Determinants of Investment in Small Very Open Economies: An Exploratory Study

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Abstract

It is generally agreed that investment plays a key role in any economy's economic growth or development. The present study revisits the determinants of investment in small very open economies (SVOEs) facing foreign exchange constraints that cannot be alleviated by changes in relative prices. It is part of a larger project dealing with the relationship between investment, saving and the current account in SVOEs. The theoretically derived investment model encompasses information from the traded sector as well as the non-traded sector and contains a number of key determinants. Among the latter, three are worth mentioning: capacity utilisation, exchange market pressure, and average labour return. The model is tested using six countries which fulfill the characteristics of SVOEs. Although the period of investigation is country based, it, nevertheless, remains in the confines of the period from 1970 to 2014. The study adopts a pure time series approach. It uses an eclectic methodology comprising correlation analysis, the autoregressive distributed lag modeling by Pesaran *et al.* (2001), and difference variable modeling, to assess the extent to which data confirm the theory embedded in the model. Despite data limitations and other econometric issues, the study is able to show that the overall state of economy (output), capacity utilisation and exchange market pressure are important determinants of investment in SVOEs. This major finding has policy implications.

Key words: investment, saving, small very open economies, ARDL, capacity utilisation, exchange market pressure, average labour return.

JEL Classifications: O16, E22.

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1. Introduction

It is generally agreed that investment plays a key role in any economy's economic growth or development. Indeed, although at various degrees, the majority of schools of economic thought acknowledge the importance of investment in growth process. Nevertheless, to fully comprehend the impact of investment on economic growth, it is useful to analyze the dynamics of investment itself. To recall, total investment as an addition to capital can be disaggregated into domestic investment and foreign direct investment[1]. While there is an abundant literature on foreign direct investment, the literature on gross capital formation is rather meager.

The present paper revisits the determinants of investment (gross capital formation) in the context of small very open economies (SVOEs)[2] facing foreign exchange constraints that cannot be alleviated by changes in relative prices. It is part of a larger project dealing with the relationship between investment, saving and the current account in SVOEs. While at the theoretical level, it is realized that in SVOEs investment in the tradable sector should have a much larger impact on future economic growth than investment in the non-tradable sector because the foreign exchange surplus generated in the tradable sector from the net export of goods and services helps cover the import requirements of the non-tradable sector (see Section 2 for the argument), in practice, because of the issue of data availability for tradable and non-tradable investments, only the aggregate investment is examined here. Nevertheless, the theoretically derived investment model encompasses information from the traded sector as well as the non-traded sector and contains a number of key determinants.

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[1] There are other types of disaggregation: private investment and public investment; investment in tradable sectors and investment in non-tradable sectors.

[2] SVOEs are economies that face a foreign exchange constraint due to their limited economies of scale, their price taker position and their international competitiveness in a very limited number of activities.

The latter include: capacity utilisation, expected growth of real GDP, average labour return in the tradable sector, average return in the non- tradable sector, interest rate, exchange market pressure and nominal income. The model is tested using six countries which fulfill the characteristics of SVOEs. The overall period of investigation goes from 1970 to 2014[3]. The following countries are of interest: Barbados, Belize, Cape Verde, Seychelles, Luxembourg and Fiji. Because with six countries the panel is too short to have good panel data properties, we resort to time series approach. Thus, each country is examined individually with the hope of drawing some conclusions for the whole set of countries. An autoregressive distributed lag (ARDL) approach to cointegration by Pesaran *et al*. (2001) is used to examine the relationship between investment and its determinants. This approach has three clear advantages over its immediate competitors: (i) smallness of sample size is not a hurdle[4], (ii) issue of endogeneity of variables is graciously solved, and (ii) non-stationary variables and stationary variables can be mixed. Nevertheless, if the ARDL does not fit the data, then the difference variable methodology becomes of interest.

The study contributes to the literature in three meaningful ways. First, this is an important add-on to the literature on the determinants of investment, which as underlined above, is rather meagre. Indeed, the studies that can be cited as studies on the determinants of aggregate investment, and not foreign direct investment, are very few (Heim 2008; Krkoska 2001; Ndikumana 2000; Griffith 1998; Fielding 1993; Bernanke 1983, to name some). In addition, some of our investment determinants rarely appear in the list of investment determinants in other papers.

Second, this is a rare study which deals with the SVOEs and claims that the latter need a different treatment. It is the case, for example, because of smallness, openness, and other peculiar

[3] In reality, various periods are used following data availability.
[4] In our view, this goes as far as the algorithm can be executed.

characteristics, the distinction between tradables and non-tradables becomes extremely important to understand investment behaviour.

Third, from methodological point of view, this is among the very few studies which utilize the ARDL approach to cointegration to scrutinize the behavior of investment.

The paper is organized as follows. Section 2 sets up the argument for investment, particularly in tradables. Section 3 derives the investment model that suits small very open economies and exploits information from tradable and non-tradable sectors. Section 4 concentrates on data analysis and estimation methodology of the model. Section 5 contains the empirical results and their interpretations. Section 6 concludes the paper.

2. The Motivation or the Argument for Investment in SVOEs

The engine of growth in the small very open economy (SVOE)[5] is really investment in the tradable sector. Indeed, such economies heavily depend for their growth on investment in those internationally tradable activities in which they have or can create a comparative advantage. There is no scarcity of finance for investment in these activities, because they are seen to be profitable by international investors, who compete with domestic savers for these investment opportunities. As a result, it is the inherent profitability of the investment which sets an upper limit on the rate of investment in tradables, not the domestic savings rate. If domestic savings are insufficient, the inherent profitability assures an unlimited supply of foreign finance to close the gap.

[5] SVOEs are economies that face a foreign exchange constraint that cannot be alleviated by depreciation of the real exchange rate or any other policies (See Worrell, 2012).

The rate of growth of tradables determines the overall growth rate of the small open economy. This is so because the non-tradable sectors depend on the foreign exchange surpluses of the tradable sector to provide for their import requirements, since by definition they generate little foreign exchange themselves. A fundamental distinction between the SVOEs and large more self-contained economies is the very high propensity to import. Because small size limits economies of scale, the typical SVOE achieves an internationally competitive scale of production in only a handful of activities, compared to the wide range of consumer and producer goods in the typical national consumption basket. The rate of growth of non-tradables is limited by the foreign exchange that is available from the receipts of the tradable sector, after that sector has taken care of its own needs.

The narrow range of export goods and services which characterizes SVOEs is a vital and unalterable structural feature of these economies which is seldom acknowledged. Economies of scale are universal in international trade, and informational and other transactions, organisational and procedural costs are high. If the country is very small, its limited human and physical capacity to surmount these challenges has to be sharply focused on the activities where its international comparative advantage is most evident. As a result, we find that SVOEs are characterised by a narrow range of internationally competitive exports and services (See Moore, Beckles and Worrell, 2015).

These features of the SVOE have implications for economic policies to stimulate the growth of the economy, and the indicators by which economic progress is measured. Active policies to stimulate domestic savings to invest in non-tradables, for example in housing, have the potential to create an unsatisfied demand for foreign currency in the open market, which could possibly destabilise the economy by increasing demand for foreign exchange, and depreciating the exchange rate. It follows that a high domestic saving rate is not necessarily a positive indicator of a healthy economy in the context of the SVOE.

It is also true that policies to reduce the current account of the balance of payments may in fact reduce the potential growth of SVOEs, and a reduction in the current account balance does not necessarily indicate an improvement in economic performance. On the contrary, a deterioration of the current account may well be an indicator of an increase in potential growth, if it reflects and is balanced by new inflows of foreign investment. To appreciate this conundrum, consider a small economy which has a balanced current account to begin with: inflows from exports, foreign investment income and transfers are just sufficient to cover all import needs. Now let us suppose that a large new hotel is to be built. If the cost of construction is funded entirely from domestic sources there is a problem: how are the investors to obtain the foreign exchange to cover the imported inputs for construction and to furnish the hotel? Rather than run down foreign reserves to fund the required imports, it is clearly preferable, from the point of view of both potential growth and balance of payments stability, to borrow from abroad to fund the imported inputs. In both cases, whether foreign inputs are financed by capital inflows or a drawdown of foreign reserves, the current account deteriorates as a result of the investment but the second case is preferred because the foreign reserves are bolstered by the foreign borrowing.

The key to the assessment of the potential growth and performance of the SVOE is therefore the investment equation. In this paper we explore the determinants of investment in SVOEs, derive an investment equation and test it on data from a range of SVOEs. From the investment performance we can then make inferences about saving rates and the current account of the balance of payments.

3. Model Derivation of Investment in the foreign exchange constrained economy.

The economies to which the investment model in this paper applies are very small, and they face a foreign exchange constraint that cannot be alleviated by changes in relative prices. The reason is that their size limits the range of products and services in which they can attain an internationally competitive cost of production. Simply put, small countries will have exhausted the available physical and human resources capacity with the export of only a handful of goods and services. This contrasts with the range of imports which a modern economy needs to function. Relative price changes have no effect: demand for exports is unaffected, because the small producer in a competitive market faces a given price on the international market; imports are hardly affected, because of the limited range of domestic production of competitively priced substitutes; and any increase in the supply of exports as a result of depreciation is invariably temporary, until the depreciation passes through to input costs. Exchange rate depreciation therefore has no lasting effect on the supply and demand for foreign exchange, and it does not relieve pressure that may arise on the foreign exchange markets of SVOEs. This is the essence of the foreign exchange constraint, and it puts an upper limit to potential economic growth: the growing economy needs more imports and more foreign exchange to pay for them. [6]

[6] The mechanism of the foreign exchange constrained economy is explained in Worrell (2012). Evidence on the structural characteristics that define foreign exchange constrained economies is presented in Moore, Beckles and Worrell (2015).

The foreign exchange constraint also applies to investment, because investment goods have a high import content, like everything else in the economy. Investment in the foreign exchange constrained economy always requires a large element of foreign direct investment, typically larger than the proportion that is to be financed in local currency. That happens because of the limited amount of foreign currency earnings that are available to finance the import of investment goods. The majority of foreign earnings go towards purchase of consumer and intermediate goods. It rarely happens that the surplus of foreign earnings over consumer and non-construction related intermediate imports are sufficient to fund the desired level of imported investment goods, even if the local currency funding is available. Foreign exchange for investment falls short particularly in case of an adverse external shock, and the external constraint becomes most acute under these circumstances.

The implication of the foreign exchange constraint is that a reduction in the current account of the balance of payments of the small economy is not necessarily a good thing. As is now generally recognised, countercyclical adjustment to temporary shocks may be preferable to procyclical policies, if there is the fiscal space to permit such policy. It is important to realise that in the case of the foreign exchange constrained economy, there must be, in addition to fiscal space in local currency, a sufficient war chest of foreign reserves to ride out the shock, and to sustain imports in the face of declining foreign exchange earnings. Successful procyclical policy therefore will be evidenced by a worsening of the current account, financed by a drawdown of foreign reserves or additional foreign investment (FI). That will be the case irrespective of whether the policy is appropriate (undertaken by a government which has fiscal space, and financed by FI) or potentially destabilising (when no additional FI is available and foreign reserves are low). The logic holds true in tranquil times as well: indeed, when investment surges, with a strong element of FI, the current account worsens, even though that circumstance is probably best for growth.

Our focus in this paper is on the parameters defining what is the optimal level of investment, and therefore the maximum potential growth of production capacity, in an economy that is foreign exchange constrained. In such economies, it is the availability of foreign exchange, not the domestic saving rate, that puts a limit to investment and potential growth. Let us suppose that, in a situation where investment is fully funded by domestic and foreign savings, there is an exogenous increase in the saving rate, providing funds for additional investment of the full amount of the additional saving. That additional investment could not take place unless additional foreign exchange sufficient to finance the import content of the new investment can be sourced.

The distinction between tradable and non-tradable production is essential for understanding the motivation for investment in the foreign-exchange-constrained economy. A tradeable good or service is one which may be bought and sold on international markets, whether or not that particular commodity is actually imported or exported. Beer is a tradable commodity, whether it is a local brew or an international brand that is imported. Tax collection is not tradable: it is a service of the government to residents. Hotels and other tourism services are tradable, because they are purchased mainly by visitors from abroad. The borders between tradable and non-tradable may be disputed if we examine them by microscope, but for practical purposes the tradable sectors of most economies consist of manufactured goods, agricultural products, minerals and travel services. Other economic sectors are categorized as non-tradable.

Producers of non-tradable goods such as housing or personal services will assess their prospective markets on the basis of expected domestic demand for their output. A traditional accelerator model of investment, where the motivation for investment is the expected growth of the market demand, is therefore appropriate for non-tradables. However, anyone who produces a tradable product or service such as tourism or domestic food items faces competition from abroad. What is more, because our concern is with small economies, local producers can sell as much as they can produce at the ruling international price for products and services of comparable quality. In effect they face a limitless international demand for their production at that price. The motivation for investment in tradables is the perception that there is scope for expanding production capacity, in light of domestic cost structures. In view of this distinction between the motivation for investment in tradables and non-tradables, the investment function for foreign-exchange-constrained economies needs to include arguments representing a domestic accelerator (for non-tradable investment) and excess capacity (*xcap*), for tradable investment (Worrell, 1993).

The investment models for tradable and non-tradable investment are identical, apart from this distinction, and are in the tradition of models that appear in Agénor (2004, 63) and elsewhere. The investor's expected return will be affected by unit labour costs (*ulc*), and the user cost of capital, and the decision to invest will be affected by the prevailing degree of business confidence in economic policy and the stability of the economy. Unit labour costs are assumed to be the same across all industries[7]; the expected *average labor return (ALR)* will therefore be:

$ALR_T = p_T - ulc$, for tradable output, and

$ALR_{NT} = p_{NT} - ulc$, for non-tradable output.

The user cost of capital in small economies, where there is not an active domestic market where financial values are determined by daily trading, is best represented by a bank interest rate. We argue elsewhere that the foreign-exchange-constrained economy in effect does not have scope for an independent monetary policy (Worrell, 2012). The prevailing international benchmark interest rate (r_f) is therefore a good indicator of trends in the movement of the user cost of capital.

The measure of business confidence which best represents the observed reality in foreign-exchange-constrained economies is an indicator of pressure on the foreign exchange market. This pressure is often manifest as a severe loss of foreign reserves and/or an inflation-inducing depreciation of the exchange rate, and less frequently by an unsustainable surge in foreign reserves and exchange rate appreciation. The exchange market pressure indicator (*EMP*) frequently employed in the literature is a weighted combination of 1) changes in the exchange rate, 2) changes in foreign exchange reserves, measured against some numeraire, and 3) changes in interest rates. The justification for 1) and 2) is obvious; 3) is justified where countries can mount an effective interest rate defense to relieve pressure on the exchange rate

[7] Our thesis is that unit labour costs are proportional to levels of skill. It may therefore be the case that some industries will have higher labour costs because they employ higher average levels of skill. In order to elucidate this effect, we would need to elaborate the model to include skills differentiation, something which is not practical in the present study.

or foreign reserves. Including this variable in the case of small open economies is not justified, because the domestic financial space is too small to allow them to mount a credible interest rate defense. All such attempts in recent times have failed, for obvious reasons: you need a really big interest rate hike to make it more profitable to remain in domestic currency if there is a perceived risk of a large devaluation, and the market will not believe that such high rates can be sustained. Instead the interest rate hike is often seen as a sign of desperation, and aggravates capital flight. So for our purposes the interest rate can be neglected. The changes in the variables in the *EMP* index are weighted by their variability. Here is a suggested formula for the index, based on Van Horen, Jager and Klasssen (2006).

$$EMP = \alpha_{ER}\ \delta ER + \alpha_{FXR}.\ (\delta FXR/MO_{-1})$$

$$\alpha_{ER} = \sigma_{\delta ER}/(\sigma_{\delta ER} + \sigma_{(\delta FXR/MO\text{-}1)})$$

$$\alpha_{FXR} = \sigma_{(\delta FXR/MO\text{-}1)}/(\sigma_{\delta ER} + \sigma_{(\delta FXR/MO\text{-}1)})$$

i.e. the change in the exchange rate (δER) is weighted by its standard deviation and the change in foreign reserves (δFXR) is normalized on the previous period's money supply (MO_{-1})[8] and weighted by the standard deviation of this variable. The weights are normalised to sum to unity.

Where data permits, we will analyse the investment motivation using separate equations for tradables and non-tradables. For tradables:

$$I_T = f_t(capu,\ ALR_T,\ r_f,\ EMP) \qquad (1)$$

[8] It is preferable to use the lagged value of the money supply, because the current year's supply will be affected by the loss or gain in foreign reserves.

and for non-tradables:

$$I_{NT} = f_n(y^*, ALR_{NT}, r_f, EMP) \qquad (2)$$

Equation (1) states that investment in the tradable sector is motivated (positively) by capacity utilisation ($capu_t$), average labour return (ALR_T), the user cost of capital (r_f), and the exchange market pressure indicator (*EMP*). The motivation for investment in non-tradables (Equation (2)) is the same, except that the accelerator (i.e., the expected growth rate of domestic income, y^*) replaces the capacity utilisation variable, and the average labour return is related to non- tradables. Where separate series for investment in tradables and non-tradables cannot be found, a composite equation is employed

$$I = f(xcap_t, y^*, ALR_T, ALR_{NT}, r_f, EMP) \qquad (3)$$

The foreign exchange constraint is expressed as a Lagrangian function. Equation (3) is to be optimised subject to the overall balance of external payments and receipts:

$$\delta FXR = XGS + FDI + OK - M_k - M_{ci} \qquad (4)$$

The change in foreign reserves (δFXR) is the result of earnings from exports of goods and services (*XGS*), foreign direct investment (*FDI*), and other capital inflows net (*OK*), less spending on capital goods imports (M_k) and all other imports (M_{ci}). The demand for capital goods imports depends on the investment level:

$$M_k = f_k(I) \qquad (5)$$

To complete the model we have an export equation which recognizes that exports of goods and services are sold on a competitive international market in which the small producer is a price taker. The amount sold therefore depends on average labour return *(ALR_T)* and working capital costs (r_f) compared to the ruling market price (p_T), in the near term:

$$XGS = f_x(p_T, ALR_T, r_f) \qquad (6)$$

Imports are determined by a standard demand equation, with arguments of income (Y), relative prices (p_T/p_{NT}) and the interest rate:

$$M_{ci} = f_{ci}(Y, p_T/p_{NT}, r_f) \qquad (7)$$

To construct the Lagrangian, we substitute the expressions for XGS, M_{ci}, and M_k into Equation (4), and we optimize investment as expressed by Equation (3) subject to the constraint the Equation (4) must be in balance. This produces a testable equation of the form:

$$I = f(xcap, y^*, ALR_T, ALR_{NT}, r_f, EMP, Y, p_T/p_{NT}) \qquad (8)$$

There are good practical reasons to expect the elasticity of imports with respect to p_T/p_{NT} to be negligible: there is limited substitutability between a non-tradable such as housing and a tradable good such as food, in any economy. In the small economies which are the subject of our study, whatever limited substitutability may be possible in large diversified economies becomes impossible because of the narrow range of tradables in which the country produces at internationally competitive prices (Worrell, 2012). Our preliminary tests suggested that the inclusion of a relative price variable introduced serious misspecification into the model. This variable was therefore omitted in the final test equation.

4. Data Analysis and Estimation Methodology

This section is divided in two subsections: data analysis and estimation methodology. Data analysis looks at the data issues involved in modeling investment in small very open economies, motivates and examines the time series properties of data and as well as analyses correlations between investment and each of its determinants in order to derive testable hypothesis for the model per se and above all discuss some associations between investment and its determinants. Estimation methodology as the name indicates concentrates on the methods of estimation of the model.

4.1. Data Analysis

4.1.1. *Sample of Countries*

As outlined above, this study targets the small open economies and only these economies. That is, the sample only consists of the countries which fulfil the characteristics of small open economies. Originally, approximately thirty countries were targeted. Due to a number of hurdles including missing data, short time series data and dubious data quality, we have retained 6 countries in this exploratory study. The following countries are of interest: Barbados, Belize, Cape Verde, Seychelles, Luxembourg, and Fiji. These six countries represent a diversity of locations. The time series period varies from country to country dictated by the data availability for the variables of interest. In any case, the study rests in the confines of the period 1970-2014.

4.1.2. *Data Issues*

To repeat, the following are the variables of interest in our model.

Investment (*I*). It represents capital formation and is expressed in millions of US dollars. The data for this variable are available for most countries.

The capacity utilization (CAPU) variable is defined here as the ratio of output gap to output potential. The output gap is simply the difference between real GDP and output potential (real GDP potential) obtained here using the Hodrick - Prescott filter[9]. Note that we really have excess capacity if output gap is negative, that is, real output is less than potential output. In reality, we know that there is excess capacity after observing the data. CAPU is a pure number.

Expected growth of real domestic income (Y*) is another determinant of investment. Naturally, several measurements can be of interest all depending on the type of expectations: naïve, adaptive and rational to name a few. This is really an empirical matter. Here we use a naïve measure of expectation; that is, growth at time t-1 carries over to time t. The variable is in percent as it is captured by growth rate.

User cost of capital (R). As explained above the user cost of capital is assimilated to the prevailing international benchmark interest rate which is captured here by the 3-month US treasury bill rate. It is in percentage terms.

Average labour return (*ALR*). This variable is perhaps the most important determinant of investment in small open economies. It is derived for traded goods as well as non-traded goods. For traded goods, the average labour return captured by ALR_T is the difference between

[9] For comparisons of filters to estimate output potentials see Dupasquier et *al*. (1999).

average price received (p_T = GDP deflator for traded sector) and unit labor cost for traded goods (ulc). Thus, mathematically, $ALR_T = p_T - ulc$. Similarly for non-traded goods, the average labor return (ALR_{NT}) is the difference between average price received for non-traded goods (p_{NT} =GDP deflator for non-traded sector) and unit labour cost (ulc), that is $ALR_{NT} = p_{NT} - ulc$. Unit labour cost per se is the ratio of total labor cost and real output; that is to say, total labour compensation per employee divided by real output per employee or total labour compensation per employee divided by labour productivity. In the present exploratory study, we capture unit labour cost by GDP per capita, which is a proxy to the ratio of total wage bill by total number of employees. Three remarks are important. In small open economies, it can be assumed that *ulc* is almost the same in both sectors (traded and non-traded). Another remark is that the presence of the two average labour returns in the same model makes the ratio p_T / p_{NT} redundant as the difference in the two returns is dictated by the extent to which p_T is different from p_{NT}. Third, where there are no data to distinguish between tradable and non-tradable we simply use the aggregate measure, that is the GDP deflator as the average revenue measurement. Hence, in this case the average labor return is the difference between the GDP deflator and unit labor cost, $ALR = p - ulc$. The ALR is pure number (index) to the extent the GDP deflator and the GDP per capita are in index form.

Nominal GDP (Y or GDP) epitomizes the overall state of economy. It is expressed in millions of US dollars and is available for all countries.

Exchange market pressure (EMP) indicator is a key variable for the determination of investment. As implicitly pointed out above, while this variable is affected by the change in exchange rate in a country with a floating exchange rate it is not the case for a country under a fixed exchange rate regime. Indeed, for EMP for the later regime is simply change in foreign exchange reserves normalized by money supply.

Time series data of different lengths (the largest covering the period 1970-2014[10]) for the countries alluded to above are of interest. The data sources are World Development Indicators, UNCTADSTAT, IMF Macroeconomic Statistics and tradeeconomics.com.

There are several issues related to data. First, as indicated above, data availability is an issue in quite a number of countries, particularly for the variables average labour return and exchange market pressure. Even when data are available, the time series length may vary from variable to variable leading to the issue of the final data size to use for the regression model. All the above explains why the sample size has gone from 30 countries to 6 countries. Data quality is also an issue for some countries. Some peculiar results might entirely be explained by data quality. Given that the number of countries is far less than the time series size, panel data loses quite a number of its appeals. In this context, the most interesting data structure to work with here is time series. Thus, this exploratory study solely concentrates on time series. That is, the study examines each individual country using its time series data.

Stationarity/non stationarity of data appears to be the most important issue with time series data. At least, three reasons justify the importance of stationarity. As pointed by Mamingi (2005, 160) "stationarity is important …because most test statistics have been derived under the assumption of stationarity. In other words, the non-fulfilment of the stationarity

[10] A decision has to be made each time in a given country data (variables) of different time lengths are the ones available.

assumption generally brings about nonstandard distributions, which are not always tractable. Second, in some circumstances the lack of stationarity gives rise to nonsense results (e.g. nonsense or spurious regressions). Third, according to the Wold's theorem any stationary series process can be decomposed into two parts: a deterministic part and a nondeterministic part (a moving average of infinite order)."

To check for stationarity, we recourse to the popular test called augmented Dickey-Fuller (ADF) test. Consider the following augmented Dickey-Fuller regression model

$$\Delta Z_t = \sim Z_{t-1} + \sum_{j=1}^{p} \;_j \Delta Z_{t-j} + e_t \tag{9}$$

where Z is the variable being analysed for stationarity or non stationarity (unit root), *j* is the lag indicator, *p* is the optimal lag, Δ is the first difference operator and *e* is the error assumed to be white noise.

Equation (9) can have several forms. Specifically, a constant term or a constant term and a trend can be added (for more details, see Elder and Kennedy, 2001). $t_{\hat{\sim}}$, which follows the Dickey-Fuller distribution, allows to conduct the unit root test. For recall, the null hypothesis of unit root is given by:

$$H_0 : \sim = 0$$

and the alternative of stationarity by

$$H_1 : \sim < 0.$$

If the *p*-value of the computed $t_{\underset{\sim}{\hat{}}}$ is smaller than the level of significance, the null hypothesis is rejected, otherwise it is not. For recall, a variable is integrated of order 1, I(1), if it needs to be differenced once to become stationary. An I(0) variable is also known as a stationary variable.

Apart from unit root, the paper also examines the correlations between investment and its key determinants. The objective here is to have a sense of the direction of results. In other words, it helps us build testable hypotheses or somewhat answer the query through the degree of association between variables.

To repeat, we derive and analyse the pair-wise correlations between investment and its determinants. The inquiry is conducted using Pearson correlation, *r*:

$$r = \frac{Cov(I\ DE)}{Std_I\ Std_{DE}}$$

where *I* is investment, DE represents any investment determinant, Cov stands for covariance and Std is standard deviation.

The null hypothesis is

$$Ho: \quad \circ = 0$$

and the alternative hypothesis is

$$H1: \quad \circ \neq 0$$

with $\circ$ being the parameter equivalent of *r*. In fact, while in general the book story emphasizes the “two-sided” alternative hypothesis, here in search of workable hypothesis we focus on “one-sided” hypothesis guided by economic theory and intuition.

The null hypothesis is tested using the following *t*- test

$$t = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}}$$

where *r* is the estimate of the Pearson correlation, and *n* is the number of observations. If *t* in absolute value is greater than the critical *t*-value we reject the null hypothesis, otherwise we do not reject it. The decision is adapted accordingly if one sided alternative hypothesis is of interest.

The interpretation of the results per se is conducted at two levels. In the first instance, we disregard all potential time series issues. In the second instance, we revisit the results by taking into account the time series issue of stationarity or nonstationarity .

4.1.3 Data Analysis in Practice

As just said , this exploratory data analysis basically concentrates on two major items: (i) time series characteristics of variables; (2) correlation between investment and its determinants.

4.1.3.1 *Time Series Properties*

We study the stationarity and non-stationarity properties of variables. The ADF regression (9) is of interest. We always start with the version with a constant and a trend to end up with a constant only if the trend is not significant. The results are presented in Table 1 in Appendix.

As can be seen, for each country examined, variables have mixed degrees of integration, precisely some are stationary, that is I(0), and others non stationary or integrated of order one here. Concretely, in quite a number of countries investment and GDP are each I(1). Variables such as expected growth and capacity utilisation are I(0) throughout. In such a situation, care should be exercised when trying to model these unbalanced variables (think of spurious regression). In other words, a proper model and method of estimation are in order. This is one of the reasons our model choice falls on the autoregressive distributed lag model (ARDL) à la Pesaran *et al.* (2001).

4.1.3.2 *Correlation Analysis*

We close our data analysis with a correlation analysis. Table 2 contains the correlations between investment and its determinants country by country without worrying about the issue of stationarity or non-stationarity of variables.

Barbados. According to the results of the table, there are negative correlations between investment and the following variables: average labour return in both traded and non-traded sectors, US interest rates, exchange market pressure and capacity utilisation. There are positive associations between investment and the following variables: expected output growth, and nominal output. Apart from the strange behaviour of average labour return in both traded and non-traded sectors and capacity utilisation, the expected signs of associations between investment and its determinants are uncovered here for Barbados. The wrongly signed associations need further investigation.

Belize. There are negative associations between investment and the following variables: US interest rates, capacity utilisation and average labour returns in both sectors. There are positive associations between investment and the following variables: expected output growth, market pressure and nominal GDP. There are two wrongly signed relationships (capacity utilisation, average labour returns and exchange market pressure).

Cape Verde. There are negative associations between investment and the following variables: expected output growth, USA interest rate, capacity utilisation and average labour returns. Positive correlations are registered with the following variables: nominal GDP and exchange market pressure. Here, expected output growth, capacity utilisation, exchange market pressure and both average labor returns are wrongly signed.

Seychelles. There are negative associations between investment and the following variables: capacity utilisation and the US interest rate. There are positive associations between investment and the following variables: expected output growth, nominal GDP, exchange market pressure and both average labour returns. Exchange market pressure, capacity utilisation and both average labour returns are wrongly signed.

Luxembourg. With the exceptions of interest rates, nominal GDP and capacity utilisation, all other associations are wrongly signed.

Fiji. Negative associations are registered between investment and the following variables: expected output growth, US interest rate, exchange market pressure and average labor returns. On the contrary, there are positive associations between investment and the following variables: nominal GDP, and capacity utilisation. Thus, expected output growth and average labour returns are wrongly signed.

In summary, the correlation results between investment and its determinants have the following features. There are a clear negative association between investment and interest rate (R) and a positive association between investment and nominal GDP (Y) in all six countries. Capacity utilisation is rightly signed in two out of the six countries, while expected output growth is in four out of the six countries. The association between investment and exchange market pressure is only rightly signed in one country. Average labour return in traded sectors is rightly signed in none of the six countries and so is average labour return in non-traded sectors.

Building on the causes of wrong signs in regression estimation models such as in Mamingi (2005, 52, 55-56), we point out the following potential causes of wrongly signed correlations between variables: poor data quality, inadequate proxy variables, incorrect interpretations, small sample size and spurious correlations. While the issue of poor data quality is not pursued here we acknowledge its relevance for some countries. We might have an issue with proxies used to capture for example average labour return, precisely unit labour cost captured by GDP per capita. Small sample size will always be an issue that cannot be ignored in any statistical or econometric exercise. Although we are aware of the issue of small sample size in quite a number of countries, here we particularly focus on spurious correlations[11]. Indeed, spuriousness can originate from the omission of an influential variable vis-à-vis the link between the variables of interest. More importantly, it can come from lack of stationarity of variables. The latter is documented by the results of Augmented Dickey-Fuller test. As seen above in a number of situations investment is I(1) and other variables are either I(1) or I(0). To avoid the danger of spurious association we difference both series except when both raw series are I(0). Table 3 presents the amended results of Table 2, following the remarks just made.

Table 3 is in many respects an improvement over Table 2. Exchange market pressure is rightly signed in four countries instead of one country. Expected output growth is statistically

[11] For further information concerning spurious correlations and regressions, read Aldrich(1995), Granger and Newbold (1974), and Phillips (1998).

positively related to investment in countries countries. The issue is that all the average labour returns are still wrongly signed reflecting a bigger problem.

Given our results, we are in position to firmly point out the following research hypotheses to be confirmed in a more formal econometric model:

(i) Expected output growth is positively related to investment;

(ii) US interest rate is negatively related to investment;

(iii) Nominal GDP or output is positively linked to investment;

(iv) Exchange rate market pressure is negatively related to investment;

(v) Capacity utilisation is negatively related to investment;

4.2. Estimation Methodology

To repeat the testable form of investment model is as follows:

$$I = f(Y^*, R, Y, EMP, -XCap, ALR_T, ALR_{NT}, p_T / p_{NT}) \tag{10}$$

In the context of time series, model (10) is linearized as follows:

$$I_t = {}_0 + {}_1Y_t^* + {}_2R_t + {}_3Y_t + {}_4EMP_t + {}_5XCAP_t + {}_6ARL_{Tt} + {}_7ARL_{NTt} + u_t \tag{11}$$

where *I* is investment, *Y** is expected output growth, *R* is US interest rate, *Y* is nominal GDP or output, *EMP* represents exchange market pressure, *CAPU* is capacity utilisation, *ALR* is average labour return in traded sector (*T*) and non-traded sector (*NT*), *t* is time index and *u* is the error term. Note that p_T / p_{NT} has been removed for reason already explained above.

Here are the expected signs. Capacity utilisation positively affects investment (although correlation analysis show different); expected output growth positively influences investment; unit labour return positively affects investment, interest rate negatively affects investment; exchange market pressure negatively impacts investment and nominal income positively affects investment.

The method of estimation of Equation (11) largely depends in the first instance on the time series properties of individual variables and how their linear combination behaves. Since Data Analysis reveals that in each country some variables are I(0) and others, I(1), it will pay to use the ARDL to cointegration by Pesaran *et al.*(2001).

Consider the following function

$$I_t = f(V_t) \tag{12}$$

where *t* stands for time index, *I* is the dependent variable and *V* is the matrix of explanatory variables. In linear form, relationship (12) reads as follows:

$$I_t = V_t B + u_t \tag{13}$$

where *V*, the matrix of explanatory variables, is of dimension *n x k*, *B* is the vector of parameters of dimension *k x 1*, and *u* is a random variable which represents the error term.

In the first instance, the bounds approach requires estimating an unrestricted error correction model version of Equation (13) by OLS. The unrestricted error correction model (ECM) proposed by Pesaran *et al*. (2001) follows the fundamental principles of the Johansen five error correction multi-variance VAR (see Pesaran *et al.* 2001; Boamah *et al*. 2011, 28-30). Here we only present two models of interest:

$$\Delta I_t = c + ®_{I\,I} I_{t-1} + ®_{IV} V_{t-1} + \sum_{i=1}^{p-1} {}'\Delta W_{t-i} + ¢'\Delta V_t + u_t \tag{14}$$

and

$$\Delta I_t = c + a\,t + ®_{I\,I} I_{t-1} + ®_{IV} V_{t-1} + \sum_{i=1}^{p-1} {}'\Delta W_{t-i} + ¢'\Delta V_t + u_t \tag{15}$$

where I_t is defined as above, V_t is the matrix of explanatory variables, W_t is $(I_t V_t)$, Δ represents the first difference operator, *t* as a variable represents trend, and u_t is the error term.

Testing for the existence[12] of a level relationship between I_t and V_t, in Equation (14) or Equation (15) or likes, means testing the joint null hypothesis that the coefficients of the level variables are jointly zero. In other words, the null hypotheses are defined as $®_{I\,I} = 0 \text{ and} ®_{\mathrm{IVV}} = 0$, and the alternatives as $®_{I\,I} \neq 0 \text{ or} ®_{\mathrm{IVV}} \neq 0$. The testing is concretely done using an *F*-test (or *Wald* test). Here, the *F*-statistics does not follow a standard distribution. In other words, this means that the critical values of the regular *F* distribution are no longer valid. Instead, one can recourse to two asymptotic critical bounds derived by Pesaran *et al*. 2001, covering three possible classifications of the variables (all are I(0), all are I(1), or variables are mutually cointegrated). While the lower value bounds concern the case of the variables being purely I(0), the upper value bounds assume that they are purely I(1). A

[12] The text below up to welcome is almost an excerpt from Boamah, Jackman and Mamingi (2011, 28-30).

computed *F*-statistic that is greater than its respective upper value bound is indicative of the existence of a long-run relationship between or among variables, that is, cointegration; on the contrary, if smaller than the lower value bound, then the null of no-cointegration is not rejected; and finally, if the value lies within the bounds, inference is inconclusive. In fact, there is a need to supplement the *F* test by a *t* test on the adjustment coefficient to really make a definitive statement about cointegration. The latter *t*-statistic does not follow a *t* distribution. Concretely, if $®_{II} = 0$ and $®_{\mathrm{IVV}} = 0$ are rejected then test $®_{II} = 0$ against $®_{II} < 0$. If the *t*-statistic to test for the latter null hypothesis is negative and greater, in absolute value, than the upper value bound of the *t*, then cointegration is confirmed. Naturally, the existence of cointegration implies that the long-run relationship among variables and corresponding error correction models can be estimated.

Note that the long-run parameter is given by: $LR_{IVV} = \frac{®_{IVV}}{-®_{II}}$. The error correction model (14') is derived from model (14):

$$\Delta I_t = c + ®_{II}(I_{t-1} - LR_{IVV}V_{t-1}) + \sum_{i=1}^{p-1} {}'\Delta z_{t-i} + ¢'\Delta V_t + u_t$$

(14')

where the first relationship in parentheses represents the long-run relationship between I_t and V_t. Model (14') has to pass a battery of diagnostic/misspecification tests (heteroscedasticity, autocorrelation, misspecification and normality). Furthermore, the lag structure must be adequate. A stepwise procedure is welcome.

If cointegration fails then we estimate a difference variable model with the particularity all variables are I(0). The parameters of interest are short-run parameters. Basically,

$$\Delta I_t = c + \sum_{i=1}^{m} ¢_i \Delta V_{ti} + u_t \tag{16}$$

Where V_i represents an individual variable; i.e., output Y. Model (16) can be expanded to accommodate trend.

5. **Empirical Results and their Interpretations**

5.1 Empirical Results

We report the estimation results and their interpretations. At the outset, we underline that out of the six countries only two countries accommodate the ARDL model. The results are reported country by country.

Barbados. We fit model (15) to Barbados. The results are presented in Table 4. The model passes all specification tests (autocorrelation, heteroscedasticity, functional misspecification, and normality) as the p-values of the related statistics indicate. For example, the p-value of the Breush-Pagan-Godfrey F-statistic is 0.613 > 0.10 or 0.05 or 0.01. Autocorrelation is absent at the 1% level as the Breusch-Godfrey F-statistic is 5.700 with a p-value of 0.022 > 0.01. With a value of 14.387, the cointegration F-statistic is greater than any upper bounds value[13]. We tentatively accept cointegration. With the t-statistic of the adjustment coefficient reaching the value of -6.550, which in absolute value is greater than any

[13] The critical values for F for cointegration are from Pesaran *et al.* (2001, Table CI(v)). For k =7 (Barbados), the upper values are 3.45, 3.83 and 4.63 at the 10%, 5%, and 1% levels of significance, respectively. For k=6 (Belize here) the corresponding values are 3.59, 4.00 and 4.90.

upper bounds value[14], we confirm cointegration. Almost 60% of disequilibrium is eliminated in one year.

We interpret the qualitative results. Note that the first part of table contains information on long-run relations and the second part, short-run relations. In the long run, expected output growth, output, average labour return in non-traded sector positively affect investment. On the contrary, foreign interest rate, excess capacity, exchange market pressure, average labour unit in traded sector and trend. In the short run, output, and average labour unit in traded sector positively affect investment. By the same token, average labour return in non-traded sector, capacity utilisation, exchange market pressure, and foreign interest rate negatively impact investment.

Overall, the results for Barbados match the theory put forward in the first part of the study. The only big issue is the peculiar behavior of capacity utilisation and average labour return.

Belize. We use model (15) for Belize. Table (5) contains the results. All specification tests –autocorrelation, heteroscedasticity, functional misspecification, and normality—are satisfied. The cointegration F-statistic has a value of 9.940 which is greater than any upper bounds value (see values in footnote 13). Thus, provisionally, cointegration between variables is accepted. With a t-statistic of -5.290 which is greater in absolute value than any upper bounds value (see footnote 14), we definitely accept cointegration with 92% of the disequilibrium being eliminated in one year. That said, in the long run, output significantly and positively affect

[14] The critical values for t are from Pesaran *et al.* (2001, Table CII(v)). For k=7 (here Barbados), the upper critical values are -4.53, -4.85 and -5.49 at the 10%, 5%, and 1% levels of significance, respectively. For k=6 (Belize), those values are -4.37, -4.69, and -5.31.

investment. Capacity utilisation and average labour return negatively and significantly affect investment. Exchange market pressure although of correct sign is not significant. In the short run, average labour return negatively affect investment, while output, at the margin, positively affects investment. As for Barbados, average labour return misbehaves.

Fiji. No ARDL fits Fiji data. Thus, we recourse to model (16) using the robust standard errors which take care of heteroscedasticity and autocorrelation. The results (short-run estimates) in Table (6) indicate that output positively and significantly impact investment. Capacity utilisation, average labour return, expected output growth, and foreign interest rate are rightly signed but not significant.

Seychelles. As above, no ARDL fits Seychelles data. Table (7) contains the results of the difference model (16) using robust standard errors. Given the size of coefficients, multicollinearity can be suspected. These coefficients essentially represent short-run effects. Output (nominal GDP) positively affects investment. Capacity utilisation and average labour return negatively affect investment. Note that data on exchange market pressure were not available.

Cape Verde. As for Seychelles, no valid ARDL could be derived with Cape Verde data. Thus, as above, we recourse to a variant of model (16). Table (8) contains the results. Again, the robust standard errors are used. That said, while expected output growth positively and significantly affects investment, average labour return negatively and significantly affects investment. Capacity utilisation is negatively signed and almost significant at the 10% level.

Luxembourg. No ARDL was found valid with Luxembourg data. We thus estimate a variant of model (16). Note that since expected output growth is stationary, we have the latitude to use as it is or difference it. Table (9) provides us with the estimation results. Huge numbers are most likely signs of multicollinearity. In any case, in the short run, output positively and significantly affects investment. Exchange market pressure negatively and significantly impacts investment. Average labour return is rightly signed but with no impact.

5.2 Interpretations

From the empirical results, we can retain the following. First, across countries, output (nominal GDP) is the key variable which dictates the pace of investment. This is not a surprise since output reflects the state of a given economy. An investor must always consider the state of economy before making his/her move. Second, to a great extent, exchange market pressure negatively affects investment. This result uncovered here can be explained by uncertainty created by exchange rate and foreign exchange reserves variability. Third, capacity utilisation also appears to be an important determinant of investment but the negative impact is counter intuitive.

There were a number of other surprising or maybe disturbing results. Average labour return impact reveals to be persistently negative across countries. Several explanations can be advanced. One thing is certain the proxy used to capture unit labour cost (here GDP per capita) impacts the way average labour return affects investment. Foreign interest rates were shown to have no impact on investment. This seems to contradict the theory of investment which centers on the interest rate. The last disturbing result is the almost null impact of expected output growth.

6. Conclusion

The objective of the study is to derive and estimate the determinants of investment in small very open economies (SVOEs). It is argued that because SVOES are different from large countries, their characteristics must be taken into account when modeling their investment functions. Particularly, the distinction between tradables and non-tradables has to be reflected in the investment equation. In final analysis, the investment model retained here contains elements from traded sector and non-traded sector. The determinants of interest are as follows: expected output growth, foreign interest rate, output, capacity utilisation, exchange market pressure, average labour return in traded sector and average labour return in non-traded sector. The model is estimated using an eclectic methodology.

The important results include the following. Output as an indicator of the state of economy positively and significantly affects investment and this, across the board. Capacity utilisation, exchange market pressure and average labour return negatively impact investment.

Policy implications are rather straightforward. Any SVOE needs continual economic improvement to attract investors; output is indeed an important pull factor of investment. As far as exchange market pressure is concerned, uncertainty has to be contained since volatility of exchange rate and foreign exchange reserve is detrimental to investment. Naturally, the solution (containment) passes by a thorough examination of the source (s) of uncertainty.

Although the major predictions of the theoretical model are, to a greater extent, uncovered by the empirical results, there are, however, some zones of doubt that need to be clarified. These include the lack of impact of foreign interest rate, the negative impacts of capacity utilisation and average labour return, and the lack of effect of expected output growth.

The study has some limitations. In the first instance, it is impeded by shortness of series; precisely, in many instances, there is lack of degrees of freedom. The regression estimates in some cases are huge raising the suspicion of multicollinearity. Increasing the length of time series will certainly improve the results obtained here. Of course, data quality for some countries is another hurdle that future studies have to overcome.

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APPENDIX

Table 1: Unit Root Status through ADF test

I	*Y**	*R*	*Y*	*EMP*	*xCAP*	ARL_T	ARL_{NT}
			Barbados				
-2.460 (0.344)	-3.400* (0.070)	-3.990* (0.017)	-3.257* (0.091)	-3.742* (0.041)	-4.725* (0.003)	-2.847 (0.126)	-2.130 (0.513)
-3.919* (0.005)						-6.996* (0.000)	-4.612* (0.000)
			Belize				
-4.296* (0.009)	-4.489* (0.005)	-3.990* (0.017)	-0.618 (0.973)	-4.721* (0.002)	-5.280* (0.000)	-1.317 (0.850)	-3.272 (0.010)
			-6.404* (0.000)			-3.017* (0.050)	-4.163* (0.005)
			Cape Verde				
-3.885* (0.035)	-5.200* (0.000)	-5.199* (0.000)	-0.986 (0.936)	-2.227 (0.443)	-3.003* (0.043)	-0.603 (0.996)	-0.735 (0.955)
			-5.412* (0.000)	-3.332* (0.100)		-3.273* (0.031)	-4.709* (0.007)
			Fiji				
-3.065 (0.149)	-9.976* (0.000)	-3.990* (0.017)	-1.490 (0.818)	-6.885* (0.000)	-1.223 (0.656)	-2.158 X (0.509)	N.A
-4.035* (0.039)			-5.867* (0.000)		-6.679* (0.000)	-5.882* (0.000)	
			Luxembourg				
-0.959 (0.939)	-4.913* (0.001)	-3.990* (0.017)	2.187 (1.000)	-2.930 (0.814)	-3.308* (0.078)	-1.007 (0.906)	-1.058 (0.896)

-10.02* (0.000)			-4.351* (0.007)	-4.563* (0.004)		-3.040* (0.060)	-3.264* (0.041)
Seychelles							
-3.083 (0.132)	-4.869* (0.002)	-3.990* (0.017)	2.115 (0.523)	-4.858* (0.004)	-4.868* (0.002)	-4.145* (0.013)	-2.555 (0.320)
			-5.873* (0.000)				-5.086* (0.000)

Note: ADF test is of interest (see Equation (9) with a constant and a trend or a constant only). The first sets of results represent those for the regressions in levels and the second sets the regressions in first differences. (…) p-values. * statistically significant at the 10% level. X average labour return for all sectors. I: investment, Y*: expected output growth, Y: output, R:foreign interest rate (Us 3 month treasury bill rate), CAPU: capacity utilisation, EMP: exchange market pressure, ARLT=average labour return in traded sector and ARLNT: average labour return in non-traded sector.

Table 2: Correlations between Investment and Its Determinants

	Barbados	Belize	Cape V.	Seychelles	Luxembourg	Fiji
I - I	1	1	1	1	1	1
I - Y*	0.126	0.168	-0.431?	0.259*	-0.219?	0.042
I - R	-0.661*	-0.667*	-0.668*	-0.527*	-0.485*	-0.544*
I - Y	0.929*	0.849*	0.996*	0.896*	0.963*	0.982*
I - EMP	-0.329*	0.486	0.328	0.221	0.055	0.129
I - CAPU	-0.149	-0.181	-0.058	-0.099	0.034?	0.084
I - ALRT	-0.255	-0.717	-0.962	-0.889	-0.935	-0.637 X
I - ALRNT	-0.948	-0.862	-0.963	-0.961	-0.960	

Note: * statistically significant at the 10% level. X: average labor return without distinguishing traded and non-traded sectors. Variables are defined as in the note to Table 1. I – Y means correlation between investment and nominal GDP.

Table 3: Correlations between Investment and its Determinants revisited

	Barbados	Belize	Cape V.	Seychelles	Luxemb.	Fiji
I - I	1	1	1	1	1	1
I - Y*	0.293*d	0.168	-0.175?e	0.276*d	0.200* d	0.366*d
I - R	-0.661*	-0.667*	-0.668*	-0.141 b	-0.049 d	-0.061 d
I - Y	0.694*d	0.509*d	0.844*d	0.403* d	0.841* d	0.869*d
I - EMP	-0.329*d	0.169 e	-0.164 d	0.221s	-0.317*d	-0.128 d
I - CAPU	-0.656*d	-0.205	-0.058	-0.099	-0.375*d	-0.450*d
I - ALRT	-0.109 d	-0.930 X	-0.755 d	-0.476 d	-0.681 d	-0.168 d X
I - ALRNT	-0.648 d		-0.813 d	-0.553 d	-0.792 d	

Note: b: one variable first differenced. d: both variables first differenced. e: different sample size. X: average labour return without distinguishing traded and non-traded sectors.

TABLE 4: ARDL Results for Barbados: The Investment Equation

Dependent Variable: DI
Method: Stepwise Regression
Sample (adjusted): 1984 2014

Variable	Coefficient	Std. Error	t-Statistic	Prob.*

C	118.329	59.324	1.995	0.069
I(-1)	-0.596	0.091	-6.550	0.000
Y*(-1)	3.629	2.571	1.411	0.184
R(-1)	-15.644	5.525	-2.832	0.015
Y(-1)	0.526	0.108	4.892	0.000
XCAP(-1)	-550.389	366.991	-1.499	0.160
EMP(-1)	-2248.005	427.808	-5.255	0.000
ARLT(-1)	-5.536991	1.171	-4.727	0.001
ARLNT(-1)	3.834860	0.594	6.459	0.000
@TREND	-52.062	11.375	-4.577	0.001
DY	0.711	0.072	9.882	0.000
DARLNT	-2.671	0.799	-3.342	0.006
DEMP	-1231.917	272.981	-4.513	0.001
DARLNT(-1)	-3.490	0.922	-3.786	0.003
DARLT(-1))	3.133	0.617	5.080	0.000
DARLT	-2.416	0.538	-4.489	0.001
DR	-10.056	4.481	-2.244	0.045
DXCAP(-3)	-577.542	278.785	-2.072	0.061
DI(-3)	0.148	0.132	1.129	0.281

R-squared	0.966	Mean dependent var	11.919
F-statistic	18.726	Prob(F-statistic)	0.000
BG F	5.700	Prob(BG F)	0.022
BPG F	0.875	Prob(BPG F)	0.613
Ramsey F	0.714	Prob(Ramsey F)	0.530
JB	0.233	Prob(JB)	0.890
Cointegration F	14.387		

Note: Model (15) is of interest. D before a variable stands for first difference, i.e., DI=first difference of investment I. Variables are defined as in Table 1. BG F= Breusch-Godfrey F-statistic for autocorrelation; BPG F= Breusch-Pagan-Godfrey F-statistic for heteroscedasticity. Ramsey F= Ramsey Reset F-test for functional misspecification; JB=Jarque Bera test for Normality. Cointegration F: F-statistic to test for cointegration

TABLE 5: ARDL Results for Belize: The Investment Equation

Dependent Variable: DI
Method: Stepwise Regression
Sample (adjusted): 1995 2013

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
C	262.822	88.541	2.968	0.021
I(-1)	-0.915	0.173	-5.290	0.001
Y*(-1)	-69.611	101.478	-0.686	0.515
R(-1)	2.682	1.868	1.436	0.194

Y(-1)	0.199	0.098	2.023	0.0828
XCAP(-1)	-194.938	89.970	-2.167	0.0669
EMP(-1)	-6467054	1.38E+08	-0.468	0.6539
ARLT(-1)	-208.625	38.206	-5.461	0.0009
@TREND	-6.803	5.830	-1.167	0.2814
DARLT	-174.607	15.591	-11.199	0.0000
DARLT(-2)	-29.774	9.315	-3.196	0.0151
DY	0.141	0.101	1.393	0.2062
R-squared	0.988	Mean dependent var		8.976
F-statistic	53.628	Prob(F-statistic)		0.000
BG F	0.327	Prob(BG F)		0.547
BPG F	0.526	Prob(BPG F)		0.836
Ramsey F	2.395	Prob(Ramsey F)		0.186
JB	0.207	Prob(JB)		0.547
Cointegration F(7,7)	9.940			

Note: see note to Table 4.

TABLE 6: The Difference Model Results for Fiji

Dependent Variable: DI
Method: Least Squares
Sample (adjusted): 2000 2014
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 3.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-82.796	260.800	-0.317	0.760
Y*	31.469	6565.231	0.005	0.996
DR	-6.765	5.786	-1.169	0.281
DY	0.254	0.055	4.588	0.002
DXCAP	-137.622	7398.448	-0.019	0.986
DEMP	206.592	269.207	0.767	0.4679
DALRT	400.024	645.218	0.620	0.555
@TREND	1.871	4.798	0.390	0.708
R-squared	0.815184	Mean dependent var		23.84000
Wald F-statistic	10.027	Prob(Wald F-statistic)		0.003

Note: Model (16) is of interest. Variables are in first differences. See note to Table 4.

TABLE 7: The Difference Model Results for Seychelles

Dependent Variable: DI
Method: Least Squares
Sample (adjusted): 1977 2014
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-614855.0	5366531.	-0.114	0.910
DY*	76729915	1.83E+08	0.419	0.678
DY	242516.9	84902.80	2.856	0.008
DXCAP	-2.28E+08	1.57E+08	-1.457	0.155

DARLT	-4.99E+08	2.12E+08	-2.357	0.025
DR	1824365.	4969870.	0.367	0.716

R-squared	0.308	Mean dependent var	13493447
Wald F-statistic	18.68156	Prob(Wald F-statistic)	0.000

Note: see note to Table 6.

TABLE 8: The Difference Model Results for Cape Verde

Dependent Variable: DI
Method: Least Squares
Sample (adjusted): 1997 2011
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 3.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	26.281	40.321	0.652	0.535
DY*	1295.387	461.828	2.804	0.026
DY	0.129	0.139	0.924	0.386
DR	-5.743	4.562	-1.259	0.248
DXCAP	-463.113	339.741	-1.363	0.215
DEMP	-1163.105	1064.669	-1.092	0.311
DALRT	-188.478	46.735	-4.033	0.005
@TREND	-0.559	1.247	-0.449	0.667

R-squared	0.937	Mean dependent var	39.880
Wald F-statistic	25.231	Prob(Wald F-statistic)	0.000

TABLE 9: The Difference Model Results for Luxembourg

Dependent Variable: DI
Method: Least Squares
Sample (adjusted): 2001 2013
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 3.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.31E+09	6.56E+08	-1.995	0.093
Y*	1.55E+10	2.09E+10	0.740	0.487
DR	-4432732.	90361168	-0.049	0.963
DY	497556.4	144917.5	3.433	0.014
DXCAP	-2.28E+10	2.28E+10	-1.003	0.355

DEMP	-3.68E+09	2.06E+09	-1.784	0.125
DARLT	9.60E+09	1.07E+10	0.894	0.406
R-squared	0.928198	Mean dependent var		4.08E+08
Wald F-statistic	117.4292	Prob(Wald F-statistic)		0.000006

Note: see previous tables.