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# Measuring the Accessibility of Arab Markets

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**Abstract**

Market access matters. This paper uses a method suggested by Hugo et al. (2006) to determine and rank a sample of Arab countries in terms of their market access. The paper suggests that market access is comprised of three components: public institutions, regulatory environment, and network industries. The paper finds that most Arab countries perform better than the world median in terms of market access, except for Morocco and Algeria. The paper demonstrates how these two countries and other Arab countries can improve their market access, either by improving their network industries, their public institutions, or their regulatory environment.

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# 1 Introduction

Market access matters. Greater market access leads to increased trade and from increased trade comes greater income growth. Unfortunately, there exists no single agreed measure or commonly accepted definition of market access. Fortunately, Hugo et al. (2006) have suggested that the Market Access Index (MAI) may be useful for determining the accessibility of a given country's markets. This paper, therefore, uses the MAI to determine market access for a sample of Arab economies that enables the construction of a league table or rank order of relative market access for these Arab countries.

Market access has traditionally been analyzed from a very narrow international trade perspective. In the trade policy literature, market access is an umbrella term aimed at including analysis of a number of measures that a country may use to restrict imports and therefore limit market access. There is a long list of such measures, including tariffs on imported goods, and non-tariff barriers such as technical standards, anti dumping actions, import quotas, and import licensing, among others. Market access restrictions also include regulation of imported services. For example, some countries may limit the number of foreign service suppliers in a sector, or limit the number of service transactions a foreign supplier may perform.

Over the past half century, the World Trade Organization (WTO) and its predecessor the General Agreement on Tariffs and Trade (GATT) have gradually increased market access as a series of outcomes from the various rounds of trade negotiations. As a consequence of rather tough negotiations on market access during the Uruguay Round, most countries cut tariffs significantly and adopted tariff bindings - levels above which tariffs may never rise - for almost all imports. More recently, WTO members agreed at the 2001 Doha Ministerial conference that more aggressive negotiations should begin toward the goal of increasing market access in recognition that the main purpose of the original GATT was to ultimately eliminate tariffs on industrial goods.

There is considerable unevenness in market access across Arab countries, due to several reasons, including the varied attempts at trade liberalization over time and the complex discriminatory regulatory framework that currently exists in many Arab countries. Several researchers have at-

tempted to assess the success of trade liberalization in enhancing greater market access. However, these attempts confront a major obstacle; market access is a slippery concept to define and an even more difficult concept to measure. This is because market access is not directly observable. Consequently, researchers have generally attempted to proxy it by using either a variety of trade policy variables, or exogenous instrumental variables. Unfortunately, measuring market access in terms of trade policy alone may result in misleading inferences with regards to the importance of market access for economic growth, because market access involves much more than trade policy and trade regulations.

The traditional trade policy approach to market access is unhelpfully narrow. Market access is a much broader concept and involves other drivers beyond the right trade policy environment. Indeed, a conducive trade policy regime may be a necessary but not sufficient condition for greater market access. A country may have in place liberal trade policies, but that does not guarantee that its suppliers will have greater access to world markets, nor that its consumers will have greater access to products sourced from the rest of the world. Trade policy is but one ingredient in the mix that is necessary to deliver greater market access.

This paper argues that market access matters and is important to Arab countries. Greater market access leads to greater income growth. The theoretical justification for this proposition comes from the three constituent components of market access. Since greater market access leads to greater income growth, the accurate measurement of market access requires the identification and inclusion of the range of factors that impact market access. Figure 1 provides a set-diagram representation of market access proposed by Hugo et al. (2006). Each of the three components of market access: regulatory environment; public institutions; and network industries has a strong theoretical foundation.

Given that the MAI and its constituent composites are not observable, we employ the statistically robust method of structural equation modeling (SEM) to construct the MAI. SEM is a powerful statistical technique that enables the allocation of appropriate weights to each of the three constituent components of market access: public institutions; regulatory environment; and network

industries. SEM has been recently used by Squalli et al. (2008) to analyze cross-country growth competitiveness. This paper employs a dataset created by the World Economic Forum (WEF) which provides key market access data on 117 countries, comprising 97% of world output. Using these data, SEM generates an MAI for each country in the sample and creates a league table of market access, enabling cross-country comparisons.[1]

The paper is structured as follows. Section 2 surveys the literature on the three components of market access: the regulatory environment; public institutions; and network industries. Section 3 redefines market access and constructs a framework to measure the MAI. Section 4 uses SEM to model the MAI. Section 5 discusses the weights generated by SEM and ranks the countries into an MAI league table. Section 6 offers concluding comments.

## 2 Survey of the Literature

There is a very large literature investigating aspects of the relationship between trade openness and income growth. Trade openness is an outcome and tends to be measured by trade intensity, $(X+M)/GDP$, or its related alternatives $X/GDP$ or $M/GDP$. Using these measures, more open economies are those characterized by large shares of income directly related to trade. Evidence concerning the importance of market access to trade openness has recently been provided by Squalli and Wilson (2007). Using five different measures of trade openness, Squalli and Wilson (2007) show that public institutions, the regulatory environment, and network industries are all important drivers of trade openness in both nominal and real terms. Therefore, the outcome of greater trade openness is a function of several policy related processes. One important policy process that forms part of the regulatory environment is trade policy openness. Trade policy is a process since more liberal or open trade policy leads to the outcome of greater trade openness, measured in terms of trade intensity.

Trade policy openness, a necessary but not sufficient condition for greater trade openness, has been advocated, at least since the contribution of Krueger (1978) who argued that trade policy matters. She identified that those countries that adopt outward-oriented trade policies instead

[1] Although the paper uses the full WEF sample, only eight Arab countries are reported in this paper.

of inward-oriented, import substitution policies grow faster. Outward-oriented trade policy leads to improvements in trade intensity which leads to enhanced economic growth. A famous example testing this hypothesis is Sachs and Warner (1995) whereby countries are classified as either open or closed on the basis of a five-policy test. The five policies include: non-tariff barriers; average tariff rates; black market exchange rate; socialist economic system; and state-owned export monopoly. In a similar vein, Harrison (1996) measures trade policy openness using seven different proxies for trade and exchange rate policies. Edwards (1998) makes a broader attempt at measuring trade policy openness using nine openness indexes of which three deal with trade policies and the remaining six measure the extent of trade policy-induced distortions. Edwards concludes that "more open countries have indeed experienced faster productivity growth" (p. 396).

The use of trade policy is therefore a key driver of market access. More open trade policies, those aimed at reducing or eliminating trade barriers lead to greater market access. However, there are other important contributors to market access beyond trade policy. According to Bagwell and Staiger (2001), "Market access is interpreted in GATT to reflect the competitive relationship between imported and domestic products" (p. 71). For example, when a government agrees to reduce its import tariff on a particular product, it alters the competitive relationship between imported and domestic units of the product in favor of imported units, and it thereby provides greater market access to foreign producers. By agreeing to lower its tariff, the government is effectively agreeing to engineer an outward shift of its import demand curve - that is, all else equal, a greater volume of imports will be demanded at any given price from foreign exporters - and as a result, foreign exporters can expect to enjoy an increase in sales into the domestic market and to receive a higher price. This interpretation of market access acknowledges that there are many ways to alter the competitive relationship between imported and domestic products. However, hitherto the majority of the literature has tended to focus narrowly on the formal, legal barriers to trade determined by the regulatory environment.

A different view of what influences economic growth is put forward by North (1990) who claims that countries with better public institutions will ultimately invest more in physical and human

capital resulting in a more efficient use of resources and higher income levels. The literature on public institutions is broad and its effects on growth are theoretically and empirically analyzed by a host of economists, such as Engerman and Sokoloff (2000) and Acemoglu et al. (2001, 2002).

Rodrik et al. (2002) use a modeling framework that adds geography to both trade and public institutions to explain growth. Rodrik et al. (2002) argue there are three 'deep' determinants of income: geography; institutions; and integration (trade intensity). They wonder "How much of the astounding variation in cross-national incomes around the world can geography, integration, and institutions explain?" (Rodrik et al., 2002, p. 4). They conclude that the quality of institutions 'trumps' everything else; their results emphasize the supremacy of institutional quality over both trade intensity and geography for economic growth.

Similarly, the question of what determinant of income growth matters most between trade intensity or public institutions has also been considered by Dollar and Kraay (2002). These authors draw together the openness-growth and institutions-growth literature in an "attempt to isolate the partial effects of trade and institutions on growth" (p. 3). They find that differences in "social infrastructure" can explain large changes in capital accumulation, productivity and ultimately income.

Intuitively, poor quality public institutions act as a hidden barrier to trade in the form of increased costs of trading, similar to a hidden tax or tariff barrier, and therefore reduces the accessibility to markets. Anderson and Marcouiller (2002) propose that poor quality institutions are associated with insecurity in international exchange. The cost of corruption, lack of enforcement of contracts and bribe extortion are likely to influence trading decisions and therefore the accessibility of markets. By fitting a structural model to the data they conclude that the "transaction costs which are associated with insecure exchange significantly impede international trade" (p. 16). Economic policy which lacks either transparency or impartiality and legal systems which fail to enforce commercial contracts adequately, significantly increase the cost of trading and act as a formal constraint. They suggest that the disparities in the quality of public institutions between the rich and lesser developed economies offers a rationale as to why the richer countries tend to

trade more amongst themselves.

Within the market access literature the cost of transportation as a natural, non-tariff barrier to trade is both widely recognized and well researched. Authors have tended to concentrate on the geographical positioning and proximity of countries whilst a smaller faction recognizes that in fact transportation costs are a function of a countries' geographical positioning and its infrastructure. Given that geographical positioning is exogenous, it is the impact of infrastructure that is integral in assessing a market's overall accessibility.

According to Limao and Venables (1999), "Remoteness and poor transport and communications infrastructure isolate countries, inhibiting their participation in global production networks" (p. 1). Transport and communications infrastructure are network industries. Network industries are those that help realize network effects (Shy, 2001). To realize network effects there must exist a network of some sort. Networks take many forms. There are telecommunications and broadcasting networks, transport and logistics networks, computing and information sharing networks, social and cultural networks. Well established and efficient network industries enhance the rest of the world's access to domestic markets as well as enhancing a country's access to world markets. In some instances the networks are real, tangible and measurable, whilst in other situations the networks may be intangible and virtual. In each case there are particular features of the network that have important economic characteristics, effects and consequences that enhance market access either domestically or internationally. The more prevalent and better are network industries, the greater the opportunities to use those network industries to increase market transactions. Access to markets is enhanced by better network industries. However, for the current exercise in constructing a MAI it is only feasible to include the tangible components of network industries; that is those network industries relating to domestic infrastructure.

Bougheas et al. (1997) also emphasize the role of infrastructure in affecting transport costs and trade. They examine the relationship between the stock of infrastructure and the volume of trade by hypothesizing that the costs of transportation is inversely related to the development of domestic and international transport and telecommunications infrastructure. They demonstrate

that by introducing infrastructure, as a cost reducing technology, into a two-country Ricardian model there is a welfare gain as a result of the reduced price of imports from the reduction in transport costs. Additionally, Bougheas et al. (1997) employ a gravity model to conduct a cross-country analysis on the importance of infrastructure in trade. Rather than transport costs merely being a function of distance, they include an 'infrastructure' variable measured by the stock of public capital and the length of the motorway networks within each country. Results confirm their hypothesis that there exists a positive relationship between infrastructure and the volume of trade. However, at high levels of investment in infrastructure Bougheas et al. (1997) warn that there is potentially a trade-off resulting from the loss in volume of goods produced and thus, final output. Limao and Venables (1999), similarly, empirically show that "poor own and partner infrastructure increase transport costs significantly" (p. 9), reporting that the inclusion of infrastructure measures explains more than double the variation in transportation costs than using distance or a landlocked dummy. They estimate the elasticity of trade flows with respect to transport costs at -2.95 for within country infrastructure and -2.34 for their transit infrastructure measure.

Bond (2005) also examines the importance of public goods, namely ports, airports, and road and rail networks, on the level of transport costs and ultimately trade volumes. Bond employs a two period partial equilibrium trade model to examine the relationship between trade liberalization and infrastructure investments, with particular attention to the effects of co-operative investments levels. He concludes that the "benefits of these investments (transportation infrastructure investments) is related to the volume of trade between the two countries" (p. 24).

Dollar et al. (2003) interestingly investigate the significant disparity between the trade intensity of four Latin American countries; Brazil, Peru, Honduras and Nicaragua. They hypothesize that the removal of formal trade barriers must be complemented by a sound investment climate. They concentrate on both the role of infrastructure as representative of the investment climate and the quality of institutions in place and empirically conclude that "a sound investment climate - as reflected in low customs clearance times, reliable infrastructure, and good financial services - makes it more likely that firms in a location will export" (p. 17).

It is clear from the literature that good quality public institutions are positively associated with economic growth. Public institutions have generally been integrated into the growth literature as a competing explanatory variable. More recently papers such as Rodrik et al. (2002) have stipulated that the two variables are endogenously related. However, there exists a small literature which examine the direct effect that public institutions have on trade and market access.

The previous literature highlights the point that an appropriate regulatory environment, suitable public institutions and efficient and extensive network industries each contributes to enhanced international trade opportunities. That is, each of these three sets of characteristics contribute to and represent greater market access for any given country. However, there is inconsistency and confusion concerning exactly what market access means in much of the literature, mainly because of the emphasis placed upon the trade regulatory environment to the exclusion of the other two sets of market access drivers. Since it is not well defined, market access is generally measured in rather imprecise and contrived ways. An important contention of this paper is, that, it is market access that facilitates greater trade openness and economic growth and that market access is a concept broader than trade regulations. The more accessible are world markets, the greater will be trade intensity. Similarly, the easier is access to a domestic market from the rest of the world, then the greater will be trade intensity. Greater trade intensity means greater income growth.

## 3 The Market Access Framework

Figure 1 visually displays the hypothesized relationship between market access and its three constituent parts: public institutions; the regulatory environment; and network industries, which are theoretically and empirically justified within the literature on income growth. The shaded areas in Figure 1 represent the aspects of each of public institutions, the regulatory environment and network industries, which determine market access. For example, in the public institutions set of Figure 1, the shaded area will include the aspects of public institutions which traders take into account, such as the autonomy of the government officials and the independence of the judicial system, whereas 'X' represents a characteristic which is formally part of the public institutions of

an economy, but is most likely not taken into consideration by traders, for example, the quality of the education system.

As Figure 1 makes clear, any economy possesses network industries, public institutions and a regulatory environment. However, only certain aspects of each are relevant to market access. Market access will involve key components of each of these three sets. In building a measure of market access, the challenge for the researcher is to identify the proxy variables that represent each of these key components and then to find data for each. To operationalize market access we follow Hugo et al. (2006) for the construction of the MAI. The hypothesized MAI is therefore comprised of three sub-indexes; the public institutions sub-index (PISI); the regulatory environment sub-index (RESI) and the network industries sub-index (NISI). For each constituent sub-index four observed variables are chosen to represent the latent construct.

In this study, the variables chosen to represent the PISI are indicative of what constitutes high quality public institutions; autonomy within the judicial system; the independence of government officials; and the efficiency and effectiveness of the legal framework. Such variables are purely indicative of favorable public institutions' qualities rather than attempting to fully encompass the broad and multifaceted nature of institutions. This is consistent with Kaufmann et al. (1999) who note that all aspects of governance may have a strong causal relationship with trade.

The RESI variables selected are only those aspects of the regulatory environment that impact on trading decisions. For example, whether the regulatory environment is unnecessarily bureaucratic and cumbersome? Or to what extent regulations hinder or facilitate trade between countries? Or whether efficient trade flows are severely hampered by rigid economic activity from excessive regulation? Or whether regulatory or policy distortions are directing resources inappropriately?

When an economy is subjected to strict government regulation, goods and services are prevented from flowing efficiently, thus raising the cost of doing business and reducing trade incentives. The importance of trade barriers as an indicative observed variable is well understood and justified within the market access literature. Similarly, the cost of agricultural policy is equally as justified as an indicator given the attention it receives, especially at the WTO Rounds. The burden of

government regulation as a variable encompasses the multitude of aspects which influence trading decisions for both domestic and foreign traders. Finally, restrictions on foreign ownership is indicative of a domestic economy's approach to foreign goods and firms and overall openness to foreign direct investment.

The variables chosen to represent NISI cover such things as the quality of roads, ports, air transport and electricity supply and are all clear indicators of the overall quality of domestic infrastructure and representative of the tangible and measurable aspects of network industries.

These three sets of characteristics determine market access. That is, they affect the rest of the world's access to a particular domestic market, or they affect the ability of a country to interact and access international markets. A better regulatory environment combined with better public institutions will increase trade intensity and this will be further enhanced by productive and efficient network industries. This will occur either directly, or indirectly via enhanced economic growth.

# 4 Data and Methodology

## 4.1 The Data and Variables

This paper uses cross-sectional data provided by the WEF for 117 countries.[2] All the data used in this study come from the *Global Competitiveness Report 2005-2006* published by Lopez-Claros et al. (2005). The survey data are gathered from executive opinion surveys which are completed annually by business leaders and decision makers and compiled by the WEF. The survey data are expressed in the form of indexes measured on a scale of 1 to 7. This scaling is particularly useful since it allows the construction of a data set free of outliers. Table 1 provides details about the variables chosen from the WEF dataset to represent each of the PISI, RESI and NISI characteristics needed to construct MAI.

The benefit of using the WEF survey data lies in its ability to quantitatively capture nonexistent or scarce data. Other important advantages of the WEF dataset are that it provides data on a range of public institutions, regulatory environment, and network industry variables which are

[2]Because of missing data for East Timor, Egypt, Kazakhstan, and Tajikistan, the sample size is reduced to 113 countries.

useful indicators of market access and not normally available to researchers. Hence, the observed variables chosen for this study originate from answers to a series of questions pertaining to a particular aspect of business operations within a specific country in terms of public institutions, the regulatory environment, and network industries. The questions that generated these variables are listed in Table 1. Questions are designed by WEF in a way that makes higher numbers designate a more positive outcome. A weakness of using the WEF data set is that it only covers a limited sample of eight Arab economies: United Arab Emirates (UAE), Tunisia, Qatar, Kuwait, Jordan, Bahrain, Morocco, and Algeria.

SEM can produce an explanatory model only when the model is accurately specified based on strong theoretical foundations. Convergence of the SEM model and the yielding of robust estimates also require the model to be adequately identified.[3] While there is no clear consensus in the SEM literature on what sample size SEM requires, Stevens (1996) suggests the use of fifteen times the number of the observed variables as a good rule of thumb. Loehlin (1992) also suggests that with over 10 variables the sample should be greater than 200. However, Bentler and Chou (1987) explain that as long as observed variables are perfectly well behaved, then SEM requires no more than 5 cases per observed variable.[4] Given that there are 12 observed variables in the MAI model, the model ought to yield stable estimates and generate unbiased model fit results.

### 4.2 Methodology

SEM provides a statistical methodology to quantify and test the hypothesized market access model. The specification of the hypothesized model can be seen in Figure 2. The MAI is represented by three latent variables or sub-indexes: PISI, RESI, and NISI. Each of these sub-indexes are then represented by their own unique set of observed variables. In the MAI model, each of the latent variable sub-indexes are represented by four observed variables. The numbers in the boxes represent the variables listed in Table 1. For instance, 6.01 is a public institutions variable describing judicial independence.

[3] As SEM is an iterative maximum likelihood process, it requires positive degrees of freedom. Adequate identification requires every parameter to be identified and at least one parameter to be over-identified.

[4] Variables are well behaved when normally distributed, when no data are missing or in the absence of outliers.

SEM exhibits properties similar to multiple regression modeling, but more robustly takes into account relationships between (a group or sub-group of) latent variables, including correlations, covariances, nonlinearities, and error terms (correlated and uncorrelated). SEM has two steps: the first validates the measurement model and the second fits the structural model. Confirmatory factor analysis on the 'measurement model' acts as a preliminary check that the chosen observed variables have high loadings on their predicted factors.[5] Should an observed variable load significantly onto two or more latent variables, the model must then be respecified. We choose four variables to represent each latent sub-index based on the theoretical foundations discussed in Section 2. Once the measurement model is well specified and achieves high goodness of fit indicators, then the structural model is fitted, in this case by incorporating MAI into the model specification and reintroducing the directional linear relationships. The methodology used in deriving a variance-covariance matrix can be found in Raykov and Marcoulides (2000) and Hugo et al. (2006).

SEM provides the best estimates of the freely varying parameters by minimizing the differences between the sample covariances and those predicted by the specified model. The specified model is estimated using a maximum likelihood procedure, then subjected to a battery of 'goodness of fit' measures to determine whether it should be accepted or rejected. Once a model is deemed acceptable, parameter estimates and their respective standard errors are then used to establish the significance of particular paths within the model specification.

The analysis of the results begins with consideration of how well the data fit the specified model. There are several goodness of fit indicators that are popularly used in the SEM literature. We rely on the $\chi^2$ to df ratio, the adjusted goodness of fit index (AGFI), the standardized root mean squared residual (SRMR), the normed fit index (NFI), and the comparative fit index (CFI).[6] These indicators provide an assessment of the extent to which the specified model predicts the observed covariances.

The chi-square fit index tests the hypothesis that an unconstrained model fits the covariance,

[5] A model where all the directional linear relationships between the latent variables are removed and replaced with co-varying relationships between the latent sub-indexes only.

[6] See Raykov and Marcoulides (2000) for details.

correlation matrix, and the specified model. Because chi-square is known to be sensitive to many factors (e.g. large samples, large correlations) and can result in the unjustified rejection of the model (Byrne, 1994), we use the $\chi^2$ to df ratio, $\chi^2/df$, which is less dependent on the sample size and where df represents the degrees of freedom. While there are no specific standards for what values the $\chi^2$ to df ratio must take to accept a specified model, it is generally expected to lie between 2 and 3 (Carmines and McIver, 1981).

A goodness of fit index (GFI) can be computed when using a maximum likelihood procedure. GFI represents the percentage of covariances explained by the model covariances. It is used to assess the ability of the empirical model to account for the patterns in the correlation matrix. However, because the GFI can be biased by the sample size, it is recommended that an adjusted goodness of fit index (AGFI) be used to adjust for the number of parameters estimated in the model (Steiger, 1989). The AGFI can be computed as follows:

$$AGFI = \frac{p}{p + 2\hat{F}} \tag{1}$$

where $\hat{F} = (\chi^2 - df)/(n-1)$ and df represents the degrees of freedom, p is the number of parameters and n is the sample size. A model is generally accepted when $GFI \approx 0.90$ and/or $AGFI \approx 0.90$ (Byrne, 1994; Gefen et al., 2000).

SRMR represents the average, standardized residual value derived from the fit between the specified model (predicted covariance) and the data (observed covariance). It is generally expressed as:

$$SRMR = \sqrt{\frac{2\sum_i^n \sum_j^i (A_{ij} - P_{ij})^2}{n(n+1)}} \tag{2}$$

where $A_{ij}$ is the $n \times n$ observed covariance matrix and $P_{ij}$ is the predicted covariance matrix. A perfect model fit exists when $SRMR = 0$. However, although SRMR is generally expected to be less than 0.05, a reasonable model fit can be achieved when $SRMR < 0.1$ (Tabachnick and Fidell, 2001).

Bentler and Bonnet (1980) suggest the use of the NFI to compare the improvement in the minimum discrepancy for the specified model ($s$), represented by $\chi_s^2$, to the discrepancy for the

independence model ($i$), represented by $\chi_i^2$.[7] The NFI can therefore be expressed as:

$$NFI = \frac{\chi_i^2 - \chi_s^2}{\chi_i^2} \tag{3}$$

where a model fit is acceptable when $0.90 \leq NFI \leq 0.95$ and good when $NFI > 0.95$ (Bentler and Bonnet, 1980).

To measure the extent to which the estimates are able to reproduce the covariance in the observed data, Bentler (1989) suggests the use of the CFI which can be computed using the discrepancies for the specified and independence models. Hence, it can be written as:

$$CFI = \frac{d_i - d_s}{d_i} \tag{4}$$

where $d = \chi^2 - df$. This index is generally set to one when exceeding one and set to zero when negative. The closer to one, the higher the proportion of the covariance in the observed data is reproduced.

## 5 Results

We find that the specified model converges to a minimum, producing estimates and respective standard errors with no further amendments necessary in the specification of the model.[8] The factor loadings estimates are summarized in Table 2. All estimates are at least statistically significant at the 0.01 level. However, these estimates are acceptable only if the data and the specified model make a good fit.

A first step in measuring the model fit indicates that the data fit the specified model fairly well, with $\chi^2/df = 2.27$. Similarly, the MAI records an AGFI of 0.96 suggesting a good data fit. In fact, these results are sufficient to accept the specified model as the general criteria for acceptance requires that $\chi^2/df < 3$ and that $GFI \approx 0.90$ and $AGFI \approx 0.90$ (Byrne, 1994; Gefen et al., 2000).[9]

The SRMR is also indicative of a good fit as it is close to zero, estimated at 0.04. Furthermore, both the NFI and CFI have values that exceed the 0.90 cut-off, at 0.92 and 0.95 respectively, which

[7] The independence model represents a model in which all the correlations/covariances are equal to zero.
[8] No modification indices or standardized residual covariances were significant.
[9] The GFI is estimated at 0.87.

indicate that 92% of the MAI model is an improved fit compared to the independence model which uses random variables and that 95% of the covariation in the data can be reproduced by the MAI model.

Since the data fit the specified MAI model relatively well and the factor loadings generated for the maximum likelihood estimations are all statistically significant, it becomes clear that the regression estimates are generated from a model representative of the data. The regression estimates can therefore be used to determine different weights for each parameter. This is done by simply summing up the different factor loadings in a system of equations with the same independent variable, and assigning the ratios as weights. The procedure used in calculating these weights is identical to that suggested by Hugo et al. (2006).

Table 2 shows that the allocation of weights within the sub-index observed variables are fairly uniform, with each of the observed variables reflecting roughly a quarter of their respective latent construct. The cost of agricultural policy (variable 2.12) as a representative variable for the regulatory environment is smaller than average at 17%, whilst the prevalence of trade barriers (variable 2.09) is attributed more weight at 33%. Intuitively this makes sense as the cost of agricultural policy is a more country specific indicator of the regulatory environment than the overall prevalence of barriers to trade. Similarly, within the PISI, judicial independence (variable 6.01) is attributed above average weight of 32%, whereas the favoritism in the decisions of government officials (variable 6.08) receives less at 18%. Once again this is intuitively compelling as the behavior of government officials is more specific than the overall integrity of the judiciary system. The fact that the observed variables represent relatively equal parts of their respective latent sub-indexes adds validity to the observed variables chosen as indicators.

The weight for NISI, $w_3$, indicates that having good network industries is the most important component in achieving good market access, as it accounts for 47% of the MAI. $w_1$ and $w_2$ reveal the importance of public institutions and the regulatory environment respectively in the MAI, whereby PISI determines 39% of the MAI and RESI only 14%. Once again these results are compelling in light of the theoretical and empirical literature to date. Whereas the importance of network

industries is almost unamimously found to be important to market access, there remains a thriving debate and mixed empirical and case study evidence on the impact and importance of the regulatory environment. Without sufficient infrastructure in place, and the public institutions to facilitate and support this, the regulatory environment is unable to influence market access decisions significantly.

### 5.1 MAI League Table

The weights generated by SEM enable the MAI to be calculated and ranked for the 113 countries included in the sample. Table 3 displays the rank and score of the latent variables included in the MAI as well as the per capita real GDP (PCRGDP) for Arab economies denominated in $US. According to the index, the United Arab Emirates (UAE) is the most accessible economy in the Arab world with a rank of 27th and a corresponding score of 4.71 out of 7.00. This is mainly due to their relatively high RESI and NISI scores which rank the country in 14th and 22nd place respectively. The UAE are however disadvantaged as a result of their public institutions, PISI, which ranks 41st. The UAE are followed by Tunisia, Qatar, Kuwait and Jordan which rank in 29th, 35th, 37th and 41st place respectively. The worst ranked Arab economy is Algeria ranking 80th with a corresponding score of 3.19. This rank is due to the country's poor performance on all sub-indexes of the MAI.

The MAI league table is an important contribution to the current literature on market access as it formally acknowledges that in order to make markets internationally accessible liberalization of the regulatory environment is not sufficient, it should be complemented by improvements in the quality of public institutions and most importantly the establishment of high quality network industries. We feel that a composite measure of market access, MAI, produces a more accurate portrayal of a country's market accessibility than the narrow trade policy proxies previously employed.

## 6 Conclusions

Market access matters. However, market access has hitherto been analyzed from a very narrow trade perspective, concentrating upon the regulatory environment and trade policy that limit market access by invoking barriers to trade. However, in this paper we argue that market access is a

broader concept that involves three sets of characteristics: the regulatory environment; public institutions; and network industries. An important contribution of this paper is to identify the key role played by network industries in facilitating market access.

Having identified the three constituent elements of market access, the paper then uses an important dataset provided by the WEF to produce a measure of market access for Arab countries. The WEF's annual surveys are a unique and valuable data source which enable usually unobservable variables to be captured and measured. The data are particularly valuable for constructing a market access measure as it avoids compiling complicated proxies using tariff rates, quotas etc. across countries and generates a measure based upon an amalgamation of a world-wide sample of the global business community's opinion.

An important contribution of this paper is the use of the robust statistical method of SEM to construct the MAI and its constituent indexes: RESI, PISI, and NISI, for Arab countries which have three important uses. First, they enable a rank order of Arab countries to see which countries enjoy the greatest market access. Second, it is possible to disentangle the drivers of market access and to see, in the case of each Arab country, which components of market access are most important in influencing the MAI. Third, they provide important policy-related information on the drivers of market access. That is, it is possible to see which component(s) of MAI are most important in determining MAI for any given country. According to evidence presented in this paper, the UAE is the Arab country ranked first in the Arab world in terms of market access. An important advantage of the rank order by MAI and its constituent sub-indexes is that they provide insight into the constraints on market access for individual countries. Policy makers can see readily what areas they need to work on in order to increase their country's market access. Although this is a restricted sample of eight Arab countries, as a generalization, it is the regulatory environment and network industries that act as the greatest inhibitors of market access amongst Arab economies. Public institutions are not such a great constraint.

Given the strong theoretical basis for the link between market access and income growth, the findings of this paper suggest that improvements in the quality of transport, logistics and communi-

cation infrastructure, so called network industries, coupled with improvements in public institutions such as property rights, the rule of law and the integrity of the judicial system and a better regulatory environment will all help improve market access in Arab economies. If market access is important for income growth, then greater market access will be achieved via better network industries, and public institutions, and a more liberal regulatory regime. Finally, there is much scope for Morocco and Algeria in particular to improve their market access by improving all three areas, but particularly their regulatory environment.

## References

[1] Acemoglu, D., Johnson, S. and Robinson, J. (2001) The Colonial Origins of Comparative Development: An Empirical Investigation. *American Economic Review*, **91**, 1369-1401

[2] Acemoglu, D., Johnson, S. and Robinson, J. (2002) Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distribution. *Quarterly Journal of Economics*, **117**, 1231-1294.

[3] Anderson, J. E. and Marcouiller, D. (2002) Insecurity and the Pattern of Trade: An Empirical Investigation. *The Review of Economics and Statistics*, **84**, 342-352.

[4] Bagwell, K. and Staiger, R. W. (2001) The WTO as a Mechanism for Securing Market Access Property Rights: Implications for Global Labor and Environmental Issues. *Journal of Economic Perspectives*, **15**, 69-88.

[5] Bentler, P. M. (1989) EQS, Structural Equations, Program Manual, Program Version 3.0, Los Angeles: BMDP Statistical Software, Inc.

[6] Bentler, P. M. and Bonnet, D. G. (1980) Significance Tests and Goodness-of-fit in the Analysis of Covariance Structure. *Psychological Bulletin*, **88**, 588-600.

[7] Bentler, P. M. and Chou, C. P. (1987) Practical Issues in Structural Equation Modeling. *Sociological Methods and Research*, **16**, 78-117.

[8] Bond, E. W. (2005) Transportation Infrastructure Investments and Trade Liberalisation Revised Policy Research Paper, Vanderbilt University, Nashville.

[9] Bougheas, S., Demetriades, P. O. and Morgenroth, E. L. W. (1997) Infrastructure, Transport Costs and Trade. *Journal of International Economics*, **47**, 169-189.

[10] Byrne, B. M. (1994) *Structural equation modeling with EQS and EQS/Windows: Basic concepts, applications, and programming.* Thousand Oaks, CA: Sage Publications.

[11] Carmines, E. G. and McIver, J. P. (1981) Analysing Models with Unobserved Variables: Analysis of Covariance Structures, in *Social Measurement: Current Issues* (Eds.) G. W. Bohrnstedt and E. F. Borgatta, Beverly Hills, CA, Sage Publications, pp. 65-115.

[12] Dollar, D. and Kraay, A. (2002) Institutions, Trade, and Growth. *Carnegie-Rochester Conference Series on Public Policy.*

[13] Dollar, D., Hallward-Dremeier, M. and Mengistae, T. (2003) Investment Climate, Infrastructure and Trade in Latin America. World Bank, Prepared for the Conference on Sectoral Reform in Latin America, Stanford Center for International Development.

[14] Edwards, S. (1998) Openness, Productivity and Growth: What Do We Really Know? *The Economic Journal*, **108**, 383-398.

[15] Engerman, S. L. and Sokoloff, K. L. (2000) Institutions, Factor Endowments and Paths of Economic Development in the New World. *Journal of Economic Perspectives*, **14**, 217-232.

[16] Gefen, D., Straub, D. W., and Boudreau, M. C. (2000) Structural Equation Modeling and Regression: Guidelines for Research Practice. *Communications of The Association for Information Systems*, **7**, 1-78.

[17] Harrison, A. (1996) Openness and Growth: A Time Series, Cross-Country Analysis for Developing Countries. *Journal of Development Economics*, **48**, 419-447.

[18] Hugo, S., Squalli, J. and Wilson, K. (2006) What Explains Market Access? Economic & Policy Research Unit Working Paper No. 06-08, Zayed University, Dubai, UAE. http://www.zu.ac.ae/research/images/06-08-web.pdf

[19] Kaufmann, D., Kraay, A. and Zoido-Lobaton, P. (1999) Governance Matters. The World Bank Policy Research Working Paper No. 2196.

[20] Krueger, A. (1978) *Foreign Trade Regimes and Economic Development*. Cambridge: Ballinger.

[21] Limao, N. and Venables, A. J. (1999) Infrastructure, Geographical Disadvantage, and Transport Costs. Policy Research Working Paper 2257, The World Bank Development Research Group, Washington.

[22] Loehlin, J. C. (1992) *Latent Variable Models: An Introduction to Factor, Path, and Structural Analyses*. Hillsdale, NJ: Lawrence Erlbaum Associates.

[23] Lopez-Claros, A., Porter, M. E. and Schwab, K. (Eds.) (2005) *The Global Competitiveness Report 2005-2006*. World Economic Forum.

[24] North, D. (1990) *Institutions, Institutional Change and Economic Performance*. New York: Cambridge University Press.

[25] Raykov, T. and Marcoulides, G. A. (2000) *A First Course in Structural Equation Modeling*. Mahwah, NJ: Lawrence Erlbaum Associates.

[26] Rodrik, D., Subramanian, A. and Trebbi, F. (2002) Institutions Rule: The Primacy of Institutions over Integration and Geography in Economic Development. International Monetary Fund Working Paper No. 02/189.

[27] Sachs, J. and Warner, A. (1995) Economic Reform and the Process of Global Integration. *Brookings Papers on Economic Activity*, **1**, 1-118.

[28] Shy, O. (2001) *The Economics of Network Industries*. Cambridge: Cambridge University Press.

[29] Squalli, J. and Wilson, K. (2007) Openness and Access. *Applied Economics*, forthcoming.

[30] Squalli, J., Wilson, K. and Hugo, S. (2008) An Analysis of Growth Competitiveness. *International Review of Applied Economics*, forthcoming.

[31] Steiger, J. H. (1989) *EZPath: Causal Modeling*, Evariston, IL: Systat.

[32] Stevens, J. (1996) *Applied multivariate statistics for the social sciences*. Mahwah, NJ: Lawrence Erlbaum Associates.

[33] Tabachnick, B. G., and Fidell, L. S. (2001) *Using Multivariate Statistics*. Boston: Allyn & Bacon.

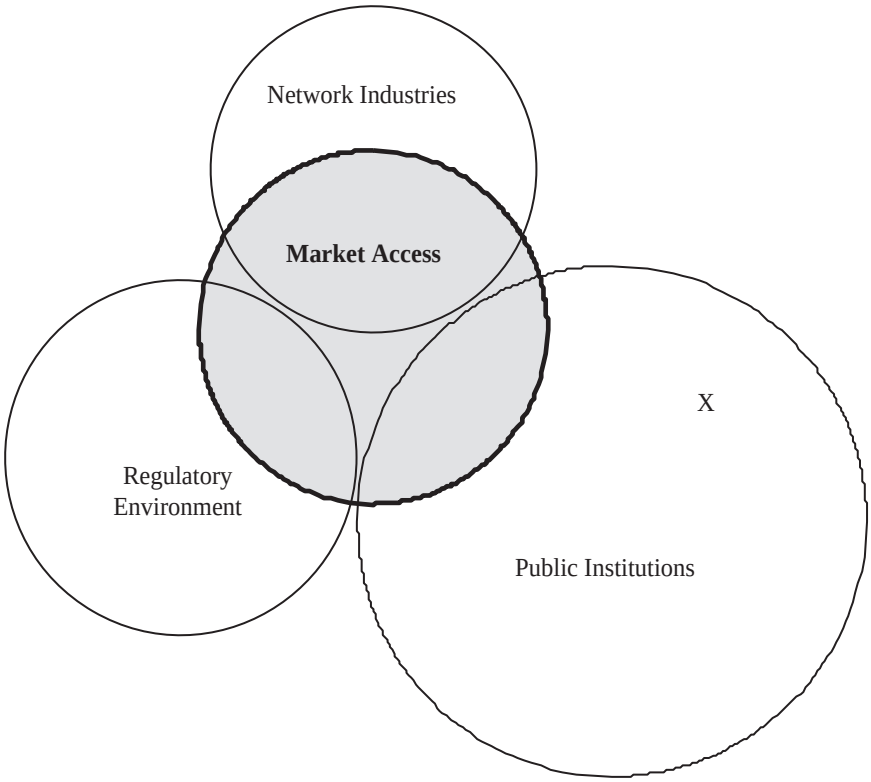


Figure 1: Components of Market Access Index

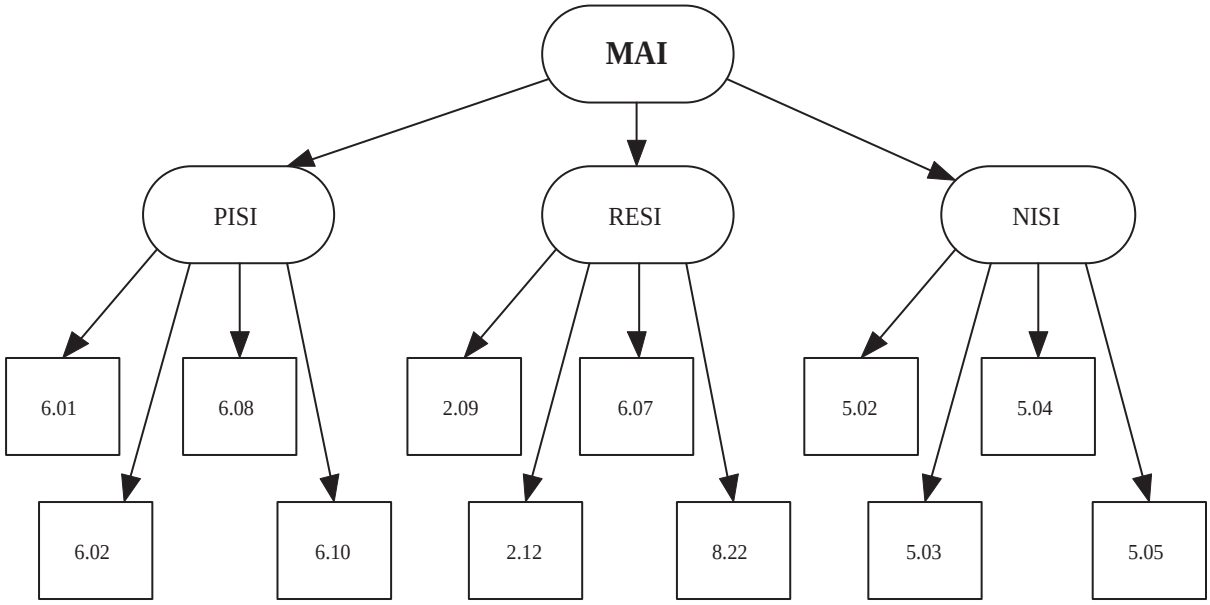


Figure 2: Market Access Index Model

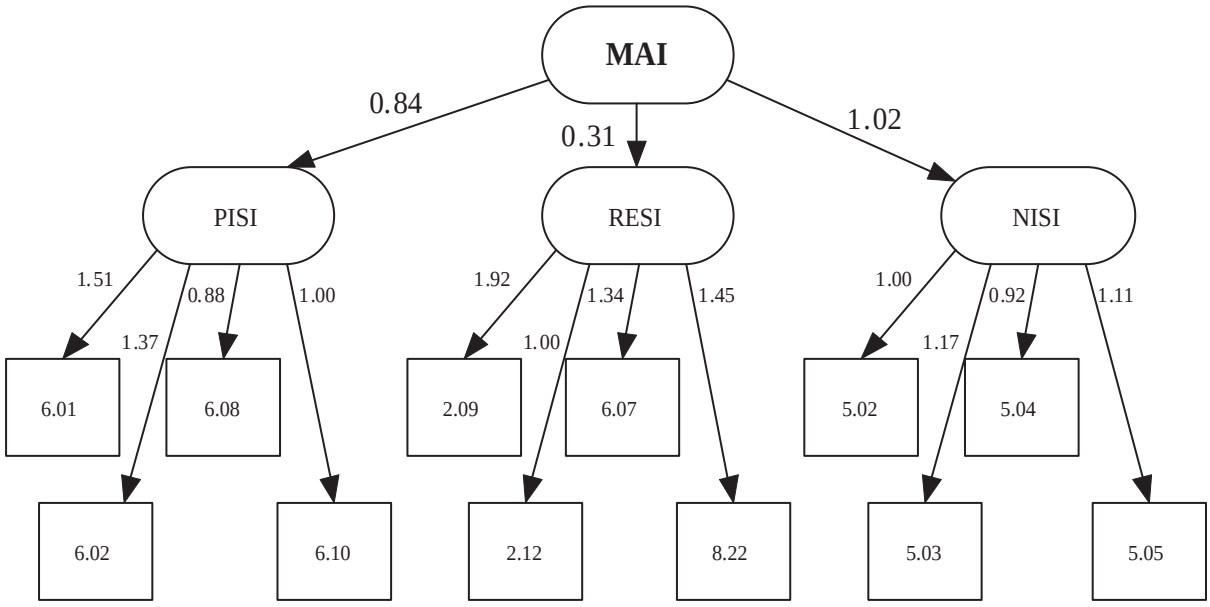


Figure 3: Market Access Index with SEM Factor Loadings

Table 1: Descriptions of the Variables

| | | |
|---|---|---|
| | **Public Institutions** | |
| 6.01 | Judicial Independence | Is the judiciary in your country independent from political influences of members of government, citizens, or firms? (1 = no, heavily influenced, 7 = yes, entirely independent) |
| 6.02 | Efficiency of Legal Framework | The legal framework in your country for private businesses to settle disputes and challenge the legality of government actions and/or regulations (1 = is inefficient and subject to manipulation, 7 = is efficient and follows a clear, natural process) |
| 6.08 | Favouritism in Decisions of Government Officials | When deciding upon policies and contracts, government officials (1 = usually favor well-connected firms and individuals, 7 = neutral) |
| 6.10 | Effectiveness of Law-making Bodies | How effective is your national parliament/congress as a law-making and oversigt institution?(1 = very ineffective, 7 = very effective - the best in the world.) |
| | **Regulatory Environment** | |
| 2.09 | Prevalence of Trade Barriers | In your country, tariff and nontariff barriers significantly reduce the ability of imported goods to compete in the domestic market (1 = strongly agree, 7 = strongly disagree) |
| 2.12 | Agricultural Policy Costs | Agricultural policy in your country (1 = is excessively burdensome for the economy, 7 = balances the interests of tax-payers, consumers and producers) |
| 6.02 | Burden of Government Regulation | Complying with administrative requirements (permits, regulations, reporting) issued by the government in your country is (1 = burdensome, 7 = not burdensome) |
| 8.22 | Foreign Ownership Restrictions | Foreign Ownership of Companies in your Country is (1 = rare, limitted to minority stakes and often prohibited in key sectors, 7 = prevalent and encouraged.) |
| | **Network Industries** | |
| 5.02 | Railroad Infrastructure Development | Railroads in your country are (1 = underdeveloped, 7 = as extenisve and efficient as the world's best) |
| 5.03 | Port Infrastructure Quality | Port facilities and inland waterways in your country are (1 = underdeveloped, 7 = as developed as the world's best) |
| 5.04 | Air Transport Infrastructure Quality | Passenger air transport in your country (1 = infrequent and inefficient, 7 = as extensive and efficient as the world's best) |
| 5.05 | Quality of Electricity Supply | The quality of electricity supply in your country (in terms of lack of interruptions and lack of voltage fluctuations) is (1 = worse than in most other countries, 7 = meets the highest standards in the world) |

All data come from the WEF. The numbers in the first column correspond with the numbers and variables determined by Lopez-Claros et al. (2005).

Table 2: Factor Loadings and Weights of MAI Index and Sub-Indexes

| Path | Factor Loadings ($\lambda$) | Weights ($w$) |
|---|---|---|
| MAI → PISI | 0.84 | 0.39 |
| MAI → RESI | 0.31 | 0.14 |
| MAI → NISI | 1.02 | 0.47 |
| PISI → 6.01 | 1.51 | 0.32 |
| PISI → 6.02 | 1.37 | 0.29 |
| PISI → 6.08 | 0.88 | 0.18 |
| PISI → 6.10 | 1.00 | 0.21 |
| RESI → 2.09 | 1.92 | 0.33 |
| RESI → 2.12 | 1.00 | 0.17 |
| RESI → 6.07 | 1.34 | 0.23 |
| RESI → 8.22 | 1.45 | 0.27 |
| NISI → 5.02 | 1.00 | 0.24 |
| NISI → 5.03 | 1.17 | 0.28 |
| NISI → 5.04 | 0.92 | 0.22 |
| NISI → 5.05 | 1.11 | 0.26 |

All factor loadings are at least statistically significant at the 0.01 level.
$\chi^2/df = 2.27$; $AGFI = 0.96$; $SRMR = 0.04$; $NFI = 0.92$; $CFI = 0.95$

Table 3: Market Access Index

| | MAI | | PISI | | RESI | | NISI | | PCRGDP | |
|---|---|---|---|---|---|---|---|---|---|---|
| Country | Rank | Score | Rank | Score | Rank | Score | Rank | Score | Rank | Score |
| UAE | 27 | 4.71 | 41 | 4.03 | 14 | 4.92 | 22 | 5.22 | 25 | 23818 |
| Tunisia | 29 | 4.68 | 28 | 4.59 | 31 | 4.54 | 31 | 4.79 | 58 | 7732 |
| Qatar | 35 | 4.44 | 24 | 4.73 | 33 | 4.51 | 46 | 4.18 | 17 | 28919 |
| Kuwait | 37 | 4.35 | 29 | 4.56 | 68 | 3.96 | 42 | 4.28 | 36 | 16066 |
| Jordan | 41 | 4.26 | 35 | 4.28 | 35 | 4.51 | 47 | 4.17 | 77 | 4383 |
| Bahrain | 48 | 4.02 | 56 | 3.43 | 23 | 4.67 | 41 | 4.32 | 34 | 18817 |
| Morocco | 60 | 3.58 | 64 | 3.25 | 89 | 3.75 | 59 | 3.81 | 80 | 4227 |
| Algeria | 80 | 3.19 | 70 | 3.11 | 100 | 3.54 | 77 | 3.14 | 65 | 6722 |