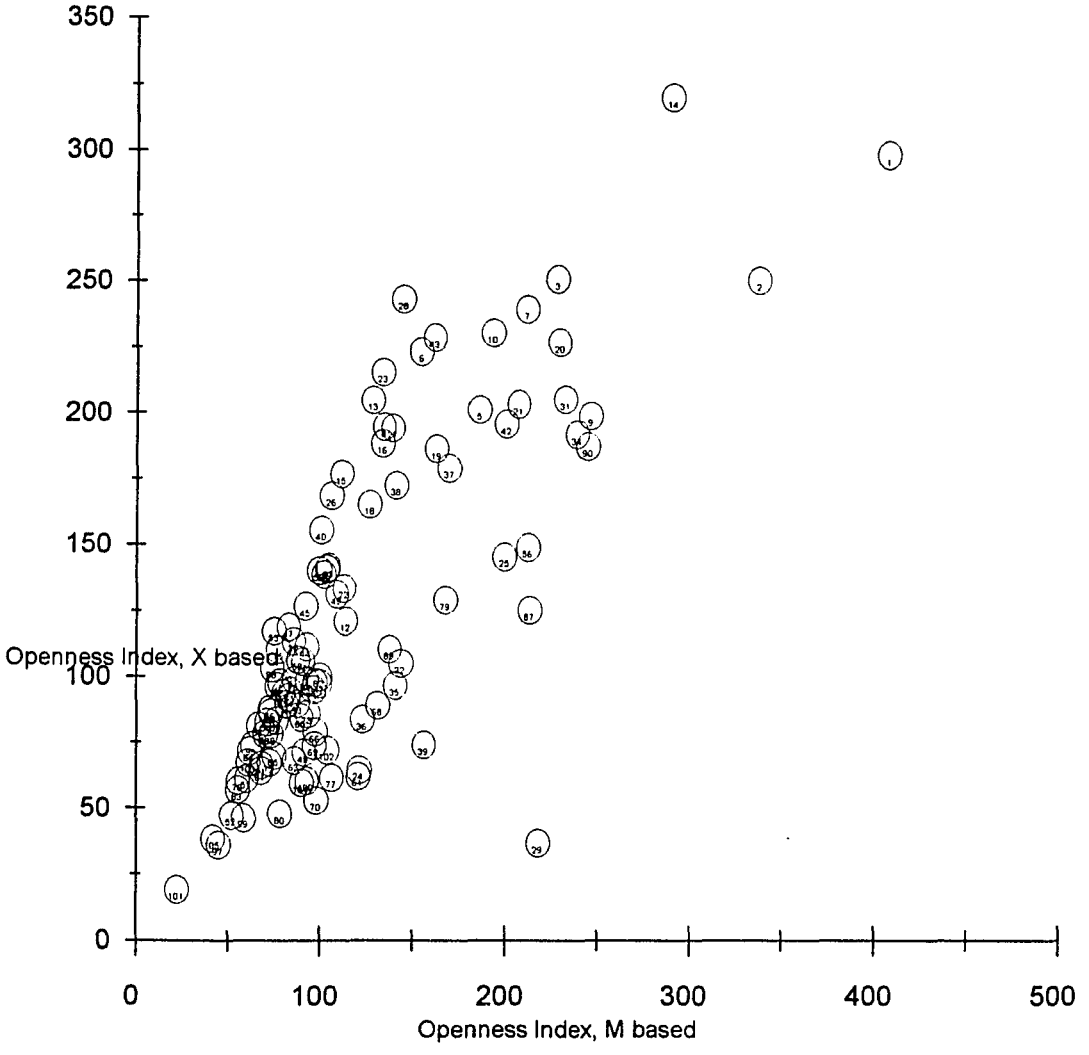
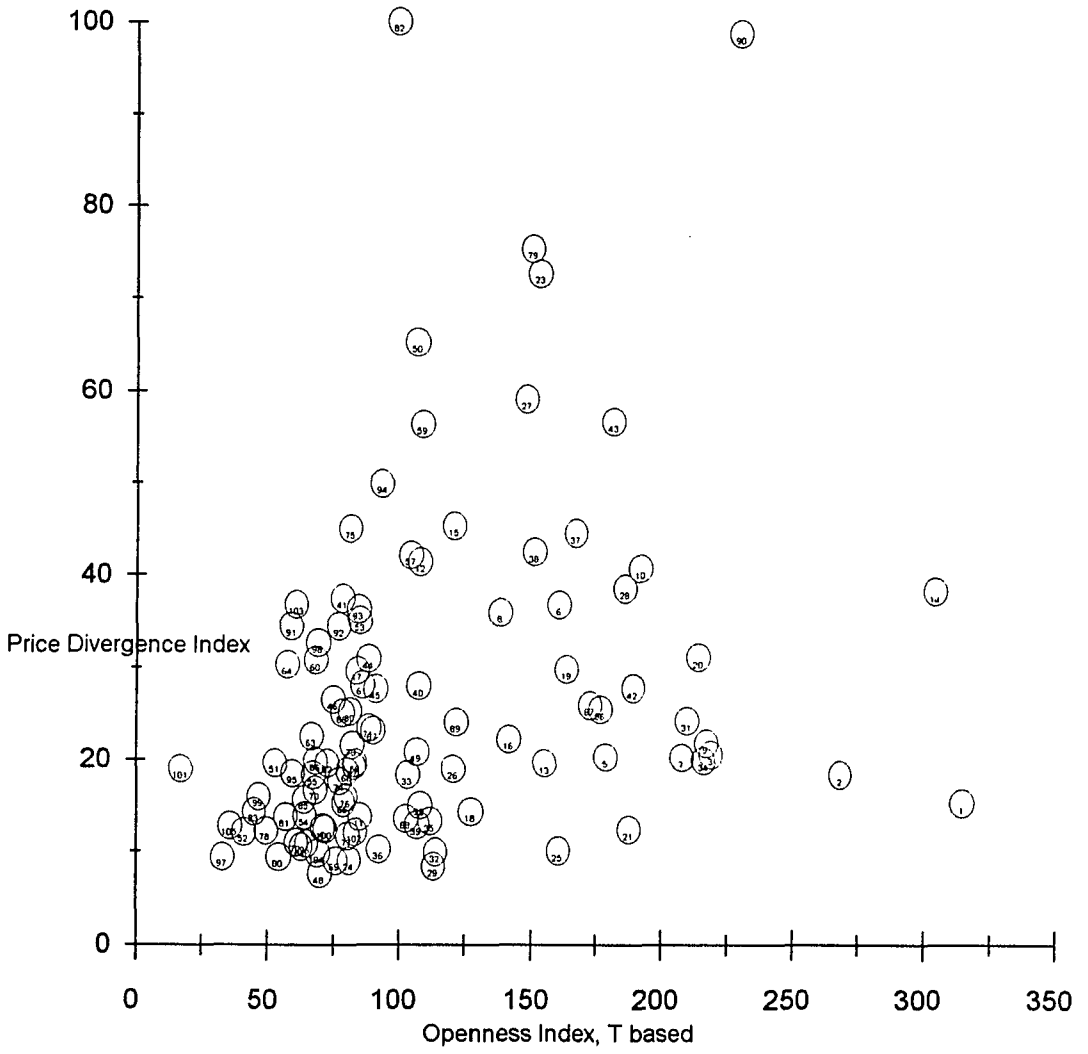


Figure III.7: Openness Index vs. Price Divergence Index, US(1961-1988)=100



Single Regression results for the relation between total trade based openness index (T), import based openness index (M), and export based openness index(X) are as follows:

Dependent	Independent	Coef	t	R^2
M	T	1.05	31.9	0.91
X	T	0.99	24.4	0.85
X	M	0.76	12.8	0.61

All three indexes are highly correlated. The only sharp outlyer is Lesotho.[51] However, the import to Lesotho exceeds the export from Lesotho mostly over %200 during 1961-1988 period.

Figure III.7 shows the relation between T based openness index and the price divergence index. There are no clear-cut linear or nonlinear relations between these two indexes. The ordering of countries by price divergence can not be interpreted as a ranking of openness. If price divergence index is used to measure openness, Turkey and Taiwan are open to foreign trade almost to the same degree. The same thing is true for Belgium and Mexico. On the other hand, Argentina and Uruguay are apart from each other in the list sorted by the price divergence index as are Taiwan and Hong Kong.

Country specific characteristics that affect the price level, but are not related to artificial barriers to trade, are not well captured by the explanatory variables of the price level equation. Therefore the price divergence index is not a good measure of openness and requires more refinement. However if the 1961-1988 average price level divergence index reflects all the factors affecting the national price level other than artificial barriers, annual

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[51]Country code for Lesotho is 29.

movements in the price divergence index for a given country will indicate the annual changes in openness of the country.

Openness and price divergence indexes calculated using the residuals from the regression equation (III.1'') are show annual changes in openness and national price level divergence from the world price level.[52] The base of these indexes is 1961-1988 average. The geometric average of these indexes in the period 1961-1988 is equal to 100. Figure III.8 shows these indexes for the US, Germany and Japan for the period 1961-1988.

Between 1961 and 1988 the US became more open. There was a slight increase in openness before the 1970's and then jump in the mid 1970's. After that the movement of the openness indexes is like movements around a mean. This result can be interpreted as follows: the average openness of the US was more or less constant in the period before the mid-1970's and after the mid-1970's, but it was higher in the second period than in the first. The divergence of the M based and X based openness indexes from the T based openness index is a result of trade imbalance in the last years of the sample, beginning 1983.

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[52] Time series openness indexes and price divergence index are in Appendixes 4-7.

For Germany, there were large fluctuations in openness indexes.[53] Both for the US and for Germany, X based openness index is larger than M based index before late 1970's and after 1970's the inverse is true.

Japan fits all three openness regressions better than the US and Germany. The fluctuations are more smoother. Openness index for Japan hardly changed in 1961-1988. This implies that Japanese artificial barriers to trade (if exist) have not changed dramatically in this period.

Price divergence indexes for these three countries are negatively correlated with openness indexes over time. However this is not the case for a large number of countries. The results of regressions of T based openness index on price divergences index for all countries are listed in Appendix 8.

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[53]In the 1964-1969 period, there was a sharp increase in openness. In the 1970's the degree of openness decreased slightly. In the period 1979-1982 another sharp increase happened. In 1985-1987 openness indexes decreased and offset the increase in 1979-82 to some extend.

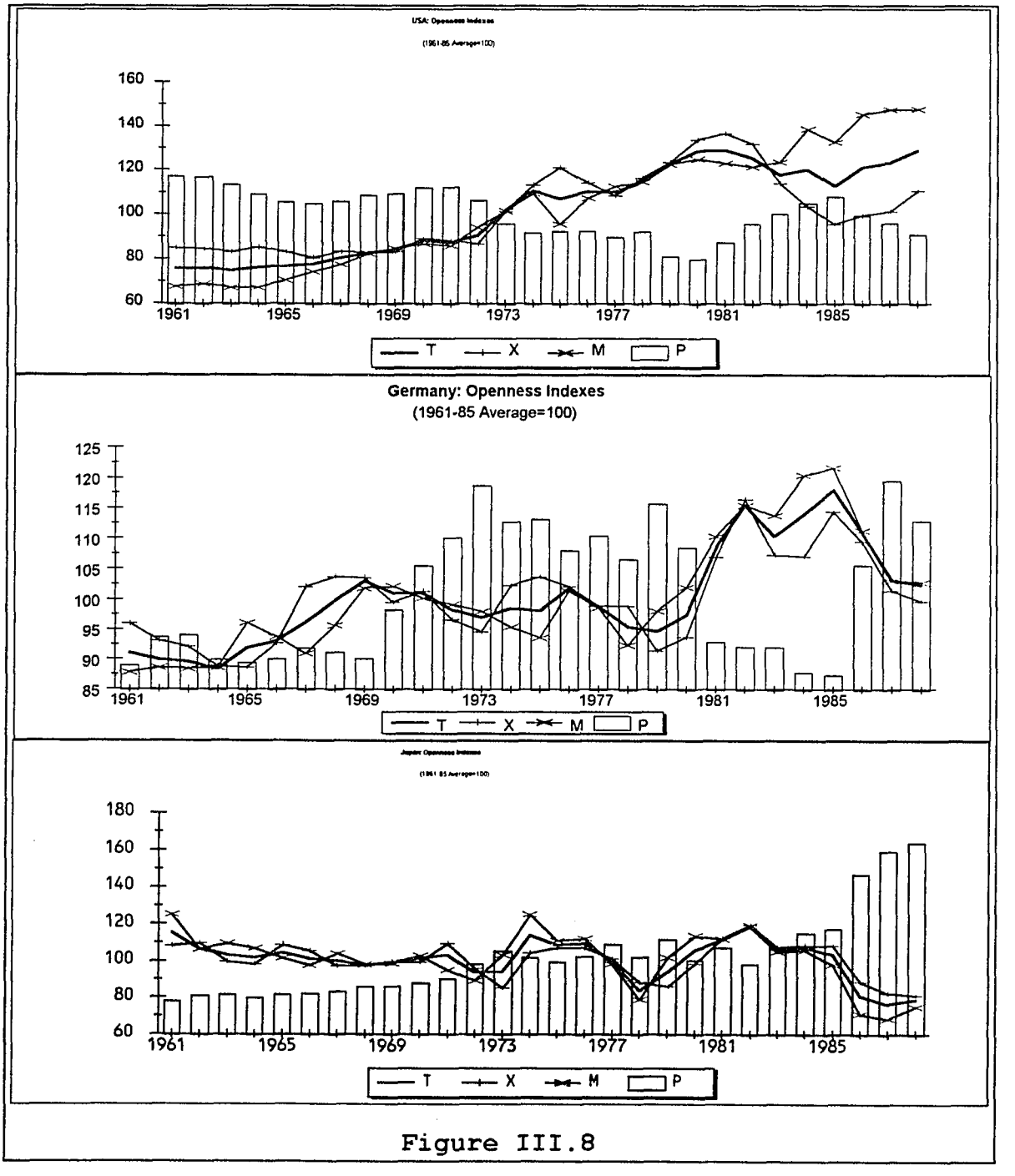
160
140
120
100
80
60
1961
1965
1969
1973
1977
1981
1985
T
X
M
P
Germany: Openness Indexes
(1961-85 Average=100)
125
120
115
110
105
100
95
90
85
1961
1965
1969
1973
1977
1981
1985
T
X
M
P
180
160
140
120
100
80
60
1961
1965
1969
1973
1977
1981
1985
T
X
M
P

Figure III.8

For 53 in a sample of 105 countries, there is a significant negative relation between openness and price divergence; for 30 more countries the sign is correct but the coefficient is not significant. Out of 22 countries having positive correlation, nine have significant positive coefficients. Thus the negative relation between openness and price divergence is not a common feature of all countries.

Countries with positive coefficients are two types. For the first, both openness and price divergence had trend increases in the sample period. Annual movements of two indexes are, mostly, in opposite direction. However, the

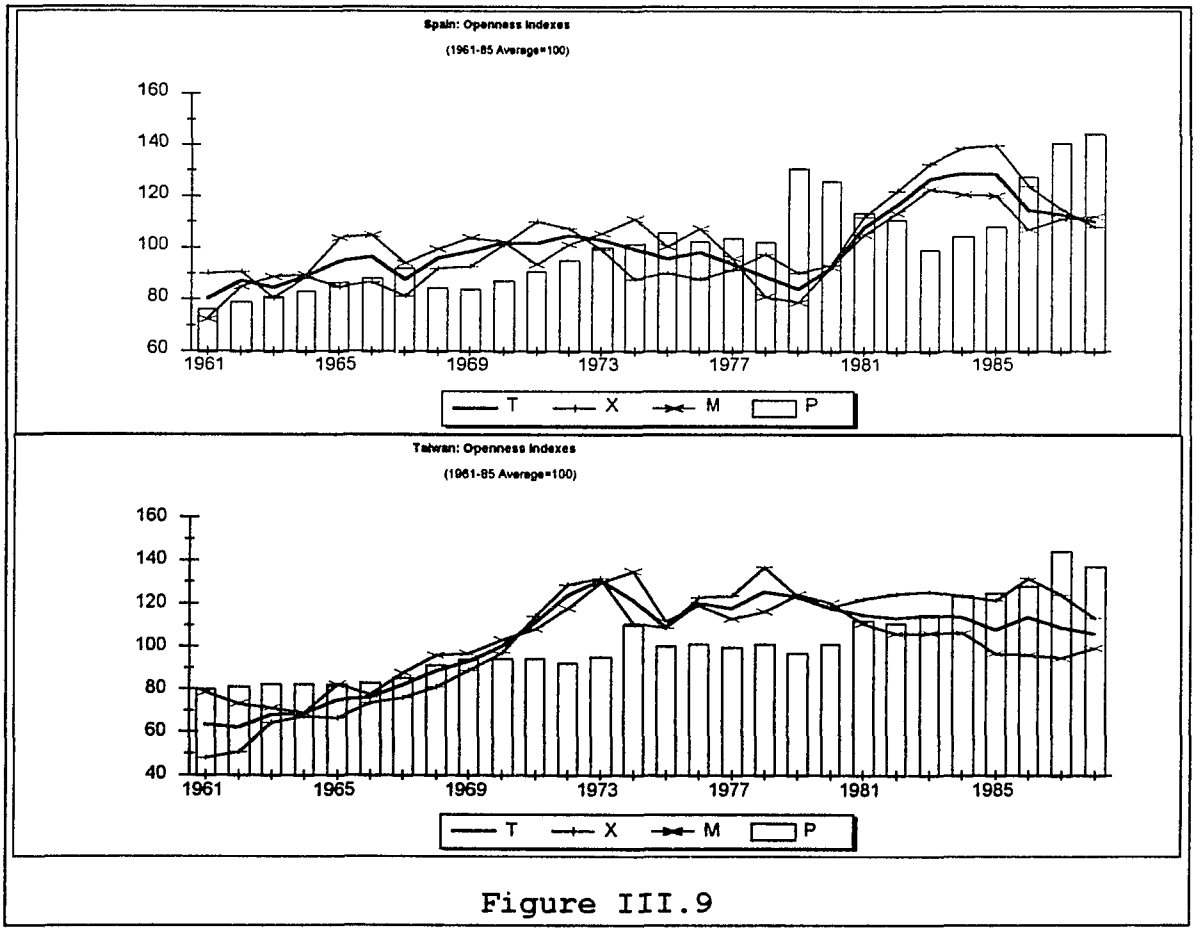

Figure III.9

long run trends dominate the results of regression analysis. This finding may be interpreted as follows: If a country's national price level is significantly below the world price level at the beginning of the period, i.e., in 1961, eliminating barriers will cause a decrease in prices in the short run. However, in the long run national price level has to converge to the world price level. Hence, in the long-run, openness and the price level are positively correlated, whereas in the short run this correlation is negative. Spain and Taiwan are of this first kind. Figure III.9 has time-series plot of openness indexes and price divergence indexes for these two countries.

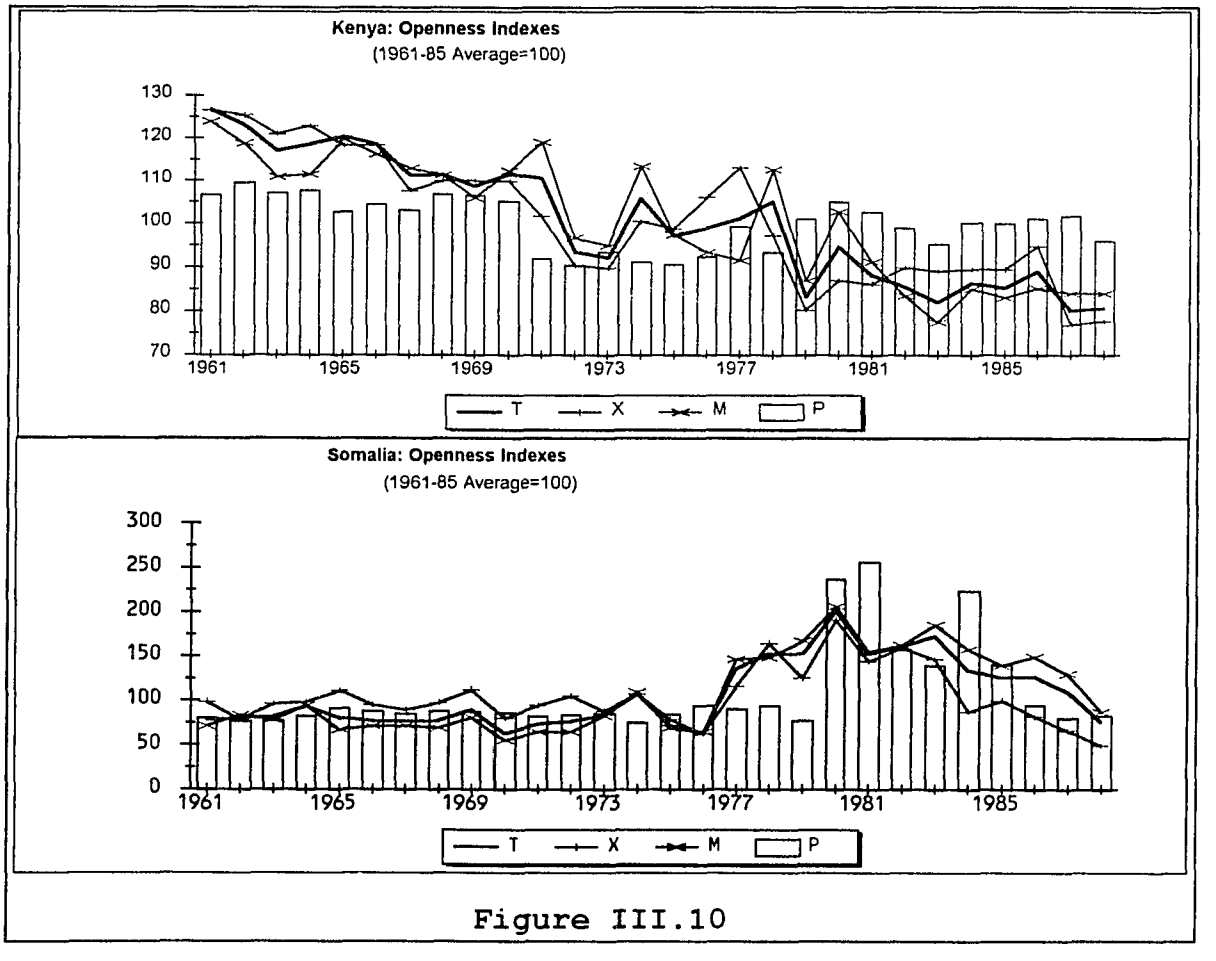

Figure III.10

For the second type of country with a positive coefficient in the openness-price level divergence regression these two indexes move in the same direction both in the long-run and in the short-run. This is the characteristics of some African countries, like Kenya and Somalia. The time series plot of openness indexes and price divergence index for these two countries are shown on Figure III.10. It is obvious from the figure that openness and price level divergence are moving in the same direction, even in the short run.

Even though the abnormal behavior of price level in these countries remains as a question which I will not attemp to explain in this book, their existence raises the doubt about using indicators based on national price level as openness indicators.

If there are differences among countries that persist over time, the effect of these differences will be captured by country dummies in the openness and national price level regressions. Among sources of these persistent differences are geographical area, average population in the sample period, average real GDP per capita in the sample period and average distance from the world markets. The effect of cross-country differences in the last three variables are not eliminated from the openness indexes calculated using

the above pooled data regression analysis even though the effects of annual changes in these variables are eliminated; therefore they need further refinement.

The results cross-country regressions of openness indexes and price divergence indexes on the variables mentioned above are in table III.1. Average real GDP per capita is the geometric average of RGDPCH in the period 1965-1985.[54] Population and distance variables are geometric averages for the 1961-1988 period. Area is geographical area in square miles.

Table IV.1 : Cross-Country Regression Results of the logarithms of openness indexes and Price divergence index: double logarithmic form.[55]

Dependent	Constant	Area	POP	RGDPCH	Dis_rY	R^2
T based	-1.98	-0.08	0.25	-0.11	0.50	0.52
	(-1.27)	(-3.51)	(9.05)	(-2.93)	(3.06)	
X based	2.60	-0.07	0.26	-010	-0.05	0.39
	(1.41)	(-2.59)	(7.77)	(-2.09)	(-0.28)	
M based	-3.32	-0.09	0.21	-0.11	0.75	0.51
	(-2.22)	(-4.10)	(7.73)	(-2.98)	(4.83)	
Price	-1.57	0.04	0.59	0.20	-0.91	0.92
	(-1.10)	(1.97)	(24.7)	(5.99)	(-6.53)	

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[54] This is the largest period in which RGDPCH data is available for all countries.

[55] Student's t ratios are in parantheses.

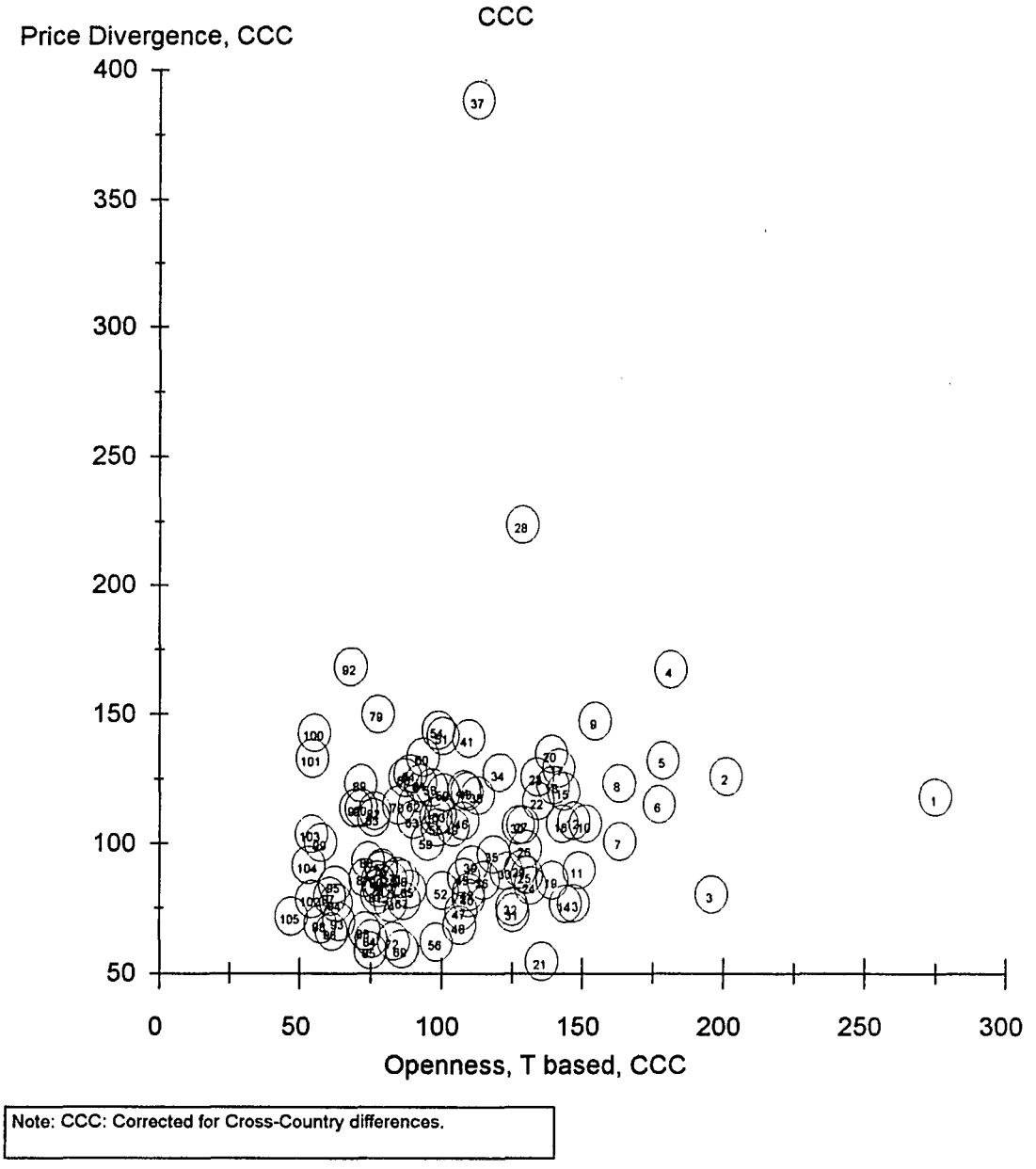
The Adjusted R square is 0.92 for price equation: i.e., over %90 of the variance of the cross-country divergences in price level is explained with the four explanatory variables. Price is an increasing function of area, population and real per capita output and a decreasing function of distance. The positive relation between price level and per capita GDP confirms the results of Kravis and Lipsey(1983, 1987, 1988).

Even though R squares are not as high as in the price regression, regressions of openness indexes are also conclusive: Except for the coefficient of distance in the export based openness index equation, all the coefficients are significant at %5.

The surprising result of these cross-country regressions is the sign of the distance variable which is positive in openness equations and negative in price equation. The implication of this is that the farther away a country is from world markets the open it is.

Using the residuals of these four equations we can get openness indexes net of the effects of the cross-country differences in determinants of trade other than artificial barriers. These indexes are listed in Appendix 9.

Figure III.11: Openness Index vs. Price Divergence



The relation between openness and price divergence is depicted in the Figure III.11. There is a positive relation between openness and price level divergence implying that the more open a country the higher is the national price level. However this relation is not strong and there are

large divergences from this relation as in the examples of Kenya (37) and Zaire (28).

IV.2. Comparison with other measures

This part compares the openness index developed here with several other openness indicators, using the openness index based on total trade.

Except for the exchange control or liberalization phases described in the NBER project directed by Krueger and Bhagwati, all of the openness indicators I will discuss are either for a single year or for a period unlike the openness indexes here. The openness index of a country i for a sub-period between years r and s, $O_{i,r,s}$, can be constructed using the time series openness index of country i, $O^T_{i,t}$ (Appendix 4), and the cross-country openness index of this country , O^C_i (Appendix 9). The formula is :

$$O_{i,r,s}=(1/100)\,O^C_i\ (\Pi_t\ O^T_{i,t})^{1/(r-s+1)},\ t=r,r+1,\ldots s \qquad \text{(III.4)}$$

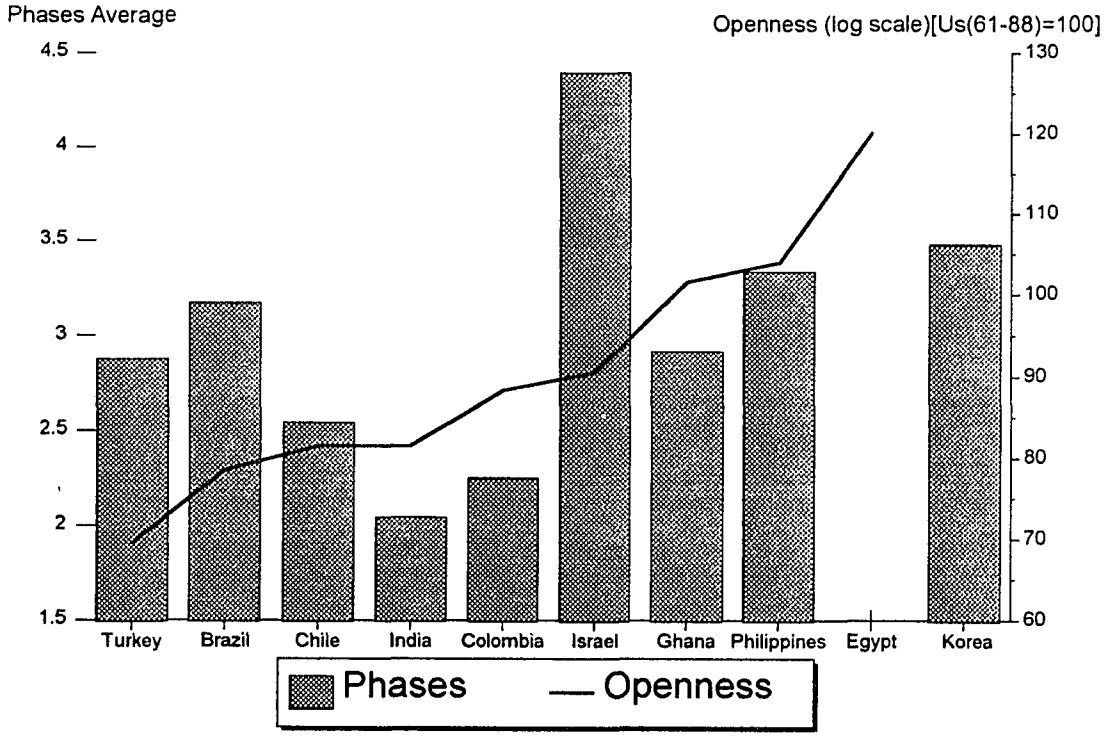
IV.2.1 Comparison with Exchange Control Phases of NBER project.

The first indicator I will compare is exchange control phases of the NBER project. As explained in the second

chapter, phases are processes. A country may get more closed or more open to international trade without changing the phase. Especially, in the first three phases the country can get more restrictive whereas in the last two phases we expect the inverse. A jump to a lower phase indicates a significant increase in the restrictiveness of the foreign trade regime. A transition to a higher phase correspond an increase in the degree of openness. However the ordering is ordinal and subjective.

Figure III.12: Openness index vs. Phases

(1961-72 Average)



The 1961-72 average of phases weighted by length and the openness index for 1961-72 period for countries in the NBER project are plotted in Figure 12.

The least open three countries by my measure, Turkey, Brazil and Chile, have higher average number for phases than India and Colombia. Considering that the values of the openness indexes of these five countries fit in a small interval, and phases are, basically, qualitative and subjective indicators, the differences between these two indicators are acceptable. The only incompatibility is in the case of Israel which has been at phase 4 for most of the period.

The graphical time-series comparisons of the openness index and phases for each country are in Appendix 11. The openness index fits phases perfectly except for three instances in this comparison of two indicators for eight countries over twelve years.

The first exception is Brazil for 1962-1963. In 1962 there is a sharp drop and in 1963 there is a sharp raise in the openness index, whereas both periods correspond to phase 2. This may be a result of extreme instability in the foreign trade of Brazil.

The second exception is Ghana. In 1962, Ghana dropped from phase 5 to phase 1. It was in phase 1 in 1962-63, in phase 2

in 1964-65 and in phase 3 in 1966. Even though Ghana climbed up to higher phases in the 1962-1966 period, the openness index continued to fall throughout the period.

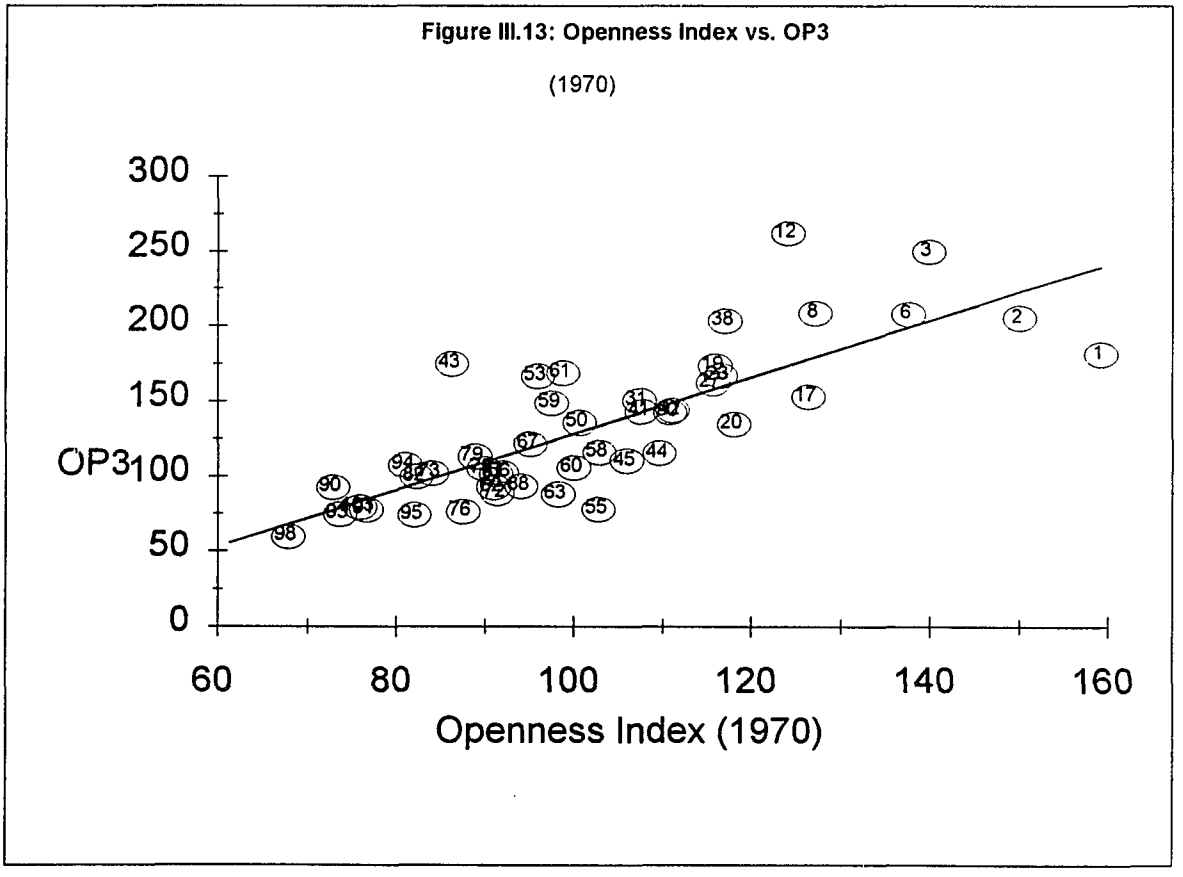
The third exception is that The Philippines dropped from phase 5 to phase 3 in 1967, whereas openness index increased slightly.

After Pritchett(1991) had compared four measures of openness, he wrote that " [b]efore focussing on the narrow issue of the impliications for cross country research let me preface by saying that this paper obviously has no implications for overall conclusions on outward orientation and performance. Even accepting the validity of the notion outward orientation measures, the evidence from cross country performance regressions is the least persuasive element of the case for outward oreintatiion. The multi-country revies of in depth country studies such as [...] Krueger(1978) [...] are much more convincing." The coherence of the openness index with Krueger(1978) justifies the soundness of the openness index introduced here.

IV.2.2 Comparison with Openness index of Kravis and Lipsey. A second comparison is with openness index in Kravis and Lipsey(1979). Their openness index, labeled OP3, is calculated for 1970 from a regression of trade intensity on

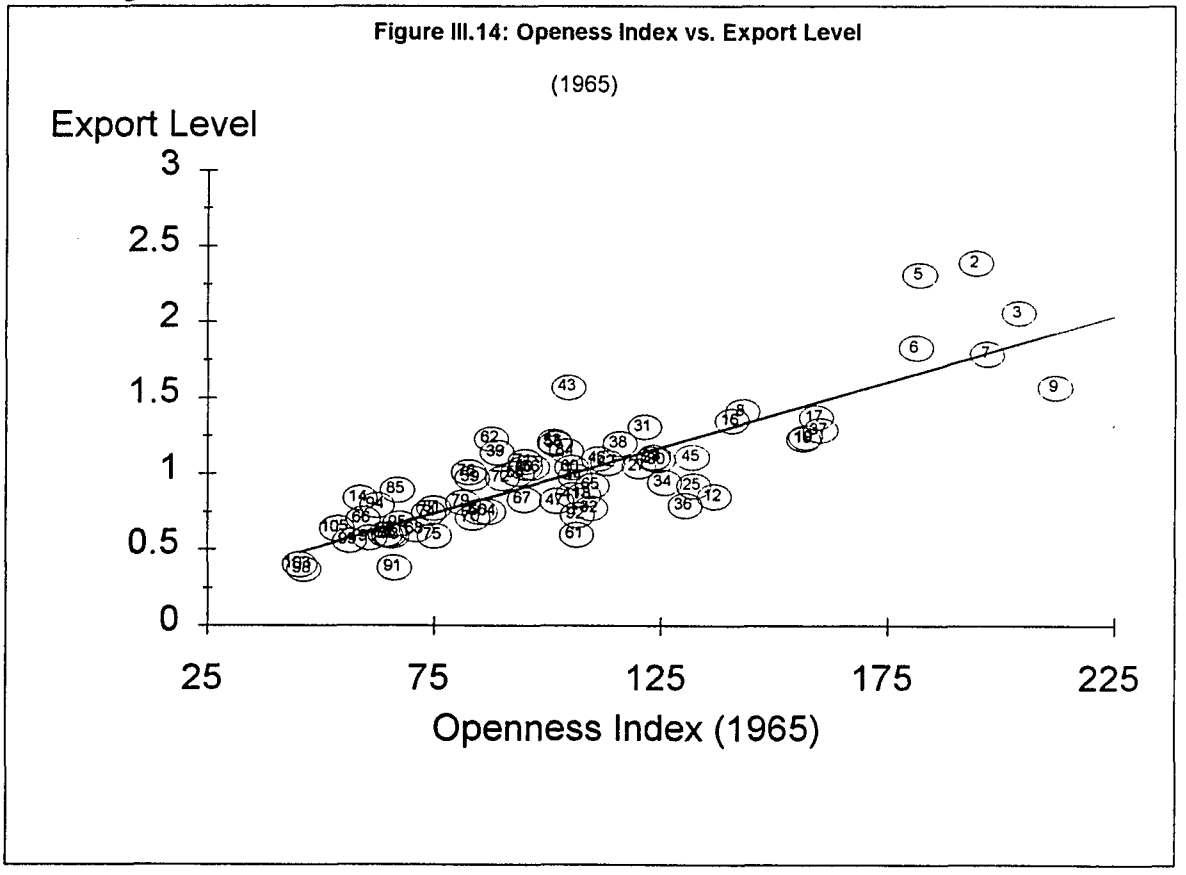
population and population density. The graphical comparison is in Figure III.13.[56]

The R squares from linear and double logarithmic regression of OP3 of Kravis and Lipsey(1979) on the openness index are 0.60 and 0.66. The slope coefficient of the linear regression is not different from one at 95% cofidence, where as the slop coefficient of double logarithmic regression is less than one at %99 confidence.



[56]Country codes in the circles in the Figure is from Appendix 10.

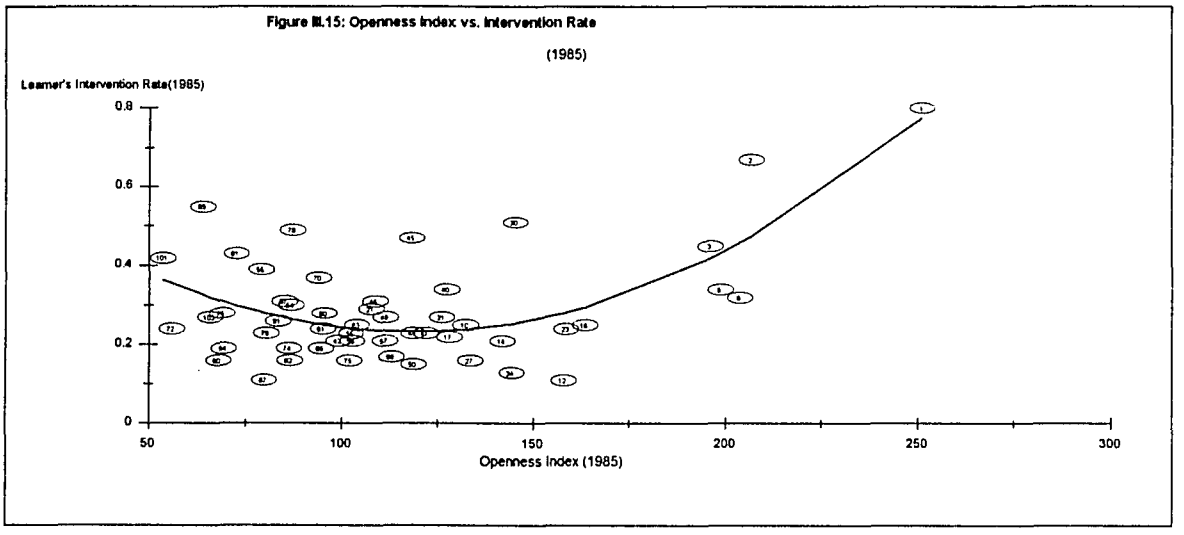
IV.2.3 Comparison with Export Level of Chenery and Syrquin. The comparison with Chenery and Syrquin(1975) is similar to the comparison with Kravis and Lipsey(1979). Figure III.14 shows the relation of openness index with the export level of Chenery and Syrquin which is calculated for 1965 from a regression of trade intensity on population and population density.



The R square of the linear regression of export level on openness index is 0.71 and the slopes of both the linear and the logarithmic regressions are not different than one at %95 confidence.

IV.2.4 Comparison with Leamer's Intervention Rate.

A fourth comparison is with Leamer's intervention rate. The relation between openness index and intervention rate is quadratic, as depicted in Figure III.15.[57]



Leamer's intervention rate is the summation of divergences from the normal level of net exports of three-digit SITC groups. A divergence will have the same effect independent of whether it is positive or negative. However, the normal level of net exports implicitly includes the effect of the average level of intervention among countries in the sample. If most countries intervene in the foreign trade of a specific commodity group the countries without intervention will diverge from the "normal level of net exports". In

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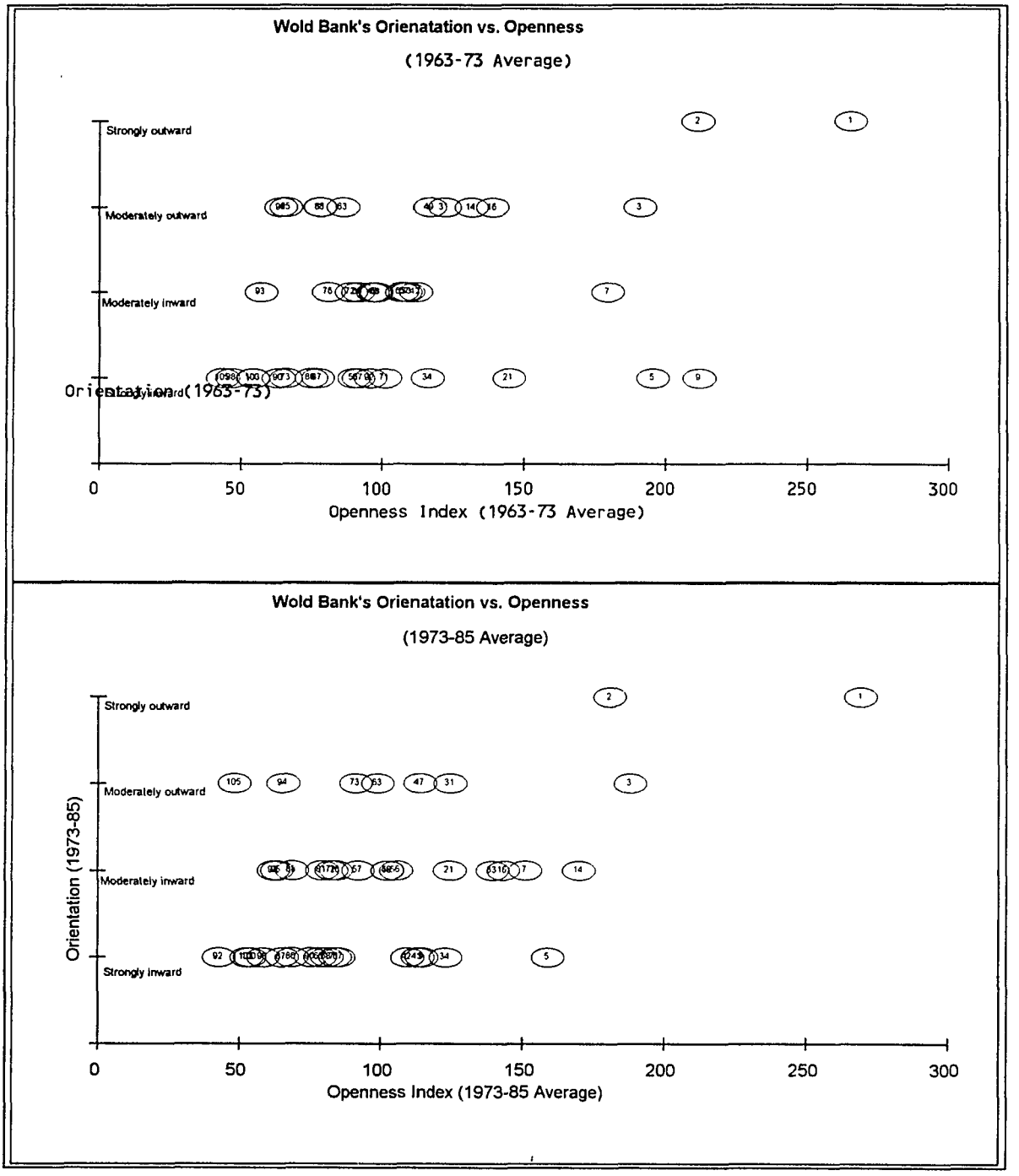
[57]Eliminating two observation having extreme values of the intervention rate, Taiwan and Hong Kong, does not change this result however R^2 decreases significantly.

other words, countries with less intervention than average intervention have a higher "intervention rate". This may be one of the reasons of this quadratic relation between openness and intervention rate.

If a high level of imports causes exports to be low as a result of the foreign exchange constraint, protecting domestic industries will decrease overall trade causing a lower degree of openness. If a high level of export causes imports to be high because of dependence on intermediate good imports or because the trade balance is determined by macroeconomic factors and exports can not diverge from imports too much, promoting exports will increase overall trade causing a higher degree of openness. Considering that both inward orientation and export promotion will require goverment intervention, this, also, may be the reason for the quadratic relation.

IV.2.5 Comparison with Orientation Classification of the World Bank.

Lastly, I will compare the openness index with the World Bank's orientation classification. We have this subjective indicator of orientation for two periods: 1963-1973 and 1973-1985. Figure III.16 shows the relation between the orientation classification and openness index. Strongly export oriented countries are also the most open countries.



Even though market orientation and openness are two different concepts, we would expect at least a weak relation where export oriented countries are more open and import

oriented countries are more closed. Table IV.2 contains some evidence in this direction.

Table IV.2: Openness Index, Group Average

	1963-1973	1973-1985
Strongly inward oriented	85.7	80.5
Moderately inward oriented	99.2	99.9
Moderately outward oriented	101.2	96.1
Strongly outward oriented	237.1	220.7

The groups of moderately inward oriented countries and moderately outward oriented countries are at almost the same level of openness in average. In the early period the average openness index for the former group is lower, whereas in the later period moderately outward oriented countries are in average less open according to my openness index. One reason for this may be that the length of the period is too large. For example, Turkey had been extremly close in the most of the 1973-1985 period and began to liberalize the foreign trade only at the end of this period.[58] However, Turkey is classified as moderately outward oriented in this period and this is true only for the last few years of this period.

[58]see Önis and Riedel(1993).

IV.3. Concluding Remarks

In this chapter I first introduced a two step method to construct openness indexes. In the first step, using pooled data I calculated the effect of determinants of trade other than artificial barriers on trade intensity. This process has two products: (i) cross-country differences in average trade propensity over 1961-1988, net of the effects of factors other than artificial barriers to trade, such as population, per capita gross national product, distance from world markets, (ii) time-series indexes of openness for each year for each country, for which the base is the period average. In the second step, I refined the cross-country openness indexes, further, to eliminate the effects of average cross-country differences in variables (other than artificial barriers). The openness indexes calculated for total trade intensity, import intensity and export intensity are very similar.

The indexes can be interpreted in the framework of gravity models of aggregate trade. Time-series openness index can be used for time-series analyses in specific country cases. Cross-sectional openness indexes can be derived easily for any year or sub-period of the sample. The openness index is continuous, implementable and objective. Hence it has all of the properties required of an openness indicator, as discussed in second chapter.

The ranking of countries according to the openness index is plausible. There is a risk that the results may be misleading for some of the countries with extreme values of variables, for countries with inaccurate data or for countries in which changes in trade policy are anticipated, for example, the value of the openness index for Brazil was very low in 1962 and very high in 1963. The trade liberalization policy was introduced in 1964. Looking at a single year may be misleading as in the 1962-63 example of Brazil.

The openness index cannot replace a detailed, qualitative analysis for specific cases and it is more suitable for large sample quantitative analysis. The comparison of the openness index with other indicators supports this idea. The openness index is correlated with other quantity-based indicators, such as those of Kravis and Lipsey(1979) or Chenery and Syrquin(1975). However, unlike the other two indicators, the openness index is not specific to a single year. Both time-series and cross-sectional openness indexes are also consistent with the exchange rate control phases of NBER project directed by Krueger(1978) and Bhagwati(1978).

There is a quadratic relation between the openness index and Leamer's intervention rate. This quadratic relation is explainable, but the fact that the correlation between these

two variables is positive, instead of negative, as it should be, implies that if the intervention rate is used in a linear regression as an openness indicator there may be a sign error.

The measure the orientation classification of the World Bank is also correlated with the openness index. Hence the comparison with other indicators shows consistency with the openness.

Aside from the quantity-based openness index an index based on national price levels was also calculated. Cross-country differences explain a great portion of the variance of national price levels. The results support the Kravis-Lipsey[59] argument. However, the ranking of countries based on the price divergence index, which is the divergence of the actual price level from the one predicted by the price level equation, is different from the ranking based on the openness index. Because the latter ranking is more plausible I concluded that there are factors other than artificial barriers that affect the price divergence index. Use of this index as an openness index can be misleading. An indicator based on the divergence of internal prices of tradables,

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[59]Kravis and Lipsey(1983, 1987, 1988).

rather than of total GDP, from world prices may give a better result.

Appendix 1: Measuring Distance from World Market

A measure of distance a the bilateral trade equation is simple the distance between two countries. However, in the case of a country's trade with a group of countries, e.g. to world, we should take a weighted average of distance. Weights should be selected such that they reflect the importance of the corresponding partner country in the total trade of the country for which the distance measure is calculated.

A candidate for the weights is the share of the partner in total trade of the country under consideration. For example if distance measure is used in an export equation, the exports to partners may be the weight for partner. The shortcoming of this approach is that two countries that are far away from each other will trade less; i.e. the effect of distance is embodied in the bilateral exports figures. Therefore, the importance of partner as an importing market in general will be underestimated. Furthermore, the weights would be different for each exporting country.

The income of the partner is another candidate for the weights. We should be careful with these too. If imports are not linear in income, more specifically if the import/income ratio is decreasing in income, high income

countries will be represented with weights showing more importance than they have. Furthermore, if were are other determinant of importance of a country as an importer, like as trade policy, income as weights will overvalue countries with protective policy.

Lastly, imports of a partner country from the world can be used as weights. Even though these weights do not have the shortcomings of others, they will underestimate the importance of a country that is far away from world markets and overestimate countries near to world market. However, we can hope this divergences will offset each other.

Another issue related to the measure of distance is the time dimension. Even though the distance between two countries with constant borders is the same over time, the distance from world markets may change overtime. For instance, the East Asian NICs, and Japan were a smaller part of the world market in 1961 than in 1988. Therefore, the countries near to them came closer to world markets over this period. We should therefore calculate distance from world markets year by year.

Distances between countries are measured as nautical distance between seaports of countries. If a country is an inland country, the distance from this country to the nearest seaport is added to the nautical distance. Lastly, a

proxy for the distance from the border to the center of the country is added. Lastly, distances from borders to the centers of both source and destination countries are added. Because we do not have data on the economic "center of gravity" for each country, I assumed that the shapes of countries are circles, and the center of the circle is the economic "center of gravity". Using the area, A, the distance from the border to the center is calculated as $\sqrt{A/\pi}$.

Appendix 2: Pooled Data Regression Results.

Regression Results of the form (III.1)

	Ln(T)		Ln(X)		Ln(M)		Ln(PO)	
	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Constant	8.16	3.39	4.15	1.49	8.97	3.54	9.02	4.04
1962	-0.00	-0.03	-0.01	-0.32	0.01	0.20	0.02	0.95
1963	0.03	0.97	0.03	0.76	0.03	0.99	0.07	2.53
1964	0.04	1.52	0.06	1.73	0.04	1.18	0.12	4.53
1965	0.03	1.21	0.05	1.52	0.03	0.85	0.18	6.67
1966	0.05	1.87	0.07	2.03	0.05	1.54	0.21	7.65
1967	0.03	0.94	0.04	1.12	0.02	0.78	0.23	8.48
1968	0.04	1.42	0.06	1.58	0.04	1.17	0.25	8.92
1969	0.05	1.61	0.07	1.85	0.04	1.23	0.30	10.60
1970	0.07	2.18	0.08	2.22	0.06	1.93	0.35	11.91
1971	0.07	2.19	0.06	1.66	0.09	2.53	0.41	13.70
1972	0.08	2.42	0.10	2.53	0.07	2.14	0.50	16.59
1973	0.13	3.92	0.16	4.14	0.11	3.14	0.67	21.40
1974	0.28	8.06	0.26	6.55	0.28	7.78	0.82	25.66
1975	0.24	6.77	0.18	4.41	0.29	7.72	0.93	28.64
1976	0.24	6.77	0.22	5.28	0.26	6.99	0.98	29.54
1977	0.26	6.97	0.23	5.44	0.28	7.22	1.07	31.53
1978	0.26	7.10	0.22	5.20	0.30	7.69	1.15	33.33
1979	0.31	8.20	0.29	6.49	0.34	8.35	1.33	37.37
1980	0.36	9.11	0.31	6.90	0.39	9.47	1.46	40.10
1981	0.33	8.26	0.27	5.75	0.39	9.08	1.46	38.92
1982	0.28	6.88	0.22	4.66	0.33	7.56	1.46	38.20
1983	0.29	6.93	0.26	5.46	0.30	6.93	1.45	37.37
1984	0.32	7.51	0.33	6.58	0.31	6.85	1.41	35.49
1985	0.31	7.14	0.31	6.09	0.30	6.61	1.41	34.83
1986	0.27	5.94	0.28	5.35	0.25	5.31	1.52	36.35
1987	0.31	6.72	0.31	5.88	0.30	6.25	1.58	36.84
1988	0.34	7.15	0.35	6.29	0.33	6.67	1.67	37.61
Algeria	0.69	3.89	0.49	2.38	0.85	4.56	-1.61	-9.73
Angola	0.88	4.39	0.56	2.38	1.02	4.83	-2.85	-15.18
Argentina	0.01	0.09	-0.35	-2.35	0.20	1.48	-1.86	-15.32
Australia	0.37	2.09	-0.40	-1.97	0.89	4.74	-2.17	-13.16
Austria	0.40	2.10	0.04	0.16	0.70	3.44	-2.04	-11.34
Bangladesh	0.86	7.21	0.27	1.96	1.18	9.35	-1.90	-17.02
Barbados	0.19	0.53	-0.68	-1.60	0.87	2.26	-4.69	-13.75
Belgium	0.75	3.79	0.53	2.31	0.96	4.60	-1.70	-9.16
Benin	0.54	2.23	-0.24	-0.86	1.09	4.27	-3.80	-16.80
Bolivia	0.55	2.62	-0.08	-0.33	0.97	4.36	-3.25	-16.51
Botswana	0.93	3.07	-0.16	-0.45	1.67	5.22	-4.43	-15.64
Brazil	0.27	3.15	0.06	0.62	0.37	4.10	-1.29	-16.20
Burkina Faso	0.32	1.39	-0.56	-2.13	0.84	3.52	-3.01	-14.17
Burundi	0.36	1.50	-0.45	-1.66	0.87	3.48	-3.25	-14.75
Cameroon	0.74	3.80	0.30	1.31	1.03	4.99	-2.70	-14.88
Canada	0.36	2.76	0.09	0.58	0.58	4.19	-1.32	-10.78
Central African Rep.	0.81	3.14	-0.05	-0.18	1.40	5.15	-3.83	-15.91
Chad	0.86	3.77	0.11	0.40	1.37	5.67	-3.56	-16.69

Regression Results of the form (III.1)

	Ln(T)		Ln(X)		Ln(M)		Ln(PO)	
	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Chile	0.46	2.68	-0.10	-0.50	0.82	4.60	-2.65	-16.71
Colombia	0.24	1.77	0.00	0.03	0.40	2.77	-2.19	-16.98
Costa Rica	0.35	1.38	-0.34	-1.13	0.86	3.20	-3.57	-15.00
Cote D'Ivoire	1.06	5.33	0.67	2.91	1.28	6.11	-2.72	-14.68
Denmark	0.17	0.76	-0.23	-0.90	0.50	2.18	-2.08	-10.15
Dominican Republic	0.34	1.52	-0.14	-0.54	0.70	2.98	-2.83	-13.59
Ecuador	0.44	2.28	-0.06	-0.25	0.78	3.85	-2.92	-16.16
Egypt	1.03	7.41	0.77	4.79	1.22	8.34	-1.51	-11.68
El Salvador	0.57	2.51	0.03	0.12	0.95	3.98	-3.19	-15.14
Ethiopia	1.05	6.81	0.63	3.51	1.28	7.85	-2.08	-14.43
Fiji	0.65	2.10	-0.38	-1.06	1.36	4.18	-4.61	-16.03
Finland	0.04	0.19	-0.38	-1.54	0.38	1.68	-2.18	-10.80
France	0.26	2.25	0.22	1.64	0.32	2.67	-0.71	-6.57
Gabon	0.54	1.77	-0.21	-0.59	1.02	3.18	-3.72	-13.10
Gambia, The	0.63	1.79	-0.00	-0.00	1.09	2.95	-3.85	-11.82
Germany	0.59	5.04	0.64	4.71	0.58	4.73	-0.55	-5.02
Ghana	0.34	1.83	-0.05	-0.22	0.60	3.04	-2.08	-11.95
Greece	0.03	0.14	-0.49	-2.14	0.44	2.13	-1.97	-10.79
Guatemala	0.20	0.96	-0.29	-1.21	0.54	2.53	-2.90	-15.24
Guyana	0.78	2.46	0.09	0.25	1.28	3.85	-4.04	-13.72
Haiti	0.25	1.07	-0.26	-0.99	0.62	2.57	-3.36	-15.68
Honduras	0.63	2.61	0.11	0.41	0.99	3.90	-3.02	-13.35
Hong Kong	1.73	8.37	1.01	4.21	2.23	10.21	-2.99	-15.50
Iceland	-0.52	-1.39	-1.33	-3.06	0.12	0.30	-3.89	-11.13
India	0.99	7.70	0.89	5.94	0.99	7.32	-0.37	-3.07
Indonesia	1.43	13.58	1.27	10.39	1.47	13.18	-1.54	-15.67
Iran	0.92	7.01	0.61	4.00	1.03	7.43	-1.73	-14.19
Iraq	1.08	6.30	0.76	3.85	1.13	6.28	-2.72	-17.39
Ireland	0.50	1.98	0.08	0.29	0.86	3.22	-2.56	-10.78
Israel	0.28	1.18	-0.40	-1.48	0.82	3.31	-2.63	-11.98
Italy	0.30	2.58	0.23	1.73	0.39	3.21	-0.89	-8.28
Jamaica	0.58	2.20	0.01	0.03	1.01	3.64	-3.17	-12.95
Japan	0.70	6.06	0.36	2.72	0.87	7.19	-0.80	-7.54
Kenya	1.29	7.51	0.88	4.45	1.53	8.47	-2.53	-15.88
Lesotho	1.10	3.86	-0.82	-2.47	2.08	6.88	-4.20	-15.75
Liberia	1.05	3.91	0.44	1.42	1.42	5.01	-3.60	-14.35
Madagascar	0.72	3.61	-0.04	-0.17	1.21	5.77	-3.20	-17.21
Malawi	1.14	5.23	0.42	1.67	1.61	7.00	-3.44	-16.89
Malaysia	1.41	8.62	0.96	5.07	1.68	9.78	-2.65	-17.40
Mali	0.68	3.04	-0.07	-0.29	1.16	4.94	-2.96	-14.31
Malta	0.43	1.16	-0.31	-0.73	1.02	2.64	-4.12	-12.03
Mauritania	0.79	2.77	0.09	0.26	1.27	4.19	-3.64	-13.57
Mexico	0.20	2.17	-0.08	-0.79	0.38	3.85	-1.63	-18.96
Morocco	0.55	2.94	0.34	1.57	0.72	3.68	-2.04	-11.75
Myanmar	0.58	3.85	0.10	0.56	0.86	5.43	-2.06	-14.78
Nepal	0.39	2.13	-0.29	-1.39	0.82	4.27	-3.06	-18.24
Netherlands, The	0.85	4.70	0.66	3.17	1.03	5.40	-1.58	-9.39
New Zealand	0.41	1.81	-0.49	-1.87	1.04	4.30	-3.18	-14.94

Regression Results of the form (III.1)

	Ln(T)		Ln(X)		Ln(M)		Ln(P0)	
	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Nicaragua	0.40	1.64	-0.29	-1.02	0.90	3.47	-3.76	-16.34
Niger	0.50	2.26	-0.19	-0.75	0.96	4.15	-2.90	-14.14
Nigeria	0.94	9.53	0.84	7.37	0.96	9.23	-1.16	-12.55
Norway	0.42	1.82	-0.01	-0.03	0.76	3.17	-2.19	-10.27
Pakistan	0.94	8.96	0.44	3.63	1.26	11.34	-2.01	-20.51
Panama	0.55	2.06	-0.07	-0.23	1.00	3.59	-3.33	-13.45
Paraguay	0.14	0.59	-0.64	-2.32	0.68	2.71	-3.40	-15.33
Peru	0.49	3.18	-0.00	-0.01	0.82	5.05	-2.47	-17.19
Philippines	1.11	9.00	0.73	5.11	1.34	10.25	-2.10	-18.26
Portugal	0.45	2.11	0.13	0.54	0.73	3.26	-2.16	-10.94
Rwanda	0.35	1.55	-0.45	-1.73	0.88	3.67	-3.54	-16.78
Senegal	0.73	3.11	0.32	1.18	1.04	4.21	-2.87	-13.12
Sierra Leone	0.34	1.35	-0.18	-0.60	0.71	2.69	-3.61	-15.42
Singapore	2.03	8.48	1.23	4.45	2.58	10.25	-3.43	-15.35
Somalia	0.84	3.75	-0.22	-0.83	1.50	6.33	-3.39	-16.16
South Africa	0.99	7.64	0.65	4.32	1.18	8.64	-2.06	-17.04
Spain	0.12	0.89	-0.01	-0.04	0.25	1.75	-1.31	-10.43
Sri Lanka	1.23	7.47	0.73	3.83	1.57	9.01	-3.12	-20.24
Sudan	0.40	2.43	-0.08	-0.42	0.71	4.10	-2.32	-15.06
Suriname	0.37	1.08	-0.44	-1.11	0.98	2.70	-4.35	-13.60
Swaziland	0.92	2.88	0.01	0.02	1.55	4.57	-4.86	-16.20
Sweden	0.23	1.25	-0.14	-0.65	0.53	2.71	-1.75	-10.06
Switzerland	0.12	0.57	-0.17	-0.68	0.40	1.74	-1.97	-9.58
Syria	0.18	0.93	-0.39	-1.70	0.61	2.96	-2.91	-15.82
Taiwan	1.36	8.61	0.88	4.79	1.65	9.90	-2.21	-14.97
Tanzania	1.20	6.86	0.66	3.27	1.51	8.20	-2.22	-13.67
Thailand	1.23	9.47	0.79	5.24	1.50	10.95	-2.27	-18.74
Togo	1.05	4.00	0.56	1.85	1.35	4.89	-3.34	-13.64
Trinidad and Tobago	0.23	0.79	-0.38	-1.15	0.68	2.23	-3.72	-13.82
Tunisia	0.47	2.03	0.11	0.42	0.77	3.15	-2.73	-12.66
Turkey	0.03	0.26	-0.29	-2.05	0.27	2.12	-1.78	-15.60
Uganda	0.97	5.06	0.56	2.52	1.19	5.85	-1.58	-8.79
United Kingdom	0.59	5.08	0.54	4.08	0.66	5.41	-0.81	-7.50
Uruguay	-0.19	-0.83	-0.86	-3.24	0.27	1.12	-3.51	-16.48
Venezuela	0.36	2.25	0.12	0.65	0.47	2.76	-1.92	-12.70
Yugoslavia	0.50	3.30	0.26	1.47	0.70	4.36	-1.61	-11.41
Zaire	1.00	6.26	0.87	4.68	0.92	5.45	-1.59	-10.62
Zambia	1.36	6.31	0.80	3.19	1.68	7.37	-2.95	-14.65
Ln(RGDPCH)	0.21	9.22	0.28	10.39	0.15	6.10	0.03	1.27
Ln(POP)	-0.30	-5.76	-0.43	-7.11	-0.20	-3.70	-0.60	-12.52
Ln(Dis_rY)	-0.75	-3.47	-0.15	-0.60	-1.08	-4.71	0.63	3.15
R**2	0.89		0.87		0.88		0.92	

Regression Results of the form (III.1')

	Ln(T)		Ln(X)		Ln(M)		Ln(PO)	
	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Constant	7.45	3.11	3.92	1.40	8.08	3.21	10.25	4.69
1962	0.00	0.11	-0.01	-0.28	0.01	0.38	0.02	0.69
1963	0.04	1.23	0.03	0.84	0.04	1.30	0.05	2.09
1964	0.06	1.97	0.06	1.85	0.05	1.72	0.10	3.75
1965	0.05	1.85	0.06	1.69	0.05	1.61	0.15	5.58
1966	0.08	2.58	0.08	2.22	0.07	2.39	0.17	6.40
1967	0.05	1.78	0.05	1.35	0.06	1.79	0.19	6.99
1968	0.07	2.37	0.06	1.83	0.07	2.32	0.20	7.16
1969	0.08	2.71	0.08	2.14	0.08	2.55	0.24	8.50
1970	0.11	3.36	0.09	2.52	0.11	3.35	0.28	9.58
1971	0.11	3.47	0.08	2.00	0.14	4.06	0.33	11.10
1972	0.13	3.81	0.11	2.87	0.13	3.82	0.41	13.65
1973	0.19	5.38	0.18	4.44	0.18	4.93	0.57	18.05
1974	0.34	9.45	0.28	6.76	0.36	9.52	0.71	21.90
1975	0.30	8.24	0.20	4.71	0.37	9.51	0.82	24.61
1976	0.31	8.30	0.24	5.54	0.35	8.88	0.86	25.16
1977	0.33	8.54	0.26	5.70	0.37	9.16	0.94	26.80
1978	0.34	8.69	0.25	5.46	0.40	9.65	1.01	28.37
1979	0.40	9.80	0.32	6.66	0.45	10.36	1.18	31.63
1980	0.45	10.68	0.34	7.04	0.50	11.45	1.30	33.91
1981	0.43	9.90	0.30	5.97	0.51	11.11	1.29	32.67
1982	0.38	8.61	0.25	4.95	0.45	9.70	1.28	31.91
1983	0.39	8.70	0.30	5.69	0.43	9.15	1.26	30.82
1984	0.43	9.25	0.36	6.71	0.44	9.10	1.22	28.85
1985	0.42	8.92	0.35	6.26	0.44	8.89	1.22	28.17
1986	0.38	7.85	0.32	5.57	0.40	7.73	1.31	29.34
1987	0.43	8.58	0.36	6.05	0.46	8.63	1.36	29.60
1988	0.47	8.99	0.39	6.42	0.50	9.04	1.43	30.09
Algeria	0.00	0.02	0.26	1.06	-0.01	-0.03	-0.36	-1.85
Angola	0.04	0.16	0.27	0.95	-0.03	-0.13	-1.31	-5.82
Argentina	-0.59	-3.56	-0.56	-2.88	-0.55	-3.16	-0.77	-5.11
Australia	-0.22	-1.08	-0.60	-2.54	0.14	0.67	-1.09	-5.91
Austria	-0.31	-1.35	-0.20	-0.76	-0.19	-0.80	-0.74	-3.58
Bangladesh	0.51	3.77	0.15	0.97	0.73	5.19	-1.25	-10.20
Barbados	-1.17	-2.71	-1.13	-2.26	-0.84	-1.85	-2.20	-5.57
Belgium	0.12	0.52	0.32	1.22	0.17	0.71	-0.54	-2.60
Benin	-0.43	-1.48	-0.57	-1.67	-0.13	-0.42	-2.02	-7.56
Bolivia	-0.37	-1.41	-0.39	-1.27	-0.19	-0.68	-1.57	-6.54
Botswana	-0.28	-0.77	-0.56	-1.32	0.15	0.38	-2.22	-6.61
Brazil	-0.09	-0.88	-0.06	-0.49	-0.09	-0.77	-0.63	-6.59
Burkina Faso	-0.40	-1.56	-0.80	-2.67	-0.06	-0.21	-1.70	-7.22
Burundi	-0.46	-1.68	-0.73	-2.28	-0.15	-0.54	-1.77	-7.08
Cameroon	-0.08	-0.35	0.02	0.07	-0.01	-0.03	-1.21	-5.56
Canada	-0.07	-0.48	-0.06	-0.33	0.04	0.22	-0.53	-3.85
Central African Rep.	-0.21	-0.66	-0.39	-1.09	0.13	0.39	-1.98	-7.00
Chad	-0.01	-0.03	-0.18	-0.58	0.28	0.97	-1.98	-7.97
Chile	-0.32	-1.48	-0.36	-1.43	-0.14	-0.64	-1.24	-6.33
Colombia	-0.38	-2.19	-0.20	-1.01	-0.38	-2.09	-1.05	-6.57
Costa Rica	-0.71	-2.28	-0.69	-1.90	-0.47	-1.44	-1.63	-5.72

Regression Results of the form (III.1')

	Ln(T)		Ln(X)		Ln(M)		Ln(PO)	
	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Cote D'Ivoire	0.20	0.81	0.38	1.34	0.20	0.78	-1.15	-5.13
Denmark	-0.58	-2.29	-0.48	-1.63	-0.43	-1.62	-0.72	-3.09
Dominican Republic	-0.56	-2.09	-0.44	-1.40	-0.43	-1.52	-1.18	-4.78
Ecuador	-0.41	-1.70	-0.34	-1.21	-0.28	-1.12	-1.37	-6.19
Egypt	0.51	3.13	0.60	3.13	0.57	3.33	-0.57	-3.80
El Salvador	-0.39	-1.39	-0.29	-0.88	-0.25	-0.85	-1.45	-5.73
Ethiopia	0.68	4.12	0.51	2.61	0.82	4.67	-1.41	-9.29
Fiji	-0.65	-1.72	-0.81	-1.85	-0.27	-0.68	-2.24	-6.49
Finland	-0.74	-2.93	-0.65	-2.19	-0.60	-2.24	-0.75	-3.25
France	-0.07	-0.55	0.11	0.73	-0.09	-0.66	-0.10	-0.89
Gabon	-0.71	-1.93	-0.63	-1.45	-0.55	-1.42	-1.43	-4.23
Gambia, The	-0.57	-1.41	-0.40	-0.86	-0.41	-0.97	-1.67	-4.52
Germany	0.29	2.30	0.54	3.64	0.21	1.57	-0.00	-0.01
Ghana	-0.42	-1.85	-0.30	-1.14	-0.36	-1.49	-0.70	-3.36
Greece	-0.72	-3.09	-0.74	-2.71	-0.50	-2.03	-0.61	-2.84
Guatemala	-0.68	-2.71	-0.58	-1.98	-0.56	-2.10	-1.30	-5.63
Guyana	-0.47	-1.23	-0.32	-0.73	-0.28	-0.70	-1.77	-5.11
Haiti	-0.62	-2.27	-0.55	-1.75	-0.46	-1.62	-1.78	-7.17
Honduras	-0.34	-1.17	-0.21	-0.62	-0.22	-0.73	-1.24	-4.64
Hong Kong	0.87	3.43	0.72	2.44	1.14	4.30	-1.42	-6.13
Iceland	-1.82	-4.21	-1.76	-3.49	-1.52	-3.33	-1.51	-3.79
India	0.99	7.77	0.89	5.95	1.00	7.42	-0.38	-3.24
Indonesia	1.12	9.47	1.17	8.48	1.07	8.63	-0.97	-8.98
Iran	0.34	2.05	0.41	2.16	0.30	1.72	-0.67	-4.50
Iraq	0.32	1.48	0.51	2.04	0.18	0.78	-1.34	-6.95
Ireland	-0.41	-1.38	-0.22	-0.64	-0.28	-0.90	-0.89	-3.27
Israel	-0.59	-2.12	-0.69	-2.15	-0.26	-0.91	-1.05	-4.15
Italy	-0.05	-0.38	0.11	0.76	-0.05	-0.33	-0.25	-2.15
Jamaica	-0.48	-1.52	-0.34	-0.93	-0.32	-0.97	-1.24	-4.26
Japan	0.42	3.41	0.27	1.88	0.53	4.05	-0.31	-2.73
Kenya	0.60	2.92	0.65	2.72	0.67	3.09	-1.29	-6.83
Lesotho	0.02	0.05	-1.18	-2.99	0.71	1.99	-2.22	-7.15
Liberia	-0.05	-0.15	0.08	0.20	0.04	0.12	-1.60	-5.35
Madagascar	-0.09	-0.36	-0.31	-1.10	0.20	0.79	-1.73	-7.84
Malawi	0.34	1.33	0.15	0.51	0.61	2.25	-1.98	-8.45
Malaysia	0.66	3.19	0.71	2.95	0.75	3.44	-1.29	-6.83
Mali	-0.06	-0.24	-0.32	-1.08	0.24	0.88	-1.62	-6.97
Malta	-0.91	-2.12	-0.76	-1.51	-0.66	-1.45	-1.68	-4.25
Mauritania	-0.31	-0.91	-0.28	-0.71	-0.12	-0.34	-1.62	-5.16
Mexico	-0.24	-2.00	-0.23	-1.67	-0.17	-1.39	-0.84	-7.73
Morocco	-0.12	-0.56	0.12	0.46	-0.12	-0.51	-0.82	-4.10
Myanmar	0.10	0.61	-0.06	-0.31	0.26	1.48	-1.20	-7.77
Nepal	-0.29	-1.36	-0.52	-2.08	-0.03	-0.15	-1.84	-9.45
Netherlands, The	0.28	1.36	0.47	1.98	0.31	1.45	-0.54	-2.87
New Zealand	-0.47	-1.73	-0.79	-2.48	-0.07	-0.26	-1.57	-6.30
Nicaragua	-0.64	-2.11	-0.64	-1.81	-0.41	-1.28	-1.85	-6.70
Niger	-0.36	-1.37	-0.48	-1.56	-0.11	-0.41	-1.34	-5.56
Nigeria	0.52	4.33	0.70	4.99	0.44	3.44	-0.40	-3.58
Norway	-0.36	-1.39	-0.27	-0.87	-0.22	-0.79	-0.76	-3.16
Pakistan	0.51	4.00	0.30	2.00	0.72	5.34	-1.23	-10.51
Panama	-0.54	-1.68	-0.44	-1.16	-0.36	-1.07	-1.34	-4.55

Regression Results of the form (III.1')

	Ln(T)		Ln(X)		Ln(M)		Ln(P0)	
	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Paraguay	-0.89	-3.01	-0.98	-2.87	-0.61	-1.96	-1.53	-5.70
Peru	-0.23	-1.17	-0.24	-1.06	-0.08	-0.40	-1.16	-6.47
Philippines	0.57	3.68	0.55	3.06	0.65	4.02	-1.11	-7.89
Portugal	-0.31	-1.24	-0.12	-0.42	-0.22	-0.83	-0.78	-3.47
Rwanda	-0.50	-1.85	-0.74	-2.37	-0.19	-0.66	-2.00	-8.18
Senegal	-0.16	-0.58	0.02	0.07	-0.08	-0.26	-1.24	-4.88
Sierra Leone	-0.64	-2.13	-0.50	-1.43	-0.51	-1.63	-1.83	-6.67
Singapore	1.03	3.53	0.90	2.64	1.33	4.34	-1.61	-6.02
Somalia	-0.06	-0.23	-0.52	-1.64	0.36	1.27	-1.74	-6.99
South Africa	0.39	2.35	0.45	2.32	0.43	2.45	-0.96	-6.38
Spain	-0.36	-2.30	-0.17	-0.91	-0.35	-2.15	-0.43	-2.99
Sri Lanka	0.50	2.40	0.49	2.01	0.64	2.96	-1.77	-9.37
Sudan	-0.27	-1.36	-0.30	-1.31	-0.13	-0.62	-1.09	-5.95
Suriname	-0.97	-2.36	-0.89	-1.86	-0.70	-1.63	-1.91	-5.08
Swaziland	-0.41	-1.04	-0.44	-0.96	-0.12	-0.30	-2.42	-6.76
Sweden	-0.42	-1.95	-0.36	-1.43	-0.29	-1.26	-0.56	-2.81
Switzerland	-0.50	-2.06	-0.38	-1.35	-0.38	-1.48	-0.82	-3.69
Syria	-0.62	-2.61	-0.66	-2.36	-0.40	-1.58	-1.43	-6.53
Taiwan	0.66	3.31	0.64	2.77	0.76	3.67	-0.92	-5.09
Tanzania	0.65	3.31	0.48	2.09	0.82	3.98	-1.23	-6.85
Thailand	0.68	4.22	0.60	3.24	0.80	4.77	-1.26	-8.61
Togo	0.08	0.27	0.24	0.67	0.14	0.43	-1.58	-5.59
Trinidad and Tobago	-0.85	-2.49	-0.74	-1.87	-0.67	-1.87	-1.76	-5.64
Tunisia	-0.40	-1.45	-0.18	-0.55	-0.32	-1.11	-1.15	-4.60
Turkey	-0.50	-3.30	-0.47	-2.65	-0.39	-2.47	-0.81	-5.82
Uganda	0.38	1.78	0.37	1.45	0.45	1.98	-0.51	-2.57
United Kingdom	0.26	2.03	0.44	2.93	0.25	1.84	-0.21	-1.78
Uruguay	-1.16	-4.13	-1.18	-3.61	-0.95	-3.21	-1.74	-6.75
Venezuela	-0.32	-1.59	-0.11	-0.46	-0.38	-1.83	-0.68	-3.73
Yugoslavia	-0.12	-0.67	0.05	0.23	-0.08	-0.43	-0.48	-2.82
Zaire	0.51	2.85	0.70	3.36	0.31	1.61	-0.70	-4.23
Zambia	0.46	1.74	0.50	1.61	0.55	1.96	-1.31	-5.41
Ln(RGDPCH)	1.21	7.04	0.61	3.05	1.40	7.74	-1.80	-11.44
Ln(POP)	-0.47	-7.96	-0.48	-6.99	-0.42	-6.75	-0.28	-5.18
Ln(Dis_rY)	-0.70	-3.23	-0.13	-0.52	-1.01	-4.44	0.54	2.76
Ln(RGDPCH)**2	-0.07	-5.86	-0.02	-1.68	-0.08	-6.98	0.12	11.72
R**2	0.89		0.87		0.89		0.92	
Rbar**2	0.89		0.87		0.88		0.92	
Number of Obs	2850		2850		2850		2873	

Regression Results of the form (III.1'')

	Ln(T)		Ln(X)		Ln(M)		Ln(PO)	
	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Constant	9.04	3.46	6.53	2.14	9.08	3.30	6.55	2.75
1962	0.00	0.11	-0.01	-0.28	0.01	0.37	0.02	0.70
1963	0.03	1.21	0.03	0.81	0.04	1.29	0.06	2.16
1964	0.06	1.94	0.06	1.81	0.05	1.70	0.10	3.83
1965	0.05	1.81	0.06	1.64	0.05	1.59	0.15	5.68
1966	0.07	2.52	0.07	2.13	0.07	2.36	0.17	6.55
1967	0.05	1.73	0.04	1.28	0.05	1.75	0.19	7.13
1968	0.07	2.29	0.06	1.72	0.07	2.26	0.20	7.36
1969	0.08	2.62	0.07	2.01	0.08	2.49	0.25	8.73
1970	0.10	3.26	0.09	2.38	0.11	3.29	0.28	9.82
1971	0.11	3.36	0.07	1.85	0.14	3.99	0.34	11.35
1972	0.12	3.71	0.11	2.73	0.13	3.75	0.42	13.89
1973	0.18	5.24	0.17	4.26	0.18	4.84	0.58	18.34
1974	0.33	9.30	0.27	6.57	0.35	9.42	0.72	22.18
1975	0.30	8.08	0.19	4.51	0.36	9.39	0.83	24.91
1976	0.31	8.13	0.23	5.33	0.35	8.76	0.87	25.46
1977	0.32	8.37	0.25	5.48	0.37	9.04	0.95	27.10
1978	0.33	8.52	0.24	5.25	0.39	9.53	1.02	28.67
1979	0.39	9.61	0.31	6.43	0.44	10.23	1.19	31.92
1980	0.44	10.47	0.33	6.79	0.50	11.30	1.31	34.21
1981	0.42	9.66	0.29	5.68	0.50	10.93	1.30	32.97
1982	0.37	8.37	0.24	4.67	0.44	9.52	1.30	32.21
1983	0.38	8.45	0.28	5.39	0.43	8.97	1.28	31.13
1984	0.42	8.97	0.35	6.37	0.44	8.90	1.24	29.17
1985	0.41	8.63	0.33	5.91	0.44	8.68	1.24	28.49
1986	0.37	7.54	0.30	5.20	0.39	7.52	1.34	29.65
1987	0.42	8.23	0.34	5.63	0.45	8.37	1.39	29.90
1988	0.46	8.63	0.37	5.98	0.49	8.77	1.46	30.38
Algeria	0.19	0.78	0.57	1.99	0.11	0.43	-0.79	-3.53
Angola	0.19	0.72	0.52	1.68	0.06	0.22	-1.66	-6.84
Argentina	-0.49	-2.76	-0.39	-1.90	-0.49	-2.60	-1.00	-6.17
Australia	-0.15	-0.70	-0.48	-1.97	0.19	0.87	-1.27	-6.66
Austria	-0.12	-0.46	0.11	0.35	-0.07	-0.27	-1.17	-4.97
Bangladesh	0.55	4.00	0.22	1.40	0.76	5.26	-1.35	-10.80
Barbados	-1.10	-2.54	-1.02	-2.03	-0.79	-1.74	-2.35	-5.95
Belgium	0.33	1.24	0.67	2.16	0.30	1.08	-1.02	-4.22
Benin	-0.27	-0.87	-0.30	-0.83	-0.03	-0.09	-2.40	-8.42
Bolivia	-0.23	-0.85	-0.17	-0.52	-0.10	-0.35	-1.88	-7.43
Botswana	-0.20	-0.55	-0.44	-1.01	0.20	0.51	-2.39	-7.09
Brazil	-0.07	-0.62	-0.02	-0.13	-0.07	-0.61	-0.70	-7.14
Burkina Faso	-0.21	-0.74	-0.49	-1.46	0.06	0.21	-2.14	-8.18
Burundi	-0.32	-1.13	-0.50	-1.51	-0.07	-0.23	-2.08	-7.93
Cameroon	0.07	0.27	0.27	0.90	0.09	0.32	-1.57	-6.62
Canada	0.08	0.44	0.19	0.91	0.13	0.69	-0.88	-5.32
Central African Rep.	-0.08	-0.24	-0.18	-0.48	0.21	0.62	-2.28	-7.78
Chad	0.13	0.47	0.05	0.15	0.37	1.21	-2.31	-8.79
Chile	-0.19	-0.83	-0.15	-0.56	-0.07	-0.27	-1.53	-7.29
Colombia	-0.24	-1.20	0.03	0.14	-0.29	-1.40	-1.38	-7.60

Regression Results of the form (III.1'')

	Ln(T)		Ln(X)		Ln(M)		Ln(P0)	
	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Costa Rica	-0.56	-1.71	-0.44	-1.16	-0.38	-1.10	-1.98	-6.62
Cote D'Ivoire	0.35	1.32	0.63	2.05	0.30	1.06	-1.50	-6.20
Denmark	-0.38	-1.32	-0.15	-0.45	-0.30	-1.01	-1.18	-4.52
Dominican Republic	-0.38	-1.27	-0.13	-0.38	-0.31	-1.00	-1.61	-5.95
Ecuador	-0.25	-0.97	-0.08	-0.27	-0.18	-0.67	-1.73	-7.21
Egypt	0.65	3.46	0.83	3.78	0.66	3.33	-0.90	-5.21
El Salvador	-0.22	-0.74	-0.02	-0.04	-0.14	-0.46	-1.83	-6.74
Ethiopia	0.77	4.38	0.65	3.17	0.87	4.71	-1.61	-10.05
Fiji	-0.60	-1.59	-0.74	-1.66	-0.24	-0.60	-2.35	-6.80
Finland	-0.55	-1.94	-0.33	-1.01	-0.48	-1.60	-1.19	-4.61
France	0.07	0.44	0.34	1.84	-0.00	-0.00	-0.43	-2.95
Gabon	-0.63	-1.69	-0.49	-1.12	-0.50	-1.27	-1.62	-4.75
Gambia, The	-0.44	-1.07	-0.19	-0.39	-0.33	-0.76	-1.97	-5.23
Germany	0.43	2.75	0.77	4.20	0.30	1.80	-0.32	-2.24
Ghana	-0.26	-1.03	-0.04	-0.13	-0.25	-0.97	-1.06	-4.66
Greece	-0.52	-1.95	-0.41	-1.32	-0.37	-1.32	-1.07	-4.35
Guatemala	-0.51	-1.87	-0.30	-0.95	-0.45	-1.56	-1.69	-6.70
Guyana	-0.34	-0.87	-0.11	-0.24	-0.20	-0.48	-2.07	-5.84
Haiti	-0.43	-1.44	-0.25	-0.71	-0.34	-1.09	-2.21	-8.12
Honduras	-0.18	-0.56	0.06	0.17	-0.12	-0.37	-1.62	-5.70
Hong Kong	0.99	3.73	0.92	2.97	1.22	4.37	-1.69	-7.01
Iceland	-1.76	-4.03	-1.65	-3.26	-1.48	-3.22	-1.66	-4.16
India	0.84	5.04	0.63	3.24	0.90	5.15	-0.01	-0.08
Indonesia	1.11	9.45	1.16	8.45	1.07	8.61	-0.96	-8.95
Iran	0.42	2.42	0.54	2.71	0.35	1.92	-0.86	-5.46
Iraq	0.44	1.92	0.71	2.67	0.25	1.06	-1.63	-7.87
Ireland	-0.20	-0.61	0.12	0.33	-0.15	-0.43	-1.37	-4.58
Israel	-0.40	-1.31	-0.38	-1.08	-0.15	-0.46	-1.49	-5.36
Italy	0.09	0.56	0.34	1.85	0.04	0.25	-0.57	-3.96
Jamaica	-0.31	-0.93	-0.07	-0.17	-0.22	-0.61	-1.63	-5.29
Japan	0.41	3.33	0.25	1.76	0.52	3.99	-0.28	-2.53
Kenya	0.73	3.27	0.87	3.34	0.75	3.20	-1.59	-7.79
Lesotho	0.13	0.37	-1.00	-2.47	0.78	2.14	-2.48	-7.81
Liberia	0.08	0.24	0.29	0.73	0.12	0.34	-1.89	-6.15
Madagascar	0.03	0.12	-0.12	-0.39	0.27	1.03	-2.00	-8.65
Malawi	0.48	1.75	0.37	1.18	0.69	2.42	-2.29	-9.25
Malaysia	0.79	3.53	0.92	3.54	0.83	3.53	-1.58	-7.78
Mali	0.11	0.41	-0.03	-0.11	0.35	1.17	-2.02	-7.93
Malta	-0.79	-1.82	-0.57	-1.11	-0.58	-1.27	-1.94	-4.86
Mauritania	-0.15	-0.43	-0.02	-0.05	-0.02	-0.06	-1.98	-6.06
Mexico	-0.16	-1.26	-0.11	-0.71	-0.13	-0.93	-1.01	-8.62
Morocco	0.08	0.30	0.44	1.49	0.01	0.03	-1.27	-5.49
Myanmar	0.20	1.10	0.10	0.46	0.32	1.70	-1.42	-8.63
Nepal	-0.18	-0.77	-0.33	-1.24	0.04	0.17	-2.10	-10.20
Netherlands, The	0.48	1.96	0.80	2.82	0.44	1.71	-1.00	-4.49
New Zealand	-0.38	-1.35	-0.64	-1.96	-0.02	-0.05	-1.79	-7.00
Nicaragua	-0.49	-1.54	-0.39	-1.06	-0.31	-0.94	-2.20	-7.56
Niger	-0.21	-0.76	-0.24	-0.72	-0.02	-0.07	-1.68	-6.55
Nigeria	0.60	4.58	0.83	5.42	0.49	3.53	-0.57	-4.76
Norway	-0.17	-0.57	0.06	0.16	-0.09	-0.30	-1.21	-4.53
Pakistan	0.57	4.27	0.40	2.54	0.76	5.36	-1.37	-11.19
Panama	-0.39	-1.15	-0.18	-0.47	-0.27	-0.75	-1.70	-5.49

Regression Results of the form (III.1'')

	Ln(T)		Ln(X)		Ln(M)		Ln(PO)	
	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Paraguay	-0.76	-2.47	-0.77	-2.16	-0.53	-1.63	-1.83	-6.55
Peru	-0.10	-0.46	-0.03	-0.11	0.00	0.00	-1.46	-7.47
Philippines	0.64	3.96	0.67	3.56	0.70	4.11	-1.28	-8.69
Portugal	-0.09	-0.31	0.24	0.71	-0.08	-0.26	-1.28	-4.92
Rwanda	-0.36	-1.28	-0.52	-1.58	-0.10	-0.34	-2.31	-8.99
Senegal	0.03	0.11	0.35	0.97	0.05	0.15	-1.69	-6.05
Sierra Leone	-0.46	-1.42	-0.21	-0.54	-0.40	-1.17	-2.25	-7.62
Singapore	1.15	3.80	1.09	3.10	1.41	4.43	-1.88	-6.81
Somalia	0.07	0.24	-0.30	-0.90	0.45	1.49	-2.05	-7.84
South Africa	0.49	2.75	0.62	2.97	0.49	2.61	-1.21	-7.38
Spain	-0.20	-1.06	0.10	0.44	-0.25	-1.27	-0.80	-4.61
Sri Lanka	0.63	2.80	0.71	2.69	0.73	3.08	-2.09	-10.13
Sudan	-0.12	-0.52	-0.05	-0.19	-0.03	-0.14	-1.45	-7.05
Suriname	-0.88	-2.13	-0.75	-1.55	-0.65	-1.49	-2.10	-5.56
Swaziland	-0.35	-0.89	-0.34	-0.74	-0.09	-0.21	-2.56	-7.12
Sweden	-0.24	-0.95	-0.06	-0.20	-0.17	-0.65	-0.98	-4.33
Switzerland	-0.28	-1.00	-0.02	-0.07	-0.24	-0.81	-1.32	-5.12
Syria	-0.44	-1.65	-0.36	-1.15	-0.28	-1.00	-1.85	-7.56
Taiwan	0.76	3.63	0.82	3.33	0.83	3.76	-1.17	-6.09
Tanzania	0.78	3.64	0.69	2.76	0.90	4.02	-1.52	-7.81
Thailand	0.74	4.47	0.72	3.70	0.85	4.84	-1.42	-9.34
Togo	0.24	0.74	0.50	1.32	0.24	0.70	-1.94	-6.53
Trinidad and Tobago	-0.70	-1.98	-0.50	-1.22	-0.58	-1.55	-2.09	-6.48
Tunisia	-0.18	-0.60	0.17	0.48	-0.18	-0.57	-1.64	-5.85
Turkey	-0.36	-2.07	-0.24	-1.19	-0.31	-1.66	-1.12	-6.96
Uganda	0.52	2.21	0.58	2.14	0.53	2.17	-0.81	-3.81
United Kingdom	0.40	2.53	0.66	3.62	0.33	2.02	-0.53	-3.67
Uruguay	-1.02	-3.47	-0.96	-2.78	-0.86	-2.78	-2.05	-7.61
Venezuela	-0.15	-0.69	0.16	0.60	-0.28	-1.19	-1.05	-5.10
Yugoslavia	0.05	0.21	0.33	1.30	0.02	0.10	-0.86	-4.39
Zaire	0.62	3.21	0.89	3.92	0.38	1.84	-0.95	-5.37
Zambia	0.58	2.11	0.70	2.17	0.62	2.14	-1.59	-6.30
Ln(RGDPCH)	1.22	7.10	0.63	3.15	1.40	7.78	-1.82	-11.62
Ln(POP)	-0.86	-3.25	-1.13	-3.64	-0.67	-2.39	0.62	2.55
Ln(Dis_rY)	-0.56	-2.38	0.10	0.36	-0.92	-3.72	0.22	1.03
Ln(RGDPCH)**2	-0.07	-5.90	-0.02	-1.74	-0.08	-7.01	0.12	11.85
Ln(POP)**2	0.01	1.51	0.02	2.13	0.01	0.90	-0.03	-3.80
R**2	0.89		0.87		0.89		0.92	
Rbar**2	0.89		0.87		0.88		0.92	
Number of Obs	2850		2850		2850		2873	

Appendix 3: The World Trade Condition Indexes and The World Net Price Level Index

Year	World Trade Conditions Index (1961=100) T-based	X-based	M-based	Net World Price Index
1961	100.00	100.00	100.00	100.00
1962	100.32	99.07	101.12	101.79
1963	103.50	102.71	103.95	105.70
1964	105.72	106.25	105.28	110.45
1965	105.36	105.67	104.94	116.03
1966	107.69	107.57	107.55	119.04
1967	105.27	104.53	105.62	121.14
1968	107.21	106.28	107.51	122.50
1969	108.49	107.57	108.51	127.96
1970	110.96	109.25	111.67	132.83
1971	111.61	107.32	114.72	140.01
1972	113.21	111.21	114.11	152.45
1973	119.94	118.81	119.32	178.20
1974	139.39	131.45	142.46	205.10
1975	134.47	121.24	143.66	229.12
1976	135.95	126.42	141.64	239.37
1977	138.32	128.08	144.56	259.58
1978	139.66	127.11	148.15	277.55
1979	148.35	136.00	155.49	328.40
1980	155.46	139.56	164.99	370.50
1981	152.41	133.48	165.10	368.64
1982	145.04	127.31	155.97	366.03
1983	146.64	132.90	153.32	359.90
1984	152.20	141.58	155.01	345.98
1985	151.07	139.01	154.74	344.70
1986	145.29	135.01	147.92	380.20
1987	152.28	139.85	156.85	401.63
1988	157.79	144.56	162.88	431.36

Appendix 4: Total Trade Based Openness Index, Time Series

	1961	1962	1963	1964	1965	1966	1967
Algeria	175	210	129	112	101	108	98
Angola	66	73	71	73	70	70	80
Argentina	103	126	130	93	84	93	102
Australia	114	111	111	114	115	105	111
Austria	97	98	96	95	98	97	98
Bangladesh	121	118	113	125	121	121	117
Barbados	102	111	110	105	118	124	119
Belgium	87	87	87	87	88	87	88
Benin	43	41	46	51	66	67	83
Bolivia	105	109	112	113	123	121	131
Botswana	83	86	88	88	113	108	108
Brazil	99	70	132	91	99	95	88
Burkina Faso	NA	NA	NA	NA	64	67	74
Burundi	108	125	90	111	105	106	102
Cameroon	NA	NA	NA	NA	122	112	108
Canada	92	92	90	93	93	95	101
Central African Rep.	108	110	112	119	113	123	130
Chad	90	93	87	95	87	87	92
Chile	87	79	81	78	80	84	84
Colombia	112	102	101	100	88	108	97
Costa Rica	81	87	85	91	97	94	99
Cote D'Ivoire	117	112	104	100	98	95	99
Denmark	119	118	116	115	112	108	106
Dominican Republic	96	113	107	107	88	96	103
Ecuador	84	94	85	83	90	90	91
Egypt	111	116	122	110	104	98	89
El Salvador	88	89	95	101	104	102	105
Ethiopia	88	96	100	98	104	103	106
Fiji	85	91	118	125	122	110	114
Finland	106	106	96	98	97	94	93
France	89	85	83	84	84	85	86
Gabon	79	76	80	95	98	93	115
Gambia, The	100	120	105	93	97	103	120
Germany	91	90	90	88	92	93	96
Ghana	222	190	172	154	157	122	136
Greece	92	95	95	92	95	95	93
Guatemala	76	76	89	98	108	111	108
Guyana	99	99	96	94	104	102	105
Haiti	125	126	111	88	91	87	82
Honduras	80	82	85	84	96	103	107
Hong kong	117	114	106	106	97	100	104
Iceland	122	133	127	113	109	100	100
India	109	109	105	95	87	111	104
Indonesia	NA	39	68	92	41	126	95
Iran	104	103	97	102	103	104	113
Iraq	103	96	100	96	94	92	83

	1961	1962	1963	1964	1965	1966	1967
Ireland	98	93	94	92	98	98	98
Israel	60	92	89	88	78	77	88
Italy	90	90	90	84	87	90	93
Jamaica	100	101	99	103	96	98	100
Japan	115	106	103	102	104	101	100
Kenya	127	123	117	119	120	119	111
Lesotho	86	88	88	84	91	82	78
Liberia	78	94	83	97	96	103	117
Madagascar	100	95	95	96	98	119	118
Malawi	109	114	118	95	102	108	111
Malaysia	117	115	109	104	104	99	96
Mali	NA	NA	NA	NA	NA	NA	100
Malta	115	111	111	116	110	107	105
Mauritania	82	92	91	85	79	79	84
Mexico	108	107	102	96	95	90	90
Morocco	122	100	93	93	87	97	98
Myanmar	232	251	208	223	206	164	131
Nepal	NA	NA	NA	NA	117	76	77
Netherlands, The	112	110	109	105	102	99	98
New Zealand	104	96	103	101	98	100	90
Nicaragua	89	102	105	103	108	110	113
Niger	55	67	57	68	68	77	64
Nigeria	92	80	79	85	96	91	113
Norway	118	114	113	112	112	112	118
Pakistan	98	101	115	104	98	87	89
Panama	96	104	104	100	103	104	106
Paraguay	126	88	78	83	98	93	91
Peru	139	135	126	116	109	107	113
Philippines	73	99	95	98	103	103	108
Portugal	99	94	95	118	122	119	116
Rwanda	81	88	74	106	132	123	100
Senegal	108	100	90	80	80	79	85
Sierra Leone	NA	NA	NA	143	138	124	121
Singapore	130	125	128	103	105	102	96
Somalia	78	80	81	93	80	77	76
South Africa	114	113	112	114	113	104	108
Spain	80	87	85	89	95	96	88
Sri Lanka	147	146	135	131	132	121	113
Sudan	109	116	132	126	112	108	109
Suriname	113	111	112	121	123	115	116
Swaziland	60	72	85	73	88	107	121
Sweden	99	98	96	95	96	93	92
Switzerland	109	110	106	104	103	103	103
Syria	99	106	113	95	89	108	95
Taiwan	63	62	68	69	75	76	82

	1961	1962	1963	1964	1965	1966	1967
Tanzania	154	142	141	135	137	144	139
Thailand	100	96	94	99	97	95	105
Togo	99	92	76	91	77	86	81
Trinidad and Tobago	171	166	156	162	167	95	95
Tunisia	96	95	83	89	95	95	99
Turkey	102	111	88	79	80	79	73
USA	76	76	75	76	77	78	81
Uganda	126	128	139	142	142	142	143
United Kingdom	102	99	98	96	93	91	93
Uruguay	109	99	92	86	113	100	101
Venezuela	104	106	100	100	102	93	98
Yugoslavia	105	104	98	90	126	115	113
Zaire	62	45	187	205	158	190	95
Zambia	114	120	120	121	102	109	115

	1968	1969	1970	1971	1972	1973	1974
Algeria	100	107	104	94	91	108	119
Angola	83	82	89	90	84	86	85
Argentina	96	103	107	99	110	98	84
Australia	106	104	105	102	97	94	93
Austria	98	103	111	109	107	102	96
Bangladesh	105	103	110	92	117	59	62
Barbados	124	123	119	116	121	107	91
Belgium	93	99	99	98	95	101	99
Benin	88	105	124	145	128	125	113
Bolivia	123	126	122	112	111	131	126
Botswana	107	104	97	97	112	96	89
Brazil	94	97	104	104	113	117	123
Burkina Faso	84	86	84	97	106	107	102
Burundi	105	96	91	85	103	89	80
Cameroon	115	110	119	117	108	100	92
Canada	104	107	104	103	104	105	99
Central African Rep.	129	108	120	112	97	104	87
Chad	98	86	107	105	95	107	107
Chile	82	93	86	68	68	82	96
Colombia	111	112	121	119	115	111	99
Costa Rica	106	103	107	111	115	110	115
Cote D'Ivoire	103	97	96	89	92	97	103
Denmark	105	105	107	103	95	100	97
Dominican Republic	109	106	97	95	105	102	112
Ecuador	92	82	85	102	107	114	140
Egypt	81	83	84	82	80	77	107
El Salvador	102	96	97	101	112	117	118
Ethiopia	96	91	91	89	90	93	89
Fiji	121	126	119	128	119	115	99
Finland	101	107	115	110	109	105	103
France	87	94	100	102	103	104	110
Gabon	109	119	94	127	161	120	88
Gambia, The	116	123	84	88	92	92	83
Germany	100	103	101	101	98	97	99
Ghana	149	142	152	125	126	128	116
Greece	88	87	84	84	90	106	97
Guatemala	105	106	107	107	110	115	117
Guyana	102	102	99	101	103	100	97
Haiti	86	87	96	92	90	85	78
Honduras	110	106	109	108	103	111	114
Hong kong	115	117	112	109	99	95	85
Iceland	110	129	132	121	107	104	89
India	93	78	74	78	80	79	84
Indonesia	96	84	98	107	114	124	133
Iran	114	117	121	133	135	143	158
Iraq	84	84	84	99	86	100	118

	1968	1969	1970	1971	1972	1973	1974
Ireland	102	100	97	93	86	91	95
Israel	108	107	107	109	99	111	91
Italy	94	99	100	100	103	104	111
Jamaica	105	106	91	96	94	88	86
Japan	97	99	101	103	94	94	114
Kenya	112	109	112	111	94	92	106
Lesotho	78	78	81	103	114	98	99
Liberia	115	117	104	105	105	120	107
Madagascar	120	121	117	102	94	93	88
Malawi	118	116	116	104	107	111	98
Malaysia	99	100	100	95	86	85	91
Mali	81	88	86	95	82	89	125
Malta	113	111	99	97	94	104	116
Mauritania	78	81	82	82	142	102	100
Mexico	92	94	85	80	83	83	78
Morocco	97	93	96	90	92	100	112
Myanmar	82	79	81	80	85	65	68
Nepal	79	93	69	77	71	86	69
Netherlands, The	97	100	107	106	100	100	99
New Zealand	101	100	103	97	97	99	97
Nicaragua	105	96	100	101	123	116	107
Niger	62	74	79	77	97	113	100
Nigeria	101	101	68	83	77	101	111
Norway	115	112	113	111	105	109	103
Pakistan	85	~~75~~	86	89	78	112	113
Panama	104	107	107	105	104	99	113
Paraguay	94	102	99	93	87	88	86
Peru	119	110	104	91	89	86	92
Philippines	97	87	112	110	103	110	112
Portugal	109	104	104	103	104	99	97
Rwanda	93	83	97	99	91	91	104
Senegal	78	90	94	94	104	105	124
Sierra Leone	136	140	129	131	129	128	118
Singapore	93	95	92	89	82	84	93
Somalia	77	90	62	73	76	82	107
South Africa	102	97	96	98	98	94	95
Spain	96	99	102	102	105	103	99
Sri Lanka	115	108	92	87	78	81	83
Sudan	123	117	118	126	120	127	102
Suriname	108	115	112	116	112	107	117
Swaziland	124	101	102	89	94	100	96
Sweden	93	98	106	101	96	102	113
Switzerland	106	113	116	111	106	102	94
Syria	103	102	104	106	110	121	122
Taiwan	88	93	100	111	123	131	121

	1968	1969	1970	1971	1972	1973	1974
Tanzania	131	127	137	149	145	126	120
Thailand	101	96	92	94	100	96	99
Togo	89	97	109	108	95	77	95
Trinidad and Tobago	96	104	104	111	104	96	89
Tunisia	86	90	89	91	90	90	100
Turkey	69	65	80	95	96	101	89
USA	83	84	88	87	91	102	111
Uganda	136	120	116	124	95	74	64
United Kingdom	103	103	104	103	99	108	115
Uruguay	99	90	90	73	99	87	87
Venezuela	97	95	92	97	94	99	113
Yugoslavia	106	107	112	118	119	116	109
Zaire	89	80	93	81	75	75	79
Zambia	111	117	109	104	102	96	91

	1975	1976	1977	1978	1979	1980	1981
Algeria	129	117	119	109	99	97	102
Angola	134	126	122	133	135	137	148
Argentina	80	102	114	96	81	72	91
Australia	90	91	95	92	96	94	92
Austria	95	99	98	96	97	98	103
Bangladesh	52	102	84	90	86	99	107
Barbados	80	78	81	86	90	89	83
Belgium	89	92	98	95	98	99	111
Benin	132	123	143	144	145	134	154
Bolivia	123	120	119	111	105	74	64
Botswana	102	106	104	106	102	89	99
Brazil	112	96	88	84	89	107	105
Burkina Faso	119	110	119	109	109	114	119
Burundi	91	101	108	105	115	89	84
Cameroon	97	101	105	105	90	89	96
Canada	99	95	97	103	104	102	103
Central African Rep.	97	82	92	90	81	95	91
Chad	99	105	107	109	134	117	103
Chile	136	117	108	112	115	111	99
Colombia	102	105	101	102	90	97	86
Costa Rica	101	94	97	94	88	84	127
Cote D'Ivoire	94	100	103	96	89	90	98
Denmark	93	94	91	85	85	88	99
Dominican Republic	112	94	84	80	87	85	84
Ecuador	127	113	111	104	103	98	86
Egypt	117	105	102	108	134	119	137
El Salvador	120	126	124	115	115	104	99
Ethiopia	96	92	96	102	95	103	105
Fiji	87	80	89	89	89	90	92
Finland	98	95	99	99	102	107	107
France	100	107	108	103	103	104	112
Gabon	90	85	97	102	90	89	100
Gambia, The	98	90	86	105	92	119	96
Germany	98	102	99	95	95	97	109
Ghana	120	102	69	57	66	50	30
Greece	106	104	99	99	94	99	104
Guatemala	116	125	127	124	113	109	98
Guyana	108	111	102	88	90	99	104
Haiti	99	109	116	126	116	117	114
Honduras	111	111	112	120	116	115	104
Hong kong	85	88	82	87	88	84	89
Iceland	97	88	85	88	88	81	83
India	100	106	102	111	120	117	115
Indonesia	122	124	115	114	126	121	116
Iran	174	154	128	97	98	68	64
Iraq	135	115	113	115	123	NA	NA
Ireland	92	101	106	108	107	100	103
Israel	105	106	111	137	120	111	113

	1975	1976	1977	1978	1979	1980	1981
Italy	106	117	114	110	111	104	113
Jamaica	89	74	71	90	103	107	112
Japan	108	109	100	83	94	106	111
Kenya	97	99	101	105	83	95	88
Lesotho	107	138	105	95	113	105	113
Liberia	100	112	104	104	96	98	100
Madagascar	95	87	96	110	113	105	90
Malawi	115	107	100	100	93	90	86
Malaysia	91	92	90	95	97	101	101
Mali	93	75	74	96	86	99	96
Malta	109	108	110	102	101	99	92
Mauritania	98	108	100	91	86	95	117
Mexico	71	78	87	91	95	102	103
Morocco	117	114	108	93	88	81	104
Myanmar	60	58	81	88	94	91	99
Nepal	102	114	114	119	113	121	132
Netherlands, The	95	97	90	86	89	91	101
New Zealand	98	106	102	97	100	100	100
Nicaragua	106	107	117	111	121	106	106
Niger	130	147	125	131	156	146	149
Nigeria	117	117	129	111	106	113	117
Norway	102	102	99	90	88	87	90
Pakistan	114	107	97	96	108	113	111
Panama	119	109	108	99	98	96	99
Paraguay	86	88	111	110	94	103	83
Peru	87	86	102	108	120	110	98
Philippines	107	98	98	99	98	99	94
Portugal	80	72	76	77	89	95	102
Rwanda	88	111	103	127	132	117	90
Senegal	110	112	131	105	98	94	120
Sierra Leone	113	107	102	108	109	115	104
Singapore	84	93	99	103	111	116	111
Somalia	72	63	135	153	152	201	152
South Africa	102	101	100	104	105	103	97
Spain	96	98	94	89	84	92	108
Sri Lanka	91	87	92	106	105	109	100
Sudan	120	113	87	83	68	108	101
Suriname	105	95	88	87	82	94	88
Swaziland	91	102	95	98	100	121	122
Sweden	103	102	96	92	99	94	95
Switzerland	86	90	98	92	92	95	97
Syria	122	119	130	102	116	108	101
Taiwan	109	120	117	125	123	118	115

	1975	1976	1977	1978	1979	1980	1981
Tanzania	111	97	89	94	83	72	63
Thailand	94	96	99	97	104	105	105
Togo	103	99	97	148	124	98	97
Trinidad and Tobago	91	99	88	85	81	83	79
Tunisia	99	97	100	104	113	112	123
Turkey	87	86	78	63	50	84	110
USA	107	110	110	115	123	129	129
Uganda	47	49	42	77	105	130	125
United Kingdom	105	114	114	106	100	90	90
Uruguay	104	109	116	108	98	90	86
Venezuela	109	110	114	112	105	102	103
Yugoslavia	105	88	86	79	74	77	80
Zaire	61	72	77	77	93	83	79
Zambia	98	90	92	77	94	96	79

	1982	1983	1984	1985	1986	1987	1988
Algeria	100	89	80	73	53	47	56
Angola	143	147	142	133	NA	NA	NA
Argentina	119	122	104	122	103	98	98
Australia	98	90	92	102	104	98	96
Austria	104	101	104	110	102	95	96
Bangladesh	118	119	108	109	NA	NA	NA
Barbados	89	92	91	84	NA	NA	NA
Belgium	123	124	128	125	118	113	114
Benin	176	113	115	100	95	104	97
Bolivia	63	61	48	69	98	89	86
Botswana	108	113	100	99	109	NA	NA
Brazil	92	119	121	110	90	88	NA
Burkina Faso	119	114	116	119	106	99	93
Burundi	109	104	103	91	97	109	113
Cameroon	99	100	101	107	90	71	68
Canada	98	97	105	107	111	102	100
Central African Rep.	90	100	93	104	86	83	75
Chad	59	120	125	119	NA	NA	NA
Chile	101	114	120	136	148	155	161
Colombia	88	80	80	88	107	99	97
Costa Rica	131	110	100	94	96	101	104
Cote D'Ivoire	104	105	113	114	102	100	96
Denmark	104	101	100	102	93	85	84
Dominican Republic	66	64	136	127	115	132	150
Ecuador	96	96	98	105	105	123	127
Egypt	121	107	98	87	74	81	108
El Salvador	94	95	84	87	97	77	63
Ethiopia	113	106	121	119	131	NA	NA
Fiji	91	92	83	88	83	89	NA
Finland	106	103	98	97	90	85	82
France	117	115	118	118	108	103	103
Gabon	105	114	107	102	NA	NA	NA
Gambia, The	89	124	109	95	NA	NA	NA
Germany	116	110	114	118	111	103	102
Ghana	21	52	50	72	120	153	139
Greece	107	113	114	120	123	125	116
Guatemala	88	73	73	67	86	105	102
Guyana	97	87	97	99	91	131	100
Haiti	128	117	111	98	86	89	85
Honduras	89	94	97	94	96	87	79
Hong kong	87	96	101	103	111	117	126
Iceland	86	96	92	98	94	86	78
India	112	107	114	108	109	108	112
Indonesia	114	119	108	98	96	107	104
Iran	70	65	50	37	NA	NA	NA
Iraq	NA	NA	NA	NA	NA	NA	NA
Ireland	102	105	113	114	107	106	108
Israel	106	98	105	115	105	106	91

	1982	1983	1984	1985	1986	1987	1988
Italy	114	104	106	108	95	90	87
Jamaica	100	99	125	144	128	125	NA
Japan	119	106	107	103	81	76	79
Kenya	86	82	86	85	89	80	81
Lesotho	129	135	127	126	NA	NA	NA
Liberia	101	97	86	86	90	NA	NA
Madagascar	90	81	89	91	87	113	115
Malawi	83	81	88	87	83	87	92
Malaysia	106	103	99	100	108	111	117
Mali	103	127	135	165	131	113	107
Malta	87	82	82	85	84	86	83
Mauritania	131	129	127	142	136	118	121
Mexico	122	136	125	121	148	154	144
Morocco	105	104	115	116	101	100	99
Myanmar	98	74	63	55	NA	NA	NA
Nepal	130	135	125	140	NA	NA	NA
Netherlands, The	105	104	108	112	99	94	93
New Zealand	106	107	116	111	102	91	82
Nicaragua	76	90	82	67	66	NA	NA
Niger	139	136	130	130	133	126	120
Nigeria	100	85	78	82	87	200	161
Norway	92	89	89	90	87	77	75
Pakistan	104	113	105	104	108	105	102
Panama	96	90	82	80	79	NA	NA
Paraguay	88	83	107	136	164	150	146
Peru	101	104	92	98	76	59	71
Philippines	91	105	99	90	107	106	109
Portugal	104	109	118	109	99	104	105
Rwanda	110	99	101	96	108	95	89
Senegal	125	117	131	110	99	88	85
Sierra Leone	78	65	58	40	52	52	NA
Singapore	107	95	91	91	NA	NA	NA
Somalia	161	172	134	125	127	110	75
South Africa	94	82	86	97	101	89	91
Spain	116	126	129	129	115	113	110
Sri Lanka	95	87	81	79	77	76	NA
Sudan	115	117	99	74	51	38	78
Suriname	86	78	71	64	NA	NA	NA
Swaziland	132	130	121	122	NA	NA	NA
Sweden	108	114	111	111	104	101	99
Switzerland	95	94	98	101	98	92	92
Syria	87	89	81	85	73	91	62
Taiwan	113	114	114	108	114	109	106

	1982	1983	1984	1985	1986	1987	1988
Tanzania	47	42	46	43	70	106	119
Thailand	100	96	94	100	105	117	129
Togo	116	102	116	121	119	110	111
Trinidad and Tobago	80	71	64	112	91	82	85
Tunisia	122	114	112	102	105	105	121
Turkey	147	156	185	196	175	188	197
USA	125	118	120	113	121	123	129
Uganda	133	104	85	69	NA	NA	NA
United Kingdom	95	97	103	103	99	95	89
Uruguay	87	130	121	121	118	103	106
Venezuela	106	70	98	93	96	101	NA
Yugoslavia	87	108	113	113	93	90	NA
Zaire	82	94	151	160	163	170	166
Zambia	79	84	87	96	120	116	87

Appendix 5: Import Based Openness Index, Time Series

	1961	1962	1963	1964	1965	1966	1967
Algeria	207	208	146	116	103	102	90
Angola	68	77	76	74	80	78	98
Argentina	113	181	141	102	74	88	90
Australia	108	108	105	114	123	107	113
Austria	94	92	92	94	98	100	99
Bangladesh	103	95	98	119	114	108	108
Barbados	104	110	104	102	116	123	118
Belgium	85	84	86	87	86	88	86
Benin	44	47	53	56	68	73	92
Bolivia	119	127	131	118	134	129	135
Botswana	85	89	92	93	117	115	125
Brazil	97	79	130	84	82	88	87
Burkina Faso	NA	NA	NA	NA	62	63	74
Burundi	98	118	101	88	99	99	91
Cameroon	NA	NA	NA	NA	124	118	113
Canada	93	92	88	92	95	98	100
Central African Rep.	106	113	114	120	113	126	141
Chad	88	93	89	100	86	84	88
Chile	99	84	88	80	77	82	81
Colombia	119	105	106	107	85	120	95
Costa Rica	82	85	87	91	107	97	102
Cote D'Ivoire	120	111	101	97	99	93	97
Denmark	119	120	111	117	113	108	107
Dominican Republic	71	102	108	115	88	106	108
Ecuador	89	95	87	87	94	93	97
Egypt	104	113	120	105	98	91	83
El Salvador	84	84	94	105	106	108	107
Ethiopia	85	96	100	97	101	109	108
Fiji	96	92	113	116	129	112	114
Finland	104	104	92	99	99	96	93
France	81	79	80	83	81	84	85
Gabon	85	77	80	98	101	103	127
Gambia, The	101	122	107	97	97	100	115
Germany	88	89	88	89	96	94	91
Ghana	256	201	191	166	189	138	142
Greece	93	95	97	101	107	97	94
Guatemala	77	77	90	101	111	107	112
Guyana	96	95	93	92	103	103	104
Haiti	130	117	99	85	92	88	80
Honduras	78	78	87	86	93	102	107
Hong kong	120	117	109	112	100	104	102
Iceland	112	121	124	113	103	98	109
India	116	117	111	105	98	125	114
Indonesia	NA	40	69	95	43	161	126
Iran	102	86	76	97	99	104	118
Iraq	117	98	90	97	99	96	82

	1961	1962	1963	1964	1965	1966	1967
Ireland	97	93	96	95	102	99	95
Israel	67	100	94	97	84	78	89
Italy	89	91	97	84	81	86	90
Jamaica	96	96	92	104	97	92	97
Japan	125	106	109	107	101	97	104
Kenya	124	119	111	112	120	116	113
Lesotho	82	81	82	78	85	83	78
Liberia	104	138	110	102	94	99	108
Madagascar	102	96	103	103	106	121	115
Malawi	123	124	131	100	114	122	115
Malaysia	116	118	113	108	105	99	98
Mali	NA	NA	NA	NA	NA	NA	103
Malta	108	106	108	119	111	106	107
Mauritania	122	138	113	69	59	58	66
Mexico	116	111	107	106	104	96	100
Morocco	117	97	89	84	76	89	94
Myanmar	216	216	184	214	218	147	127
Nepal	NA	NA	NA	NA	132	81	67
Netherlands, The	109	107	108	107	103	101	99
New Zealand	106	93	98	98	102	103	92
Nicaragua	85	99	101	101	108	115	120
Niger	52	68	53	73	71	77	70
Nigeria	109	91	88	99	105	97	125
Norway	118	112	112	109	111	112	118
Pakistan	103	107	117	111	107	88	93
Panama	98	103	106	101	103	105	104
Paraguay	118	85	75	82	92	93	93
Peru	137	135	131	113	116	114	124
Philippines	78	105	90	99	102	97	112
Portugal	106	88	90	109	114	110	104
Rwanda	64	86	86	93	131	134	101
Senegal	101	95	90	79	80	74	84
Sierra Leone	NA	NA	NA	138	137	125	120
Singapore	132	124	128	104	106	101	96
Somalia	71	83	78	94	67	71	72
South Africa	103	99	107	119	125	107	116
Spain	73	85	89	90	104	105	94
Sri Lanka	142	142	132	129	125	123	114
Sudan	99	102	120	119	102	99	90
Suriname	118	117	117	142	142	112	111
Swaziland	55	71	81	69	80	109	130
Sweden	97	95	94	95	98	95	92
Switzerland	115	116	112	111	106	103	102
Syria	94	90	96	84	76	103	88
Taiwan	78	73	71	69	82	77	88

	1961	1962	1963	1964	1965	1966	1967
Tanzania	138	128	117	111	121	126	124
Thailand	95	98	99	100	97	93	107
Togo	90	89	85	97	80	80	72
Trinidad and Tobago	171	169	157	167	180	93	87
Tunisia	105	105	91	100	110	104	107
Turkey	102	113	96	76	76	78	68
USA	68	69	67	67	70	74	77
Uganda	125	125	133	131	143	146	144
United Kingdom	101	97	97	99	94	91	95
Uruguay	114	113	93	86	89	83	98
Venezuela	86	85	76	89	96	85	91
Yugoslavia	113	99	95	92	118	111	110
Zaire	51	37	157	187	139	184	83
Zambia	110	119	112	102	94	103	120

	1968	1969	1970	1971	1972	1973	1974
Algeria	99	112	114	107	97	118	109
Angola	100	94	95	102	83	87	68
Argentina	97	115	118	112	119	95	88
Australia	114	106	105	100	86	87	97
Austria	98	102	109	106	107	104	97
Bangladesh	99	98	105	90	130	43	73
Barbados	125	130	128	118	126	112	90
Belgium	92	98	97	94	92	102	101
Benin	90	102	114	128	125	117	113
Bolivia	129	129	118	114	115	131	104
Botswana	131	128	120	110	117	100	91
Brazil	98	97	107	114	125	130	158
Burkina Faso	80	87	84	101	109	114	101
Burundi	101	91	80	88	98	83	82
Cameroon	121	109	115	124	121	108	85
Canada	103	109	101	100	105	107	101
Central African Rep.	129	114	123	112	101	109	82
Chad	93	84	104	99	92	110	105
Chile	81	87	84	71	79	89	94
Colombia	117	118	130	134	119	111	103
Costa Rica	106	105	112	118	119	115	126
Cote D'Ivoire	93	91	95	90	94	105	102
Denmark	106	108	110	103	94	105	100
Dominican Republic	116	113	104	101	106	102	121
Ecuador	103	95	93	120	112	104	124
Egypt	78	79	81	79	80	77	117
El Salvador	101	98	92	98	106	119	125
Ethiopia	96	92	84	86	89	78	69
Fiji	123	128	120	131	127	129	101
Finland	95	104	118	111	108	109	110
France	87	98	101	99	102	106	116
Gabon	124	134	92	125	180	138	87
Gambia, The	122	119	74	88	86	94	74
Germany	96	102	102	100	99	98	95
Ghana	147	142	153	134	104	110	121
Greece	94	94	90	87	94	115	98
Guatemala	105	100	101	104	105	111	119
Guyana	96	97	97	92	101	113	92
Haiti	80	84	93	87	91	86	82
Honduras	109	108	117	104	98	111	126
Hong kong	112	113	109	106	96	96	84
Iceland	117	122	126	126	108	107	98
India	95	74	73	76	76	76	82
Indonesia	113	105	108	113	114	123	112
Iran	122	125	122	140	148	123	118
Iraq	75	77	80	91	85	95	110

	1968	1969	1970	1971	1972	1973	1974
Ireland	104	106	101	95	88	95	103
Israel	109	112	116	112	99	126	100
Italy	88	96	99	95	101	113	121
Jamaica	108	112	94	101	102	99	93
Japan	98	98	103	95	89	103	125
Kenya	111	106	112	119	97	95	113
Lesotho	77	74	81	102	114	101	102
Liberia	92	88	90	91	91	112	103
Madagascar	119	120	109	104	93	93	85
Malawi	129	128	124	106	116	112	97
Malaysia	100	92	99	95	92	84	95
Mali	79	84	78	85	82	95	143
Malta	119	120	109	102	100	108	119
Mauritania	62	66	68	66	133	93	99
Mexico	103	103	98	87	90	94	90
Morocco	92	88	95	85	84	94	101
Myanmar	87	81	90	82	87	59	67
Nepal	71	95	75	81	71	91	77
Netherlands, The	98	103	111	106	99	101	99
New Zealand	97	98	106	95	95	96	114
Nicaragua	105	95	98	96	105	127	120
Niger	70	83	87	73	100	120	120
Nigeria	112	105	71	82	72	90	70
Norway	111	108	113	112	104	112	106
Pakistan	88	70	90	91	78	99	106
Panama	101	106	110	106	109	104	120
Paraguay	99	107	93	90	79	79	82
Peru	116	104	95	89	88	91	106
Philippines	105	96	111	108	103	100	116
Portugal	103	98	102	100	99	101	106
Rwanda	100	92	94	102	101	82	109
Senegal	83	96	93	96	101	112	120
Sierra Leone	131	136	125	123	120	123	120
Singapore	93	97	98	93	87	88	97
Somalia	69	81	56	65	65	82	109
South Africa	103	105	113	115	101	98	104
Spain	99	104	102	94	101	105	111
Sri Lanka	115	117	91	83	75	78	85
Sudan	116	106	98	112	109	109	97
Suriname	99	104	103	102	104	102	111
Swaziland	126	102	99	78	88	91	80
Sweden	94	101	108	98	94	100	116
Switzerland	104	112	121	113	109	108	97
Syria	94	98	95	98	105	111	121
Taiwan	96	97	103	108	118	129	135

	1968	1969	1970	1971	1972	1973	1974
Tanzania	123	113	126	140	136	125	130
Thailand	107	102	99	95	98	97	98
Togo	76	84	99	101	98	81	59
Trinidad and Tobago	88	104	108	123	120	96	68
Tunisia	83	90	88	84	84	88	90
Turkey	68	64	80	96	96	98	100
USA	83	85	87	86	94	101	109
Uganda	135	120	110	135	89	67	64
United Kingdom	104	102	101	97	99	117	124
Uruguay	90	88	97	78	99	85	95
Venezuela	100	101	98	97	103	96	82
Yugoslavia	104	106	120	125	119	121	123
Zaire	78	71	87	87	86	79	81
Zambia	115	86	98	116	110	86	88

	1975	1976	1977	1978	1979	1980	1981
Algeria	133	117	130	123	96	85	88
Angola	112	123	113	127	130	110	123
Argentina	85	86	106	81	86	86	95
Australia	82	88	94	93	91	92	93
Austria	91	101	102	94	98	99	102
Bangladesh	57	123	82	100	97	113	116
Barbados	78	84	84	83	90	86	85
Belgium	87	92	99	94	100	101	110
Benin	131	126	140	137	141	134	159
Bolivia	125	118	118	118	105	61	62
Botswana	99	100	96	104	93	79	91
Brazil	131	110	91	90	100	118	104
Burkina Faso	122	110	122	110	110	112	114
Burundi	100	90	86	106	118	101	91
Cameroon	97	106	106	107	99	90	94
Canada	100	97	99	101	105	99	100
Central African Rep.	100	76	86	85	78	94	83
Chad	101	106	112	109	142	117	96
Chile	131	102	108	114	118	116	116
Colombia	93	94	87	90	84	93	94
Costa Rica	101	94	96	94	93	89	118
Cote D'Ivoire	97	99	100	101	98	101	109
Denmark	89	98	93	84	86	86	93
Dominican Republic	101	97	82	81	87	90	79
Ecuador	130	111	112	108	97	93	77
Egyp	128	106	102	112	139	115	132
El Salvador	117	117	115	119	107	94	97
Ethiopia	91	84	94	105	98	102	107
Fiji	81	81	87	87	90	89	96
Finland	105	97	94	89	98	106	102
France	95	110	109	99	103	107	113
Gabon	98	98	109	99	77	63	83
Gambia, The	79	92	83	127	93	122	106
Germany	94	101	99	92	98	102	110
Ghana	106	96	68	56	61	48	28
Greece	103	100	96	92	90	88	93
Guatemala	109	131	123	126	115	107	103
Guyana	100	123	106	82	90	98	109
Haiti	99	111	116	122	117	114	122
Honduras	114	111	111	117	114	116	103
Hong kong	80	83	80	86	89	85	88
Iceland	101	85	84	80	86	80	83
India	88	87	85	103	118	121	114
Indonesia	113	118	102	105	109	90	104
Iran	174	153	138	108	77	83	81
Iraq	155	109	123	135	126	NA	NA

	1975	1976	1977	1978	1979	1980	1981
Ireland	89	101	107	107	114	104	106
Israel	112	107	104	129	114	101	103
Italy	101	118	110	102	108	110	115
Jamaica	92	79	68	82	97	100	110
Japan	111	112	98	79	102	114	112
Kenya	97	93	92	113	87	103	91
Lesotho	107	143	112	92	113	104	112
Liberia	98	114	116	111	102	100	97
Madagascar	88	78	88	105	127	118	95
Malawi	114	101	89	105	98	89	75
Malaysia	90	84	85	89	92	101	107
Mali	100	72	65	99	90	98	94
Malta	101	103	106	93	94	91	86
Mauritania	102	129	122	105	96	105	123
Mexico	82	86	88	94	103	109	109
Morocco	119	135	131	104	98	87	112
Myanmar	54	55	86	103	97	89	102
Nepal	98	107	102	113	106	120	125
Netherlands, The	90	94	90	85	90	92	97
New Zealand	108	110	103	93	97	98	96
Nicaragua	107	96	115	94	84	119	118
Niger	130	149	124	118	146	146	142
Nigeria	111	118	131	119	92	87	121
Norway	105	112	110	89	86	81	80
Pakistan	115	107	100	96	113	112	104
Panama	118	111	106	97	102	94	96
Paraguay	86	85	104	104	95	118	97
Peru	106	101	112	98	91	101	102
Philippines	114	108	101	103	104	103	96
Portugal	84	80	85	81	90	99	110
Rwanda	91	102	92	124	110	119	96
Senegal	102	110	124	106	98	100	127
Sierra Leone	115	111	102	108	117	127	114
Singapore	86	93	95	98	106	110	107
Somalia	69	64	146	148	168	206	155
South Africa	111	110	94	94	92	93	102
Spain	100	107	96	81	79	92	105
Sri Lanka	89	81	77	99	108	121	103
Sudan	129	122	89	89	74	116	114
Suriname	101	90	90	82	80	94	93
Swaziland	75	93	94	107	118	135	132
Sweden	101	104	98	88	100	95	93
Switzerland	78	83	92	85	90	96	94
Syria	124	128	151	114	127	119	114
Taiwan	112	119	113	116	124	120	111

	1975	1976	1977	1978	1979	1980	1981
Tanzania	114	86	82	105	92	80	65
Thailand	94	94	102	96	109	106	104
Togo	111	98	108	159	149	101	99
Trinidad and Tobago	74	87	79	83	81	78	74
Tunisia	92	97	102	103	107	105	117
Turkey	102	98	96	65	53	96	107
USA	96	107	113	114	122	125	123
Uganda	50	44	37	85	96	142	135
United Kingdom	104	114	111	100	98	84	82
Uruguay	111	111	123	113	110	104	95
Venezuela	109	129	153	159	121	102	105
Yugoslavia	111	87	93	81	82	79	77
Zaire	74	86	104	85	103	65	62
Zambia	122	89	99	83	86	102	92

	1982	1983	1984	1985	1986	1987	1988
Algeria	89	81	75	66	59	42	54
Angola	123	140	149	137	NA	NA	NA
Argentina	106	105	92	97	101	105	87
Australia	101	90	97	109	112	101	97
Austria	99	101	108	114	106	98	100
Bangladesh	131	130	118	119	NA	NA	NA
Barbados	85	90	87	78	NA	NA	NA
Belgium	123	125	134	128	120	116	118
Benin	183	105	112	91	95	99	94
Bolivia	49	51	39	70	100	98	93
Botswana	110	101	84	84	76	NA	NA
Brazil	94	105	92	83	79	72	NA
Burkina Faso	119	115	114	124	112	95	89
Burundi	122	123	120	97	102	130	123
Cameroon	94	89	79	87	89	80	73
Canada	89	93	104	108	117	107	104
Central African Rep.	87	98	93	104	90	87	76
Chad	62	116	118	142	NA	NA	NA
Chile	100	103	122	128	137	144	143
Colombia	100	89	84	85	85	87	92
Costa Rica	112	101	93	90	89	99	98
Cote D'Ivoire	110	112	104	101	89	98	99
Denmark	100	97	101	104	97	85	81
Dominican Republic	66	65	121	126	114	138	146
Ecuador	94	83	82	89	102	132	126
Egypt	120	106	104	93	79	87	116
El Salvador	93	96	91	95	98	84	70
Ethiopia	123	117	139	140	150	NA	NA
Fiji	89	91	80	83	77	81	NA
Finland	103	104	99	100	92	88	86
France	121	118	123	122	111	107	108
Gabon	88	102	96	98	NA	NA	NA
Gambia, The	92	130	121	95	NA	NA	NA
Germany	115	114	120	122	111	103	103
Ghana	18	58	49	74	119	152	132
Greece	104	111	111	122	121	117	108
Guatemala	89	72	76	66	78	116	111
Guyana	99	94	100	106	98	134	97
Haiti	127	122	117	102	88	94	90
Honduras	84	94	103	96	94	87	78
Hong kong	87	98	103	103	114	120	130
Iceland	90	94	95	101	93	91	82
India	110	106	115	114	114	110	116
Indonesia	110	118	103	96	101	105	99
Iran	61	72	58	43	NA	NA	NA
Iraq	NA	NA	NA	NA	NA	NA	NA

	1982	1983	1984	1985	1986	1987	1988
Ireland	100	101	110	108	101	96	95
Israel	98	92	99	105	95	100	84
Italy	115	104	113	114	96	92	90
Jamaica	103	105	127	148	119	117	NA
Japan	119	105	106	98	71	68	75
Kenya	84	78	85	83	85	84	84
Lesotho	131	143	140	137	NA	NA	NA
Liberia	103	102	86	83	83	NA	NA
Madagascar	93	82	86	95	85	105	111
Malawi	75	77	71	81	73	75	88
Malaysia	116	113	104	100	107	101	111
Mali	100	124	133	180	141	112	109
Malta	86	83	86	88	86	87	86
Mauritania	151	140	140	141	129	112	118
Mexico	94	88	89	97	125	118	131
Morocco	116	107	124	121	104	98	90
Myanmar	110	74	66	61	NA	NA	NA
Nepal	126	147	134	146	NA	NA	NA
Netherlands, The	100	103	110	113	100	95	94
New Zealand	106	104	122	111	103	90	76
Nicaragua	81	96	96	72	74	NA	NA
Niger	134	124	121	134	124	117	109
Nigeria	114	94	73	72	95	181	152
Norway	85	83	85	87	98	85	81
Pakistan	103	112	108	111	105	94	92
Panama	94	86	83	79	74	NA	NA
Paraguay	99	83	114	145	175	160	136
Peru	106	99	77	80	78	63	72
Philippines	97	112	94	78	86	97	100
Portugal	115	112	116	104	94	103	108
Rwanda	115	101	100	101	108	100	95
Senegal	122	123	133	115	101	89	83
Sierra Leone	87	70	56	39	51	46	NA
Singapore	106	95	90	88	NA	NA	NA
Somalia	163	185	158	139	149	130	87
South Africa	97	79	89	86	89	80	87
Spain	113	123	121	120	107	111	112
Sri Lanka	103	94	81	86	84	80	NA
Sudan	132	136	106	87	65	42	89
Suriname	93	88	77	66	NA	NA	NA
Swaziland	143	148	143	143	NA	NA	NA
Sweden	108	112	110	113	104	103	101
Switzerland	90	92	100	101	99	93	93
Syria	91	101	92	97	83	93	59
Taiwan	106	106	106	97	96	95	99

	1982	1983	1984	1985	1986	1987	1988
Tanzania	51	45	54	52	86	131	146
Thailand	92	102	97	100	94	108	123
Togo	121	103	120	133	135	120	122
Trinidad and Tobago	93	89	72	112	107	84	82
Tunisia	119	114	119	102	106	97	109
Turkey	131	147	176	180	164	169	162
USA	121	123	139	133	145	147	148
Uganda	140	113	90	73	NA	NA	NA
United Kingdom	89	96	107	105	105	101	99
Uruguay	93	125	113	111	107	101	98
Venezuela	128	60	88	85	118	118	NA
Yugoslavia	80	101	109	106	87	81	NA
Zaire	76	93	146	169	187	223	217
Zambia	89	83	88	99	124	118	91

Appendix 6: Export Based Openness Index, Time Series

	1961	1962	1963	1964	1965	1966	1967
Algeria	141	212	109	108	99	114	107
Angola	65	70	67	71	63	64	66
Argentina	97	79	123	85	92	97	113
Australia	121	115	119	113	106	102	107
Austria	101	105	102	96	97	95	97
Bangladesh	163	166	147	145	141	152	140
Barbados	99	113	117	107	120	125	121
Belgium	90	91	89	88	90	87	90
Benin	42	33	35	45	64	60	71
Bolivia	89	90	91	107	112	112	127
Botswana	79	82	82	79	106	96	83
Brazil	103	64	138	99	119	104	91
Burkina Faso	NA	NA	NA	NA	73	79	77
Burundi	126	138	77	145	113	115	118
Cameroon	NA	NA	NA	NA	119	104	103
Canada	93	94	93	94	91	94	102
Central African Rep.	111	107	108	118	114	119	114
Chad	94	96	86	90	92	93	100
Chile	75	75	75	75	82	87	87
Colombia	105	101	97	93	92	95	99
Costa Rica	81	89	84	91	85	90	95
Cote D'Ivoire	113	112	106	102	97	96	101
Denmark	121	116	122	114	111	107	106
Dominican Republic	126	127	106	98	87	84	97
Ecuador	80	94	84	78	85	87	84
Egypt	117	117	122	113	109	105	94
El Salvador	92	95	95	97	103	95	103
Ethiopia	90	97	100	99	108	96	103
Fiji	74	89	123	132	114	107	113
Finland	109	110	101	96	96	93	95
France	100	93	87	85	88	86	88
Gabon	75	75	80	93	97	85	106
Gambia, The	97	116	100	88	96	106	126
Germany	96	93	92	89	89	93	102
Ghana	188	180	152	141	124	106	130
Greece	88	93	90	78	75	92	89
Guatemala	75	76	89	93	104	116	103
Guyana	101	102	99	96	105	99	106
Haiti	119	140	128	92	89	87	83
Honduras	83	85	82	81	99	102	106
Hong kong	116	112	103	101	93	97	107
Iceland	137	150	134	115	117	102	91
India	101	99	98	83	74	93	91
Indonesia	NA	38	66	86	38	90	64
Iran	106	118	113	106	105	105	110
Iraq	95	95	107	94	91	89	84

	1961	1962	1963	1964	1965	1966	1967
Ireland	101	94	93	89	93	98	101
Israel	52	82	83	77	71	76	87
Italy	91	90	83	85	95	95	96
Jamaica	104	106	107	101	95	105	104
Japan	108	110	99	98	109	105	97
Kenya	127	125	121	123	118	119	108
Lesotho	117	130	128	127	130	85	89
Liberia	56	58	62	93	98	105	126
Madagascar	99	95	87	89	90	117	123
Malawi	91	100	100	88	85	91	105
Malaysia	116	112	105	99	102	96	93
Mali	NA	NA	NA	NA	NA	NA	96
Malta	123	116	112	111	107	108	101
Mauritania	37	38	69	110	108	111	113
Mexico	103	107	100	88	89	86	82
Morocco	129	105	99	104	100	106	105
Myanmar	248	295	241	233	192	185	135
Nepal	NA	NA	NA	NA	98	70	90
Netherlands, The	116	116	111	103	102	98	97
New Zealand	101	99	107	102	93	95	87
Nicaragua	95	107	112	108	110	105	106
Niger	59	66	64	63	64	79	56
Nigeria	77	71	72	73	88	86	101
Norway	122	119	116	116	116	113	119
Pakistan	92	93	113	94	86	87	84
Panama	93	106	101	99	103	103	107
Paraguay	137	92	82	85	106	93	89
Peru	144	138	124	120	103	100	103
Philippines	68	92	99	95	102	108	102
Portugal	88	101	100	128	133	130	133
Rwanda	106	91	58	123	130	107	100
Senegal	117	107	91	82	79	85	87
Sierra Leone	NA	NA	NA	148	140	124	121
Singapore	130	128	128	103	105	103	97
Somalia	98	79	96	98	111	95	90
South Africa	125	126	116	109	102	101	100
Spain	90	91	81	89	85	87	81
Sri Lanka	150	150	137	130	138	117	111
Sudan	126	139	154	140	130	125	139
Suriname	108	106	106	99	103	117	121
Swaziland	64	74	88	76	96	104	111
Sweden	104	102	98	95	94	90	92
Switzerland	104	104	100	97	100	101	103
Syria	109	131	139	112	109	116	106
Taiwan	48	50	64	67	66	74	76

	1961	1962	1963	1964	1965	1966	1967
Tanzania	174	160	172	168	159	170	162
Thailand	102	93	87	96	94	95	102
Togo	104	93	66	85	74	90	90
Trinidad and Tobago	175	168	158	159	157	100	103
Tunisia	86	82	73	75	77	85	90
Turkey	104	111	77	84	87	82	82
USA	85	85	83	85	83	81	83
Uganda	127	130	146	153	139	138	142
United Kingdom	104	103	99	92	92	91	91
Uruguay	105	87	91	86	137	117	105
Venezuela	123	127	122	110	108	102	107
Yugoslavia	94	109	100	87	133	118	115
Zaire	69	51	206	215	169	194	103
Zambia	116	121	126	136	107	113	111

	1968	1969	1970	1971	1972	1973	1974
Algeria	101	102	94	81	84	99	134
Angola	70	74	83	82	85	85	101
Argentina	96	94	97	87	102	100	83
Australia	97	101	104	103	106	100	90
Austria	97	105	112	111	106	98	95
Bangladesh	125	120	126	99	97	91	46
Barbados	123	115	107	113	115	100	95
Belgium	93	99	101	101	97	97	98
Benin	87	111	142	173	135	139	117
Bolivia	117	123	127	111	107	132	153
Botswana	71	70	65	78	108	94	91
Brazil	91	99	103	94	101	105	91
Burkina Faso	96	90	85	88	99	93	109
Burundi	111	104	109	82	114	101	82
Cameroon	108	110	122	110	95	91	100
Canada	105	104	107	105	103	102	99
Central African Rep.	130	100	116	112	91	99	95
Chad	107	90	112	114	101	105	112
Chile	84	98	86	65	56	75	100
Colombia	105	106	112	103	111	111	96
Costa Rica	105	100	102	101	110	105	102
Cote D'Ivoire	110	101	97	88	90	91	106
Denmark	105	102	102	103	96	95	96
Dominican Republic	100	98	89	86	103	102	104
Ecuador	81	68	76	83	101	125	160
Egypt	83	88	86	84	79	78	95
El Salvador	102	94	101	103	118	114	112
Ethiopia	96	90	99	92	92	111	117
Fiji	119	123	118	123	109	99	98
Finland	107	110	113	108	108	100	97
France	87	90	99	105	102	100	106
Gabon	98	107	96	129	147	106	89
Gambia, The	108	128	95	89	99	90	98
Germany	104	104	99	101	97	95	102
Ghana	150	143	151	115	149	148	113
Greece	78	76	76	79	85	94	98
Guatemala	105	111	114	109	116	120	117
Guyana	108	108	101	109	105	88	105
Haiti	94	92	99	98	88	83	73
Honduras	111	103	101	112	107	111	102
Hong kong	118	121	116	112	101	95	88
Iceland	103	138	141	116	106	101	81
India	90	83	75	79	86	82	88
Indonesia	78	63	88	100	112	124	157
Iran	109	112	121	129	126	156	190
Iraq	89	88	86	105	86	103	126

	1968	1969	1970	1971	1972	1973	1974
Ireland	100	94	92	91	83	85	86
Israel	106	100	94	106	99	91	80
Italy	101	102	100	104	104	95	102
Jamaica	102	100	87	91	84	76	79
Japan	97	99	99	109	96	85	104
Kenya	110	110	110	102	90	90	101
Lesotho	91	105	88	110	123	102	89
Liberia	134	141	117	118	117	128	115
Madagascar	122	124	130	100	98	94	95
Malawi	104	101	104	100	97	111	102
Malaysia	97	106	100	94	80	85	88
Mali	87	96	105	115	82	81	92
Malta	105	100	85	89	87	100	114
Mauritania	102	104	106	108	162	119	110
Mexico	82	88	73	74	75	74	67
Morocco	104	102	97	96	102	108	129
Myanmar	76	76	70	77	83	74	70
Nepal	89	90	62	70	72	80	60
Netherlands, The	96	98	101	104	99	97	99
New Zealand	105	102	99	98	97	100	79
Nicaragua	107	99	103	106	145	105	96
Niger	52	63	70	83	95	105	74
Nigeria	89	97	66	84	83	112	156
Norway	121	116	113	110	107	107	102
Pakistan	83	86	80	85	79	135	127
Panama	108	107	104	103	98	93	107
Paraguay	89	97	106	97	97	99	93
Peru	122	117	114	93	91	82	78
Philippines	88	77	113	112	103	120	110
Portugal	117	112	107	107	110	98	88
Rwanda	84	72	105	96	77	105	100
Senegal	72	83	94	92	107	96	130
Sierra Leone	141	146	134	141	139	134	118
Singapore	94	94	86	83	76	79	91
Somalia	98	112	80	94	105	88	108
South Africa	99	89	81	82	95	90	87
Spain	92	93	101	110	107	99	88
Sri Lanka	113	98	93	92	82	85	82
Sudan	138	135	151	150	140	155	114
Suriname	117	126	122	130	121	112	125
Swaziland	122	100	106	100	99	109	116
Sweden	91	95	102	103	97	102	111
Switzerland	107	112	111	107	101	96	91
Syria	118	111	118	119	119	138	129
Taiwan	81	89	97	114	128	132	111

	1968	1969	1970	1971	1972	1973	1974
Tanzania	145	149	155	167	161	132	112
Thailand	93	87	83	92	101	96	102
Togo	101	109	119	116	94	74	134
Trinidad and Tobago	106	105	101	99	89	96	110
Tunisia	89	90	89	99	97	94	115
Turkey	71	69	81	94	98	107	77
USA	83	83	89	88	87	101	113
Uganda	136	121	124	113	101	82	66
United Kingdom	100	103	106	108	98	99	107
Uruguay	108	92	84	69	98	88	81
Venezuela	97	93	90	99	88	101	135
Yugoslavia	107	107	103	108	119	111	95
Zaire	96	86	98	79	68	73	82
Zambia	108	142	119	96	96	104	97

	1975	1976	1977	1978	1979	1980	1981
Algeria	127	118	109	94	105	114	121
Angola	157	130	130	140	140	164	175
Argentina	77	118	122	112	79	60	89
Australia	98	94	95	92	100	98	91
Austria	100	97	94	99	97	97	105
Bangladesh	43	65	93	73	68	74	89
Barbados	82	70	77	90	91	92	81
Belgium	93	92	97	96	97	97	111
Benin	133	118	147	153	152	133	140
Bolivia	122	124	122	105	106	91	67
Botswana	111	119	120	112	121	110	116
Brazil	93	83	85	80	79	97	108
Burkina Faso	104	111	107	103	106	115	124
Burundi	76	122	147	105	115	71	75
Cameroon	99	96	105	102	81	89	100
Canada	98	92	94	105	104	105	106
Central African Rep.	91	91	100	97	86	97	103
Chad	95	103	98	107	119	115	111
Chile	142	135	108	112	113	108	81
Colombia	114	118	116	117	98	102	79
Costa Rica	101	94	98	93	81	79	139
Cote D'Ivoire	93	102	106	92	82	81	90
Denmark	99	90	89	86	84	91	107
Dominican Republic	127	92	88	78	87	79	91
Ecuador	125	118	111	100	111	105	97
Egypt	99	104	104	103	130	129	147
El Salvador	125	137	136	110	125	117	101
Ethiopia	105	105	101	100	92	106	105
Fiji	94	79	91	91	89	93	87
Finland	91	93	104	111	106	107	112
France	106	104	107	108	104	102	112
Gabon	83	73	86	104	102	115	117
Gambia, The	125	90	93	78	95	118	85
Germany	104	102	99	99	91	94	107
Ghana	137	109	72	59	72	54	32
Greece	110	110	104	111	101	118	123
Guatemala	125	119	133	121	111	113	93
Guyana	119	99	98	95	91	102	100
Haiti	99	107	116	131	116	123	101
Honduras	107	112	113	124	119	115	106
Hong kong	93	94	85	90	88	83	89
Iceland	93	92	85	96	90	82	83
India	118	132	125	123	124	112	115
Indonesia	135	133	131	125	147	158	135
Iran	177	155	121	89	118	59	52
Iraq	126	120	107	105	119	NA	NA

	1975	1976	1977	1978	1979	1980	1981
Ireland	96	100	105	109	100	97	99
Israel	92	104	122	148	130	127	129
Italy	113	115	118	120	113	98	111
Jamaica	85	69	75	101	111	118	115
Japan	107	107	101	88	86	98	112
Kenya	99	106	113	97	80	87	86
Lesotho	90	107	67	103	118	110	104
Liberia	106	112	97	100	93	101	107
Madagascar	106	101	109	117	93	85	81
Malawi	116	119	118	93	86	92	104
Malaysia	93	100	95	101	103	102	96
Mali	75	81	92	86	80	102	99
Malta	119	114	115	115	112	110	102
Mauritania	97	87	77	78	77	87	115
Mexico	60	71	87	90	89	98	98
Morocco	114	88	80	79	76	75	94
Myanmar	69	64	75	67	92	98	99
Nepal	108	126	133	126	125	124	146
Netherlands, The	100	98	90	86	87	91	105
New Zealand	88	102	101	103	104	105	107
Nicaragua	106	122	121	133	172	90	89
Niger	129	145	126	151	174	147	160
Nigeria	127	119	129	105	124	143	115
Norway	99	92	88	92	90	93	98
Pakistan	110	106	91	93	99	113	123
Panama	120	107	111	102	94	99	103
Paraguay	86	92	119	119	94	84	66
Peru	64	69	92	121	157	123	94
Philippines	99	88	96	95	92	96	94
Portugal	76	62	64	72	88	91	90
Rwanda	83	127	124	133	173	115	80
Senegal	121	115	141	102	98	87	109
Sierra Leone	112	103	102	109	99	100	92
Singapore	84	94	104	110	115	122	115
Somalia	79	63	116	165	125	191	145
South Africa	95	94	106	114	119	115	94
Spain	90	88	92	98	90	93	112
Sri Lanka	95	96	112	116	103	96	97
Sudan	109	104	87	74	62	97	81
Suriname	111	101	87	93	85	96	85
Swaziland	112	115	98	89	83	109	115
Sweden	106	99	94	97	98	93	98
Switzerland	96	98	105	102	95	96	102
Syria	122	107	100	83	101	94	83
Taiwan	109	123	124	137	123	118	122

	1975	1976	1977	1978	1979	1980	1981
Tanzania	110	116	105	80	73	64	64
Thailand	94	99	95	98	100	105	108
Togo	97	103	88	142	103	99	98
Trinidad and Tobago	110	110	95	88	80	87	83
Tunisia	108	97	98	105	123	123	133
Turkey	65	68	52	59	45	68	116
USA	121	114	108	116	123	134	137
Uganda	45	55	47	69	112	115	111
United Kingdom	108	113	118	114	102	98	100
Uruguay	99	109	109	105	87	77	79
Venezuela	111	96	86	78	93	104	104
Yugoslavia	98	89	79	76	65	76	84
Zaire	55	65	60	74	88	99	95
Zambia	78	94	88	73	104	94	68

	1982	1983	1984	1985	1986	1987	1988
Algeria	115	100	87	82	48	53	59
Angola	164	154	137	131	NA	NA	NA
Argentina	135	141	116	147	107	94	110
Australia	96	90	87	97	97	96	94
Austria	109	102	100	106	98	91	92
Bangladesh	92	103	97	98	NA	NA	NA
Barbados	94	95	95	92	NA	NA	NA
Belgium	123	123	122	122	115	109	110
Benin	160	129	122	117	96	113	101
Bolivia	81	73	58	70	97	80	78
Botswana	108	140	132	129	170	NA	NA
Brazil	92	135	150	138	101	103	NA
Burkina Faso	113	107	126	110	92	112	105
Burundi	90	77	82	88	96	81	102
Cameroon	107	114	125	131	92	64	65
Canada	107	100	104	106	105	97	94
Central African Rep.	94	104	94	104	80	77	73
Chad	52	125	133	84	NA	NA	NA
Chile	105	127	120	147	160	169	182
Colombia	76	71	76	91	128	111	103
Costa Rica	157	122	109	100	106	104	111
Cote D'Ivoire	100	99	123	128	114	102	93
Denmark	110	105	99	99	89	85	85
Dominican Republic	67	64	157	131	118	125	156
Ecuador	99	111	115	123	110	115	129
Egypt	125	113	92	83	69	76	101
El Salvador	96	93	77	80	98	69	56
Ethiopia	100	94	101	95	109	NA	NA
Fiji	95	95	88	95	91	102	NA
Finland	109	102	97	94	88	81	75
France	113	112	113	114	104	98	98
Gabon	123	128	116	108	NA	NA	NA
Gambia, The	88	119	97	99	NA	NA	NA
Germany	116	107	107	114	110	101	100
Ghana	25	45	52	70	121	156	148
Greece	115	119	122	120	132	139	132
Guatemala	86	75	71	69	96	93	92
Guyana	96	78	95	92	85	129	103
Haiti	129	111	106	93	84	82	77
Honduras	96	95	90	91	99	87	80
Hong kong	88	94	98	102	106	111	118
Iceland	81	97	87	95	92	78	72
India	115	111	116	103	106	108	109
Indonesia	125	126	119	105	95	115	114
Iran	82	61	44	33	NA	NA	NA
Iraq	NA	NA	NA	NA	NA	NA	NA

	1982	1983	1984	1985	1986	1987	1988
Ireland	104	110	117	123	116	117	122
Israel	120	107	116	132	120	115	103
Italy	113	103	100	102	94	86	83
Jamaica	97	92	125	142	140	134	NA
Japan	119	107	109	108	89	83	81
Kenya	90	89	90	89	95	77	78
Lesotho	96	81	75	76	NA	NA	NA
Liberia	104	96	88	91	98	NA	NA
Madagascar	85	78	93	85	91	125	121
Malawi	98	89	115	100	100	106	98
Malaysia	99	95	96	102	111	123	124
Mali	109	133	146	142	118	117	105
Malta	90	83	80	82	83	85	81
Mauritania	110	121	119	153	155	136	133
Mexico	155	190	164	149	176	194	161
Morocco	93	102	107	113	100	104	112
Myanmar	82	76	61	49	NA	NA	NA
Nepal	138	119	117	136	NA	NA	NA
Netherlands, The	110	106	106	111	97	91	91
New Zealand	108	113	112	113	104	95	90
Nicaragua	69	82	67	63	58	NA	NA
Niger	147	154	143	124	147	139	133
Nigeria	87	77	84	94	79	221	171
Norway	99	94	91	92	75	68	67
Pakistan	102	116	102	95	116	125	121
Panama	98	95	82	83	86	NA	NA
Paraguay	75	86	102	127	154	138	161
Peru	96	112	109	121	74	54	71
Philippines	86	99	108	108	135	120	123
Portugal	91	107	123	120	108	107	103
Rwanda	102	99	106	92	112	88	81
Senegal	129	111	129	103	98	87	86
Sierra Leone	66	59	61	42	54	60	NA
Singapore	108	95	90	93	NA	NA	NA
Somalia	159	146	87	100	82	66	49
South Africa	94	86	84	109	114	99	96
Spain	122	132	139	140	124	115	108
Sri Lanka	87	80	85	75	70	73	NA
Sudan	90	90	95	59	32	35	63
Suriname	80	69	67	63	NA	NA	NA
Swaziland	125	114	102	104	NA	NA	NA
Sweden	110	116	111	109	104	99	95
Switzerland	101	96	97	102	98	91	90
Syria	80	74	67	69	61	91	67
Taiwan	124	126	124	121	132	124	113

	1982	1983	1984	1985	1986	1987	1988
Tanzania	43	41	37	33	50	74	84
Thailand	113	92	95	105	120	131	140
Togo	115	105	115	114	106	102	102
Trinidad and Tobago	66	55	57	113	80	82	90
Tunisia	127	117	106	105	105	116	137
Turkey	174	175	205	226	197	218	253
USA	132	114	104	96	100	101	111
Uganda	128	97	83	69	NA	NA	NA
United Kingdom	103	99	100	102	94	89	78
Uruguay	82	139	133	134	131	107	116
Venezuela	92	79	107	101	82	91	NA
Yugoslavia	98	118	121	124	101	101	NA
Zaire	89	96	156	157	148	136	133
Zambia	72	86	88	95	118	115	84

Appendix 7: Price Divergence Index, Time Series

	1961	1962	1963	1964	1965	1966	1967
Algeria	87	96	94	92	95	92	92
Angola	85	85	88	87	87	86	85
Argentina	92	87	91	87	85	89	89
Australia	92	91	90	86	88	88	90
Austria	90	94	93	90	91	90	91
Bangladesh	114	115	106	111	114	127	122
Barbados	103	101	107	104	102	100	95
Belgium	97	97	97	95	97	97	98
Benin	101	99	97	97	93	95	92
Bolivia	73	75	75	80	79	80	86
Botswana	78	78	78	79	74	78	78
Brazil	73	78	97	67	80	96	100
Burkina Faso	NA	NA	NA	NA	106	105	100
Burundi	121	137	144	160	102	99	97
Cameroon	80	80	85	88	87	90	90
Canada	118	111	107	104	102	102	106
Central African Rep.	84	85	86	89	93	90	88
Chad	107	109	110	111	116	118	116
Chile	122	138	96	137	119	110	111
Colombia	117	121	113	123	118	99	104
Costa Rica	124	113	109	106	102	99	100
Cote D'Ivoire	87	84	87	90	88	88	90
Denmark	80	84	87	83	85	88	92
Dominican Republic	109	112	115	113	112	105	106
Ecuador	102	100	106	96	93	95	96
Egypt	178	159	152	152	155	151	146
El Salvador	116	110	107	106	104	100	99
Ethiopia	106	104	104	105	109	107	110
Fiji	95	100	90	87	95	97	97
Finland	96	102	104	103	102	105	105
France	101	104	106	104	102	100	101
Gabon	98	103	106	105	105	104	107
Gambia, The	120	118	117	116	119	120	117
Germany	89	94	94	90	89	90	92
Ghana	65	70	72	77	91	99	77
Greece	106	111	107	106	106	108	109
Guatemala	103	103	104	98	97	96	94
Guyana	145	142	137	131	145	126	128
Haiti	89	85	86	92	94	95	94
Honduras	97	98	97	99	101	103	105
Hong kong	102	102	102	101	100	96	101
Iceland	95	97	100	108	115	121	124
India	95	97	103	111	116	99	91
Indonesia	NA	82	85	87	82	57	74
Iran	75	77	77	77	76	76	77
Iraq	80	84	90	83	77	79	88

	1961	1962	1963	1964	1965	1966	1967
Ireland	93	94	92	95	96	97	98
Israel	145	106	111	110	117	125	127
Italy	92	97	100	103	106	105	104
Jamaica	123	124	123	119	118	122	122
Japan	78	81	81	80	81	82	83
Kenya	107	110	107	108	103	104	103
Lesotho	106	109	112	116	114	123	121
Liberia	89	84	90	100	109	107	109
Madagascar	88	89	88	90	91	95	95
Malawi	101	107	106	105	108	110	106
Malaysia	108	106	106	105	104	103	104
Mali	71	72	73	89	87	91	108
Malta	135	131	124	120	120	119	117
Mauritania	102	105	102	104	105	107	112
Mexico	86	89	89	91	92	94	95
Morocco	107	110	105	102	106	105	105
Myanmar	130	120	124	115	115	116	124
Nepal	101	99	102	117	126	141	124
Netherlands, The	80	83	84	84	85	87	88
New Zealand	107	106	105	101	100	98	106
Nicaragua	92	88	88	88	86	88	85
Niger	128	128	126	124	127	108	106
Nigeria	75	79	75	75	78	87	81
Norway	92	94	92	90	91	90	92
Pakistan	97	96	101	103	100	106	108
Panama	122	122	119	118	115	112	113
Paraguay	85	90	89	86	92	91	89
Peru	88	92	91	97	107	114	107
Philippines	166	91	97	99	102	107	110
Portugal	100	102	100	101	103	107	112
Rwanda	85	88	89	94	107	75	72
Senegal	122	116	110	112	108	104	97
Sierra Leone	124	119	121	122	124	123	122
Singapore	95	93	96	97	101	102	100
Somalia	80	77	77	82	91	88	85
South Africa	92	95	93	89	90	93	94
Spain	76	79	81	83	86	88	92
Sri Lanka	134	122	126	132	128	122	124
Sudan	96	96	94	92	91	90	93
Suriname	107	106	104	107	98	103	97
Swaziland	97	93	95	95	99	95	97
Sweden	93	96	95	93	95	98	101
Switzerland	70	74	75	74	76	77	79
Syria	119	111	121	109	111	121	112
Taiwan	80	81	82	82	82	83	85

	1961	1962	1963	1964	1965	1966	1967
Tanzania	87	88	90	97	96	101	100
Thailand	89	92	91	91	92	98	99
Togo	100	98	95	98	93	107	103
Trinidad and Tobago	106	109	106	101	105	108	106
Tunisia	105	106	111	104	93	93	96
Turkey	84	90	93	94	96	100	107
USA	117	117	113	109	105	105	106
Uganda	116	111	115	113	133	137	138
United Kingdom	109	112	110	106	108	109	108
Uruguay	105	112	98	101	64	85	86
Venezuela	141	145	145	113	113	113	115
Yugoslavia	191	214	220	234	124	80	84
Zaire	129	137	127	102	132	133	84
Zambia	82	86	88	90	106	108	112

	1968	1969	1970	1971	1972	1973	1974
Algeria	93	91	92	90	93	98	93
Angola	91	94	102	101	108	117	124
Argentina	90	94	93	100	84	104	123
Australia	90	90	93	97	100	101	118
Austria	93	93	93	96	100	107	105
Bangladesh	135	133	129	134	104	91	115
Barbados	87	81	81	88	90	91	92
Belgium	99	98	97	101	107	107	102
Benin	96	96	89	85	92	92	88
Bolivia	91	92	95	96	95	78	102
Botswana	81	77	90	109	108	126	117
Brazil	100	102	105	102	99	100	104
Burkina Faso	100	99	94	92	103	103	93
Burundi	102	103	99	86	80	80	79
Cameroon	95	90	85	83	87	91	90
Canada	109	108	115	115	122	111	113
Central African Rep.	94	88	80	81	86	84	88
Chad	114	111	106	110	113	107	88
Chile	103	107	108	120	128	96	89
Colombia	100	99	97	95	91	87	85
Costa Rica	105	107	107	108	107	105	96
Cote D'Ivoire	96	97	90	86	90	95	95
Denmark	91	90	95	99	102	111	111
Dominican Republic	109	110	109	107	104	97	96
Ecuador	99	98	97	83	89	93	95
Egypt	143	143	139	135	127	111	69
El Salvador	98	97	97	97	90	82	83
Ethiopia	114	114	117	116	113	109	105
Fiji	90	91	96	95	103	106	108
Finland	98	95	90	93	92	96	100
France	104	101	94	95	101	104	94
Gabon	107	103	98	88	109	102	84
Gambia, The	110	106	103	89	91	96	107
Germany	91	90	98	106	110	119	113
Ghana	71	76	78	81	66	78	85
Greece	110	108	108	105	100	103	109
Guatemala	98	98	98	95	88	88	90
Guyana	122	124	124	128	118	96	105
Haiti	93	94	93	94	92	95	98
Honduras	108	108	106	104	99	91	89
Hong kong	98	99	104	103	108	116	118
Iceland	102	87	92	96	100	109	124
India	92	95	97	98	97	102	102
Indonesia	84	94	90	85	88	103	123
Iran	79	82	86	89	87	99	102
Iraq	86	89	91	92	85	85	91

	1968	1969	1970	1971	1972	1973	1974
Ireland	86	87	93	99	102	96	90
Israel	91	87	87	94	100	100	121
Italy	105	103	106	109	112	108	99
Jamaica	107	107	110	113	108	97	105
Japan	86	86	88	90	98	105	101
Kenya	107	106	105	92	90	93	91
Lesotho	122	128	128	109	110	127	119
Liberia	111	109	116	106	107	99	103
Madagascar	97	94	91	92	96	105	107
Malawi	94	93	94	102	102	95	97
Malaysia	106	107	103	100	102	114	105
Mali	106	100	95	100	109	111	91
Malta	99	96	100	103	106	108	98
Mauritania	121	109	99	102	105	113	102
Mexico	98	100	108	111	110	108	113
Morocco	109	103	106	107	113	116	116
Myanmar	135	135	130	124	101	106	113
Nepal	110	115	118	117	123	101	105
Netherlands, The	89	90	91	97	106	112	109
New Zealand	90	89	94	105	107	110	100
Nicaragua	94	95	96	95	96	87	93
Niger	102	101	94	93	95	120	100
Nigeria	77	84	97	94	98	89	104
Norway	95	96	102	103	108	113	109
Pakistan	113	128	131	137	113	63	74
Panama	113	110	108	103	97	92	88
Paraguay	89	89	90	91	92	96	105
Peru	102	106	109	112	112	106	106
Philippines	115	117	90	91	87	88	96
Portugal	109	111	109	106	109	110	105
Rwanda	77	76	78	75	75	76	66
Senegal	103	105	95	94	103	106	98
Sierra Leone	114	116	103	95	88	77	81
Singapore	103	100	95	92	99	117	112
Somalia	88	87	86	82	84	85	75
South Africa	99	99	102	100	99	109	103
Spain	84	84	87	91	95	100	101
Sri Lanka	114	115	123	118	108	100	101
Sudan	82	90	93	89	93	92	110
Suriname	101	102	97	92	95	93	96
Swaziland	94	99	101	114	97	109	119
Sweden	101	100	101	107	112	110	100
Switzerland	82	80	81	88	94	107	105
Syria	119	107	116	116	113	102	93
Taiwan	91	94	94	94	92	95	110

	1968	1969	1970	1971	1972	1973	1974
Tanzania	101	101	102	101	104	99	102
Thailand	101	100	98	100	98	99	108
Togo	103	105	97	103	108	111	107
Trinidad and Tobago	117	100	96	74	90	100	103
Tunisia	100	100	99	103	108	109	111
Turkey	111	114	99	85	95	103	113
USA	108	109	112	112	106	96	92
Uganda	142	146	154	169	147	132	131
United Kingdom	96	98	99	105	104	92	90
Uruguay	93	106	113	124	97	102	116
Venezuela	119	113	118	118	112	98	79
Yugoslavia	88	87	91	84	82	89	86
Zaire	92	100	105	113	107	105	112
Zambia	121	128	117	107	104	106	104

	1975	1976	1977	1978	1979	1980	1981
Algeria	95	96	99	97	102	100	98
Angola	127	132	120	133	98	101	90
Argentina	80	109	91	109	146	181	157
Australia	115	116	108	115	97	93	108
Austria	106	104	108	103	113	108	95
Bangladesh	160	74	62	75	77	75	83
Barbados	88	92	93	90	91	92	103
Belgium	112	109	115	108	120	110	95
Benin	101	102	99	102	117	112	97
Bolivia	99	105	107	105	111	113	140
Botswana	107	105	112	105	118	129	137
Brazil	105	114	117	115	110	95	115
Burkina Faso	101	96	100	97	121	116	101
Burundi	86	84	81	83	95	100	101
Cameroon	101	105	97	106	116	116	121
Canada	102	109	92	109	80	76	81
Central African Rep.	104	109	105	109	116	117	107
Chad	104	99	97	99	99	94	82
Chile	66	85	97	84	98	110	126
Colombia	81	86	96	87	98	98	106
Costa Rica	98	107	109	106	105	111	66
Cote D'Ivoire	101	105	119	106	126	134	110
Denmark	118	117	118	116	124	111	99
Dominican Republic	107	111	112	111	103	100	112
Ecuador	90	100	102	101	101	103	124
Egypt	74	77	75	78	67	68	65
El Salvador	82	88	88	88	90	91	97
Ethiopia	92	95	97	96	85	77	82
Fiji	110	104	95	104	94	99	99
Finland	104	109	104	107	97	97	94
France	106	101	99	100	106	106	94
Gabon	95	98	93	98	96	101	96
Gambia, The	98	94	108	94	124	117	90
Germany	113	108	110	107	116	108	93
Ghana	95	120	175	119	139	181	315
Greece	102	99	102	99	107	96	88
Guatemala	92	99	105	100	98	96	105
Guyana	86	73	75	72	82	76	77
Haiti	92	100	100	100	84	87	90
Honduras	85	86	86	86	85	83	94
Hong kong	110	114	111	113	101	99	96
Iceland	102	103	109	101	97	94	94
India	86	87	91	88	92	98	100
Indonesia	121	140	146	141	109	121	121
Iran	98	102	112	103	121	133	155
Iraq	83	102	96	104	73	83	80

	1975	1976	1977	1978	1979	1980	1981
Ireland	95	89	90	88	107	113	103
Israel	94	90	98	90	87	83	84
Italy	104	90	91	89	96	96	87
Jamaica	107	116	119	115	77	78	83
Japan	99	102	109	102	111	100	107
Kenya	91	92	99	93	101	105	103
Lesotho	91	81	87	81	96	97	96
Liberia	97	90	95	90	92	91	96
Madagascar	114	110	106	110	121	124	121
Malawi	93	99	105	99	101	107	108
Malaysia	99	101	97	101	97	85	82
Mali	120	121	120	121	135	129	106
Malta	96	87	86	87	94	95	91
Mauritania	102	84	84	83	88	93	96
Mexico	116	111	93	112	99	106	124
Morocco	113	101	107	101	110	109	92
Myanmar	89	93	84	93	79	72	69
Nepal	109	97	75	98	73	69	79
Netherlands, The	115	114	115	113	125	118	99
New Zealand	86	85	94	84	98	98	99
Nicaragua	96	99	93	100	105	90	108
Niger	99	94	98	94	109	118	96
Nigeria	117	129	129	130	144	149	140
Norway	115	115	120	114	100	95	93
Pakistan	86	95	96	97	91	92	110
Panama	86	88	88	88	81	81	84
Paraguay	103	102	101	102	128	113	134
Peru	115	104	87	105	76	82	98
Philippines	88	95	97	96	96	99	106
Portugal	116	110	97	110	88	91	88
Rwanda	107	117	116	117	111	105	109
Senegal	113	106	95	106	99	96	79
Sierra Leone	85	79	78	79	85	90	95
Singapore	109	100	96	100	88	86	92
Somalia	84	93	90	94	77	237	256
South Africa	95	90	103	90	106	111	107
Spain	105	102	103	102	130	126	113
Sri Lanka	102	86	78	86	68	69	78
Sudan	107	119	116	119	139	83	94
Suriname	98	125	101	124	85	81	91
Swaziland	109	98	97	97	89	100	99
Sweden	104	110	115	110	109	110	101
Switzerland	117	119	114	118	133	120	108
Syria	89	89	83	90	80	76	69
Taiwan	100	101	99	101	97	101	112

	1975	1976	1977	1978	1979	1980	1981
Tanzania	101	103	111	104	112	105	124
Thailand	101	104	102	105	96	97	103
Togo	131	105	110	104	103	105	92
Trinidad and Tobago	92	80	78	79	67	71	77
Tunisia	112	108	106	108	105	102	93
Turkey	112	116	118	116	143	105	105
USA	92	92	90	92	81	80	87
Uganda	126	126	127	127	81	58	38
United Kingdom	95	85	85	84	98	112	109
Uruguay	92	89	92	88	105	121	136
Venezuela	77	79	79	80	76	82	95
Yugoslavia	88	99	102	99	104	96	94
Zaire	119	112	139	112	134	112	102
Zambia	92	99	100	100	109	115	123

	1982	1983	1984	1985	1986	1987	1988
Algeria	99	106	117	123	136	138	117
Angola	76	81	103	139	NA	NA	NA
Argentina	79	89	108	98	101	98	104
Australia	117	112	118	107	97	92	108
Austria	95	95	93	93	116	134	127
Bangladesh	77	70	82	92	NA	NA	NA
Barbados	122	132	152	165	NA	NA	NA
Belgium	84	83	81	85	102	114	107
Benin	90	95	93	103	122	137	137
Bolivia	149	149	163	133	96	99	101
Botswana	109	134	135	95	120	NA	NA
Brazil	120	101	106	108	108	107	NA
Burkina Faso	94	88	84	89	102	114	110
Burundi	107	114	106	118	108	94	82
Cameroon	111	111	117	111	119	136	148
Canada	90	90	95	95	84	86	93
Central African Rep.	113	110	104	113	135	145	137
Chad	77	78	73	83	NA	NA	NA
Chile	116	98	95	80	73	73	72
Colombia	113	116	117	107	93	88	87
Costa Rica	73	87	98	103	99	90	84
Cote D'Ivoire	101	94	100	104	120	126	116
Denmark	93	93	89	90	110	128	127
Dominican Republic	114	104	83	76	78	67	56
Ecuador	110	106	107	126	110	101	88
Egypt	71	74	79	86	68	68	74
El Salvador	104	115	129	118	104	116	124
Ethiopia	83	91	96	97	91	NA	NA
Fiji	106	108	112	115	110	102	NA
Finland	91	88	92	94	108	121	122
France	88	86	85	88	106	118	113
Gabon	94	113	96	108	NA	NA	NA
Gambia, The	87	96	52	57	NA	NA	NA
Germany	92	92	88	87	106	119	113
Ghana	413	305	104	86	70	51	50
Greece	93	85	85	80	85	96	96
Guatemala	112	122	134	141	94	85	87
Guyana	81	89	97	99	92	62	63
Haiti	98	109	129	140	141	132	137
Honduras	102	111	121	127	121	118	108
Hong kong	96	85	90	93	86	85	83
Iceland	87	80	84	85	91	106	114
India	103	110	111	119	112	114	105
Indonesia	125	109	121	118	93	82	86
Iran	145	146	157	155	NA	NA	NA
Iraq	233	180	218	235	NA	NA	NA

	1982	1983	1984	1985	1986	1987	1988
Ireland	104	104	103	107	130	138	134
Israel	90	98	96	88	97	100	111
Italy	86	90	90	91	110	124	119
Jamaica	87	98	72	63	69	72	NA
Japan	98	107	115	117	147	159	164
Kenya	99	95	100	100	101	102	96
Lesotho	91	96	60	45	NA	NA	NA
Liberia	104	98	106	108	101	NA	NA
Madagascar	119	121	105	104	107	78	67
Malawi	104	109	107	97	92	89	76
Malaysia	83	92	103	105	97	102	91
Mali	93	83	83	82	105	123	119
Malta	85	86	83	80	91	99	93
Mauritania	96	101	102	97	100	100	97
Mexico	94	92	111	116	80	83	95
Morocco	88	83	77	74	82	87	89
Myanmar	69	72	76	79	NA	NA	NA
Nepal	81	84	90	85	NA	NA	NA
Netherlands, The	100	98	93	92	112	127	121
New Zealand	99	99	87	99	107	130	133
Nicaragua	117	121	153	153	132	NA	NA
Niger	84	78	74	72	82	92	92
Nigeria	144	154	183	176	87	44	50
Norway	95	92	89	90	102	114	113
Pakistan	116	103	110	102	92	85	85
Panama	90	97	103	107	99	NA	NA
Paraguay	132	148	119	82	85	97	115
Peru	100	94	103	89	99	122	93
Philippines	107	94	102	111	95	92	90
Portugal	83	77	78	82	99	108	106
Rwanda	117	123	140	146	143	155	155
Senegal	75	74	75	83	110	124	121
Sierra Leone	106	120	99	143	129	49	NA
Singapore	88	105	124	121	NA	NA	NA
Somalia	157	139	224	140	95	80	83
South Africa	106	126	114	93	95	112	106
Spain	110	99	104	108	127	141	144
Sri Lanka	79	82	97	91	86	84	NA
Sudan	97	94	92	99	110	140	117
Suriname	99	92	101	117	NA	NA	NA
Swaziland	103	127	107	79	NA	NA	NA
Sweden	89	82	83	84	97	107	108
Switzerland	112	115	111	111	133	152	146
Syria Arab Republic	79	83	93	97	110	155	82
Taiwan	111	114	123	125	128	144	137

	1982	1983	1984	1985	1986	1987	1988
Tanzania	129	140	126	151	86	57	48
Thailand	107	109	115	102	101	105	102
Togo	80	80	76	81	98	114	113
Trinidad and Tobago	89	106	146	169	137	128	130
Tunisia	91	89	89	91	92	92	90
Turkey	97	93	90	92	84	87	84
USA	96	100	105	108	99	96	91
Uganda	39	40	43	57	NA	NA	NA
United Kingdom	103	95	91	92	99	106	112
Uruguay	129	89	95	97	99	101	96
Venezuela	106	111	86	96	84	67	NA
Yugoslavia	86	67	67	71	84	82	NA
Zaire	110	94	56	54	62	59	59
Zambia	134	119	100	82	54	62	102

Appendix 8: Regression Results:

ln(Openness)= const. + coef. ln(Price Divergence).

Country	Coef.	t ratio
Turkey	-2.17	-5.6
Algeria	-2.04	-6.8
Sudan	-1.53	-5.6
United States	-1.52	-6.7
Fiji	-1.34	-4.0
Niger	-1.24	-3.7
Guatemala	-1.07	-5.2
El Salvador	-1.07	-9.6
Bolivia	-1.04	-7.5
Israel	-1.02	-10.0
Chile	-1.00	-7.7
Tanzania	-0.99	-3.3
Mexico	-0.97	-3.2
Ghana	-0.96	-9.8
Greece	-0.95	-6.6
Iran, Islamic Rep. of	-0.95	-4.6
Nepal	-0.89	-5.5
Mali	-0.87	-4.0
Peru	-0.85	-2.9
Finland	-0.82	-8.6
Singapore	-0.79	-3.7
South Africa	-0.78	-6.9
Cameroon	-0.77	-8.0
Tunisia	-0.77	-3.3
Nicaragua	-0.75	-6.1
France	-0.75	-3.0
Dominican Republic	-0.75	-4.6
Zaire	-0.71	-2.9
Denmark	-0.67	-13.0
Central African Rep.	-0.67	-5.7
Hong Kong	-0.66	-3.0
United Kingdom	-0.66	-7.7
Italy	-0.65	-4.1
Costa Rica	-0.65	-5.2
Senegal	-0.61	-3.5
Australia	-0.60	-7.4
Philippines	-0.58	-7.5
Uruguay	-0.57	-4.3
Mauritania	-0.53	-1.3
Belgium	-0.53	-2.4

Country	Coef.	t ratio
Jamaica	-0.53	-5.3
Lesotho	-0.52	-4.9
Honduras	-0.51	-2.9
Pakistan	-0.46	-4.2
Burkina Faso	-0.44	-1.1
Ethiopia	-0.42	-2.8
Argentina	-0.40	-3.4
Ecuador	-0.40	-1.4
Norway	-0.40	-1.6
Colombia	-0.40	-2.4
New Zealand	-0.38	-4.2
Netherlands, The	-0.38	-5.9
Sweden	-0.37	-3.3
Madagascar	-0.37	-2.6
Japan	-0.35	-4.2
Zambia	-0.31	-2.5
Barbados	-0.30	-1.8
Chad	-0.29	-1.3
Paraguay	-0.29	-1.2
Morocco	-0.27	-1.8
Switzerland	-0.27	-7.1
Portugal	-0.26	-1.1
Haiti	-0.25	-1.3
Togo	-0.22	-0.9
Nigeria	-0.22	-1.8
Suriname	-0.19	-0.5
Iceland	-0.18	-0.7
Malaysia	-0.18	-0.9
Venezuela	-0.15	-1.9
Cote D'Ivoire	-0.14	-1.4
Austria	-0.13	-1.6
Egypt, Arab Republic of	-0.13	-1.4
Canada	-0.10	-1.3
Yugoslavia	-0.07	-0.9
Bangladesh	-0.07	-0.4
Germany, Federal Republic of	-0.06	-0.4
Uganda	-0.06	-0.4
Benin	-0.05	-0.1
Guyana	-0.04	-0.8
Panama	-0.04	-0.3
Malawi	-0.04	-0.1
Syrian Arab Republic	-0.02	-0.1
Sierra Leone	-0.02	-0.1
India	0.04	0.1
Botswana	0.06	0.7

Country	Coef.	t ratio
Gambia, The	0.07	0.6
Rwanda	0.11	1.0
Trinidad and Tobago	0.11	0.5
Thailand	0.13	0.6
Brazil	0.13	0.7
Burundi	0.15	1.4
Iraq	0.15	0.5
Ireland	0.21	2.1
Swaziland	0.24	0.6
Spain	0.32	2.5
Liberia	0.45	1.9
Malta	0.49	3.9
Sri Lanka	0.50	3.0
Gabon	0.51	1.1
Indonesia	0.54	2.2
Angola	0.58	1.9
Somalia	0.63	4.5
Taiwan	0.89	4.3
Myanmar	0.89	2.5
Kenya	1.00	2.3

Appendix 9: Openness and Price Divergence Indexes, Cross-Country

Code	Country	Openness Indexes (1961-1988=100) T-based	X-based	M-based	Price Divergence Index
1	Singapore	275.117	282.334	272.327	118.086
2	Hong kong	201.249	207.515	198.106	126.022
3	Malaysia	196.032	222.731	181.199	80.3271
4	Guyana	181.619	198.513	166.886	167.56
5	Zambia	178.985	217.658	155.244	132.242
6	Netherlands, The	177.526	179.775	171.882	115.198
7	Kenya	163.575	188.089	151.05	101.084
8	Belgium	163.335	166.235	158.232	123.33
9	Tanzania	154.779	145.965	159.06	147.382
10	Egypt	151.292	147.632	158.256	107.608
11	Mauritania	149.208	146.405	149.806	89.7601
12	Canada	147.191	129.192	158.252	108.968
13	Iraq	147.163	193.198	107.75	76.791
14	Indonesia	144.477	157.651	135.87	76.7647
15	Algeria	143.722	158.066	137.53	120.439
16	Cote D'Ivoire	143.005	180.913	120.549	107.765
17	Norway	141.879	135.098	144.848	129.228
18	Togo	139.862	171.612	118.889	122.676
19	South Africa	139.454	153.827	129.442	85.7751
20	Taiwan	139.278	159.358	127.81	134.68
21	Sri Lanka	135.83	146.18	133.666	54.6838
22	Liberia	134.558	165.675	114.446	116.583
23	Germany	134.3	133.589	129.223	125.885
24	Botswana	131.657	111.254	151.751	83.8418
25	Malawi	130.361	127.156	135.345	87.7795
26	Angola	129.927	173.147	102.402	98.0593
27	United Kingdom	129.052	122.309	131.621	107.356
28	Zaire	128.784	173.943	92.7725	223.708
29	Lesotho	128.224	43.9787	193.133	89.9441
30	Ireland	127.365	130.114	127.291	107.231
31	Thailand	125.749	131.307	127.083	73.3517
32	Chad	125.224	116.225	135.946	75.7684
33	Senegal	123.224	137.186	117.828	89.5386
34	Ethiopia	120.77	116.906	122.246	127.446
35	Mali	118.613	92.5473	138.306	96.0247
36	Central African Rep.	115.144	106.582	126.35	85.7254
37	Uganda	113.102	129.802	100.367	388
38	Iran	112.926	133.258	96.6063	118.746
39	Somalia	111.119	80.2323	136.791	92.0292
40	Morocco	109.863	117.354	107.27	79.1301
41	Sweden	109.862	103.821	112.883	140.626
42	Philippines	109.834	118.494	107.346	81.258
43	Nigeria	109.028	124.323	99.188	120.384
44	Austria	108.328	108.836	107.242	121.043
45	Portugal	108.166	107.97	110.868	87.1847

Code	Country	Openness Indexes (1961-1988=100) T-based	X-based	M-based	Price Divergence Index
46	Switzerland	107.652	98.7076	110.62	108.973
47	Tunisia	107.08	115.037	104.882	74.0201
48	Swaziland	106.768	113.777	103.324	68.427
49	Cameroon	104.25	121.958	95.3926	106.364
50	France	100.807	95.8044	102.016	119.798
51	Gabon	100.736	114.216	90.0323	141.612
52	Suriname	100.489	99.1505	103.088	81.8282
53	Venezuela	99.6406	115.586	84.0273	111.463
54	Gambia, The	99.1282	109.185	91.9666	143.844
55	Panama	98.4666	107.823	94.94	106.406
56	Pakistan	98.3381	81.0038	115.773	61.9371
57	Yugoslavia	98.2303	103.531	96.7273	110.665
58	Honduras	96.7255	112.113	89.5155	121.913
59	Italy	95.2774	89.6241	98.6786	101.034
60	Denmark	93.7936	90.3411	95.296	133.583
61	Australia	92.7891	75.6406	109.141	123.307
62	Jamaica	90.8061	101.299	86.1052	115.459
63	Israel	90.4113	73.9048	105.602	109.341
64	Finland	89.367	87.0922	90.6495	127.131
65	Bolivia	89.0432	96.795	87.0295	82.4425
66	Niger	87.3772	84.5834	92.4904	125.465
67	Peru	86.932	89.0281	88.4143	77.906
68	Madagascar	86.387	82.7679	92.867	86.4594
69	Benin	86.1546	77.8039	95.2509	59.3419
70	New Zealand	85	74.3467	94.8637	114.784
71	Sudan	84.7086	80.0586	89.5426	87.3412
72	Nicaragua	83.2998	85.1336	84.8233	62.294
73	Chile	82.493	86.0464	82.3965	86.1467
74	Ecuador	82.2456	90.2059	79.3948	77.0241
75	Spain	79.2844	78.9568	80.0603	90.5284
76	El Salvador	79.0026	90.4429	73.9966	89.8262
77	Burkina Faso	78.9014	51.7956	97.6833	84.6684
78	Trinidad and Tobago	78.1286	81.6553	73.2387	82.8408
79	Japan	77.8776	72.3098	80.7314	150.145
80	Fiji	77.623	77.422	80.3892	85.8086
81	Costa Rica	77.456	79.6414	78.6412	80.1265
82	United States	76.75	60.6329	86.0542	112.721
83	Malta	76.3468	76.9084	76.5005	110.061
84	Sierra Leone	75.4141	84.1865	71.5878	63.1789
85	Syria	75.0769	67.454	83.1046	58.7524
86	Dominican Republic	74.2193	80.1389	72.5949	93.5779
87	Bangladesh	73.1541	56.6831	84.9744	86.9259
88	Colombia	73.049	81.7958	68.4761	66.1918
89	Myanmar	71.8681	68.6492	74.795	123.233
90	India	71.6923	61.7162	80.2816	113.939

Code	Country	Openness Indexes (1961-1988=100) T-based	X-based	M-based	Price Divergence Index
91	Greece	69.7728	59.8357	79.6563	113.931
92	Ghana	68.0268	78.5737	62.7411	168.345
93	Mexico	63.9345	61.608	66.0509	69.9962
94	Brazil	62.9276	62.5171	63.7928	77.1814
95	Guatemala	62.6468	69.5351	60.1938	84.087
96	Haiti	61.3399	64.492	60.754	65.9261
97	Barbados	60.928	57.2959	63.6533	79.6429
98	Turkey	57.6165	52.6388	63.1082	69.0201
99	Paraguay	57.5855	57.9717	60.0579	100.478
100	Burundi	55.4339	50.8218	58.2141	142.837
101	Iceland	54.5586	47.4074	59.1702	133.063
102	Nepal	54.3934	51.5588	57.9668	78.5503
103	Argentina	54.1865	58.8628	50.4847	104.027
104	Rwanda	53.2284	49.6807	56.5369	91.907
105	Uruguay	47.1893	49.1384	46.4065	71.8319

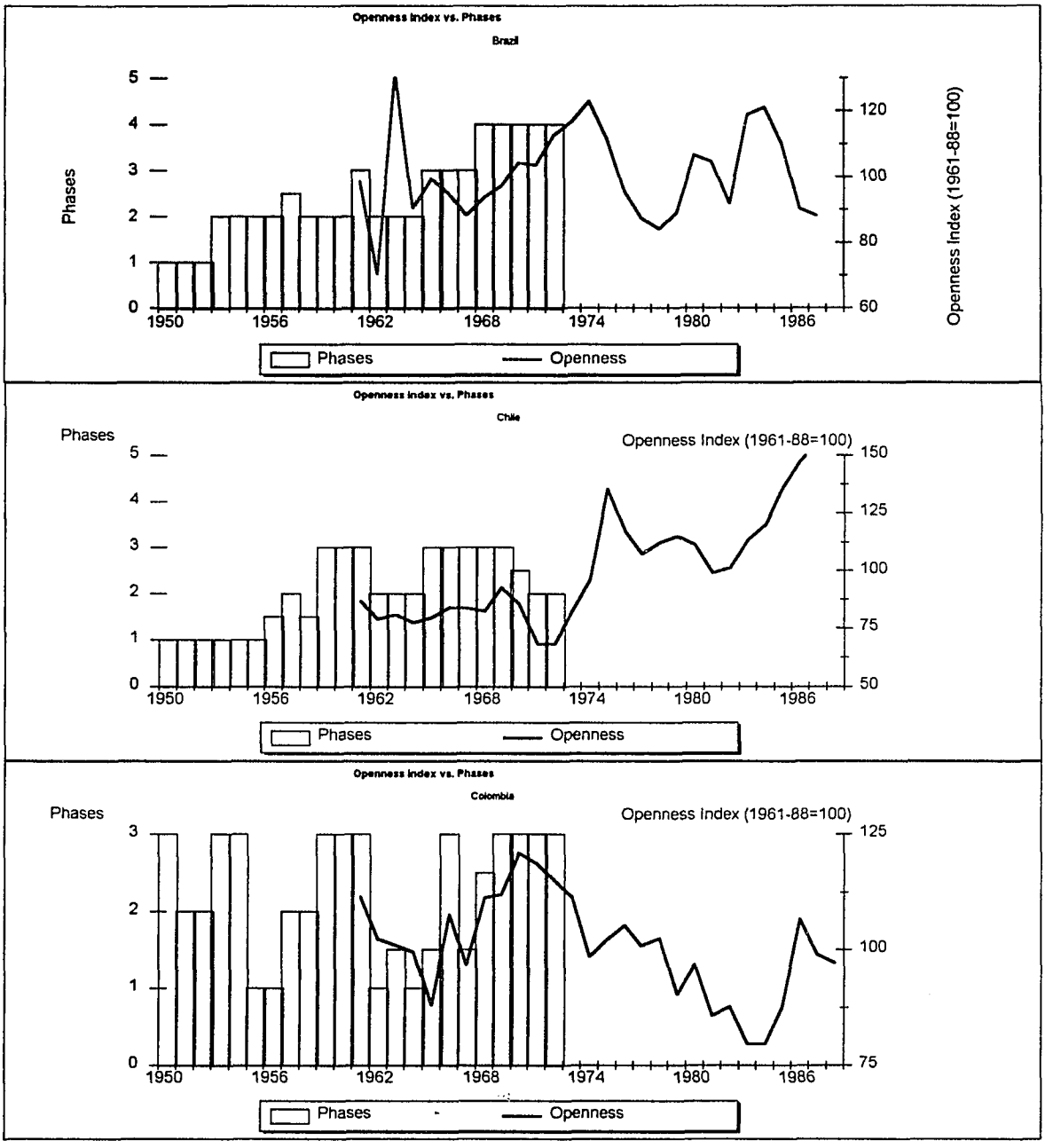
Appendix 10: Country Code List

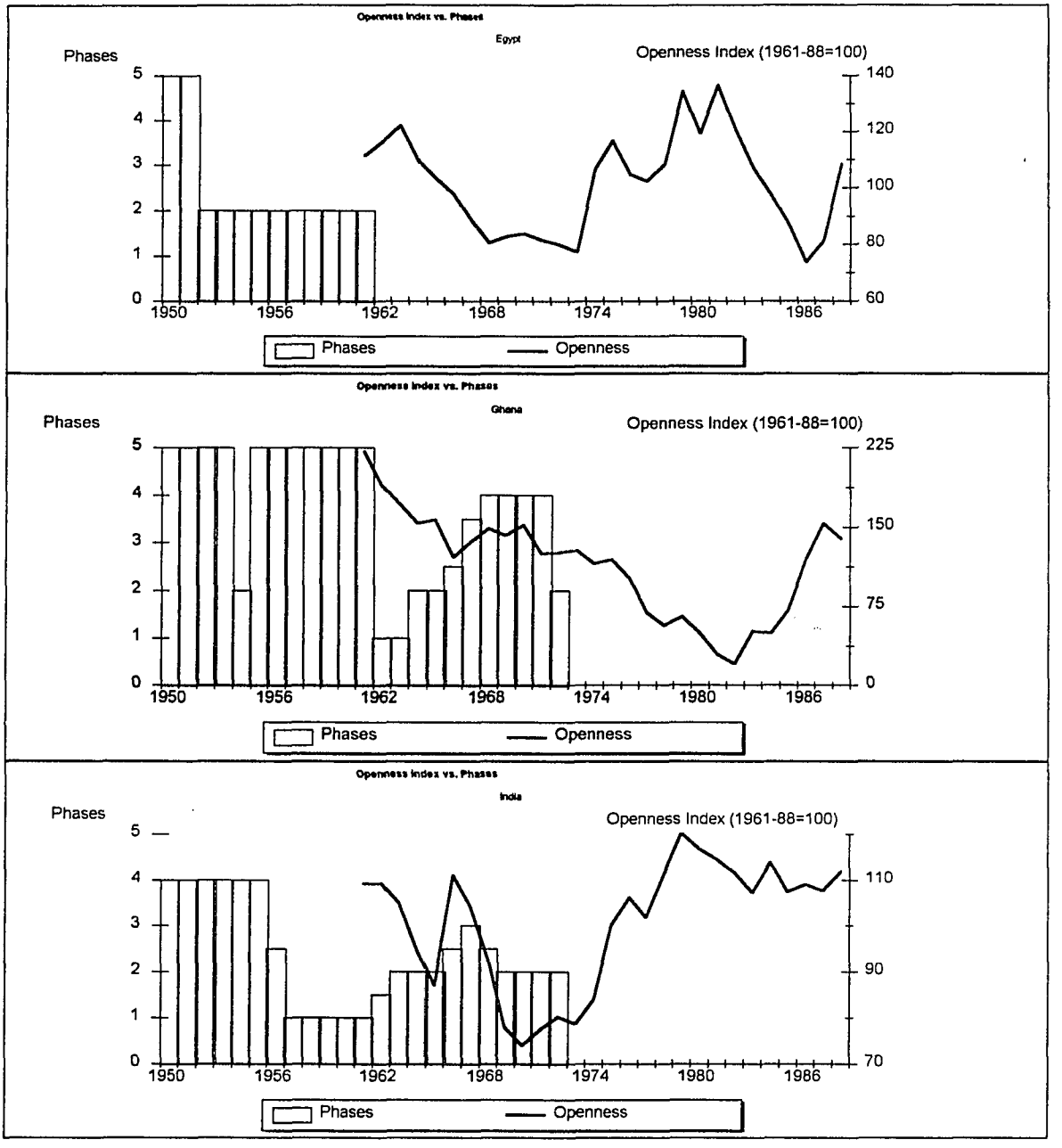
Code	Country Name
15	Algeria
26	Angola
103	Argentina
61	Australia
44	Austria
87	Bangladesh
97	Barbados
8	Belgium
69	Benin
65	Bolivia
24	Botswana
94	Brazil
77	Burkina Faso
100	Burundi
49	Cameroon
12	Canada
36	Central African Rep.
32	Chad
73	Chile
88	Colombia
81	Costa Rica
16	Cote D'Ivoire
60	Denmark
86	Dominican Republic
74	Ecuador
10	Egypt, Arab Republic of
76	El Salvador
34	Ethiopia
80	Fiji
64	Finland
50	France
51	Gabon
54	Gambia, The
23	Germany, Federal Republic of
92	Ghana
91	Greece
95	Guatemala
4	Guyana
96	Haiti
58	Honduras
2	Hong Kong
101	Iceland
90	India

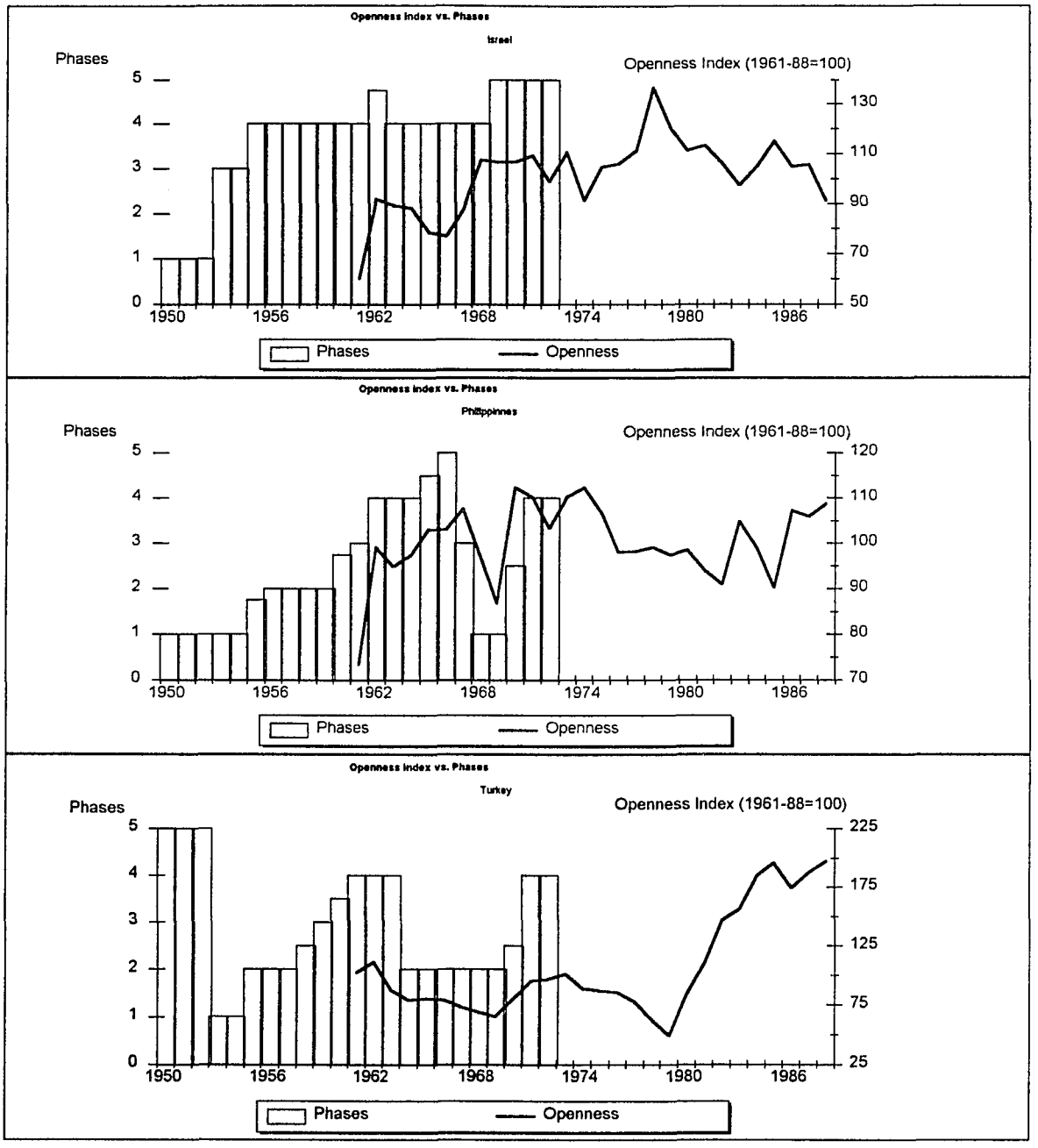
Code	Country Name
14	Indonesia
38	Iran, Islamic Rep. of
13	Iraq
30	Ireland
63	Israel
59	Italy
62	Jamaica
79	Japan
7	Kenya
29	Lesotho
22	Liberia
68	Madagascar
25	Malawi
3	Malaysia
35	Mali
83	Malta
11	Mauritania
93	Mexico
40	Morocco
89	Myanmar
102	Nepal
6	Netherlands, The
70	New Zealand
72	Nicaragua
66	Niger
43	Nigeria
17	Norway
56	Pakistan
55	Panama
99	Paraguay
67	Peru
42	Philippines
45	Portugal
104	Rwanda
33	Senegal
84	Sierra Leone
1	Singapore
39	Somalia
19	South Africa
75	Spain
21	Sri Lanka
71	Sudan
52	Suriname
48	Swaziland
41	Sweden

Code	Country Name
46	Switzerland
85	Syrian Arab Republic
20	Taiwan
9	Tanzania
31	Thailand
18	Togo
78	Trinidad and Tobago
47	Tunisia
98	Turkey
37	Uganda
27	United Kingdom
82	United States
105	Uruguay
53	Venezuela
57	Yugoslavia
28	Zaire
5	Zambia

Appendix 11: Graphical Comparison of Openness Index and Phases




Openness Index vs. Phases
Egypt
Phases
Openness Index (1961-88=100)
5
4
3
2
1
0
140
120
100
80
60
1950
1956
1962
1968
1974
1980
1986
Phases
Openness
Openness Index vs. Phases
Ghana
Phases
Openness Index (1961-88=100)
5
4
3
2
1
0
225
150
75
0
1950
1956
1962
1968
1974
1980
1986
Phases
Openness
Openness Index vs. Phases
India
Phases
Openness Index (1961-88=100)
5
4
3
2
1
0
110
90
70
1950
1956
1962
1968
1974
1980
1986
Phases
Openness


Openness Index vs. Phases
Israel
Phases
Openness Index (1961-88=100)
5
4
3
2
1
0
130
110
90
70
50
1950
1956
1962
1968
1974
1980
1986
Phases
Openness
Openness Index vs. Phases
Phillippines
Phases
Openness Index (1961-88=100)
5
4
3
2
1
0
120
110
100
90
80
70
1950
1956
1962
1968
1974
1980
1986
Phases
Openness
Openness Index vs. Phases
Turkey
Phases
Openness Index (1961-88=100)
5
4
3
2
1
0
225
175
125
75
25
1950
1956
1962
1968
1974
1980
1986
Phases
Openness

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