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Abstract

The implications of the division of labor, capital and technology for economic growth have long been a fundamental issue in development economics. This paper employs the error correction mechanism for cointegration to examine the relationship between the extent of the market, capital accumulation, communication technology and economic growth for China for the period 1952-1998. We find that both in the short-run and long-run, capital stock, the extent of the market and investment all have statistically significant positive effect on growth, while telecommunication technology, seemingly a bit surprising, has a statistically insignificant impact on growth. We also examine the cointegration between division of labor, capital and communication technology and find no evidence of a long run relationship among these variables. Our empirical analysis lends support to the thesis that technology and capital accumulation maybe overshadowed by institutions in determining division of labor and the long run economic growth.

Keywords: Capital, China, Cointegration Analysis, Division of Labour, Growth, Technology

JEL Classifications: C22; O12

1. Introduction

It has long been understood in economics, often referred to as the Smith Theorem, that economic growth is profoundly promoted by the division of labor, and that the division of labor is limited by the extent of the market (Smith 1776, Stigler 1951; for a recent empirical study supporting the importance of the extent of the market for economic growth, see Ades and Glaeser 1999). What's relatively less understood, however, is that the extent of the market is also dependent on the division of labor, for the latter largely determines productivity and hence the "buying power" of the individuals in the economy at large (Young 1928, pp539-540; for a recent formulation and elaboration of Young's thesis on the interdependence between the extent of the market and the division of labor among other things, see Sun and Lio 2003). It is thus only natural to see the division of labor and the extent of the market as two sides of the same coin and to explore determinants and implications of *both.* Two factors that exert a decisive influence on the extent of the market, long before articulated by Smith as well, are the transport (transaction) condition in which the improvement enlarges the market size and engenders a finer division of labor, and capital, which serves as a vehicle for promoting the division of labor, especially in the manufacturing sector at Smith's time. Among factors that contribute to improving the market transaction efficiency are postal and telecommunication facilities, which may well be used as a proxy for communication technology conducive to enlargement of the extent of the market. It goes without saying that capital, above and beyond facilitating the division of labor, also *directly* makes a significant contribution to economic performance.

In this paper, we conduct an empirical study on the relationship between the extent of the market, capital accumulation, communication technology and economic growth for China over the period 1952-1998. To achieve the aim of this study we use the error correction mechanism test for co-integration, and find overwhelming evidence that GDP, the division of labor, capital stock and the postal and telecommunication service facility are co-integrated and that the division of labor, net investment and capital stock all have statistically significant long-run effects on economic growth, while communication efficiency has a statistically weak effect on growth. Similarly, in the short-run we find that capital stock, division of labour and investment all contribute positively to growth though the level of significance differs; however, telecommunication technology, as in the long-run, has a statistically insignificant impact on growth. We also examine evidence for cointegration between division of labour, capital and communication technology and find no evidence of a long run relationship among these variables.

Given the significance of the division of labor for economic growth, it would be of interest to empirically explore the determinants of the former. Theoretically, several authors have in the recent decade argued that principal determinants of division of labor consist of far more elements than the Smithian transport condition.[1] Knowledge, transaction institutions, uncertainty and insurance, information communication technology and coordination costs each may also produce a profound influence on the division of labor and hence on economic progress (e.g., Becker and Murphy 1992, Yang and Ng 1993, Black 1995 and Sun and Lio 2003). Each of the aforesaid elements consequently contributes to the economic growth via, but not always confined to, promoting division of labor and hence promoting productivity. It is of both theoretical and policy interest to estimate empirically the contribution of these elements and explore their short-run vs. long run effects.

There have also been a few empirical studies on the extent of the market and economic growth. For instance, Yang, Wang and Wills (1992) conduct detailed linear regression analyses of the institutional change in rural China during the period of 1979-1987 and examine its implication for economic growth. They find that commercialization and institutional reform in specifying and enforcing property rights contribute significantly to economic growth. But the sample size of their data can hardly make their econometric analysis convincing. An interesting topic closely related to both the division of labor and economic growth is choice of techniques. In a study of the adoption of modern crop varieties in Punjab in India,

[1] For an excellent study of Smithian growth driven by improvements in the waterway transport system in the Song Dynasty of ancient China, refer to Kelly (1997).

McGuirk and Mundlak (1992) report that the adoption of modern varieties is positively and significantly influenced by the density of roads. Ades and Glaeser (1999), using the conventional linear regression technique to analyse cross-country data on per capita GDP over 1960-1985 and state-specific data on urbanization, transport facility and labor force in the US over 1840-1890, find that the division of labor is not only connected to urbanization but it is also important for economic development in general. In a recent empirical study on the division of labour and economic structural changes, Lio and Liu (2003) employ a cross-country data set for the year of 1996 to examine the (positive) effect of the transaction service facility on urbanization, which is therein used as a proxy for the division of labor. It should be noted that all these studies have used conventional linear regression analysis to test their hypothesis. This paper contributes to the literature by employing instead cointegration analysis, which is a superior method for spelling out the long-run and short-run relations between the extent of market, capital, communication technology and economic growth, while conventional regression analyses cannot distinguish between long-run and short-run effects. To the best of our knowledge, our analysis is the first of its kind in the empirical literature to examine the relationship between extent of the market (division of labor) and economic growth.

The rest of the paper is organized as follows. We present our theoretical models in the next section. In Section 3, after briefly discussing the data, we first conduct unit root tests in order to ascertain the order of integration and then conduct the error correction mechanism cointegration analysis. The long run and short run relations between economic growth and explanatory variables including the extent of the market, the capital stock, net investment and postal and telecommunication facility are examined. Section 4 concludes.

2. Theoretical models

Two theoretical models are presented in this section. Throughout the paper, per capita GDP is denoted by Y, the proxy of the division of labor is denoted by D, capital by K and communication facility (technology) by T. We use trade dependence, measured by the ratio of trade volume to GDP, as proxy of the division of labor, for as mentioned in the introduction the division of labor and the extent of the market (represented by the trade volume) can only be seen as intrinsically interdependent (Sun and Lio 2003). The capital variable conceptually encompasses both physical capital and human capital, yet due to the failure of the unit root test of data of human capital (details available upon request from the authors) this paper only employs the physical capital which is of course related to investment. Both institutions and technologies (in transport and telecommunication in particular) may produce important influences on the extent of the market. This paper, however, considers only one important aspect of technologies, namely postal and telecommunication facility, largely due to the unavailability of reliable data on institutions of sufficiently large size.

The first model on which the empirical study is based describes the relation between the communication facility, capital and the division of labor,

$$D = g(K,T) \tag{1}$$

Beside its indirect effect on the economic growth via promoting the division of labor, both capital and the telecommunication facility also directly contribute to economic growth by saving transportation and/or telecommunication costs. Thus, we also consider the following theoretical model.

$$y = f(D,K,T) \tag{2a}$$

For capital is necessarily related to investment, Equation (2a) may be put in further details to facilitate the empirical analyses below as,

$$y = f(D,K,I,T) \tag{2b}$$

where I stands for net investment and T for postal and telecommunication service facilities (as a proxy of the communication efficiency).

3. Data, methodology and results

3.1. Data

The data used in this paper are for the period 1952-1998. The period of analysis was dictated by data availability. The series on real GDP is constructed by Hsueh and Li (1999) and updated for the period 1996 to 1999 from the *China Statistical Yearbooks*. Note China starts its opening and reform toward market economy around 1979-1980, and the national account system accordingly experienced a transformation from the material product balance (MPS) account, which was required for a planning economy but is seriously flawed for its excluding the service sector, to a GDP system in 1980s. Appropriate adjustment of the data on GDP has been made in Hsueh and Li (1999), which is regarded as more reliable than the official estimates of real GDP up to the 1990s. The data on capital stock and investment is compiled by Wang and Yao (2003) and is available in an appendix to their article. The real capital stock series was constructed using the standard perpetual inventory approach. Data on post and telecommunication facilities is extracted from the *Comprehensive Statistical Data and Materials on 50 Years of New China* published by the China Statistics Press.

3.2. *Empirical specifications*

Based on our theoretical discussions in the previous section we posit the following generic model to estimate the impact of division of labour, capital and telecommunication technology on China's GDP over the 1952-1998 period.

$$\ln Y_t = \alpha_0 + \alpha_1 \ln K_t + \alpha_2 \ln D_t + \alpha_3 \ln I_t + \alpha_4 \ln T_t + \varepsilon_t \quad (3)$$

Here, $\ln Y$ is the natural log of real GDP. $\ln K$ is the natural log of capital stock. $\ln D$ is the natural log of market trade (includes domestic trade plus exports and imports). $\ln I$ is the natural log of investment as a proportion of GDP. $\ln T$ is the natural log of the postal and telecommunication service facilities and ε is the error term. Of all variables in our model, the variable D is a proxy for division of labour while T is a proxy for telecommunication efficiency. A priori, we expect that the division of labour and telecommunication efficiency may positively impact China's GDP. The impact of capital stock is also expected to be positive.

Similarly, another theoretical model drawing on Equation (1) can be written in natural log form as follows:

$$\ln D_t = \beta_0 + \beta_1 \ln K_t + \beta_2 \ln T_t + \mu_t \quad (4)$$

Here, all variables are as previously defined.

3.3. *Unit root tests*

To ascertain the order of integration we apply the Augmented Dickey-Fuller (ADF, 1979, 1981) and Phillips and Perron (PP, 1988) unit root tests. Testing for cointegration among several variables requires a test for the presence of unit roots of individual series using the ADF test based on the auxiliary regression:

$$\Delta x_t = \alpha + \delta t + \beta x_{t-1} + \sum_{i=1}^{k} \psi \Delta x_{t-1} + \mu_t \qquad (5)$$

The ADF auxiliary regression tests for a unit root in x_t, namely GDP, capital stock, investment, and proxies for division of labour and telecommunication facility at time t; t denotes the deterministic time trend; Δx_{t-1} is the lagged first differences to accommodate serial correlation in the errors, μ_t; and α, δ, β and ψ are the parameters to be estimated. The null and the alternate hypotheses for a unit root in x_t are:

$$H_0: \beta = 0 \quad H_1: \beta < 1$$

While relevant critical values are available from various sources, we use the approximate critical values compiled by MacKinnon (1991).

Table 1 reports the results of the unit root tests. The ADF statistic for the levels of GDP, capital stock, investment, and proxies for division of labour and communication efficiency $[Y, K, D, I, T]$ do not exceed the critical values (in absolute terms). However, when we take the first difference of each of the variables, the

ADF statistic is higher than the respective critical values (in absolute terms). Therefore, we conclude that $[Y, K, D, I, T]$ are each integrated of order one or $I(1)$.

INSERT TABLE 1

To ensure the robustness of the ADF test results, we also apply the PP test for unit roots. The PP test is also based on equation (5), but without the lagged differences. While the ADF test corrects for higher order serial correlation by adding lagged difference terms to the right-hand side, the PP test makes a non-parametric correction to account for residual serial correlation. Monte Carlo studies suggest that the Phillips-Perron test generally has greater power than the ADF test (see Banerjee *et al* 1993: 113).

The PP test is also reported in Table 1 and the results are consistent with those from the ADF test. For instance, we find that the PP statistic do not exceed the critical values (in absolute terms) for the levels of $[Y, K, D, I, T]$. However, when we take the first difference of each of the variables, the PP statistic is higher than the respective critical values (in absolute terms). Therefore, we conclude that $[Y, K, D, I, T]$ are each integrated of order one or $I(1)$.

3.4. Cointegration

We use the Error Correction Mechanism (ECM) test for cointegration. The main advantage of the ECM test is that it has a limit distribution which does not depend on nuisance parameters. Thus, it does not suffer in finite samples from possibly invalid common factor restrictions. Banerjee *et al.* (1998) show that when other popular cointegration tests such as the Engle and Granger *(1987)* and Hansen (1990) approaches are exposed to invalid restrictions, the power properties of these tests may be very poor in comparison with the ECM test, which does not impose those restrictions. The ECM test can be described using a simple data generating process (Banerjee *et al.*, 1998: 269-270):

$$\Delta y_t = \alpha' \Delta x_t + \beta (y_{t-1} - \lambda' x_{t-1}) + \in_t \qquad (6)$$

where α, λ and x_t are $k \times 1$ vectors of parameters and explanatory variables. The regressand y_t is a univariate process, β is a scalar and T is the sample size. Here, the tests for cointegration relies upon some estimate of the parameter β. Under the assumption that x_t is strictly exogenous, non-linear least squares (NLS) can be applied to equation (6) producing consistent and asymptotically efficient estimates of α, β and λ. However, it has been shown by Banerjee *et al.* (1993) that by adding x_{t-1} to Equation (6) one can achieve a parameter-free distribution for the estimator of β. Then ordinary least squares (OLS) can be used to estimate β. This is because under the alternative hypothesis of cointegration, the true cointegrating slope λ is implicitly estimated when x_{t-1} is included as an additional regressor. In order to correct for serial correlation, Banerjee *et al.* (1998) follow the recommendation in Phillips and Loretan (1991) to augment the model with leads of Δx_t. Thus, it follows that an unrestricted dynamic model can be specified which takes the form:

$$\Delta y_t = \alpha'\Delta x_t + \beta y_{t-1} + \theta' x_{t-1} + \sum_j^n \alpha_j \Delta x_{t+j} + \epsilon_t = \alpha'\Delta x_t + \phi' w_{t-1} + \sum_j^n \alpha_j \Delta x_{t+j} + \epsilon_t \qquad (7)$$

where $w_t' = (y_t, x_t')$ and $\phi' = (\beta, \theta')$. Since $\beta(1, -\lambda') = \phi'$, the non-cointegrating restriction $\beta = 0$ implies $\phi = 0$ and so the ECM test can be based upon either the OLS estimator of β in (7) or on its t ratio. Banerjee *et al.* (1998: 268) show that the t-ratio form of the ECM test may have better power properties than the normalised bias form, particularly when the common-factor restrictions are grossly violated. The approximate critical values for the t-test are provided in Pesaran *et al.* (2001). Pesaran *et al.* (2001) develop a bounds testing procedure whereby the asymptotic distribution of their statistics is obtained for cases in which all regressors are purely $I(1)$ as well as when the regressors are purely $I(0)$ or mutually cointegrated.

The asymptotic critical value bounds of the t-statistics for the ECM test, based on Equation (3), for cointegration are reported in Table 2. For cointegration to exist, the absolute value of the estimated t-statistic needs to be higher (in absolute terms) than the upper bound critical values. We consider three variants of Equation (3). In Model 1, we exclude the communication technology variable, in model 2 we include communication technology but exclude the investment variable, while in model 3 we include all the variables as in Equation (3). Across all models capital and division of labour are the common variables. From Table 2 it can be seen that the absolute value of the calculated t-statistic is higher than the absolute value of the upper bound critical value for all the three models. This leads us to the conclusion that there is cointegration between all the variables in each of the three models. This allows estimation of the models in their levels, which in our case is the natural log of the variables.

INSERT TABLE 2

Similarly, we conducted the ECM cointegration test based on Equation (4). The t-statistic turned out to be -1.9755, which is greater than the 5 per cent critical value; hence, we conclude that there is no long run relationship between division of labour, physical capital and telecommunication technology.

3.5. Long-run and short-run elasticities

To estimate the long-run elasticities we use the Fully Modified Ordinary Least Squares (FMOLS) procedure developed by Phillips and Hansen (1990). This estimator has two important advantages. Apart from correcting for endogeneity and serial correlation effects it also asymptotically eliminates the sample bias. There are two conditions considered essentially for the appropriateness of the FMOLS. First, there is only one integrating vector. Second the explanatory variables are not co-integrated among themselves. Assuming these provisions are met, the econometric model is of the following form:

$$y_t = \sigma_0 + \sigma_1' X_t + \mu_t, \qquad t = 1,2,\ldots,n \tag{8}$$

where y_t is an $I(1)$ variable and X_t is a $(k \times 1)$ vector of $I(1)$ regressors, which are not co-integrated among themselves. By assumption, X_t has the following first difference stationary process:

$$\Delta X_t = \eta + \lambda_t, \qquad t = 2,3,\ldots,n \tag{9}$$

where η is a $k \times 1$ vector of drift parameters, λ_t is a $k \times 1$ vector of $I(0)$ variables. It is also assumed that $\varpi_t = (\mu_t, \lambda_t')'$ is strictly stationary with zero mean and a finite positive-definite covariance matrix, Σ.

The Granger representation theorem states that in the presence of a co-integrating relationship among variables, a dynamic error correction representation of the data exists. Following Engle and Granger (1987) we estimated the following short-run models:

$$\Delta \ln Y_t = \beta_0 + \sum_{q=0}^{m} \eta_q \Delta \ln Y_{t-q} + \sum_{q=0}^{m} \theta_q \Delta \ln K_{t-q} + \sum_{q=0}^{m} \zeta_q \Delta \ln D_{t-q} + \sum_{q=0}^{m} \phi_q \Delta \ln I_{t-q} + \sum_{q=0}^{m} \varpi_q \Delta \ln T_{t-q} + \delta \varepsilon_{t-1} + \mu_t \quad (10)$$

$$\Delta \ln D_t = \alpha_0 + \sum_{q=0}^{m} \phi_q \Delta \ln D_{t-q} + \sum_{q=0}^{m} \vartheta_q \Delta \ln K_{t-q} + \sum_{q=0}^{m} \psi_q \Delta \ln T_{t-q} + \delta \mu_{t-1} + \varepsilon_t \quad (11)$$

All variables in Equations (10) and (11) were defined before. μ_t and ε_t are the disturbance terms; Δ is the first difference operator; ε_{t-1} and μ_{t-1} are the error corrections (one lagged error) generated from Equations (3) and (4), respectively, and m is the lag length. By specification, Equations (10) and (11) consist of lagged dependent and independent variables; a 'test down' procedure is employed repeatedly until the most parsimonious specification is achieved.

Equations (10) and (11) capture both the short and long run relationship between GDP and a set of explanatory variables. The long-run relationship is captured by the lagged value of the long-run error correction term, expected to be negative, reflecting how the system converges to the long-run equilibrium implied by Equations (3) and (4); convergence is assured when δ_1 is between zero and minus one.

The long-run results for Equation (3) are reported in Table 3. We report three versions of Equation (3) just to gauge the robustness of the results. As mentioned earlier, in Model 1, we exclude the telecommunication efficiency variable, in model 2 we include telecommunication efficiency but exclude the investment variable, while in model 3 we include all the variables as in Equation (3). Across all models capital and division of labour are the common variables. According to model 1, all variables have a statistically significant and positive impact on growth. A 1 per cent increase in capital stock, for instance, increases growth by around 0.7 per cent; a 1 per cent increase in division of labour increases growth by some 0.15 per cent, while a 1 per cent increase in investment increases growth by 0.26 per cent. All results are statistically significant at the 1 per cent level of significance. In model 2 where we exclude investment but include communication efficiency, we find that while both capital and division of labour contribute positively and significantly (at the 1 per cent level) to growth, telecommunication efficiency has a statistically insignificant impact on growth. In model 4, where all variables are included, two results are worth noting. First, consistent with the results from models 1 and 2, we find capital, division of labour and investment having a statistically significant (at the 1 per cent level) impact on growth. Second, the impact of telecommunication efficiency is at best statistically weak.

INSERT TABLE 3

The short run results based on Equation (3) are reported in Table 4. Across all models we find that capital, division of labour and investment positively and significantly contribute to growth. However, as in the long-run, communication technology has a statistically insignificant impact on growth. Moreover, the error correction terms ECT_{t-1} in the short run models are all statistically significant at the 5 per cent level or better with a negative sign, confirming that a long run equilibrium relationship exists between the variables.

INSERT TABLE 4

4. Concluding remarks

We conduct error correction mechanism analysis for cointegration to examine the relationship between the extent of the market (the division of labor), capital, telecommunication technology and economic growth for China for the period 1952-1998. We find strong evidence of cointegration among these variables. We then employ the fully modified ordinary least squares technique to explore the long-run as well as the short-run relationships among the above-mentioned variables. We find that both in the short-run and in the long-run, capital stock, the extent of the market and investment all have statistically significant positive effect on the growth, while telecommunication technology, seemingly a bit surprising, has a statistically insignificant impact on growth. On the other hand, the long-run relationship between the extent of the market, physical capital and telecommunication technology is rather weak. To the best of our knowledge, our cointegration analysis is the first of its kind in empirical studies on the relationship between the division of labor and economic performance.

Due to social and political movements during late 1950s – late 1970s (especially the Cultural Revolution 1966-1976), the education system in China experienced abrupt changes during the said period. For instance, the higher education system virtually broke down and very few students with bachelor's degree were produced during the Cultural Revolution. This may well explain why human capital time series data fails the unit root test, and as a consequence we cannot include human capital into our cointegration analysis, although human capital may, just like physical capital, directly make a significant contribution to economic growth, as revealed in Wang and Yao (2003). In addition, we would speculate that human capital accumulation, which maybe seen as a reasonably acceptable proxy for growth in knowledge, may also indirectly contribute to growth via promoting the division of labor as theoretically predicted (e.g, Becker and Murphy 1992, Yang and Ng 1993, Black 1995), should the human capital time series data otherwise survive the unit root test.

It should be noted that the unavailability of consistent time series data does not allow for readily conducting cointegration analysis of the relationship between institutional change, the extent of the market and economic growth in China during 1952-1998. However, our empirical finding that the communication *technology* has a rather insignificant impact on both the division of labor and economic growth is complementary to Yang *et al.*'s (1992) empirical study of economic performance and institutional change in rural China during 1979-1987 and Rodrik *et al.*'s (2002) comprehensive cross-country study revealing that institution "trumps" all other variables in determining economic performance. As is already mentioned in the preceding section, the cointegration analysis is superior to the conventional linear regression analysis in spelling out the robust long-run (as well as shot-run) relationship among fundamental variables underlying economic performance. As such, we plan to construct and include more variables including proxies for institutional change over a much longer period than that in Yang *et al.*'s (1992) in a sequel to this paper to conduct a more comprehensive historical study of economies that have undergone remarkable institutional changes.

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Table 1: Unit root tests

Variables	ADF test		PP test	
	Statistics [LL]	Critical value**	Statistics [BW]	Critical value**
lnY_t	1.6001 [3]	-2.9314	1.9564 [16]	-2.9266
ΔlnY_t	-5.1141 [1]	-2.9297	-4.3391 [43]	-2.9281
lnK_t	2.3097 [2]	-2.9297	3.8102 [1]	-2.9266
ΔlnK_t	-3.4937 [1]	-2.9297	-2.7625 [9]	-2.6022*
$\ln D_t$	0.3935 [1]	-2.9281	0.8677 [4]	-2.9266
$\Delta \ln D_t$	4.2896 [0]	-2.9281	-4.1106 [8]	-2.9281
lnI_t	-2.6724 [2]	-2.9297	-3.5056 [11]	-3.5811
ΔlnI_t	-5.3679 [2]	-2.9314	-8.2546 [44]	-2.9281
$\ln T_t$	0.1205 [1]	-3.5131	2.9492 [3]	-2.9266
$\Delta \ln T_t$	-3.2384 [0]	-3.1868*	-3.1097 [5]	-2.9281

Note: **(*) denotes critical values at the 5% and 10% levels respectively. LL stands for lag length and BW stands for bandwidth.

Table 2: Cointegration test results based on Equation (3)

	Model 1		Model 2		Model 3	
ECM t-statistics	-4.9320		-3.9247		-5.5022	
Critical values						
k	10%		5%		1%	
	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$
3	-2.57	-3.46	-2.86	-3.78	-3.43	-4.37
4	-2.57	-3.66	-2.86	-3.99	-3.43	-4.60

Note: the critical values are extracted from Table C2.iii, Pesaran et al., (2001: T4). k denotes the number of regressors.

Table 3: Long run results

Regressor	Model 1	Model 2	Model 3
$ln K_t$	0.7091***	0.7232***	0.6585***
	(12.0477)	(9.4126)	(10.0348)
$\ln D_t$	0.1513***	0.1472***	0.1426***
	(4.4364)	(3.4187)	(4.1965)
$ln I_t$	0.2594***	-	0.2999***
	(3.0208)		(3.5410)
$\ln T_t$	-	0.0174	0.0368^
		(0.5218)	(1.3948)
Constant	1.4054***	-0.0432^	1.9031***
	(3.1215)	(-1.1928)	(3.6478)

Note: t-statistics are in parenthesis.***(**)* denote statistical significance at the 1%, 5% and 10% levels respectively.

Table 4: Short-run results

Regressor	Model 1	Model 2	Model 3
$\Delta ln Y_{t-1}$	-	0.2859**	-
		(2.4969)	
$\Delta ln K_t$	0.4844**	0.9922*	0.2413
	(2.2059)	(1.9647)	(0.7646)
$\Delta \ln D_t$	0.1935***	0.2376***	0.2089***
	(4.6096)	(5.0413)	(4.9241)
$\Delta ln I_t$	0.3723***	-	0.3594***
	(6.7046)		(6.0753)
$\Delta \ln T_t$	-	0.0446	0.0671
		(0.5012)	(0.9455)
ECT_{t-1}	-0.2663***	-0.5349***	-0.2669***
	(-2.7137)	(-4.2833)	(-2.6449)
Constant	0.0184	-0.0474^	0.0182
	(0.8370)	(-1.6655)	(0.9956)
R^2	0.7614	0.6861	0.7631
$\overline{R}^2$	0.7380	0.6459	0.7336

Note: t-statistics are in parenthesis.***(**)*(^) denote statistical significance at the 1%, 5%,10% and 20% levels respectively.

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