A VAR ANALYSIS ON THE DETERMINANTS OF FDI INFLOWS: THE CASE OF SRI LANKA

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Abstract
Foreign direct investment in Sri Lanka has grown immensely since the initiation of economic reforms in 1977. Further escalations in FDI inflows are considered an integral component of the current Sri Lankan Government’s intentions to foster economic growth. This paper examines the long-run effects on Sri Lanka’s FDI inflows from changes in key macroeconomic variables of interest. Findings indicate that, of the five variables considered, the wage rate is the most important determinant of inbound FDI to Sri Lanka. However, other major economic indicators such as GDP, exchange rates, interest rates, and the level of external trade should also be given due consideration in policies designed to attract FDI inflows.

JEL F21, F14, F13
Key Words: FDI, Sri Lanka, VAR

1. Introduction

After gaining independence in 1948, Sri Lanka mainly adhered to a policy regime of import substitution characterised by prohibitive trade barriers and government regulatory controls. The introduction of economic liberalization reforms in 1977 provided the impetus for change in a number of Sri Lanka’s economic sectors. Nowhere has the change been more evident than in the foreign investment sector. During the pre-liberalization era, foreign direct investment (FDI) inflows to Sri Lanka were virtually zero. However, the post liberalization period has witnessed strong foreign investment growth, and for much of the past decade Sri Lanka’s economy has been the recipient of in excess of $US200 million annually.

In recent years, much of the economic growth in Sri Lanka has been driven by areas of the services sector such as import-related trade, mobile telephones and financial services (Asian Development Bank 2007). Not surprisingly, foreign investment in the services sector has been significant, receiving 47.7 per cent of FDI inflows in 2004. Sri Lanka’s total inbound FDI in 2004 increased by 10.9 per cent on 2003 foreign investment, with Malaysia, Switzerland, the UK, and India among the biggest investors (Central Bank Annual Report, 2005).

Despite good economic performances of late, Sri Lanka’s trade deficit and current account deficits have widened over the last few years. Medium term prospects for the country rely on government plans to encourage economic growth by significantly raising FDI inflows to the country (Asian Development Bank 2007). Increased foreign
investment is therefore an important factor in Sri Lanka’s economic development and its ability to finance current account deficits, now and in the future.

The dependence on FDI in Sri Lanka’s potential future economic growth raises a number of pertinent questions such as: What are the determinants of inbound FDI to Sri Lanka and what are the relative impacts of each determinant on the level of FDI inflows? This paper uses vector auto-regression (VAR) analysis to investigate the long-run impacts on Sri Lanka’s FDI inflows from changes in other macroeconomic variables. The macroeconomic variables of interest are real GDP, trade, wage rate, exchange rate and interest rate.

The paper is divided into six main sections. In Section 2, a synopsis of Sri Lanka’s economic liberalization reforms and the key policy elements underlying its transition from a closed to open policy regime is given. Section 3 provides a brief review of the literature with respect to the relevant variables specified in this study. The VAR methodology used in the analysis is outlined in Section 4 and the use of impulse response functions and variance decomposition techniques to examine the interrelationships among the variables are discussed. The results of Sri Lanka’s inbound FDI responses to the various macroeconomic shocks simulated in the model are presented in Section 5. Concluding comments are given in Section 6.

2. Economic Liberalization

Initially following independence, Sri Lanka’s market policies were predominately implemented without intervention. Snodgrass (1966) noted that at the time of independence, Sri Lanka was a classic example of an economy reliant on a restricted range of agricultural export commodities. From 1960-1977, Sri Lanka operated under an import substitution policy regime that arose primarily as the result of political leadership change and balance of payments difficulties (Athukorala and Jayasuriya 2004). Trade restrictions, regulation and intervention were common features of policies designed to achieve economic growth by limiting the need for imports.

Key elements of the Sri Lankan economic liberalization process were foreign investment development and trade policy reform. Quantitative import restrictions were replaced by tariffs that were subsequently accompanied by tariff reductions. As noted by Athukorala and Jayasuriya (2004), the reform process initiated in 1977 was aimed at reducing restrictions on foreign investment but it lost momentum in the early 1980s, mostly as a consequence of civil conflict within the country. Political uncertainty and macroeconomic instability led to delays and inconsistencies in the implementation of the reform process, prompting a further round of liberalization strategies in the early 1990s.

The second component of trade policy reform focused on export expansion. Export processing zones (EPZ) were established offering economic incentives to export oriented firms including complete foreign ownership of investment projects, tax and duty exemptions, and access to foreign-currency credit at interest rates prevailing in world financial markets (Athukorala and Jayasuriya 2004).
Privatisation of state owned enterprises (SOE) and the removal of various price controls were instrumental in the rapid expansion of FDI in Sri Lanka in the 1990s. According to UNCTAD (2005), though Sri Lanka lagged behind the dynamic South-East Asian economies it did have the potential to attract more FDI due to its ‘trainable labour force, relatively low wages, tax incentives, generally good quality governance (low level of corruption) and the existence of a dynamic domestic private sector’.

3. Literature Review on Determinants of FDI

The level of FDI in a host country is influenced by a myriad of factors. A number of studies have identified the determinants of inbound FDI with respect to different countries. In the following discussion, a brief review of the literature relevant to the variables of interest included in this study is given.

Host country market size is considered one of the foremost determinants of FDI inflows. The market size hypothesis suggests that multinational companies evaluate the size of the host country's market when considering the location of its FDI (Moosa 2002). Larger markets provide foreign investors with opportunities to benefit from economies of scale and increased sales, though the latter may not be a critical factor in the case of Sri Lanka as a host country. Nevertheless, the strong performance of an economy can still be a good investment signal. The market size hypothesis has been tested in numerous empirical studies (e.g. Billington 1999; Wijeweera et. al 2007).

The relationship between FDI and trade has attracted significant research interest. Studies by Billington (1999) and Wijeweera and Clark (2006) indicate that the level of trade between a host country and the rest of the world is positively related to the amount of FDI inflows to that country. Others have demonstrated the existence of complex relationships between export opportunities and FDI. For example, Blonigen (2001) shows that in some countries, an increase in FDI flows can lead to a decrease in exports. Findings by Swenson (2004) concur with Blonigen’s conclusions.

Dunning’s (1981) eclectic approach suggests wage rate differences influence the location investment decisions of multinational corporations. Empirical evidence largely supports the argument that investors from high wage countries should be attracted to low wage countries to save on production costs.¹ For example, using bilateral FDI inflows to the US, Cushman (1987) found that in the absence of a capital-labour substitution effect, an increase in the host country wage rate discouraged inbound FDI flows. The impact of investment liberalisation on employment in Sri Lanka lends support to the wage rate argument. During the post-reform period much of the foreign investment in Sri Lanka has been in the labour intensive manufacturing industries. As manufacturing employment has increased, real wages have either stagnated or declined (Athukorala and Jayasuriya 2004).

¹ However, some studies (e.g. Wheeler and Mody 1992) have not found evidence to suggest that labour cost is a statistically significant determinant of inbound FDI.
Exchange rate uncertainty and the impacts of exchange rate fluctuations on FDI have also received considerable attention in the literature. Empirical studies by Froot and Stein (1991), Swenson (1994), and Klein and Rosengren (1994) observed a positive link between currency depreciation in the host country and increased FDI. Though the focus of their studies was on US investors, Blonigen (1997) reached the same conclusion in a study of Japanese firms investing in the US. In contrast, other studies have failed to find evidence of a significant relationship between FDI and the exchange rate. Lipsey (2001) showed that even in times of rapid exchange rate movement (Central America in 1982, Mexico in 1994 and East Asia during the economic crisis of 1997), FDI inflows remained stable in comparison to other capital movements.

The difference in the cost of capital between the home and host country is generally regarded as a potential determinant of FDI flows. This difference can also be a proxy for the rate of return that investors earn. According to the differential rate of return hypothesis, international capital will flow from one country to another until the rates of return advantages are exhausted. In general, an increase in the cost of capital should decrease investment in that country even though contradictory results have been found in some research (see Billington 1999).

While inbound FDI has increased considerably since the inception of market-based economic policies in 1977, few empirical analyses have been undertaken to identify the main determinants of the FDI inflows to Sri Lanka. Athukorala and Jayasuriya (2004), in investigating the complementarity between trade and FDI inflows, concluded that trade and foreign investment liberalisation reforms assisted in the transformation of Sri Lanka’s export sector from one reliant on traditional primary products to one dominated by the manufacturing sector. Balamurali and Bohawatte (2004) examined the relationship between FDI inflows and Sri Lanka’s economic growth for the period 1977-2003. Their findings indicate that FDI inflows have the potential to accelerate economic growth in Sri Lanka.

4. VAR Analysis

In this paper, we use vector autoregressive methods (VAR) to examine how FDI inflows respond to different macroeconomic variables. If there are concerns surrounding the endogeneity of the variables, VAR provides a framework in which to explore the interrelationships, as all variables are considered endogenous and allowed to impact on the other variables in the system. Our six-variable VAR is estimated using annual Sri Lankan data on foreign direct investment inflows (FDI), market size and performance (RGDP), an openness indicator (TRADE), a labour cost indicator (WAGE), the exchange rate (EXR), and the interest rate (IR).

The data for the variables were obtained from IMF’s financial statistics database and various issues of the Sri Lankan Central Bank annual reports. The FDI, RGDP and TRADE (exports plus imports) variables are all expressed in terms of $US millions. EXR is the bilateral exchange rate between the $US and Sri Lankan rupees. WAGE is the wage index (1978=100) for workers in industry and commerce, and IR is the rate at which the
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Sri Lankan Central Bank grant advances to commercial banks for urgent liquidity purposes. Summary statistics are given in the Table 1.

<table>
<thead>
<tr>
<th></th>
<th>EXR</th>
<th>FDI</th>
<th>GDP</th>
<th>IR</th>
<th>TRADE</th>
<th>WAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>26.90</td>
<td>53.78</td>
<td>5039.69</td>
<td>9.58</td>
<td>4178.51</td>
<td>260.79</td>
</tr>
<tr>
<td>Median</td>
<td>15.45</td>
<td>1.40</td>
<td>3851.09</td>
<td>10.00</td>
<td>2142.69</td>
<td>79.50</td>
</tr>
<tr>
<td>Maximum</td>
<td>104.61</td>
<td>430.05</td>
<td>14522.66</td>
<td>25.00</td>
<td>15887.02</td>
<td>1044.10</td>
</tr>
<tr>
<td>Minimum</td>
<td>4.75</td>
<td>-10.20</td>
<td>698.66</td>
<td>2.50</td>
<td>611.87</td>
<td>25.70</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>28.84</td>
<td>88.13</td>
<td>4153.08</td>
<td>5.86</td>
<td>4435.20</td>
<td>316.44</td>
</tr>
<tr>
<td>Observations</td>
<td>55.00</td>
<td>55.00</td>
<td>55.00</td>
<td>55.00</td>
<td>55.00</td>
<td>55.00</td>
</tr>
</tbody>
</table>

Table 1. Summary Statistics, 1950-2004

Representation of the equations in VAR estimation can be in structural form, reduced form or recursive form (Stock and Watson 2001). The reduced form equations used in this analysis express each of these six variables as a function of its own lag values, the lag values of all the other variables and an uncorrelated error term. Hence, there are six equations, each of which is estimated using the ordinary least squares regression method. The general form of the VAR can be written as:

\[ y_t = \sum_{j=1}^{m} \beta_j y_{t-j} + \epsilon_t \]  

(1)

where, \( y_t \) is the period \( t \) vector of \( n \) variables (FDI, RGDP, TRADE, WAGE, EXR, IR), \( \beta \) is a matrix of coefficients to be estimated and \( \epsilon_t \) is a vector of innovations that are uncorrelated with their own lagged values and uncorrelated with all of the right hand side variables.

The appropriate lag length of the VAR is determined using optimum lag length selection criteria such as the Akaike Information Criterion (AIC) or Schwarz Criterion. Both tests showed an optimum lag length of two. Consequently, a second order VAR was used in the estimation:

\[ y_t = \sum_{j=1}^{2} \beta_j y_{t-j} + \epsilon_t \]  

(2)

When conducting time series estimation it is standard practice to check for unit roots to verify VAR stability. With the exception of the interest rate, all variables were found to contain a unit root. First differences of the data can be taken to achieve stationarity but Sims (1980), and others (e.g. Stock and Watson 2001), have shown that in doing so, vital information of long run properties can be lost. Therefore, we decided to use levels rather than first differences in our estimations.

Once the VAR is estimated, impulse response functions (IRF) and forecast error variance decompositions (VDC) can be used to examine the interrelationships among the
The responses of each of the variables to a one unit increase in the current value of one of the VAR errors are traced out using IRF (Stock and Watson 2001). Vector moving average representation (VMA) of the VAR enables impulse responses to be generated. In VMA representation, each equation in the VAR is expressed in terms of the current and past values of the innovations. This allows the time path of the shocks (\(e_t\)) to each of the endogenous variables to be traced.

The proportions of the forecast errors that are attributable to shocks to each of the variables in the model are found using VDC. Separation of this type explains the interactions among the series and determines the relative importance of each random innovation in affecting the variables in the VAR. If the correlations among the various innovations are large, ordering of the variables can substantially change the results of IRF and VDC (see, Enders 2004). Estimates in our analysis suggest that the correlations among the innovations are small and different orderings of the variables provide similar results. In the interest of brevity, the results presented in this paper are for one ordering only. In addition, as the behaviour of FDI inflows in response to various macroeconomic shocks is the main focus of this paper, the impacts on the other variables are not presented.

5. Sri Lanka’s Inbound FDI Responses to Various Macroeconomic Shocks

The responses of FDI inflows to changes in the other macroeconomic variables specified in the VAR model are analysed in this section using the IRF and VDC techniques. To conserve space, rather than include the IRF in graphical form we chose to present the accumulated impulse responses of various shocks on inbound FDI for a 10-year horizon (Table 2). In each instance, a shock is defined as a one unit increase in the relevant variable. Variance decompositions of FDI are reported in Table 3, which shows the percentages of the forecast error variance due to each innovation. The sum of each row in Table 3 is equal to 100.\(^3\)

It is reasonable to assume foreign investors investigate the history of a prospective location before making a commitment to invest their capital. Thus, FDI inflows are partially determined by past and current levels of foreign investment and institutional credibility. Our study suggests that an increase in current FDI inflows has a positive impact on future FDI inflows, a finding supported by the IRF and VDC. Overall, the effect on future FDI inflows is positive, as shown by the accumulated effects listed in column 6 of Table 2. Over the 10 year horizon, FDI inflows increase by approximately $US1.8 million in response to a current year $US1 million increase in FDI inflows. In column 2 of Table 3, VDC indicates that current FDI inflows have a significant impact on the future FDI inflows to the country. For instance, even after 10 years, approximately one third of the forecast variance is due to its own innovations. The remaining variables account for around two thirds of the variations.

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\(^2\) An excellent treatment of the technical details of VAR, IRF and VDC is given in Enders (2004, pp. 264-290).

\(^3\) Variance decompositions for the other variables in the model are available from the authors by request.
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The hypothesis that market size is one of the main long-run determinants of FDI has been reinforced in a number of empirical studies (e.g. Wijeweera et. al. 2007). Significant positive relationships between GDP and FDI inflows are more likely to exist in developed countries such as the USA, Germany and the UK where production and sales in the host country are corresponding aims of the foreign investment. It is expected the GDP-FDI inflow relationship would be less significant in low-income countries such as Sri Lanka where product sales in the host country are not a primary investment objective. However, GDP is still an important factor as healthy economic growth is vital to maintain investor confidence in low-income economies.

<table>
<thead>
<tr>
<th>Time Horizon</th>
<th>Exchange Rate Shock</th>
<th>GDP Shock</th>
<th>Trade Shock</th>
<th>Interest Rate Shock</th>
<th>Own Shock</th>
<th>Wage Shock</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>9.50</td>
<td>-0.01</td>
<td>0.01</td>
<td>-4.11</td>
<td>0.58</td>
<td>-5.56</td>
</tr>
<tr>
<td>3</td>
<td>-0.99</td>
<td>-0.02</td>
<td>0.07</td>
<td>1.24</td>
<td>0.40</td>
<td>-1.51</td>
</tr>
<tr>
<td>4</td>
<td>19.27</td>
<td>-0.04</td>
<td>0.06</td>
<td>24.31</td>
<td>0.75</td>
<td>-19.53</td>
</tr>
<tr>
<td>5</td>
<td>1.30</td>
<td>-0.06</td>
<td>0.13</td>
<td>-0.44</td>
<td>0.83</td>
<td>-2.26</td>
</tr>
<tr>
<td>6</td>
<td>-6.60</td>
<td>-0.07</td>
<td>0.13</td>
<td>-7.58</td>
<td>0.38</td>
<td>2.91</td>
</tr>
<tr>
<td>7</td>
<td>8.52</td>
<td>-0.03</td>
<td>0.03</td>
<td>-5.74</td>
<td>0.40</td>
<td>-18.95</td>
</tr>
<tr>
<td>8</td>
<td>1.09</td>
<td>0.00</td>
<td>-0.03</td>
<td>11.00</td>
<td>1.21</td>
<td>-21.71</td>
</tr>
<tr>
<td>9</td>
<td>-7.48</td>
<td>0.03</td>
<td>-0.01</td>
<td>8.81</td>
<td>1.44</td>
<td>-12.58</td>
</tr>
<tr>
<td>10</td>
<td>-4.07</td>
<td>0.06</td>
<td>-0.02</td>
<td>-2.07</td>
<td>1.77</td>
<td>-12.00</td>
</tr>
</tbody>
</table>

From Table 2 (column 3), it is clear Sri Lanka’s GDP does have a positive impact on FDI inflows in the long run, even though the initial impacts are negative. The accumulated effects indicate that after the 10 year period, the response of FDI to a $US1 million increase in real GDP is positive but small in magnitude compared to studies involving developed economies. For example, Wijeweera and Clark (2006) found that a 1
per cent increase in US GDP results in a 2 per cent increase in the transfer funds component of US FDI inflows. The VDC in Table 3 (column 3) suggest that the percentage of the forecast variance attributable to the GDP innovation increases steadily with time. This shows that market size is an important determinant of FDI inflows in the host economy.

Trade policy reforms were one of the key elements of Sri Lanka’s liberalization policies in 1977. Further liberalization reforms, including the reduction and removal of a number of tariffs, were implemented from the late 1980s onwards (Athukorala and Jayasuriya 2004). As previously mentioned, FDI inflows to Sri Lanka rose substantially post liberalization and increased sharply again from the late 1980s-early 1990s onwards (Figure 1), indicating that Sri Lanka’s more open trade policies were a contributing factor in the growth of inbound FDI.

Recent studies (e.g. Billington 1999; Wijeweera and Clark 2006) have established evidence of a positive relationship between FDI and trade with the rest of the world. The accumulated impacts on Sri Lanka’s FDI inflows resulting from a $US1 million increase in total trade are given in Table 2 (column 4). After the initial shock, FDI inflow responses remain positive for a number of years before disappearing. This suggests that investors are more concerned with the openness of the economy’s trade policies in recent time periods rather than the policies adopted historically. It may also partly explain the ability of some countries that previously operated closed market economic policies to attract substantial amounts of foreign investment once more open economy policies were adopted.

The accumulated effects of an increase in the wage rate index on inbound Sri Lankan FDI are shown in the last column of Table 2. The results depict a strong inverse relationship with FDI inflows, decreasing by around $12 million at the end of the 10-year period as a consequence of a one percentage point increase in the wage index. Table 3 (column 5) indicates that future inbound FDI is largely influenced by the current wage rate. After 3 years, approximately 50 per cent of the forecast variance is due to the wage rate innovation, and the proportion is still significant at around 35 per cent after 10 years. The results support the hypothesis that FDI moves from developed countries to developing countries in order to capitalise on cheap labour.

An important factor to bear in mind is that the cost of labour does not account for labour productivity. Many industrialized countries such as the US, UK and Germany attract large sums of FDI inflows despite higher wage rates. Higher productivity can offset higher wage rates and equate marginal revenue product with marginal resource cost. Athukorala and Jayasuriya (2004) noted that throughout the post-reform period in Sri Lanka, real wage declines were accompanied by strong labour productivity growth.

The accumulated impacts on FDI from an exchange rate shock are illustrated in the second column of Table 2. Here the shock is defined as a one-unit increase in the bilateral exchange rate, or a depreciation of the host country currency. The response of FDI is expected to be positive but, as discussed in Section 3, contradictory results are not uncommon in the literature. We found that the initial impacts are positive however, at the end of the 10 year period FDI declines by approximately $US4 million. The results imply that although foreign investment increases in the short run, the negative impact from host country currency depreciations on the repatriation of profits derived from reinvested earnings are a long run concern. This is consistent with the inconclusive findings of the existing literature on the relationship between FDI inflows and the exchange rate.
The accumulated responses of inbound Sri Lankan FDI to an interest rate shock are shown in column 5 of Table 2. In this instance, the shock is defined as a one percentage point increase in the interest rate. Intuitively, an increase in the cost of capital should lead to a reduction in the level of investment, but inspection of the IRF suggests the opposite may be true. Higher host country interest rates provide unfavourable investment conditions for domestic companies. For example, Sri Lankan companies using domestically borrowed funds to invest in the local economy would be disadvantaged from an increase in Sri Lankan interest rates. Quite often domestic investors are confronted with a numerous difficulties in trying to borrow money from the less costly international lending market. On the other hand, multinational corporations are better positioned to borrow investment funds from either the global market or source country. Higher interest rates in the host country may encourage foreign investors to source capital from their home country market rather than from the intended country of investment capital market. Positive relationships between host country interest rates and FDI inflows have been found in similar studies (e.g. Billington 1999; Wijeweera and Clark 2006).

6. Conclusion

Since economic reforms were introduced in 1977, Sri Lanka has experienced strong growth in inbound FDI. Plans by Sri Lanka’s government to encourage economic growth in the medium-term include significantly increasing FDI flows to the country (Asian Development Bank 2007). In this paper we examined the response of FDI inflows to Sri Lanka from changes in various macroeconomic variables. Major determinants of inbound FDI can be identified from the analysis. Our findings indicate that, of the five variables considered, the wage rate is the most important determinant of inbound FDI to Sri Lanka. Simulations showed that a one percent increase in the wage rate index would lead to a US$12 million decrease in FDI inflows. This finding confirms the cheap labour hypothesis. However, in order for Sri Lanka to sustain this comparative advantage, labour productivity growth is vital. In the long run, wage rate increases will detract from Sri Lanka’s viability as a foreign investment destination. Observations suggest that countries with very high labour costs can still attract FDI if higher productivity can compensate for higher wage rates.

As expected, positive long-run relationships were found between FDI and real GDP, and between FDI and previous levels of FDI. This suggests that the size and strength of Sri Lanka’s economy, prior foreign investment levels in the country, and institutional credibility, including political stability, are also considerations of multinational companies decisions’ to invest in Sri Lanka. More open trade was similarly found to exert a positive influence on FDI inflows however, the positive effects dissipated quickly beyond the seventh year. The accumulated effects on inbound FDI from a depreciation of the Sri Lankan rupee against the US dollar were found to be negative at the end of the ten-year period, as were the accumulated effects of an increase in the domestic interest rate. In short, the evidence of this paper suggests that Sri Lanka should focus on the health of their major economic indicators, in particular the wage rate, GDP, exchange rates, interest rates, and the level of external trade, in designing policies that aim to attract FDI inflows.
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