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An Empirical Growth Model for India: 1954–1994

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Abstract

The aim of this paper is to investigate the determinants of economic growth in India for 1954-1994. We include indicators of both financial and trade policies as determinants of real per capita income. We emphasise the complementarity of these policies and assess their joint impact. Investment in physical capital and human capital are also considered and in addition, the impact of both oil shock and droughts during 1973-75 and 1979-82 is examined. Our analysis of time series data suggests that liberalisation of finance and trade and the development of Human Capital have had a positive and statistically significant impact. Our results also suggest that the second oil price shock and droughts from 1979-82 were more disruptive than the earlier episode of 1973-75.

Keywords: Financial and Trade Liberalisation; Human capital; Growth; Cointegration; India.

JEL Classification: F31; F32; O11; O53.

1. Introduction

The aim of this paper is to investigate the determinants of economic growth in India by applying time series techniques to annual data from 1954–1994. More specifically, this paper examines the

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joint impact on real per capita income of both financial and trade policies along with investment in physical and human capital. It is widely accepted that financial repression and trade restrictions mis-allocate resources towards less productive sectors and hence deter economic growth whereas financial and trade liberalisation[1] policies (FL, TL) positively affect economic growth. For example, growth rates in countries following liberalised trade and financial policies outperform the growth rates in countries associated with restrictive financial and trade policies (McKinnon, 1973; Shaw, 1973; Fry, 1995; Levine, 1997; World Bank, 1987)[2].

FL facilitates economic growth by raising (i) the ratio of saving to gross domestic product; (ii) the proportion of savings channelled to investment and (iii) the marginal productivity of capital (Pagano, 1993). FL raises productivity by (a) improving competitiveness, including the availability of information regarding investment projects, and (b) facilitating education and training which enhance the quality of human capital (Gregorio, 1996). TL reduces redundant research efforts and increases (i) market size for products, (ii) the efficiency of investment, and (iii) positive externalities for firms

[1] Financial liberalisation implies the removal of restrictions such as administrative setting of interest rates, the allocation of credit facilities to preferred sectors and high reserve requirement. Such liberalisation encourages financial saving and hence facilitates the development of the financial sector (McKinnon, 1973; Shaw, 1973; Fry, 1995). Thus, following traditional practice, we use Financial Liberalisation (FL) and Financial Deepening (FD) interchangeably in this paper. Trade Liberalisation (TL) implies the removal of quantitative and qualitative restrictions including tariffs and quotas on foreign trade. TL also implies the removal of restrictions on participation in foreign exchange markets.

[2] The McKinnon (1973) and Shaw (1973) hypothesis predicts that restrictions on interest rates discourage financial savings and hence investment is constrained by the supply of funds. These restrictions also reduce the efficiency of investment by encouraging investors to undertake low return projects. Preferential/directed credit also reduces the efficiency of investment since investment decisions under such circumstances are based on government socio-political goals rather than on the productivity of investment.

(Krugman, 1994; Revera-Batiz and Romer, 1991; Grossman and Helpman, 1991; Walz, 1998).

The main effect of both forms of liberalisation is reduced inefficiency in the production process. However, neither is fully effective in isolation since restrictive policies in either sector could mis-allocate resources and hence cause inefficiency in the production process. Considering the shared importance of both factors Roubini and Sala-i-Martin (1991) have extended the Barro (1991) growth model, which uses cross section data, to incorporate FL and TL. Their inclusion causes the Latin American dummy in the Barro model to be insignificant and also increases the explanatory power of the model, highlighting the importance of both financial and trade variables in influencing per capita income in the steady state. Blackburn and Hung (1998) consider the impact on economic growth of both financial intermediation and TL. Their model predicts that economic growth rates under financial intermediation tend to be higher than those under direct lending and borrowing and that FL and TL jointly facilitate the rate of economic growth by decreasing redundant research efforts and increasing markets for new products.

Empirical investigation of the joint importance of both forms of liberalisation using time series data is still underdeveloped generally. Finding the joint impact is particularly important for India since she has experienced both restrictive and liberalised economic policies: liberalisation began in the mid-1980s and still continues with significant changes in the early 1990s (see section 2 below). The cost of restrictive policies on Indian economic growth has been significant: until the early 1990s India experienced a low level of economic growth despite high levels of saving and investment which, at about one fifth of GDP, have been higher than other LDCs (Siddiki, 2000; Joshi and Little, 1994).

Although knowing the relationship between real per capita income and financial and trade variables is crucial before commen-

cing any meaningful financial and trade deregulation policies, to the best of our knowledge, no study of this experience has looked at the joint impact of financial and trade policies. Empirical studies have tended to look separately at the impact of FL or TL on real per capita income, generally finding positive effects (Demetriades and Luintel, 1997, for FL; Ghatak and Price, 1997; Ghatak and Utkulu, 1997, for TL).

We shall look at the joint impact of FL and TL on the growth of real per capita income in India. We consider the impact of oil price shocks and droughts during 1973-75 and 1979-82, which periods saw significant growth rate reductions. Identifying the impact of such shocks is important since unacknowledged regime changes might lead to mis-specification bias in model estimation and to mis-diagnosis of the time-series properties of the data.

We employ the ARDL approach of Pesaran and Shin (1998). The more common method of Engle and Granger (1987) has been criticised as sensitive to the endogeneity of the explanatory variables and to serial correlation in the disturbances. Maddala and Kim (1998) and Banerjee *et al.* (1993) offer reviews. The ARDL method includes lagged regressors that proxy dynamic specifications omitted from the model in order to mitigate the effects of serial correlation and functional mis-specification. This method distinguishes between endogenous and exogenous variables and hence avoids the endogeneity problem.

This paper is organised as follows: section 2 gives some details of financial and trade policies and the pattern of economic growth in India; section 3 presents the empirical modelling and section 4 draws the conclusions.

2. Financial and Trade Policies in India: 1950-1995

India maintained restrictive trade policies after independence in 1947 and restrictive financial policies following the late 1950s[3]. It launched a major planning programme during the 1950s and 1960s for rapid industrialisation via import substitutions, tariffs, forex controls and channelling funds towards the priority sectors (e.g. agriculture, exports and small scale industry) (Demetriades and Luintel, 1997; Joshi and Little, 1994; Sen and Vaidya, 1998). This planning programme was mainly aimed at achieving national self-reliance and economic independence. Large scale industries were promoted and regulated by the government. Imports were severely controlled and exports were subsidised.

Interventionist policies were reduced and the trade regime was liberalised significantly in 1985 and 1991. However, imports of consumer goods are still restricted; import tariffs in India still remain as amongst the highest in the world; forex is strictly regulated (World Bank, 1994, p.224; IMF, 1997). Trade restrictions are also reflected in forex black market premia (Siddiki, 2000).

The Government of India nationalised the 14 largest commercial banks in 1969 and another six in 1980 in order to accommodate a development programmes and sustain socio-political objectives and 'social controls' over commercial banks (Demetriades and Luintel, 1997; Joshi and Little, 1994; Sen and Vaidya, 1998). After the first nationalisation in 1969, the 22 public sector banks accounted for 86% of deposits, increasing to 92% after the second nationalisation in 1980. The administratively determined lending rates for the priority sectors were lower than other commercial lending rates. The nationalised commercial banks were asked to increase the priority sector lending to 33% of total credit, by May 1979, of which 16% to the agricultural sector. This directed credit was fur-

[3] However, until the late 1950s, India followed liberal financial policies with no controls on interest rates and low reserve requirements (Demetriades and Luintel, 1997).

ther raised to 40% of total credit. In addition, the entry of new domestic and foreign commercial banks was also significantly restricted. In the late 1980s, the financial sector was being gradually liberalised with complete removal of ceilings on lending rates in 1989 and of concessionary lending rates in 1990 (Demetriades and Luintel, 1997). The government's financial policies have had both positive and negative aspects. The high growth of bank branches resulting from the government directed policies increased the deposits from 15.3% of GDP in 1969 to 44.7 in 1993 (Joshi and Little, 1994). However, credit controls can have a negative impact on saving, investment and economic growth (Demetriades and Luintel, 1997; Ketkar, 1993). The overall impact on resource allocation of distortions in foreign trade and financial sectors is potentially enormous. This may be seen as reflected in the fact that although saving and investment were high relative to other LDCs, India experienced low productivity of investment and low GDP growth rates until the 1980s (Joshi and Little, 1994; World Bank, 1994).

The Indian economy was exposed to oil price shocks and droughts in 1972-75 and 1979-82 (Joshi and Little, 1994). The droughts during 1972-74 reduced average food grain and agricultural production by 8%. The first oil price shock in 1973 raised imports prices by 135% in one year. The official depreciation in 1973 also raised import prices by 15%. Consequently, the terms of trade deteriorated by 43% from 1973 to 75, the current account deficit increased from 16% of exports of goods and services (0.7% of GDP) in 1973 to 21% of exports of goods and services (1.1% of GDP) in 1975. This deterioration of the current account due to increased import prices occurred despite the fact that exports rose, due to the depreciation in official rates, by 64% in dollar value and 17% in volume from 1973 to 1975.

The adverse consequences of the second oil price shock in 1979 were also worsened by the severe droughts in 1979/80. The droughts brought about a reduction of 17.6% in food grain pro-

duction and of 15% in agricultural production. Overall prices rose rapidly during 1979–82. In addition, import prices in dollars rose by 50% in 1979 and 1980. Domestic oil prices also rose due to the disruption in oil production resulting from the agitation in Assam. Trade balances also deteriorated: the current account position changed from a deficit of 0.3% of GDP (4% of exports) in 1978/79 to a deficit of 2% of GDP (31% of exports) in 1981/82. Joshi and Little (1994, p.149) associate the shocks from 1979–82 with a 20% decline in exports and a 1.5% reduction in GDP.

3. Econometric Model

In considering the implications of Roubini and Sala-i-Martin (1991) and Blackburn and Hung (1998) for Indian economic development, we explore the impact on real per capita income of FL and TL in the context of accompanying investment in physical and human capital[4]. Our empirical model also incorporates dummies to capture the two external shocks occurred during 1973–75 and 1979–82. Following traditional practice, we use the extent of liquidity provision by the formal financial sector relative to economic activity to measure financial sector development or 'financial depth'[5]. The underlying intuition for using this indicator is that the capacity of the financial intermediaries is positively related to their provision of financial services. Our measure of 'financial depth' is the ratio of liquid liabilities of the financial system (i.e. M3) to GDP.

[4] An anonymous referee has suggested that we clarify the sense in which a model couched in levels can be informative about growth processes. We therefore ask the reader to note that a model estimated in log-levels readily transforms to one in log-differences, i.e. growth rates. Additionally, since the ARDL approach permits us to identify a direction of dependency, we interpret the cointegration embedded within it as defining the growth path that was opened up for the Indian economy during the observed period.

[5] The difficulties in measuring financial development and trade liberalisation and the frequent unavailability of data are well recognised in the literature (King and Levine, 1993, pp. 720–721, and references therein for financial development; Ghatak, Milner and Utkulu, 1997, for trade liberalisation).

The ratios of M1 or M2 to GDP are alternatives in principle but consistent data series are not available to us because of definitional changes by the reserve Bank of India in 1978.

Similarly, we use the trade penetration ratio as a measure of trade liberalisation. There are other possible measures for trade liberalisation but trade penetration ratios capture both the quantitative and qualitative restrictions in the foreign trade sector and time series data for this indicator are available. Additionally, other measures, e.g. tariffs and non-tariff barriers only capture specific aspects of TL and some of them[6] are based on subjective judgement. Importantly, time series data for them are not available for our sample period.

Suppressing the short-run dynamics, our a priori assumptions can be summarised as follows:

$$y = \beta_0 + \beta_{73}\text{D73} + \beta_{79}\text{D79} + \beta_1\text{INV} + \beta_2\text{HC} + \beta_3\text{FD} + \beta_4\text{OPEN}$$

$$\text{with } \beta_{73}, \beta_{79} < 0 \text{ and } \beta_1, \beta_2, \beta_3, \beta_4 > 0 \qquad (3.1)$$

Here y is real per capita income (the wholesale price index with base 1990 is used as a deflator). INV, indexing improvement in physical capital, is gross investment as a percentage of GDP. HC, indexing improvements in human capital, is secondary school enrolment as a percentage of total population. FD is the money supply (M3) as a percentage of GDP. OPEN is the trade penetration ratio - exports plus imports as a percentage of GDP. D73 and D79 are dummies to capture the oil shocks and droughts during 1973-75 and 1979-82, respectively. D73 takes a value one during 1973-75 and otherwise a value of zero and D79 takes a value one during 1979-82 and otherwise a value of zero. We use annual data in natural logarithms with sample period: 1954-1994.

[6] These include composite indices of distortions (Agarwala, 1983) and overall trade orientation, i.e. the degree to which the protective/incentives structure in a country is biased against exports (Krueger, 1978; Bhagwati, 1978).

We apply the ARDL approach[7] using *Microfit 4.0* (Pesaran and Pesaran, 1997). The augmented Dickey Fuller (ADF) test shows that all variables except INV are I(1), i.e. the levels are non-stationary[8], while the first differences are stationary at the 5% level of significance. Thus, the possibility exists of a long-run cointegrating relationship in the spirit of 3.1, albeit with some doubts now raised over the inclusion of INV.

The small sample properties of OLS estimation of cointegrating regressions may be weakened by, for example, endogeneity of the explanatory variables and serial correlation in the disturbances (Maddala and Kim, 1998; Banerjee *et al.*, 1993). Two strategies have been considered for dealing with this problem: modifying the initial choice of regression model or modifying the initial choice of estimator. In the first case, which includes the ARDL approach, initial models are re-specified to include additional regressors that proxy dynamic specifications omitted from the model. In the second case, exemplified by FMLS (Phillips and Hansen, 1990), least squares estimators are modified to produce an alternative with better known distributional properties and robust with respect to non-iid disturbances.

We employ the ARDL approach to explore the long and short-run dynamics of our model and test for the existence of cointegration. This method is applicable whether the variables in question

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[7] The "two-step" method of Engle and Granger (1987) and the FMLS method of Phillips and Hansen (1990) give qualitatively similar results to those presented here – see Siddiki and Daly (1999).

[8] Our analysis treats as I(1) some ratios, for example School enrolment /population, where common sense suggests that a permanent trend is not sustainable. However, our study is of a *developing* economy during a period of time when a number of institutional changes were in train. During such a period, ratios which might be I(0) in the steady state may follow trends that index the evolution of the economy through the transitory period. Since our intention is to draw conclusions from this development experience that pertain *to* the development experience, we argue that it is appropriate to apply statistical methods that accommodate the non-stationarity evident in our data.

are trend stationary or difference stationary (Pesaran and Shin, 1998) and may be motivated by the following argument. The Engle – Granger (1987) representation theorem asserts that whenever the level of a set of I(1) variables are constrained by one or more cointegrating relationships then their data generating process may be expressed as an error correction model (ECM). However, at one level an ECM is simply one possible (constrained) parameterisation of a vector autoregression (VAR). Since the separate equations of a VAR are individually autoregressive distributed lag (ARDL) regressions then the representation theorem may be taken as suggesting that cointegrating relationships, as well as short run dynamics, may be investigated via estimation of ARDL regressions. Pesaran and Shin (1998) argue that un-modified OLS has desirable asymptotic properties when applied to ARDL, provided that the lag lengths are sufficient to proxy for the serial correlation and endogeneity. They further suggest that the choice of estimator for small-sample investigations should be based on Monte Carlo assessment and offer evidence to support a "two-step" strategy. Lag lengths are first determined by the Schwartz Bayesian criterion or by the Akaike information criterion with OLS applied to an ARDL model detailing the short-run dynamics. Recovery of the coefficients of the long run model or of the ECM then follows as a re-parameterisation exercise.

Pesaran, Shin and Smith (1996) offer a procedure for identifying the dependent variable in a system containing a single cointegrating relationship. This procedure involves computation of standard hypothesis tests, albeit with non-standard critical values, applied to an unrestricted version of an ECM (UECM), which we can sketch as:

$$UECM: \Delta y_t = \alpha + \sum_{i=1}^{p} \Delta y_{t-i} \beta_i + \sum_{i=0}^{q} \Delta x_{t-i} \gamma_i + \varphi y_{t-1} + \delta' x_{t-1} + \varepsilon_t$$

The joint hypothesis $\varphi = 0$, $\delta' = 0$ asserts that no ECM and therefore no long run relationship exists. An "F-statistic" of this hypo-

thesis is carried out using non-standard critical values developed by Pesaran, Shin and Smith (1996). The UECM is normalised upon a particular selection of dependent variable by omitting the current change of this variable from the right hand side; applying the F-test to all such normalisations constitutes a search for the direction of causation.

As described above, we follow a two-step procedure to estimate an ARDL version of equation (3.1). In the first step, we carried out 'stability tests' to explore the existence of the long-run relationship, if any, among the variables y, INV, HC, FD and OPEN. Dummies D73 and D79 are considered as exogenous variables. The following UECM is constructed with y considered as the dependent variable:

$$\begin{aligned}\Delta y_t = {} & a_{y0} + a_{y73}D73 + a_{y79}D79 + \sum_{i=1}^{n} b_{yi}\Delta_i y_{t-i} + \sum_{i=0}^{n} c_{yi}\Delta_i INV_{t-i} + \\ & + \sum_{i=0}^{n} d_{yi}\Delta_i HC_{t-i} + \sum_{i=0}^{n} e_{yi}\Delta_i FD_{t-i} + \sum_{i=0}^{n} f_{yi}\Delta_i OPEN + \gamma_{1y}\, y_{t-1} + \\ & + \gamma_{2y}INV_{t-1} + \gamma_{3y}HC_{t-1} + \gamma_{4y}FD_{t-1} + \gamma_{5y}OPEN_{t-1} + \varepsilon_t\end{aligned} \tag{3.2}$$

Considering the limited number of observations and annual data, we specify the maximum lag, n, as two. The F test, denoted by F_y(y| INV, HC, FD, OPEN), is used to examine existence of the 'stable and long-run relationship'. The null hypothesis of the 'non-existence of the long-run relationship', i.e. the coefficients of all level variables are jointly zero can be written as follows: $H_0 : \gamma_{1y} = \gamma_{2y} = \gamma_{3y} = \gamma_{4y} = \gamma_{5y} = 0$. The alternative hypotheses that there exists a long-run relationship is $H_1 : \gamma_{1y}, \gamma_{2y}, \gamma_{3y}, \gamma_{4y}, \gamma_{5y} \neq 0$. The calculated F statistic, F_y (.|...), is equal to 4.4083 which is higher than the upper bound for a 5% critical value for I(1) variables, 4.049. Therefore, we reject the null of no long-run relationship. Similarly, we constructed further ECMs with INV, HC, FD and OPEN used in turn as dependent variable. The corresponding F statistics are all

lower than the critical value 4.049 at a 5% level. Thus, we obtain a cointegrated model with y as a dependent variable. However, our initial ARDL modelling shows that INV and D73 are statistically insignificant in both short and long run.

We therefore re-examine the long-run relationship excluding INV and D73. Re-estimated F(.|...) statistics are as follows: F_y(y| HC, FD, OPEN) = 6.3905, F_{HC}(HC| y, FD, OPEN) = 0.976, F_{FD}(FD| y, HC, OPEN) = 1.2715, F_{OPEN}(OPEN| y, HC, FD) = 1.9834. The results show that only F_y(.|...) is statistically significant and the remaining F_{HC}(.| ...), F_{FD}(.|...), F_{OPEN}(.|...) are statistically insignificant. Therefore, we have again found a stable long-run relationship, excluding INV and D73, with y as dependent variable. This finding implies that causality runs from financial and trade policies to economic growth but not the other way round i.e., liberalisation policies enhances economic growth rather than growth inducing liberalisation.

Having found a unique relationship, we estimate the following ARDL (1,2,1,1) model, with lag length determined by the Schwartz Bayesian Criterion (SBC) and considering the dummy D79 as an exogenous variable[9]:

$$\begin{aligned} y_t = {} & \underset{(4.48)}{2.60^{**}} - \underset{(-3.36)}{0.05\ D79_t^{**}} + \underset{(4.48)}{0.53\ y_{t-1}^{**}} - \underset{(-1.19)}{0.08\ HC_t} + \underset{(0.20)}{0.016 HC_{t-1}} + \underset{(2.83)}{0.19 HC_{t-2}^{**}} \\ & - \underset{(-0.67)}{0.04\ FD_t} + \underset{(2.37)}{0.14\ FD_{t-1}^{*}} - \underset{(-1.45)}{0.07\ OPEN_t} + \underset{(2.37)}{0.24\ OPEN_{t-1}^{*}} \end{aligned} \qquad (3.3)$$

[9] Throughout our analysis, t-statistics are reported in parentheses, ** and * represent 1% and 5% significant levels, respectively; probability values are reported in the square brackets

R-bar^2 = 0.98, DW = 1.94, S.E. of regression = 0.0234,

SBC=82.8618,

RSS = 0.017, AR2-F(2,29) = 0.624[.542], AR2-λ^2(2) = 1.69[.429],

RESET-F(1,30) = 0.51[0.479], RESET-λ^2(1) = 0.69[0.406],

NOR-λ^2(2) = 0.64[0.726], H-λ^2(1) = 0.86[0.355], H-F(1,39) =

0.83[0.368].

The model passes all diagnostic tests. The corresponding static long-run model can be written as follows:

$$\underset{}{y} = \underset{(42.83)}{5.51^{**}} \underset{(-3.49)}{-0.10\,D79^{**}} \underset{(6.39)}{+0.26\,HC^{**}} \underset{(2.51)}{+0.22\,FD^{*}} \underset{(3.03)}{+0.22\,OPEN^{**}} \quad (3.4)$$

All variables are statistically significant and have expected signs. The ECM representation of the ARDL (1,2,1,1) model can be written as follows:

$$\underset{}{\Delta y_t} = \underset{(3.83)}{2.6^{**}} \underset{(-3.36)}{-0.05 D79_t^{**}} \underset{(-1.2)}{-0.08\Delta HC_t} \underset{(-2.83)}{-0.18\Delta HC_{t-1}^{**}} \underset{(-1.45)}{-0.07\Delta OPEN_t} \underset{(-0.67)}{-0.04 FD_t} \underset{(-4.00)}{-0.47 ECM_{t-1}^{**}} \quad (3.5)$$

R-bar^2 = 0.49, DW = 1.94, S.E. of regression = 0.0234,
SBC = 82.86, RSS = 0.01953.

The negative and statistically significant coefficient on the error correction term (ECM_{t-1}) confirms a cointegrated stable long-run relationship.

These results reveal that real per capita income (y), human capital (HC), financial deepening (FD) and trade penetration ratio (OPEN) are cointegrated where y is a dependent variable. That is, the important long-run determinants of y are HC, FD and OPEN, implying that government may facilitate economic growth via in-

vestment in education as well as by a liberalisation of financial and trade policies. We observe that HC, FD and OPEN have positive and statistically significant impact on y and that the second oil shock and droughts during 1979-82 had negative impact.

Finding that HC is an empirically important determinant of y is consistent with the prediction that technological progress is an engine of growth, with HC playing a pivotal role in the process (Lucas, 1988), i.e. technological progress is unsustainable in the absence of skilled manpower. On the other hand, finding the impact on y of INV to be statistically insignificant is surprising. The statistically insignificant impact might be rationalised as follows: Firstly, the impact of INV may be partially captured by HC due to the fact that a proportion of investment is channelled towards the educational sector. Secondly, the impact of INV may also be captured by FD, since it represents the availability of funds. Finally, the statistically insignificant impact of INV is also in accordance with the fact that the growth rate of India has been very low even when saving and investment have been more than one fifth of GDP. The apparent inefficiency of investment within the Indian economy is one of the most worrying factor for Indian economists and media (Joshi and Little, 1994; World Bank, 1994). Note that the bulk of the investment in India has been carried out by the government sector, the productivity of which is very low (Joshi and Little, 1994). In addition, a significant proportion of private investment has been controlled and directed towards the preferential sectors, (e.g. agricultural, exports and small scale industries) by the government. This preferential credit is mainly allocated according to socio-political consideration rather than the productivity of projects. Thus, though the quantity of physical investment is very high, the quality of it is very low. Our results for INV and HC may indicate that the quality of investment, in addition to the quantity, is an important factor in the economic development of India.

Our result also shows that financial deepening (FD) has a positive and statistically significant impact on y. This positive impact supports the prediction of the McKinnon and Shaw hypothesis. An increase in financial deepening raises the capacity of financial intermediaries to supply credit which increases investment and economic growth. Our results are similar to Demetriades and Luintel (1997) who use the ratio of bank deposits to GDP as a measure of FD. These authors also find the impact of real interest rate (R) on y is very small (0.0022). Our own unreported research has also suggested a positive but statistically insignificant impact of R. Our results on FD and R reveal that the availability of funds is more important than the costs of funds in the growth process.

Further, we observe that the trade penetration ratio (OPEN) as a proxy for trade liberalisation (TL) has a positive and statistically significant impact on y. This result is again in accordance with other studies (Ghatak and Utkulu, 997). As explained in section three above, TL allows market forces to channel resources towards relatively productive sectors and hence leads to a rise in efficiency. It also increases markets for new products, helps in using scale economies and reduces redundant research efforts across countries.

Finally, our results reveal that the second oil shock in 1979 together with droughts during 1979–82 adversely affected real per capita income. On the other hand, the first oil shock and droughts during 1973–75, captured by D73, do not have any statistically significant impact on y . This may be due to the adverse impact of those shocks being mitigated by a 64% rise in exports from 1973–75 following official devaluations (see section two).

As to short-run dynamics, the ARDL method has suggested that the short-run influences on y of HC, FD and OPEN are negative. We have made no *a priori* suggestion as to the signs of short-run effects but these results may seem initially surprising and might be rationalised as follows. Investment in HC is a long-run project, which requires giving up present consumption for future benefits.

Consequently, investment in HC reduces economic growth in the short-run. Similarly, liberalising trade may adversely affect the economy in the short-run due to the shut down of inefficient businesses and the economy requiring a transitory period to adjust to the international competitive environment. Finally, a statistically insignificant short-run impact of FD may again be due to the fact that the financial system needs time to transform financial savings into investment.

4. Conclusions

In this paper, we have explored the determinants of economic growth in India from 1954-1994. Our study also looks at the impact of two oil price shocks and droughts in India during 1973-75 and 1979-82. Our overall results reveal that financial (FD) and trade variables (OPEN) along with investment in human capital (HC) are important determinants of real per capita income (y) in India. The result from the ARDL method on the direction of causation is that financial and trade liberalisation has led to economic growth.

It is observed that HC has a positive and statistically significant impact on y. This is in accordance with the prediction of growth theory that skilled manpower is essential for technological progress which is one of the driving force of economic growth. Our result for HC tends to support this argument and thus support a policy of investment in human capital formation.

We have found that FL has a positive and statistically significant impact on y. This positive impact supports the McKinnon and Shaw hypothesis that an increase in FL raises the capacity of banking systems to supply credit for investment which in turn raises y . We also observe that trade liberalisation (OPEN) positively influences y . This result is accordance with the argument that OPEN reduces inefficiency by channelling resources towards more productive sectors and increasing markets for new products, hence helping to achieve scale economies. Finally, it is observed that the second oil

shock and droughts during in 1979-82 adversely affected y . On the other hand, the first oil shock and droughts during 1973-75 do not have any statistically significant impact on y. This may be due to the adverse impact of D73 being mitigated by a substantial rise in exports following official devaluations.

In principle, this study might have benefited from separating the pre-liberalisation and post liberalisation regimes. However, since significant liberalisation was not achieved until the early 1990s we feel that there is an issue of data-shortage, which the passage of time might remedy. Secondly, we have chosen to treat liberalisation in India as a process gathering momentum, rather than an instantaneous event marking a change of regime. As more data become available we would hope the details of this process could be examined more deeply.

Surprisingly, there is no empirical recognition, within the framework we have employed, of the role played by investment in physical capital. This does not deny the obvious contribution of physical capital in the production process, but suggests that this period of economic development in India has been one in which financial and trade liberalisation and an increasingly educated workforce have marked out the long-run growth path for per capita income.

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