CDE
March, 1999

Centre for Development Economics

Foreign Direct Investment and Economic Activity in India

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Working Paper No. 62

ACKNOWLEDGEMENTS

The authors are grateful to the Centre for Development Economics, Delhi School of Economics for providing support for this project. An earlier version of this paper was presented at the American Social Science Association Meetings in New York, January 1999.

ABSTRACT

This paper examines the relationship between foreign direct investment and economic activity in India in the post liberalisation period. Foreign direct investment is measured both by the amount approved as well as the actual flows. Economic activity is measured by the index of industrial production. Granger causality tests and innovation accounting analysis suggest that FDI flows (approvals and actual) respond to the level of industrial production. Actual flows, however, do not Granger-cause industrial output.

1. INTRODUCTION

The objective of this study is to investigate the relationship between economic activity and foreign direct investment (FDI) in India. Economic theory suggests that FDI can have a positive effect on the economy. It can also be argued that output in an economy influences FDI flows. We examine the direction of the relationship between FDI and output in the post liberalisation period in the framework of a vector autoregressive model using Granger causality tests, impulse responses, and variance decompositions.

The following section provides a review of the literature on the relationship between FDI and economic activity. Section 3 outlines changes in the FDI policy in India. Section 4 describes the econometric methodology. Section 5 reports the empirical results and the last section concludes the paper.

2. Relationship between FDI and Economic Activity

In the last decade many developing countries formerly sceptical regarding the role of FDI, changed their views.[1] This resulted in the adoption of more liberal policies towards FDI and subsequently to a surge in foreign capital inflows to these countries.[2] There is therefore now renewed interest in analysing the effects of FDI on economic activity.

Singer (1950) argues that FDI has a detrimental effect on developing countries and leads to uneven global development. This is based on the premise that FDI going to developing countries is mainly in the primary sector.[3] However, Singer (1975) modifies his views by focusing on differences between countries rather than commodities. Griffin (1970) and Weisskopf (1972) also support the view that FDI from developed to developing countries does not have beneficial effects. On the other hand, economists like Rosenstein-Rodan (1961), and Chenery and Strout (1966) in the early 1960s show that foreign capital inflows

[1] See e.g. Lall and Streetan (1977) and Lall (1993).

[2] See UNTC (1997). For determinants of FDI, see Dua and Rashid (1996), and for a survey of literature, De Mello (1997).

[3] This line of thought greatly influenced many developing countries including India who had just emerged from many years of colonial rule to take a strong stance against FDI.

have a favourable effect on economic efficiency and growth.

In the recent past, there is much literature showing that FDI can have positive effects on growth in the host country. Most of this literature consists of endogenous growth models that try to rectify the shortcomings of the traditional framework of growth as developed by Solow (1956), where technological change was left as an unexplained residual and policy variables were considered to have only a short-term impact on growth. The need to explain the experience of positive long-term growth rates in many countries has led economists to develop growth models that look at growth determinants as endogenous. Thus till the advent of the endogenous growth models (Barro and Sala-i-Martin, 1995), FDI only affected the level of income, leaving the long-run growth rate unchanged due to diminishing returns to capital. Endogenous growth models also highlight the dependence of growth rates on the state of domestic technology relative to that of the rest of the world. The rate of growth of a developing country therefore depends on the adoption and implementation of new technologies that are already in use in developed countries.

A number of studies show the central role played by technology diffusion in the process of economic growth (Nelson and Phelps, 1966; Grossman and Helpman, 1991; and Barro and Sala-i-Martin, 1995). Endogenous growth models look at FDI as an important vehicle for the transfer of technology and knowledge (Balasubramanyam et al., 1996) and show that FDI can have long-run effects on growth by generating increasing returns in production via externalities and productivity spillovers.[4] Moreover, FDI can contribute more to growth than domestic investment when there is sufficient absorptive capacity available in the host country (Borensztein et al., 1998). This is because FDI flows today are not confined to the primary sectors of developing countries but to modern manufacturing.

To make their operations more productive and efficient, transnationals take with them high levels of technology.[5] Thus, FDI can lead to higher growth by incorporating new inputs

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[4] Aitken, Hansen and Harrison (1994) show the spillover effect of FDI on exports with the example of Bangladesh, where the entry of a single Korean multinational in garment exports led to the establishment of a number of domestic export firms, creating the country's largest export industry.

[5] These flows attempt to take advantage of low wages, or as in the case of China and India to cater to the large domestic market. In 1913 the primary sector (mainly mining and unprocessed agricultural raw materials)

and techniques (Feenstra and Markusen, 1994). Kathuria (1998) finds that technology spillovers from FDI in Indian manufacturing have significant benefits. Wei (1996) uses urban data to show that FDI produces technological spillovers in China and explains growth differentials among Chinese urban areas. There are good theoretical reasons to show that the growth consequences of FDI depend on what kinds of sectors receive FDI and that the change in sectoral flows strengthen the positive effects and weaken the negative ones (Dutt, 1997).[6]

FDI is also an important source of human capital augmentation and provides specific productivity increasing labour training and skill acquisition through knowledge transfers. De Mello and Sinclair (1995) show that FDI can promote knowledge transfers even without significant capital accumulation as in the case of licensing and start-up arrangements, management contracts and joint ventures in general.

The idea of trade-related international knowledge spillovers developed by Grossman and Helpman (1992) is extended by Walz (1997) to FDI to show that FDI is accompanied by interregional spillovers of knowledge from the more to less advanced countries. Policies leading to an inflow of FDI therefore speed up the growth process and anything from investment controls for TNCs to specific taxes on their repatriation of profits hurts the international growth process and thereby the consumers in the developing country. Thus, theoretically speaking, the main avenues by which FDI can affect growth are productivity spillovers, human capital augmentation and technological change, though it becomes very difficult to incorporate these in empirical studies as these are not easy to measure.

The dependency theorists believe that FDI can have a favourable short-term effect on growth. In the long-run, however, as FDI accumulates, it can have a negative effect on the rest of the economy due to the intervening mechanisms of dependency, in particular, "decapitalization" and "disarticulation" (lack of linkages; see Stoneman, 1975; Bornschier, 1980).

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accounted for more than half of FDI flows to developing countries and the manufacturing sector only 10%; in 1990 about 40% of FDI went to manufacturing, 50% to services and only 10% to the primary sector (see Dutt, 1997). Also see Bahaduri (1996).

[6] Empirically Dutt (1997) was not able to obtain these results due to the small sample of countries for which data on high technology are available. He suggests that case studies of individual countries may yield better results.

Two recent empirical studies – Karikari (1992) and Saltz (1992) – do not find support for a positive relationship between FDI and economic growth. Karikari (1992) tests for causality using data for Ghana and finds that FDI does not affect output. In a cross-sectional study of developed and less developed countries, Saltz (1992) finds a negative correlation between FDI and economic growth.

Causality can also run from the state of the economy to FDI because economic activity itself may be a determinant of FDI. This would be the case if higher economic activity or growth leads to a larger market size that can increase the attractiveness of a country for multinationals. The market size may enable investors to exploit potential economies of scale. Further, foreign investors may be attracted to a country where technology is changing fast since technological progress can provide opportunities to increase profits. In fact, in a recent empirical study for the U.S., Kasibhatla and Sawhney (1996) report support for the hypothesis that GDP causes FDI while they do not find support for reverse causation.

3. FDI Policy in India

India has many factors that are attractive to FDI - a large market, a well developed industrial base with the required infrastructure and a qualified and skilled labour force. Yet, prior to 1991, it was not able to attract FDI in the same proportion that some other Asian countries have. This is attributed to the negative investor perception of the country's commitment to foreign capital (UNTC, 1992) as a result of the cautious policy regime that the Government of India followed with respect to foreign capital until 1991. However, with a more liberal economic policy that includes changes in the regulations towards FDI, India has now become an attractive destination for foreign investment.

In this section we give a brief outline of the FDI policy prior to 1991, the factors leading to a change in economic policy in 1991, and the response of FDI flows to the change in economic policy.

The strategy for India's industrial development was outlined in the Industrial Policy Resolution, 1948 which assigned a specific role to the public sector, private sector and foreign investment. The policy resolution stated that India welcomed foreign investment within the overall parameter of national development strategy. Non-discriminatory treatment, repatriability and emphasis on exports were the hallmarks of the policy (Kapur, 1997). It was recognised that foreign investment was required to fill the savings gap and was a vehicle for the transfer of technology not indigenously available. It therefore needed to be controlled in the national interest and approvals were to be granted on a case by case basis (Gopinath, 1997). Any subsequent changes in economic policy have been carried out by making the necessary changes to the Industrial Policy Resolution by either widening or limiting the scope of the private and international sector.

The passing of the Foreign Exchange Regulation Act (FERA) in 1973 was in response to a worsening of the balance of payments situation and marked a tightening of the regulatory regime regarding management of foreign capital. A process of Indianization and dilution was carried out whereby foreign companies were required to dilute their non-resident share holding within two years to the levels prescribed by the Reserve Bank which were placed generally at 40 percent. A restrictive approach was adopted for non-cash inflows and the use of foreign brand names for internal sale. Companies in high technology and skills were, however, allowed foreign share holdings up to 74 percent.

The 1980s marked an easing of restrictions and there was policy liberalisation. Foreign investment and technical collaboration were welcomed. The foreign investment policy was designed to channel investment in areas of sophisticated technology or where production gaps existed and to help increase the country's export potential (UNTC, 1992).[7] Direct investment up to 74 percent and 100 percent was allowed in the priority sector and export oriented units respectively with full repatriation benefits.

During 1990-92, India experienced an external payments crisis which brought about a complete change in its economic policy. The gulf war had several adverse effects on India: an increase in POL imports, partial loss of export markets in West Asia, and a slow down of remittances from non-resident Indians in the affected countries all of which caused the current

[7] Gopinath (1997) classifies the policy towards FDI into four phases. Phase I (1956-66) marks a cautious approach, phase II (1967-79) characterized a restrictive regime, phase III (1980-90), a progressive attenuation of regulations, and phase IV (1991-95) witnessed a liberal foreign investment regime.

account deficit to go up to 3.2 percent of GDP in 1991. As a result of the decline in reserves to just about one month of imports at the end of 1990-91, India decided to introduce the new economic policy (Kapur, 1997).

The change in attitude was also due to the realisation that competition for external resources was growing, official development assistance was becoming stagnant, and commercial bank lending had dried up after the debt crisis. With China adopting reforms and changes taking place in the former Soviet Union and Eastern Europe, India realised that it would have to adopt more liberal policies to attract capital or else it would lag behind other developing countries.

India introduced market oriented reforms in 1991 where the new FDI policy was a part of a package encompassing industrial policy, trade policy, exchange rate policy, and financial sector policy. These were undertaken to create an economic environment conducive to private investment, both domestic and foreign, and recognised the need for modernising India's industrial and export infrastructure. There was a marked change in the policy toward foreign investment - both foreign direct investment and portfolio investment - and new institutions were set up to facilitate the flow of FDI. FDI inflows were encouraged into high-tech, export oriented, and employment generating manufacturing sectors. India soon became an attractive FDI location not only for India's major trade and investment partners, United States and United Kingdom, but also for Asian newly industrialised economies. Joshi and Little (1993)[8] point out, however, that the time taken to attract foreign investment in developing countries is at least five years after the introduction of reforms.

Did the FDI inflows have a beneficial effect on the Indian economy or was the effect of the inflows unidirectional, i.e., the inflows merely responded to the state of the Indian economy? We now turn to these and related questions.

[8] China, for example began its reforms in 1978-79 and despite its strong links with Chinese expatriates, attracted foreign capital flows only in the mid-1980s.

4. Econometric Methodology

This paper analyses the empirical relationship between FDI and economic activity in India in the framework of a vector autoregressive model for the post liberalisation period. Granger causality tests along with innovation accounting, i.e. impulse responses and variance decompositions, are used to examine the relationship

Foreign direct investment is measured both by the amount of foreign investment approved (Rs. crore) and the actual foreign investment inflows. Monthly data are collected from the *Monthly Review* of the *Centre for Monitoring Indian Economy*. Note that in 1992 the definition of FDI underwent a change (Gopinath, 1997). Until 1991, FDI included investment in three types of Indian companies, viz., companies that were subsidiaries of foreign companies; companies in which the share of equity capital held in any one country outside India was 40 percent or more; and companies in which a single investor abroad held 25 percent or more of the equity capital. Since 1992, the definition includes investment in companies in which a single investor has 10 percent ownership of ordinary share capital.

Monthly data on FDI approvals are available from 1992 onwards while that for actual flows are only available since 1994. FDI approvals can best be treated as capturing the "expectations" or "sentiment" of foreign investors since the approvals do not materialise until these are translated into actual flows. We use the FDI approvals to proxy FDI flows since monthly data on actual flows are available for a shorter time period.

Economic activity is measured by the monthly index of industrial production gleaned from various issues of the *RBI Bulletin*. While this is not an accurate measure of overall economic activity and accounts for less than one-fourth of total output, the alternative, gross domestic product, is available only on an annual basis.

The first step is to test if the series are nonstationary. The classical regression model requires that the dependent and independent variables in a regression be stationary in order to avoid the problem of what Granger and Newbold (1974) called 'spurious regression.' Nonstationarity or the presence of a unit root can be tested using the augmented Dickey-Fuller

(1979, 1981) tests. To test if a sequence y_t contains a unit root, three different regression equations are considered.

$$\Delta y_t = \alpha + \gamma y_{t-i} + \theta_t + \sum_{i=2}^{p} \beta_i \Delta y_{t-i} + \varepsilon_t \tag{1}$$

$$\Delta y_t = \alpha + \gamma y_{t-i} + \sum_{i=2}^{p} \beta_i \Delta y_{t-i} + \varepsilon_t \tag{2}$$

$$\Delta y_t = \gamma y_{t-i} + \sum_{i=2}^{p} \beta_i \Delta y_{t-i} + \varepsilon_t \tag{3}$$

The first equation includes both a drift term and a deterministic trend; the second excludes the deterministic trend; and the third does not contain an intercept or a trend term. In all three equations, the parameter of interest is γ. If $\gamma=0$, the y_t sequence has a unit root. The estimated t-statistic is compared with the appropriate critical value in the Dickey-Fuller tables to determine if the null hypothesis is valid. The critical values are denoted by τ_τ, τ_μ, and τ for equations (1), (2), and (3) respectively.

Following Doldado, Jenkinson, and Sosvilla-Rivero (1990), a sequential procedure is used to test for the presence of a unit root when the form of the data-generating process is unknown. Such a procedure is necessary since including the intercept and trend term reduces the degrees of freedom and the power of the test implying that we may conclude that a unit root is present when, in fact, this is not true. Further, additional regressors increase the absolute value of the critical value making it harder to reject the null hypothesis. On the other hand, inappropriately omitting the deterministic terms can cause the power of the test to go to zero (Campbell and Perron, 1991).

The sequential procedure involves testing the most general model first (equation 1). Since the power of the test is low, if we reject the null hypothesis, we stop at this stage and conclude that there is no unit root. If we do not reject the null hypothesis, we proceed to determine if the trend term is significant under the null of a unit root. If the trend is significant, we retest for the presence of a unit root using the standardised normal distribution. If the null of a unit root is not rejected, we conclude that the series contains a unit root. Otherwise, it does not. If the trend is not significant, we estimate equation (2) and test for the presence of a unit root. If the null of a unit root is rejected, we conclude that there is no unit root and stop at this point. If the null is not rejected, we test for the significance of the drift term in the presence of a unit root. If the drift term is significant, we test for a unit root using the standardised normal distribution. If the drift is not significant, we estimate equation (3) and test for a unit root.

We also conduct the Phillips-Perron (1988) test for a unit root. This is because the Dickey-Fuller tests require that the error term be serially uncorrelated and homogeneous while the Phillips-Perron test is valid even if the disturbances are serially correlated and heterogeneous. The test statistics for the Phillips-Perron test are modifications of the t-statistics employed for the Dickey-Fuller tests but the critical values are precisely those used for the Dickey-Fuller tests.

If the variables are nonstationary, we test for the possibility of a cointegrating relationship. If the variables are stationary, these can be used in a classical regression model.

The next step is to test for Granger causality between foreign direct investment and the index of industrial production. Assuming that the two variables are stationary, this can be done in the framework of a two-variable vector autoregressive (VAR) model

$$FDI_t = \alpha_1 + \sum_{i=1}^{p} \gamma_{1i} FDI_{t-i} + \sum_{i=1}^{p} \beta_{1i} IIP_{t-i} + \varepsilon_{1t} \quad (4)$$

$$IIP_t = \alpha_2 + \sum_{i=1}^{p} \gamma_{2i} FDI_{t-i} + \sum_{i=1}^{p} \beta_{2i} IIP_{t-i} + \varepsilon_{2t} \quad (5)$$

We say that FDI does not Granger cause IIP if in equation (5) the lags of FDI are jointly not significantly different from zero. Hence, Granger causality can be tested using the standard F-test. For our empirical tests, we set up two bivariate VAR models, one with FDI measured by FDI approvals and the second with FDI actual inflows.

In the context of the two variable VAR, we also examine the impulse response functions that represent the time paths of the variables in response to shocks to the two series. We impose an additional restriction on the VAR in the form of the Choleski decomposition that determines the ordering of the variables. For instance, if a shock to IIP affects both FDI and IIP contemporaneously but that a shock to FDI impacts IIP with a lag, we say that IIP is 'prior' to FDI.

We study the forecast error variance decompositions that measure the proportion of variation in a variable due to its own shocks relative to shocks to other variables. For example, if a shock to FDI does not explain any of the forecast error variance of IIP at all forecast horizons, IIP is exogenous. On the other hand, if a shock to FDI explains all of the forecast error variance in IIP, IIP is entirely endogenous. Generally, a variable explains most of its forecast error variance at short horizons and smaller proportions at longer horizons. Variance decompositions also require ordering of variables.

5. Empirical Results

The estimates are based on monthly data from January 1992 through March 1998 for FDI approvals and from January 1994 for actual FDI flows. We test for causality between FDI flows and the level of economic activity measured by the index of industrial production. We also examine the impulse responses and variance decompositions.

For the unit root tests, the null hypothesis $\gamma=0$ in the most general model (equation 1) is tested against the critical value τ_τ. The critical values for equations (2) and (3) are τ_μ and τ respectively. The critical value for the test for a time trend in the presence of a unit root in equation (1) is ϕ_3. Similarly, the critical value for the test for a drift in the presence of a unit root in equation (2) is ϕ_1. The test statistics are given in Table 1. The sequential procedure is used so that if the null of unit root is rejected for the most general model, we stop at this stage. If the null is not rejected, we look at smaller models (equations 2 and 3).

In the most general model of the ADF test (equation 3), we reject the null hypothesis of a unit root in FDI approvals and we therefore stop at this stage. The Phillips-Perron (PP) test-statistic reinforces the conclusion that the series for FDI approvals is stationary. For FDI actuals, the test-statistic τ_τ is marginal for the ADF test while the PP test-statistic decisively rejects the null of a unit root. We therefore conclude that the series for FDI actual flows is stationary. There is a contradiction between the ADF test and the PP test for the index of industrial production. The PP test decisively rejects the null of a unit root while the sequential procedure for the ADF test fails to reject the null of a unit root. Since the Phillips-Perron test is based on fairly mild assumptions about the distribution of the error term, we prefer to use the PP test in this case. Thus, we conclude that the index of industrial production is stationary in the post 1992 period.

We now proceed with the Granger causality tests between the index of industrial production and FDI. We estimate two bivariate vector autoregressive models, one with IIP and FDI approvals, and the second with IIP and FDI actuals. For both models, we first test for the optimal lag length using the Akaike information criterion, Schwartz Bayesian criterion and the likelihood ratio test (Sims, 1980). For both models, we find lag length of two to be optimal.

Table 2 shows the existence of bi-directional causality between FDI approvals and IIP in the post 1992 period. In other words, the level of industrial production affects the FDI approvals. Moreover, FDI approvals also Granger-cause IIP. Over a shorter time period, from 1994, we find that the level of industrial production Granger causes FDI actual flows while industrial production is not Granger caused by FDI. Thus, higher economic activity results in an increase in FDI flows.

The results for FDI actuals are more plausible. This is because FDI approvals here are used merely as an indicator or expectations of FDI flows. FDI approvals, of course, cannot directly materialise into higher levels of industrial production unless the approvals are translated into flows. Foreign investors' perceptions about economic activity are, however, likely to impact applications for FDI and hence approvals.

Innovation accounting analysis corroborates the Granger causality results. Figures 1 through 4 show the impulse responses. The Choleski decompositions assume that IIP is 'prior' to FDI, i.e. a contemporaneous shock to IIP affects both IIP and FDI but that a contemporaneous impulse or innovation to FDI affects IIP with a lag. These responses can be interpreted as a type of correlation between the variables at different times. If innovations in IIP are highly correlated with future FDI, then an innovation in IIP will be followed by large movements in FDI. The impulse responses (solid lines) are drawn with the 95 percent confidence bands for 24 periods after the innovation. The bands are estimated using the Bayesian Monte Carlo procedure described in Doan (1991) with 500 random draws. If the bands do not straddle the zero axis, there is a 95 percent probability that the impulse responses are not zero. If the band lies entirely above (below) the zero axis, we infer that there is a 95 percent probability that the response is positive (negative).

Figures 1 and 2 correspond to the model with FDI approvals. Figure 1 shows that a one standard deviation shock to IIP has a positive and significant effect on FDI for a few periods after the shock. The same can be said about the response of IIP to a one standard deviation shock to FDI approvals (Figure 2). This conforms with the bi-directional Granger causality results obtained earlier.

Figures 3 and 4 are for the model with FDI actuals. Figure 3 shows that the response of FDI actuals to a one standard deviation shock to IIP is positive and significant in the near future while Figure 4 shows that the impulse response of IIP is not significantly different from zero for all time periods (the confidence band straddles the zero axis). Again, these responses support the unidirectional (IIP to FDI) findings of the Granger causality tests.

The variance decompositions are reported in Tables 3a and 3b. For each variable in the left-hand column, the percentage of the forecast error variance for six, twelve, and twenty-four months ahead that can be attributed to shocks in each of the variables in the remaining columns is reported. Each row sums to 100 percent since all of the forecast error variance in a variable must be explained by the variables in the model. If a variable is exogenous in the Granger-sense, i.e., if other variables in the model are not useful in predicting it, a large proportion of that variable's error variance should be explained by its own innovations. If another variable is useful in explaining a left-column variable, that variable will explain a positive percentage of the prediction error variance.

Table 3a reports the variance decompositions for the VAR with FDI approvals. At the forecast horizon of 24 months, innovations in FDI approvals explain about 25 percent of the forecast error variance in IIP. Innovations in IIP explain a slightly higher percentage (31 percent) of the forecast error variance in FDI approvals. These results reinforce the bi-directional Granger causality reported earlier.

The variance decompositions for the VAR with FDI actuals yield different results. Table 3b shows that at a forecast horizon of 24 months, almost all of the forecast error variance in IIP is explained by its own innovations supporting the assumption that IIP is 'predetermined' or 'prior'. IIP is, however, an important determinant of FDI actuals and explains about 40 percent of the 24-months-ahead forecast error variance. Since innovations in IIP explain a large proportion of the unexpected fluctuations in FDI actuals, IIP is potentially useful in predicting FDI actuals.[9] These results are consistent with the unidirectional Granger causality results.

In sum, we strongly support the hypothesis that IIP is an important determinant of the actual flows of FDI. We also support the contention that IIP Granger causes FDI approvals (and indirectly, applications for FDI). The result that FDI approvals cause IIP has to be treated with caution since approvals really signify expected flows, not actual flows.

6. Conclusions

With the objective of becoming more efficient in a global environment, a number of developing countries adopted market oriented reforms. This resulted in a surge in FDI flows to these countries. India, a late comer on the scene of economic reforms, started liberalising its FDI policy and introduced new institutions for facilitating FDI following a macroeconomic crisis in 1991. Subsequently it experienced an increase in FDI inflows. We examine whether this increase proved beneficial for economic activity or whether the flows responded to the economic outlook.

[9] The substantive results are unaltered by changing the ordering of the variables.

Our results, in general, show that FDI approvals and actual flows have responded to the level of economic activity measured by industrial output. The evidence is, however, inconclusive regarding the response of industrial production to FDI flows. The Granger causality tests and innovation accounting analysis suggest that IIP has yet to respond to actual flows while FDI approvals do affect output. FDI approvals, however, do not measure actual flows and therefore this result needs to be interpreted cautiously. Further, this apparent contradiction between the results for FDI actuals and approvals can perhaps be resolved by using a longer time period for FDI actuals, a topic for future research when more observations for actual flows are available.

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Table 1
Tests for Unit Root

Variables/Tests	τ_τ (Null: γ=0 in equation 3)	ϕ_3 (Null: γ=0, 0=0, equation 3)	τ_μ (Null: γ=0 in equation 2)	ϕ_1 (Null: γ=0, α=0 equation 2)	τ (Null: γ=0 in equation 1)
IIP					
1992:1 - 1998:3 ADF-Test	-.2.91 (-3.13)	4.28 (5.34)	-..278 (-2.57	3.28 (3.78)	2.55 (-1.62)
PP-Test	-5.36 (-3.13)				
FDI-Approvals					
1992:1-1998:3 ADF-Test	-3.71 (-3.13)				
PP-Test	-8.98 (-3.13)				
FDI-Actual					
1994:1-1998:3 ADF-Test	-3.04 (-3.13)	4.73 (5.34)	-1.83 (-2.57)	2.07 (3.78)	0.697 (-1.62)
PP-Test	-5.75 (-3.13)				

Note: Figures in parentheses represent critical values at the 10% level of significance.

Table 2
Granger Causality Tests

Null Hypothesis	**Number of lags**	**F-statistic**	**Conclusion (at 5% significance level)**
FDI Approvals: 1992:1-1998:3			
IIP is not Granger caused by FDI approvals	2	F(2,68)=10.335	Reject null hypothesis
FDI approvals are not Granger caused by IIP	2	F(2,68)=7.362	Reject null hypothesis.
FDI-Actual Flows: 1994:1-1998:3			
IIP is not Granger caused by FDI actual flows	2	F(2,44)=0.105	Do not reject null hypothesis.
FDI actual flows are not Granger caused by IIP	2	F(2,44)=8.349	Reject null hypothesis.

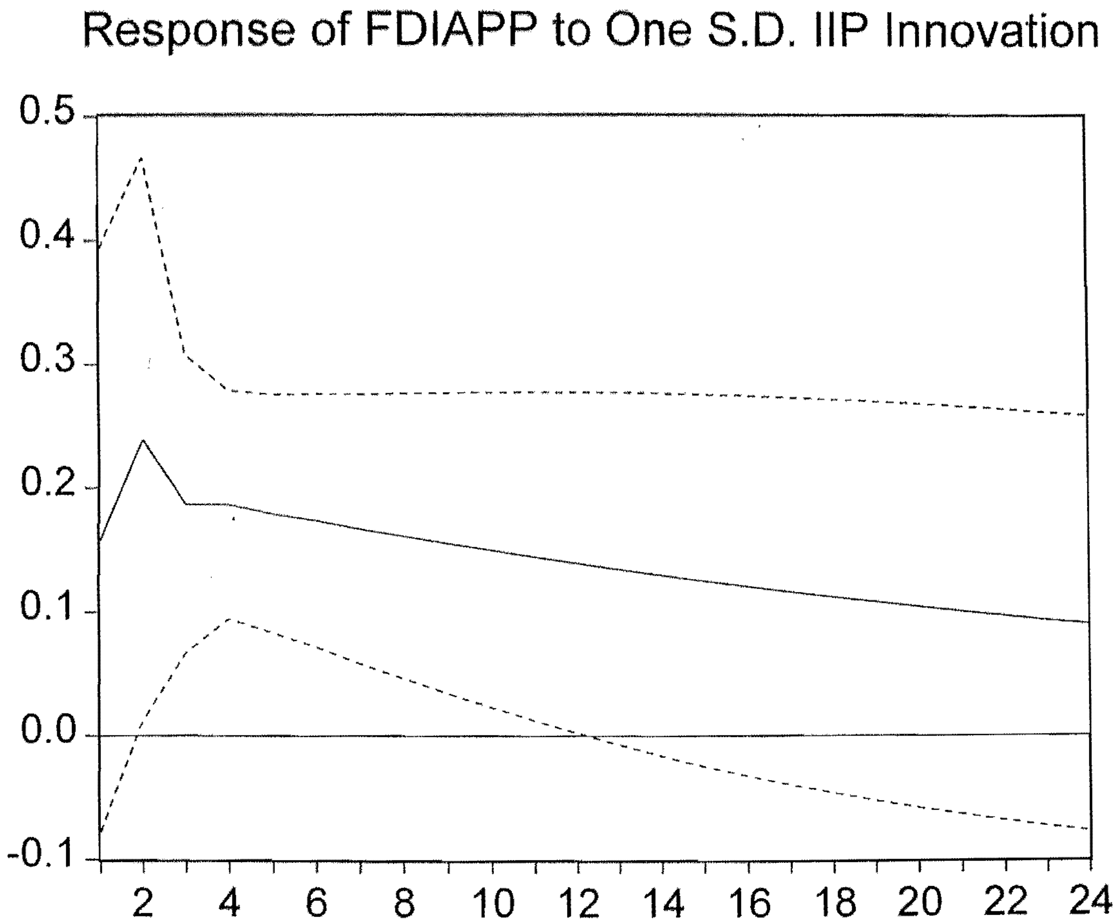
Table 3a
Variance Decompositions

Variable	Forecast Horizon	IIP	FDI Approvals
11P	6	77.220	22.780
	12	75.891	24.109
	24	75.239	24.761
FDI Approvals	6	17.007	82.993
	12	24.483	75.517
	24	30.554	69.446

Table 3b
Variance Decompositions

Variable	Forecast Horizon	IIP	FDI Actuals
11P	6	99.868	0.132
	12	99.875	0.125
	24	99.878	0.122
FDI Actuals	6	43.225	56.775
	12	55.182	44.818
	24	61.177	38.823

Figure 1



Response of FDIAPP to One S.D. IIP Innovation
0.5
0.4
0.3
0.2
0.1
0.0
-0.1
2
4
6
8
10
12
14
16
18
20
22
24

Figure 2

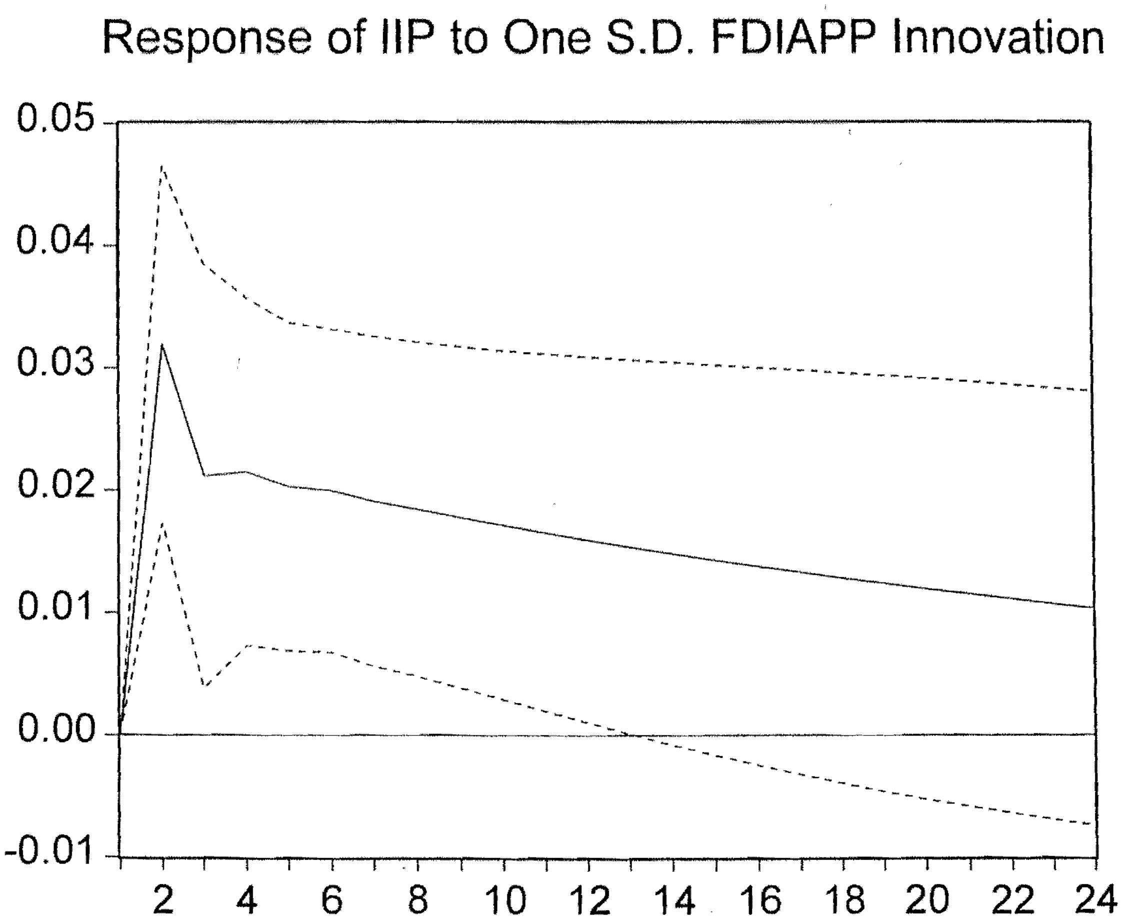

Response of IIP to One S.D. FDIAPP Innovation
0.05
0.04
0.03
0.02
0.01
0.00
-0.01
2
4
6
8
10
12
14
16
18
20
22
24

Figure 3

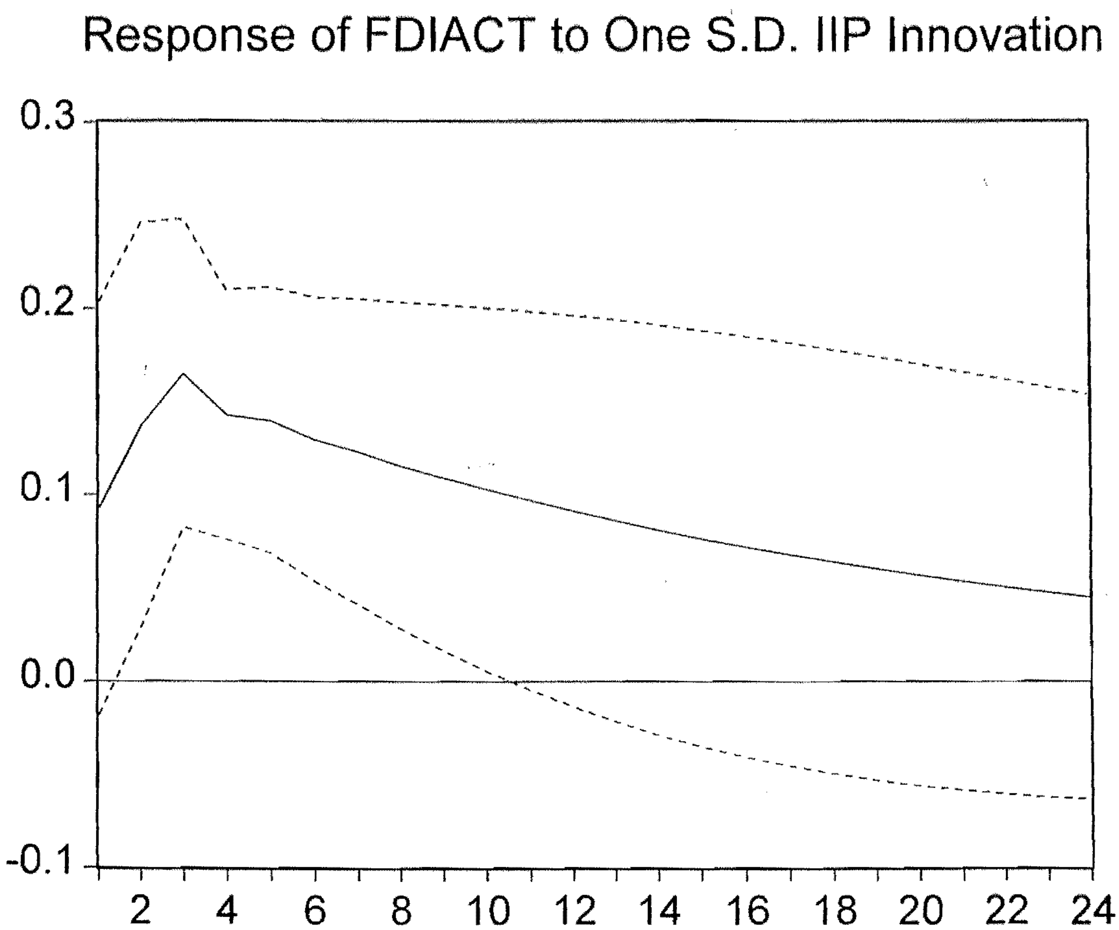
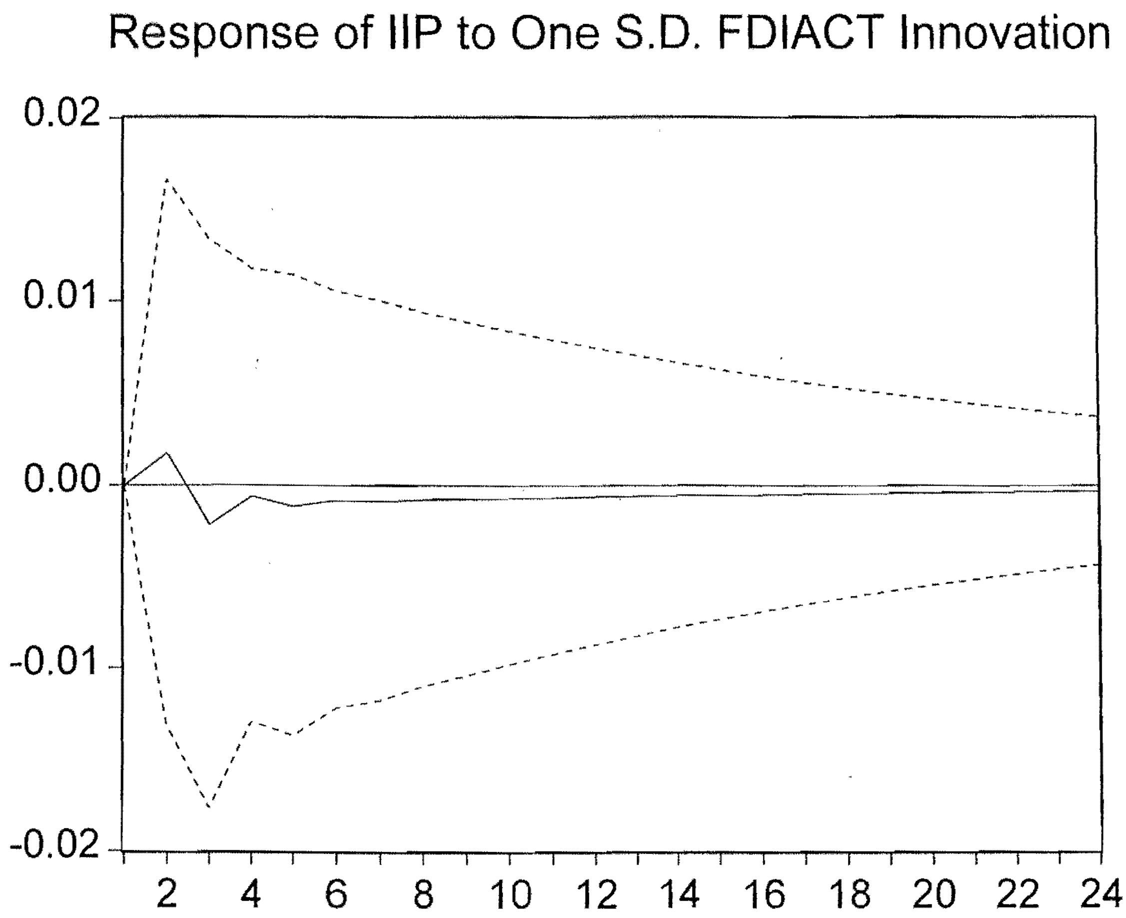

Response of FDIACT to One S.D. IIP Innovation
0.3
0.2
0.1
0.0
-0.1
2
4
6
8
10
12
14
16
18
20
22
24

Figure 4


Response of IIP to One S.D. FDIACT Innovation
0.02
0.01
0.00
-0.01
-0.02
2
4
6
8
10
12
14
16
18
20
22
24

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