Trade Openness and Economic Growth:

Evidence From Mauritius

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TRADE LIBERALIZATION AND ECONOMIC PERFOMANCE: AN OVERVIEW

ABSTRACT

The idea that international trade is an engine of economic growth dates from long back, and even now an overwhelming body of literature affirms a strong and positive link between trade liberalization and economic development. However, most of these studies focused on developed countries. Indeed, while literature from developing countries are scant, those from Small Islands Developing States (SIDS), like Mauritius are almost nonexistent.   The long-held belief of an underlying positive association between trade liberalization and growth has prompted trade liberalization to be a prominent component of policy advice in many developing countries. Nevertheless, despite the shift towards greater openness in developing countries, recent evidence suggest that the benefits of trade reforms have either not been as high as expected, or response across countries have been varied - with some benefiting, and others losing from the trade reform. Taking into account the diverging response of trade liberalization in different countries, and the absence of such a scrutiny in a SIDS like Mauritius, the need to rigorously analyze the link between openness and economic development has become unavoidably crucial in the island. This paper endeavors to innovatively scrutinize the relationship between trade liberalization and economic growth in Mauritius, using bi-annual data for the period 1989-2009, through a Vector Error Correction Model (VECM). The stationary properties and order of integration of the data are tested using the Augmented Dickey-Fuller (ADF) test on all the time series data. The variables are stationary at first differences, and so Johansen co-integration tests are then employed to determine whether the variables are co-integrated. In order to examine both the long run and short run relationships between trade liberalization and economic growth, the VECM is then constructed. Finally, the direction of causality between openness and economic growth is determined by applying Granger-Causality tests.

1. <u>INTRODUCTION</u>

Gains from trade are one of the earliest and most enticing discussions in economics. Not until a few decades ago however, the putative benefits from trade has been extended to include its catalytic effect on economic growth. Indeed, the relation between increased trade and economic expansion has for a long while now been deemed to be highly important. With the belief that trade liberalization is conducive to economic growth, foreign trade has been increasingly acknowledged as what Nurkse (1961) called an important "engine of growth", and Kravis (1970) later referred to as the "handmaiden of growth".   Sprouting from these strong convictions, a copious number of subsequent empirical researches have emerged. As such, the relationship between trade liberalization and economic growth has been well documented in economic literature.

Despite the differences in their econometric techniques, various authors have attempted to determine whether indeed an increased openness leads to economic expansion. This link has however generated some controversy among analysts and the debate across ideologies on the relationship has not been properly settled yet.   There is a considerable body of literature providing evidence that trade liberalization contributes significantly to economic development (Mckinnon (1973); Shaw (1973); Fry (1995, 1997); Levine (1997); Edwards (1998); Darrat (1999); Jin (2000); Wacziarg (2001) and Greenaway et al. (2002)).   According to the WTO (2008), trade liberalization not only enhances a country's access to a wider array of goods and services, and, knowledge and technologies, but also stimulates entrepreneurship in the private sector, attracts private and foreign capital, creates employment, reduces distortions in price relatives, promotes development of activities with comparative advantage and, increases foreign earnings. These factors eventually boost up economic growth. Thus, trade liberalization is now often advanced as a key element-within other policies and reforms- of any development strategy, and, is considered to be a prime source of convergence to growth. However, contrary to the wealth of literature that support the relationship that trade liberalization enhances economic development, it has been argued that an increase in openness might curb economic growth (Rodriguez and Rodrik, 1999; Clemens and Williamson, 2002; and Vamvakidis, 2002). These

studies have been more skeptical and found that the statistical significance of this correlation depends on the specification of the empirical model and the proxy variable used for openness. Moreover, critics have been quick to point out that there is no convincingly persuasive evidence that illustrates that trade liberalization is always associated with economic growth. Despite the shift in policies towards greater openness in developing countries, recent evidence suggested that the benefits of trade reforms have not been as high as expected (see Taylor, 1991; Winters, 2004). The response of growth to trade liberalization has actually greatly varied across countries, with many countries benefiting, but others being negatively affected from the trade reform. A number of explanations have been put forward for these peculiarities, among which are the timing of the reforms (some undertaken during a time of crisis), and the credibility of and the political commitment to the reforms. While it is clear that properly lowering trade barriers sends an economic upsurge, doubt still exists as to whether trade leads to a higher rate of growth in the long run. Instead, trade openness might act as a facilitator of growth processes only if it is associated with other efficient and focused development policies or trade liberalization might deliver only a one-time gain, after which the economy might grow at the same rate as before.

Although it has been well documented in economic literature, the relationship between trade liberalization and economic has not received much attention for the case of Small Island Developing States (SIDS) like Mauritius. Due to their smallness and persistent structural disadvantages and vulnerabilities, it is still unsure whether trade liberalization will trigger similar responses on the economic growth of SIDS. Moreover, with Mauritius being so strongly reliant on trade for survival, such a study might prove to be tremendously valuable for the island. This paper therefore endeavors to investigate two major questions for the case of Mauritius: first, whether indeed there is any relationship between trade liberalization and economic expansion, and, second, what are the nature and the causal direction of this relationship.

To achieve this goal, an econometric model, known as Vector Error Correction Model is constructed. The VECM enables not only the analysis of the long run and short run relationships, but also the examination of any causal relationships between stock market

development and economic growth. This framework, through which the dynamics feedbacks are captured, also permits the detection of any indirect effects among the variables.

It is believed that this paper may improve and contribute to existing research works as follows: Firstly, the intensive use of the dynamic VECM captures both the long run and the short run relationships while simultaneously allowing for the identification of any bi-directional and/or uni-directional causality between the variables of interest. Secondly, the model used uncovers any direct and indirect impacts which trade liberalization might have on the economic growth of the island. Moreover, as a spin-off from the model, possible determinants of trade liberalization can be determined, and the impact of trade liberalization on the control variables can be analyzed.

The rest of this paper is organized as follows: Section 2 reviews existing literature on the link between trade liberalization and economic growth and also discusses about trade liberalization in the island. Next, section 3 describes the trade liberalization and economic growth proxies which will be used in this study, as well as the control variables. The next section introduces the VEC model and provides empirical evidence to the Augmented Dickey-Fuller tests and the co integration test. Section 5 eventually constructs the VECM for the purpose of this study in Mauritius and provides a detailed interpretation of the results. Finally, all the conclusions deduced from the results are given.

2. RELATTED LITERATURE

The relationship between trade openness and growth is highly debated in the growth and development literature. Yet, this issue is far from being resolved. Theoretical growth studies established an ambiguous link between trade restrictions and growth. A different array of models in which trade restrictions can decrease or increase the worldwide rate of growth has been provided by the endogenous growth literature (Romer, 1990; Grossman and Helpman, 1990; Rivera-Batiz and Romer, 1991 a, b; Matsuyama, 1992). The endogenous growth approach found that trade policy has impacts on both the level of income and the long-run rate of growth of an economy through scale, allocation, spillover, and redundancy effects. On the other hand, in the neoclassical approach, neither the opening up of trade nor different patterns of specialization can play a role in affecting rate of growth; the trade patterns among countries are determined only by comparative advantage. Static (such as improvements in the allocating efficiency of resources use) or dynamic (such as imported technology or "learning-by-doing" effects) benefits can be extracted from trade. The neoclassical theory does not generally imply that trade liberalization leads to a long-run increase in the rate of growth, but only to an increase in the level of income. On the contrary, in the new growth and trade theory (post-Keynesian and Schumpeterian evolutionary model), there are mechanisms that allow trade and specialization to influence long term growth. The theoretical growth literature has however emphasized more on the relationship between trade policies and growth rather than the relationship between trade volumes and growth. Closely related though they might be, the effect of trade volumes and trade restrictions on growth may differ considerably. As such, any conclusion about the relationship between trade barriers and growth cannot be directly linked to the effects which varying trade volumes might have on growth. Since theoretical literature fails to provide a clear picture of the impact of trade on growth, we resort to empirical studies.

The growth-openness connection is also still an open question in the empirical literature. In order to determine the potential relationship, and direction of causality, if any between trade liberalization and economic expansion, an extensive range of research has surfaced - both cross country and country specific. Cross country studies encounter problems in defining and measuring openness, identifying causation and isolating trade liberalization effects. While case

studies by pass some of these problems, they can however not be generalized. Though most studies have vehemently confirmed a positive impact of openness on growth, others have either doubted or criticized the robustness of this effect.

Using cross-country regressions, Dollar (1992), Edwards (1998), Barro and Sala-i-Martin (1995), Sachs and Warner (1995), Greenaway et al. (1998), and Vamvakidis (1998) enforced the conviction that trade liberalization fostered economic growth. Ben-David (1993) and Sachs and Warner (1995) have further shown that only open economies experience unconditional convergence. Using cross sectional and panel data for the period 1960-1987, Harrison (1996) examined the relationship between openness and economic growth in developing countries basing its estimation technique on an augmented production function. The results suggested that the time period chosen for analysis is critical (longer time series data favor more evidence of the positive impact of openness on growth), thus highlighting the importance of analyzing the short-run and long-run impact of openness. Openness to international trade was seen to positively influence economic growth and Granger-causality test revealed a bi-directional causality between openness and economic growth. Results also indicated that the estimates of a variety of openness measures were more significant in fixed effects regressions than in cross-country regressions. Similar conclusions were drawn by Vamvakidis (1999) who resorted to a fixed effect model using panel data and established a positive and statistically significant correlation between openness and growth. Frankel and Romer (1999), on the other hand, used geographic characteristics to obtain instrumental variables estimates and confirmed that trade has a large, robust impact on growth. In 2005, Wong Hock investigated the impact of openness to international trade and financial development on economic growth in Malaysia. An error correction model was estimated, which indicated that openness to international trade has a significant impact on economic growth. Strong evidences that openness to international trade Granger-causes economic growth and not vice versa was also found. Soukhakian (2007) also proposed a study that empirically investigated the causal relationship between financial development, trade openness and economic growth in Japan covering the period 1960-2003. Results showed that there was a long run equilibrium relationship between financial development, trade and economic growth in Japan except between domestic credit (second

measure of financial development), trade and growth. As far as causality is concerned, economic growth is seen to Granger-cause openness, thus supporting the growth-driven trade hypothesis for Japan. Yet another study analyzing the causal linkages between trade openness and the Turkish economic growth was put forward by Yucel (2009) who employed econometric methods (the Johansen and Juselius co integration and Granger-Causality tests) during the period 1989-2007. Results indicated that while trade openness has a positive influence, financial development has a negative effect on growth. Moreover, the Granger causality test results revealed the presence of bi-causal relationship between financial development, trade openness and growth, thus favoring the view that economic policies directed at financial development and trade openness have a statistically significant impact on economic growth.

However, there is another group of studies which argue that trade has no impact on economic growth, so much so that some even claim a possible negative link between the two variables of interest. Using cross-section data for a period spanning over 1920-1990, Vamvakidis (2002) analyzed the relationship between openness to international trade and economic growth in developed and developing countries. The results revealed that there was no positive relationship between openness to international trade and economic growth before 1970. The correlation was even found to be negative in the 1930s, thus hinting that the positive relationship between openness to international trade and economic growth was only a recent phenomenon. The findings indicate that domestic trade policy must be set in relation to the trade policy followed by the world and that openness fosters growth when protection in the world economy is low. Moreover, Hassan and Islam (2005) analyzed the role that financial development and openness played on economic growth in Bangladesh during the period 1974-2003. Again, the econometric method used involves Granger-causality test and Johansen co-integration test. No co integration relation was detected in the study, and Granger-causality detected no causal relationship between trade openness and growth, and financial development and growth.

A number of studies have also provided evidence of the indirect impact which openness has on economic growth through investment and productivity.   Levine and Renelt (1992) found that the positive impact of openness on growth is indirect, through higher investment, and that the

direct impact is not robust to extreme-bounds analysis. Several cross sectoral studies for individual countries also reveal the indirect impact of openness on growth through productivity (see Hay (2001), and Ferriera and Rossi (2001) for Brazil, Jonsson and Subramanian (1999) for South Africa and Lee (1996) for Korea).

The impact of openness on growth is however highly sensitive to the measure of openness used. The lack of clear definition of what is meant by trade liberalization or openness is the most common problem faced by analysts. Lately though, the meaning of openness has become similar to the notion of free trade- a trade system where all trade distortions are eliminated. It is crucial to realize that varying openness measures have different linkages with growth. Nonetheless, empirical studies have not been clear on this issue. As a matter of fact, Harrison (1996) revealed that although most of the openness proxies have positive estimates, only some of them are significant in cross-country growth regressions. The robustness of the positive correlation between openness and growth found in Dollar (1992), Sachs and Warner (1995), Ben- David (1993) and Edwards (1998) was also questioned by Rodriguez and Rodrik (1999). The latter also demonstrated either due to their shortcomings in the openness measures used, or due to a lack of control of other important growth determinants, or even as a result of weak econometrics, the studies were not robust. The most basic measure of openness is the trade shares, which is the sum of exports and imports divided by GDP. A large number of studies used trade shares in GDP and established, as reviewed in Harrison (1996), a positive and strong relationship with growth. Another measure of trade liberalization used is a measure of trade barriers that encompass average tariff rates, export taxes, total taxes on international trade, and indices of non-tariff barriers.   Mixed empirical results were reported by numerous studies which explored the link between average tariff rates and growth: Lee (1993), Harrison (1996), and Edwards (1998) found a significant and negative relationship between tariff rates and growth while Edwards (1992), Sala-i-Martin (1997), and Clemens and Williamson (2001) concluded that this relationship is weak. Rodriguez and Rodrik (2001) however argued that most of these studies assumed, without any theoretical evidence, that trade restrictions are always detrimental for growth regardless of the countries' development level and size. The third possible openness proxy includes bilateral payments arrangements (BPAs) as a measure of the trade orientation of countries (see Trued and Mikesell (1955), Triffin (1976), and Auguste (1997)).The fourth proxy involves exchange rates

measured as the black market premium, frequently used to show the severity of trade restrictions. Most of these of studies reported a significant and negative relationship between the black market premium and growth (Harrison (1996), Edwards (1998), and Sala-i-Martin (1997)). However, Levine and Renelt (1992) and Rodriguez and Rodrik (2001) argued that it might be misleading to use the black market premium as a measure of the severity of trade barriers due to the high correlation between the black market premium and a number of ''bad'' policies and outcomes- high inflation, severe external debt problems, a high degree of corruption, a less reliable bureaucracy, and ineffective law enforcement.

Other than the difficulty in choosing a proxy for openness, empirically establishing the link between liberal trade and growth is subject to three more difficulties: the difficulty of measuring trade across countries, establishing the direction of causality and the need to combine trade policies with other good policies for ensuring a long term impact on growth (see Winters (2003) for more details).

True though it is that liberal trade policies are likely to boost the economy, they need to be complemented with other good policies as well to ensure a longer term effect on growth (see Winters (2004) for more details). Corruption is one of the most important dimension through which trade liberalization is linked to growth. Wei (2000) finds evidence from two cross country relationships and attributes the link to the fact that corruption induces greater loses in open countries and as a result, increases incentives to develop better institutions in those economies. Romer (1993) on the other hand demonstrated that inflation is lower in open economies, suggesting that since it is more costly for them, the open economies exercise more caution in avoiding it. Moreover, a proper investment policy is also argued to be an important route through which trade liberalization has been effective in promoting growth (Taylor, 1998; Wacziarg, 2001). Rodrik et al (2002) found that openness has a positive indirect impact on incomes as it partly explains the quality of institutions. Education is also found to be another concomitant policy to ensure that openness enhances long term growth. Indeed, openness is found to stimulate the need for education (Wood and Ridao-Cano, 1999), which eventually triggers productivity and growth.

This trade-growth relationship is of particular importance for Small Islands Developing States, where trade openness is usually higher than in developing countries and least developed countries (Santos-Paulino, 2011). Indeed, openness was seen to greatly enhance economic development in SIDS such as Bahrain (Sinha, 1999), Jamaica (Edwards, 1997), and Sri Lanka (Paudel and Perera, 2009). The statistically significant positive impacts of trade liberalization on growth confirm the high dependence of the SIDS' economic performance on openness. However, their relatively acute dependence on trade liberalization simultaneously magnifies their vulnerability to trade shocks and thus sharpens the susceptibility of their economy to high international trade exposure.

Overall, most studies acknowledged a positive link between openness and economic growth despite the varying methodologies and openness proxies used. The impact of trade openness on growth was also found to be indirect in some cases, targeting first productivity or investment, before boosting the economic development. Moreover, to optimize the gains from trade, trade policies should often be properly complemented with other policies. However, as noted by Rodriguez and Rodrik (1999), many papers were characterized by a lack of care in dealing with issues related to endogeneity and measurement errors, thus questioning the robustness of the results.

3. <u>TRADE LIBERALIZATION IN MAURITIUS</u>

The role of trade in the traditional four-pillar economy (sugar, textile, tourism and financial services) of Mauritius is of paramount importance. Despite having previously proven to be a striking example of an export oriented economy development, with the perpetual global trends of trade liberalization, Mauritius has eventually shifted its focus to promoting an open economy. In 1995, Mauritius became a member of the World Trade Organization (WTO), and as such committed itself to the WTO agreements, designed to promote trade openness among nations. In an attempt to enhance trade, Mauritius also became a member of the Common Market of Eastern and Southern Africa (COMESA), the Southern African Development Community (SADC), the African Economic Community, and the Indian Ocean Commission (COI).

Mauritius had preferential access to US and EU markets as its sub-Saharan counterparts. However, its political context, institutional framework and strong human capital foundation enabled it to grow and reduce poverty to a greater extent than its fellow sub-Saharan African countries. In the 1970s, Mauritius followed a policy of import substitution, which involved protecting certain domestic industries from outside competition by keeping tariffs at high levels. This policy reduced the country's reliance on outside imports. Policymakers however soon realized that the small domestic market offered little scope for import-competing firms to thrive. Alternatively, an export-led strategy was recommended, following which, an export-processing zone (EPZ) was established in the island. The EPZ Act of 1970, which catered exclusively to the export market, was originally intended to attract foreign direct investment by offering incentives such as duty-free imports of machinery, raw materials and other inputs, substantial tax holidays, subsidized power rates and factory space, free and unlimited repatriation of profits and dividends, and access to concessional credit. Mauritius' export processing zone saw a boom of clothing exports (on which it also had preferential access into the EU) and investment at home. This was combined with a domestic sector that was highly protected until the mid-1980s (UNDP, 2003).During the period 1979-1990, Mauritius was seen to have a dual trade regime, where the EPZ has coexisted with a traditionally conservative import protecting sector. The policy exempting domestic import competing firms from payment of duties on imported inputs was

terminated, and, a substantial increase from 13.2% to 17% was implemented on Stamp duty on import goods. Export was simultaneously promoted by the setting up of the Mauritius Export Development and Investment Authority (MEDIA) in 1984 to catalyze foreign investment in the EPZ and market EPZ products abroad, and, the Export Credit Guarantee Scheme was introduced in 1981. Moreover, though the Development Certificate scheme (used to foster the establishment of import-substituting industries) was phased out in 1984 and quantitative restrictions were dismantled on all imports between 1984 and 1985, import licensing was only terminated in 1991. Having been heavily dependent on trade taxes for revenue, import duties have continuously been an important source of revenue for the island. By 1993 however, all export taxes were abolished.   Eventually, spanning over the years 1994-2001, a series of tariff reforms have emerged: import levy was abolished, the number of tariff rates plunged from 60 to 8 following the conclusion of the Uruguay Round, the maximum customs duty shrank from 600% to 100%, discriminatory tariff regime against "non-scheduled" countries (minor trading partners of Mauritius) trade was eliminated, and, duties were minimized on more than 4000 items.   Furthermore, excise duties which have traditionally been collected on the locally manufactured goods, were extended to some import products (tobacco, cigarettes and wine). However, the calculation methods for excise duties were different for imported goods (rates applied were ad valorem) and, locally manufactured goods (taxed on a per unit basis). This resulted in higher excise duty rates on imports, which were an infringement to the WTO non-discrimination rules. To resolve the matter, the rates of excise duties were later equalized in 2001.

Major trade related reforms have been undertaken since 2001 and these have had serious repercussions on the Mauritian economy. The SADC Trade Protocol, which became effective in 2000, called for the establishment of a free trade area (FTA) among member states and was launched in 2008. It was agreed that each member country would lower its tariffs on intra-regional trade by given percentages over the next few years. Moreover, with the dream of metamorphosing into a duty free island, Mauritius has reduced its tariff rates and the number of duty-free lines increased to about 79% of all tariff lines. Under the Cargo Fast Track Programme, attempts to accelerate customs clearance have led to the implementation of a channel system in

2003 and a new "blue" channel in 2007, thus enabling paperless customs clearance.   On the other hand, 2005 has witnessed the elimination of the differentiation in tariff rates based on the source of imports (scheduled or non scheduled). Soon after, in 2006, the differences between the rates of excise duties on imported and local goods were also terminated and a VAT of 15% was applied to both imported and domestically manufactured goods. Mauritius has also enacted several property laws, directly attempting to conform its legislation to the WTO Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS).

The preferential market access Mauritius has previously benefited from the Multi Fibre Agreement (MFA) has been crucial in the development of the Export Processing Zone (EPZ) and the Mauritian economy. The agreement works on a bilateral quota system designed to protect clothing and textile manufacturers in developed countries and also facilitate market access for developing countries.   However, with the inclination towards an increasingly liberal world market, Mauritius has been called upon to compete on an equal footing with lower cost countries. Indeed, the phasing out of the MFA in 2004 and the Africa Growth and Opportunity Act, coupled with the gradual phasing out of agricultural subsidies in Europe, including cuts in sugar price under the Lome Convention (which allowed the country an export quota of 300,000 metric tons, at a price which is generally quite higher than that paid on the world market) by the European Union in 2006, have not only opened the market increasingly to competition from very large-volume, low-cost producers in other countries, but also caused Mauritius to gradually lose its comparative advantage from low cost producing economies. Moreover, with the Export Processing Zone focusing predominantly on the export of clothing and textiles to Europe, the manufacturing sector which had rapidly expanded in Mauritius owing to previously duty free export under the MFA, has been seriously hit by the closure of several firms in the industry. The export interests of Mauritius in textile and sugar have indeed been indirectly and harshly affected.

Overall, trade policies in Mauritius have become less restrictive and less discriminatory, confirming the island's stance in the trade related reform program it has been implementing

during the past years. As it happens, the MFN Tariff Trade Restrictiveness Index (TTRI) plunged to 3.1 % in 2009, making the country's trade regime even much less restrictive than that of Sub-Saharan Africa (SSA) -11.3%, and ranking it 13th among 125 countries (with 1st being least restrictive). Mauritius also enjoys favorable access to foreign markets, with a Market Access TTRI including preferences of 0.8%, compared to SSA (3.9%). However, the Logistics Performance Index (LPI) recorded a poor 2.72 out of 5, reflecting nonetheless a relatively higher extent of trade facilitation in the island than in SSA.

4. <u>METHODOLOGY AND DATA ANALYSIS</u>

With data spanning over a period from 1968 to 2010, the study investigates the impact of openness the economic growth of the island. The model used in this research adopts a similar econometric framework (related to growth modeling) as Khadaroo and Seetanah (2007, 2008) for the case of Mauritius whereby the authors used a standard production function derived from the augmented Solow-type model. This is also in line with the contributions of Romer (1990) to the development of the new growth theory, and of Levine and Renelt (1992) to the search for a set of variables for modeling growth (see Barro, 1991; Mankiw, Romer and Weil, 1992; Gould and Ruffin, 1995; Easterly, 2001 and Li and Liu, 2005 among others). The econometric model thus takes the following functional form:

$$GDP = f\ (PRIVT, PUB, OPEN, EDU, FD) \tag{1}$$

where *GDP* denotes the total output of the country, PRIVT the private physical capital of the country, PUB the public capital investment ratio, OPEN the level of openness of a country, *EDU* the secondary enrolment ratio that accounts for the quality of labor, and FD the financial development measure of the country.

In the growth literature there exist a unanimous consensus (see Delong and Summers, 1990, 1994; Reinhart, 1989 and more recently Sala-i-Martin, 1997 and Arin 2004) on the role of private investment in promoting economic performance, possibly because technological change is embodied in recent vintages of capital. As such, PUB is included as the latter also has solid empirical underpinnings and forms part of investment (see Aschauer, 1989; Pareira, 2000 and Seetanah, 2008, 2009)

OPEN, which proxies for the level of openness of the country is also included in the economic model following the work of Dollar (1992), Sachs and Warner (1995) and Edwards (1998). These authors supported the idea that increased trade openness raised economic growth through various channels: increased specialization, efficient allocation of resources (owing to

comparative advantage), transmission and smoother adoption of international knowledge (including new technological advances through trade), magnified domestic competition (as a consequence of international competition), better access to bigger markets, a heightened development of R&D through increasing returns to innovation, and also ensuring that developing countries have better access to investment and intermediate goods (which is vital to their development processes).

A measure of education (*EDU*) is also added to account for the quality of labor. This follows the arguments and empirical evidences of Mankiw, Romer, and Weil (1992), Barro (1998) and more recently Temple (2001). Human capital can be thought of as affecting economic growth in the sense that workers with higher levels of education or skills should, *ceteris paribus*, be more productive, inventive, and innovative. Higher levels of human capital may also encourage capital accumulation, or may even raise the rate of technological catch-up for follower countries (Temple, 2001).

Furthermore, Levine, 1997 argued that financial development has an important impact on economic growth. Indeed, financial functions (mobilization of savings, allocation of resources, corporate control, risk management and ease of trading) performed by the financial markets and intermediaries lead to economic growth through capital accumulation and technological innovation. Thus, given the importance of financial development on growth, we draw from King and Levine, 1993, and include a measure of financial development, proxied by FD, in the model.

For the econometric analysis, equation (1) is expressed as a log-linear regression, where lowercase variables denote the natural log of the respective uppercase variables:

$$gdp = \alpha + \beta_1 privt + \beta_2 pub + \beta_3 open + \beta_4 edu + \beta_5 fd + \mu \qquad\qquad (2)$$

where μ is the error term.

DATA

Real Gross Domestic Product at constant price *(GDP)*, is used as a proxy for the dependent variable, and is generated from IFS. Due to the unavailability of data on capital stocks, private investment (*PRIVT*) is measured as the Gross Fixed Capital Formation by the private sector in percent of *GDP*. As for public capital (*PUB*), it is measured as the ratio of public capital investment to *GDP*. On the other hand, the proxy used for education (*EDU*) is measured as the secondary enrolment ratios, while openness (*OPEN*) is taken as the sum of export and import expressed as a ratio of *GDP*. These are standard measures used in the literature (see Barro, 1998, Sachs and Warner, 1995 and Edwards, 1998).   The *FD* proxy which measures financial development is actually taken as the ratio of M3 to *GDP* (see Levine, 1996; King and Levine, 1993; Demirgüç-Kunt& Levine, 1995). Data is extracted from the Central Statistical Office of Mauritius.

UNIT ROOT TEST

Before considering which appropriate framework of the econometric model to be used, it is important to investigate the univariate properties of all data series and to determine the degree to which they are integrated. Both the augmented Dickey-Fuller (ADF) (1979) and Phillips-Perron (PP) (1988) unit-roots tests have been employed for that purpose and the variables were all found to be I(1). Subsequently, in order to establish whether there is a long run relationship among the underlying variables, a Johansen Co integration test is done and results revealed the presence of a co integrated relationship with one co integrating vector. Results are shown below:

Table 1: Summary results of Unit Root Tests in log level form: ADF and PP Tests

Variables (in log)	Lag selection	Aug. Dickey Fuller	Phillips Perron	Critical Value	Variable Type	ADF (time trend (t)	Critical Value	Variable Type
gdp	1	+1.48	+2.56	-2.924	*I(1)*	-2.22	-3.51	*I(1)*
privt	1	+1.19	-2.288	-2.924	*I(1)*	-1.35	-3.51	*I(1)*
pub	1	-0.11	+0.28	-2.924	*I(1)*	-1.47	-3.51	*I(1)*
open	1	-1.14	-0.87	-2.924	*I(1)*	-2.18	-3.51	*I(1)*
edu	1	+0.97	+2.96	-2.924	*I(1)*	-1.16	-3.51	*I(1)*
fd	1	-1.25	-0.54	-2.924	*I(1)*	-0.76	-3.51	*I(1)*

Table 2: Summary results of Unit Root Tests in first difference: ADF and PP Tests

Variables (in log)	Lag selection	Aug. Dickey Fuller	Phillips Perron	Critical Value	Variable Type	ADF(with time trend(t)	Critical Value	Variable Type
Δgdp	0	-8.59	-8.76	-2.936	*I(0)*	-8.97	-3.508	*I(0)*
$\Delta privt$	0	-8.79	-5.27	-2.936	*I(0)*	-8.68	-3.508	*I(0)*
Δpub	0	-4.08	-4.99	-2.936	*I(0)*	-4.07	-3.508	*I(0)*
$\Delta open$	0	-5.09	-3.49	-2.936	*I(0)*	-5.18	-3.508	*I(0)*
Δedu	0	-4.27	-3.77	-2.936	*I(0)*	-4.48	-3.508	*I(0)*
Δfd	0	-4.79	-2.96	-2.936	*I(0)*	-5.09	-3.508	*I(0)*

JOHANSEN COINTEGRATION TEST

Next, the presence of a long run relationship is investigated by testing for the presence of a co integrating relation through the Johansen Test. To do so, the order of the VAR for the above variables is first selected, after which, a multivariate co integrating VAR is then specified in k, trans, nontrans and l including an intercept as its deterministic component. According to SBC, a VAR of order 2 is chosen. At this stage, a prior point must be underlined: the asymptotic distributions of the co integration tests depend on the deterministic components in the system. In

particular, these tests are conditional on the possible presence of a constant or a linear deterministic trend in the long run relations. Since we have turned down the possibility that these series have a linear drift (as a preliminary estimation a time trend turned out to be insignificant), the co integrating rank tests have been investigated in a system with an unrestricted constant with no linear deterministic trend.

The ensuing step is to test the number of co integrating relationships that exist between the variables of the system by running a co integration test on the VAR of order 2, with unrestricted intercept and no trends. Results of co integration rank by Johansen procedure are reported in Table 2. Evidence from both the trace and maximal eigenvalue tests suggest that there is at most a single co integrating vector or analogously 2 independent stochastic trends within the equation. This implies that at 5% significance level, the trace value and maximum eigenvalue tests both indicate the presence of one co integrating vector, thus indicating that the underlying variables are co integrated, reinforcing the Engle-Granger results performed earlier.

Table 3: Test result from Johansen procedure

	Null Hypothesis	Alternative Hypothesis	Test Statistic	Critical Value 5%	Critical Value 10%
Maximal eigenvalue of the stochastic matrix	$r=0$	$r=1$	61.34	33.64	31.02
	$r<=1$	$r=2$	21.32	27.42	24.99
	$r<=2$	$r=3$	10.23	21.12	19.02
	$r<=3$	$r=4$	9.25	14.88	12.98
	$r<=4$	$r=5$	2.74	8.070	6.500
Trace of the stochastic matrix	$r=0$	$r>=1$	110.22	70.49	66.23
	$r<=1$	$r>=2$	38.34	48.88	45.70
	$r<=2$	$r>=3$	17.67	31.54	28.78
	$r<=3$	$r>=4$	11.57	17.86	15.75
	$r<=4$	$r=5$	2.045	8.070	6.500

For our analysis, it is believed that a Vector Autoregressive (VAR) model would be the most appropriate. The VAR model has proven to be especially useful for describing the dynamic behavior of economic time series and for forecasting. Moreover, it often provides superior forecasts compared to those from univariate time series models and elaborate theory-based simultaneous equations models. Forecasts from VAR models are also quite flexible because they can be made conditional on the potential future paths of specified variables in the model. Thus, given the endogeneity and causality issues, using a VAR model can prove to be highly advantageous. Indeed, by adopting a VAR Model, we can also correctly analyze the effect of openness on growth, any causality which might exist between openness and growth, and also investigate other feedback and indirect effects in the hypothesized link between openness and growth. In fact the VAR resembles a series of equation where each determinant comes as the explained variable in a system which is then solved simultaneously.

Since the variables are stationary only in first difference and are co integrated, we estimated a VAR in an error correction model.

5. **ESTIMATION AND ANALYSIS**

VECTOR ERROR CORRECTION MODEL, VECM

Having established the presence of co integration, and hence a long run equilibrium relationship among the variables, the next step is to specify and estimate a VECM including the error correction term to investigate the dynamic nature of the model. The VECM specification forces the long run behavior of the endogenous variables to converge to their co integrated relationships, which accommodates short run dynamics.

In this study, the VECM is estimated to be of order 2 according to SBC. The tables below report the results of the model.

Table 4: Estimates of long run parameters

Variables	β	t-ratios
gdp	*1*	
privt	*0.772****	*-7.52*
pub	*0.26**	*-2.01*
open	*0.56**	*-1.73*
edu	*0.49****	*-6.26*
fd	*0.26****	*-3.32*

From here onwards, *, **, and *** indicate significance at 10%, 5% and 1% respectively

In the long-run, all the variables are seen to be significantly affecting economic growth. Indeed, as expected, economic development is observed to be fostered by all the variables. Most importantly, the results indicate that openness has a relatively high and statistically significant positive impact on the economic growth of the island. In fact, a 1% increase in openness is seen to cause a 0.56% rise in the economic development of the island.   Right after the relatively higher positive impact of private physical capital on growth, openness is seen to have the next highest positive influence, thus suggesting that, with time, trade liberalization will possibly become one of the most crucial drivers of the economy of Mauritius.

WEAK EXOGENEITY TEST

Ericsson et al. (1998) discussed the concepts of weak and strong exogeneity in the context of conditioning variables for the VECMs. Weak exogeneity of a variable with respect to other variables in the VAR is said to hold when the loading coefficient of the relevant variable(s) can be tested to be equal to zero in the loading matrix. If the adjustment coefficient of a dependent variable is not significant, it means that it is weakly exogenous and the VECM should be reformulated conditioning on this variable. The weakly exogenous variable will have an equation that does not include the co integrating vectors in the reformulated model, and hence will behave as a random walk variable. Weak exogeneity is a sufficient condition for the efficient inference on the parameters of interest in the conditional model (Ericsson et al, 1998).

Weak exogeneity tests on each equation were performed, and the Wald-test yields Likelihood or Chi square values enable us to reject the null hypothesis of weak exogeneity at 5% significance level in all cases and we thus proceeded with an unchanged system of equation.

ESTIMATES OF THE VECTOR ERROR-CORRECTION MODEL

Table 5: Short Run Estimates

Variables	Δgdp	$\Delta privt$	Δpub	$\Delta open$	Δedu
Constant	-1.134***	0.421***	-0.41*	-0.22	0.651**
Δgdp_{t-1}	0.123*	0.696*	0.253*	0.18*	0.273*
$\Delta privt_{t-1}$	0.474***	0.767***	0.083	0.15*	0.086
Δpub_{t-1}	0.17**	0.12**	0.343*	-0.11	0.22
$\Delta open_{t-1}$	0.242**	0.16**	-0.083	0.765*	0.037
Δedu_{t-1}	0.114**	0.082	-0.155	0.17**	0.527**
Δfd_{t-1}	0.124***	0.079**	0.032	0.034	0.095*
ECT	-0.233***	-0.153***	-0.141*	-0.282**	-0.27**
R^2	0.76	0.723	0.560	0.63	0.56

Since the variables are co integrated, in the short run, deviations from the long run equilibrium will feed back on the changes in the dependent variables so as to force their movements towards the long run equilibrium state.   The deviation from the long-run equilibrium is corrected gradually through a series of partial short term adjustments, the cointegration term or the error correction term (ECT).   It indicates the speed of adjustment of any disequilibrium towards the long-run equilibrium. The negative and statistically significant error correction coefficient indicates a satisfactory rate of convergence to the equilibrium state per period, that is, the temporary deviations are pushed back to the long run equilibrium once the deviation occurs.

Examining the short run estimates of the equation having **GDP**as the dependent variable, we discern that the openness variable has a statistically significant positive influence on economic growth. As a matter of fact, a short run increase of 1% in **opns**induces an increase of 0.242% in**GDP**. Thus, even in the short run, trade liberalization is undeniably seen to have a positive causal impact on the economic growth of the island. This is in line with Yucel (2009), Wong Hock (2005) andFrankel and Romer (1999).   All the other control variablesalso enhance economic growth, with private physical capital and openness playing the greatest role. A short run 1% increase in **privt**actually causes a rise of 0.474% in **GDP**.The 76% R-squared confirmed that economic growth in Mauritius is appropriately explained by the model.

Next, the short run result with the openness as dependent variableis analyzed. **GDP** has a relatively small causal impact on**opns**. This leads to the conclusion that a bi directional causality exists only between economic growth and openness. Furthermore, the methodology can help establish some determinants of openness. Interestingly, private physical capital, the quality of labor, and economic growth are seen to trigger trade liberalization in the short run.

The impact of openness on the other variables is now examined. Other than promoting economic growth, the table also reveals that openness stimulates private physical

capital at 5% significance level (refer to the equations $privt$ as dependent variable). Indeed, a 1% rise in the openness generates a 0.16% rise in the private physical capital.

Another impressive result is the indirect effect of the stock market development on GDP. Considering the GDP equation, we notice that a percentage increase in $privt$ generates a 0.474% rise in GDP while the $privt$ equation demonstrates that a 1% increase in $opns$ leads to an increment of 0.16% in $privt$. Combining these two effects yields an indirect 0.474×0.16 percentage point increase in GDP after a year. This is actually the indirect effect that trade liberalization has on GDP through $privt$.

The VECM results thus confirm the existence of a definite causality between trade liberalization and economic growth, at least in the short run.

6. <u>CONCLUSION</u>

This study empirically investigates the causal links between trade liberalization and economic growth in Mauritius during the years 1968-2010 within a VECM framework. The econometric methodology employed was the Cointegration and Granger Causality test. First, thestationary properties of the data and the order of integration of the data were tested using both the AugmentedDickey-Fuller (ADF) test and the Phillip-Perron (PP) test. It was found that the variables were non-stationary inlevels, but stationary in first differences, that is, they are integrated of order one 1(1). The Johansenmultivariate approach to cointegration test was then applied to test for the long-run relationship among the variables. Results indicated the presence of 1 cointegrating vector, thus confirming the presence of a long run relationship among the underlying variables. The VECM model was then estimated. Significant positive links were revealed both in the long-run and the short-run, indicating thatopenness is an important engine of economic growth in the island. It is important to realize that the coefficients of the short run estimates were however smaller than the long run ones, thus suggesting that the absolute effect of trade liberalization would be seen later in time. In the long run, the results demonstrated thatopenness enhances growth. In the short run however, the VECM table depicted the presence of a bi-directional causality between the trade liberalization proxy and economic growth. Yet another major result from the VECM framework shows that trade liberalization indirectly promotes economic growth by boosting private physical capital in the short run. Trade liberalization thus proves to be an important ingredient for growth in the island. If these findings are seriously considered by policy makers, it is pertinent that policies enhancing both growth-led trade and trade-led growth can be successfully pursued inMauritius, which will undoubtedly benefiteffectively from international trade.

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