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Structural Transformation in China and India: the Role of Macroeconomic Policies

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Structural Transformation in China and India: the Role of Macroeconomic Policies

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Abstract: The current paper examines the role of macroeconomic policies in guiding structural transformation towards higher productivity and better paid jobs in China and India. To this end the paper uses a Kaldorian model of economic growth for an open, dual economy. The model assumes endogenous employment growth in the modern or formal sector and no unemployment in the standard sense as the unemployed always find work in the informal sector. The economy expands following a higher growth rate of labor productivity in the formal sector and higher effective demand through a Keynesian channel. The model addresses both medium and long-run growth paths, and is calibrated to base year data from a formal-informal Social Accounting Matrix for 2000 and 1999-2000 for China and India respectively. Several simulation exercises are then ran for the two economies. Specifically, we look into how an increase in investment demand, higher wages, a change in the labor productivity trend or a depreciation of currency affects the macroeconomy and in particular job creation in the formal sector.

Keywords: Structural transformation, Endogenous productivity growth, Dual economy, China, India

JEL classifications: O11, O41, E26

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1. Introduction

Following the lost decades of 1970s and 1980s when many developing economies recorded extended periods of output decline the economic profession has renewed its interest in what drives economic growth. Much of the effort has been spent on aspects related to income convergence between developing and industrialized countries. Within this context the debate has been focused on ways to raise labor productivity growth and capital accumulation. But for the past two decades empirical evidence shows that higher productivity and therefore growth are not sufficient to solve problems of acute poverty or underdevelopment (Ocampo et al., 2009, Easterly, 2003). The expected link between economic growth and development seems to be missing nowadays in many developing economies as output growth is often not followed by a transfer of labor surplus towards more productive and better paid jobs. This new phenomenon has been known as the jobless growth and it signals the failure of many economies to change the basic structure of their economies. Pakistan, dubbed by Easterly (2003) as “growth without development”, is one such example. Despite steady growth for the past four decades, Pakistan’s economy has seen at best only modest structural changes. In addition, an economic downturn, as the one that countries across the world are currently facing, leads to rapid job losses thus exacerbating poverty in the developing world.

The current paper examines the role of macroeconomic policies in guiding structural transformation towards higher productivity and better paid jobs in developing countries, and in particular in the two most populous countries: China and India. Because of contrasting empirical facts on structural changes taking place in Indian and Chinese economies -- details are presented in a latter section -- the comparison seems appropriate. The paper uses a Kaldorian model of growth developed by Rada and Taylor (2006) and Rada (2007) to run several simulation exercises that can shed some light on the direction that macro policies in the two countries should take in order to stimulate structural change. The model can also be used to asses the effects of a global economic downturn on the economic structure of developing countries.

Aside from this introductory section, the current paper is organized as follows. The second section is a succinct presentation of the model used in this paper. Next, the focus is on the calibration

of the model to the Indian and Chinese economies using available statistics and Social Accounting Matrices (SAMs) that distinguish between formal or high productivity and informal or low productivity sectors. Following the calibration, the paper discusses the short/medium-run comparative statics for the model in growth terms followed by the long run dynamics. The paper concludes with a view on the synergies between the role of the state and the markets in the context of global economic integration.

2. A Model of Structural Transformation and Development

Prior to the current global recession many economies recorded good growth performance, but which oddly enough did not lead to a decline in the underutilized labor force. The lack of structural change in developing countries raises at least two issues. First and foremost, efforts to fight widespread poverty are destined to fail unless good jobs are created for the many unemployed and poor. Secondly, economic history shows¹ that sustainable growth is associated with changes towards secondary and tertiary sectors, shifts in sectoral employment from low to high-productivity sectors and changing patterns of specialization towards higher value-added products. Several empirical studies (Pieper, 1999, Ocampo et al. 2009, Ros 2005) as well as development theory (Syrquin 1988, Chenery et al. 1986) support the association between labor shifts across sectors and sustainable economic performance. Growth momentum as observed in India or other developing countries has the chance to become sustained only if structural change takes place at all levels, and particularly in the labor markets. Otherwise, as put by Ocampo (2005), there will be the danger of a “vicious circle of slowdown in productivity and economic growth, decline in investment, increased structural heterogeneity as surplus manpower is absorbed into low-productivity activities”.

Rada (2007) develops a Kaldorian model of economic growth and transformation which addresses the question of dynamic structural change in an open economy with a significant informal sector. I present here the main relations of the model and its conclusions.

Table 1 here

The model studies a two-sector, two-commodity open economy that functions according to the SAM presented in Table 1. The modern sector produces a tradable good using capital and labor, whereas the subsistence sector produces a nontradable good using only labor. The tradable good

can be consumed, invested or exported. The foreign sector supplies intermediate inputs used in the production of the tradable or modern sector's good. Capitalists and workers are two distinct classes within the modern sector only; the capitalists own the capital, conduct investment, consume the tradable good and save; the workers receive a wage which they spend entirely on consumption of both sectors' products. The model makes the classical assumption that workers do not save, or, if they do, the saving is at a level that can be ignored. In the simulations this assumption is relaxed given that both China and India's household sector have sizable saving rates (Rada 2009).

Macro equilibrium is reached when excess demands in the two sectors are zero. In line with standard fixed-flex price models (Hicks, 1965, Taylor, 1983) excess capacity in the modern sector implies that equilibrium in the sector is attained through quantity adjustments, while in the subsistence sector it is the price level that adjusts to ensure zero excess demand.

There are two main ideas behind the workings of the economy in this model: the Kaldor-Verdoorn (KV) relation which postulates that overall productivity growth responds to higher output growth in the industrial or capitalist sector² and therefore is endogenous as in the new growth theory; but, unlike the new growth theory, output growth is being determined in the short and medium run from a demand-side perspective along Keynesian lines. Subsistence productivity responds to the amount of employment in the sector given that the marginal product of labor in the subsistence sector where capital is limited is close to zero (Sen, 1966). For example a transfer of labor to the modern sector eventually leads to a rise in the average product in the subsistence sector as a smaller number of workers obtains the same amount of output as before. In this economy employment growth in the formal or high-productivity sector follows from the dynamics between output and productivity growth, while employment in the subsistence sector is determined as a residual between total labor force and formal employment. Employment in formal sector can be lost if productivity grows faster relative to output or if output declines following an exogenous shock, such as a collapse in external demand. The outcome is an increase in the structural heterogeneity of the economy with potential negative consequences on long-run development efforts. The released labor ends up in the low-productivity, low-wage informal sector which has adverse effects on both overall productivity growth and output – the latter due to a loss in purchasing power and therefore a further decline in demand. The vicious

circle replicates itself as lower output further spreads into falling rates of productivity growth.

Macroeconomic policies that stimulate aggregate demand can step in to counteract such negative effects.

Finally, in an economy where growth is demand-driven distributive issues play a crucial role which further informs the direction of macroeconomic policy. The analysis takes into account two types of demand-led growth regimes: wage-led and profit-led growth as incorporated in models developed by Bhaduri and Marglin (1990) and Foley and Michl (1999). If, for example, economic activity is profit-led, redistribution of income towards wages causes output contraction and therefore a decline in employment.

In what follows I present the main relations of the model and in particular those that address the functioning of the modern or tradable sector since the output, employment, and productivity for the subsistence sector are derived as residuals.

2.1. The medium-run model in growth terms

The model assumes endogenous employment growth in the modern or formal sector and no unemployment in the standard sense as the unemployed always find work in the informal sector. The concern of the model is with the distribution of employment between sectors and not with the exogenous expansion of the labor force. Log-differentiation of the output identity, $X_M = L_M \varepsilon_{LM}$, where $X_M, L_M, \varepsilon_{LM}$ are output, employment and labor productivity in the formal sector gives an expression for the growth rate of formal employment as $\hat{L}_M = \hat{X}_M - \hat{\varepsilon}_{LM}$, where the hat over a variable signifies its growth rate. The subscript M stands for the modern sector which I use interchangeably with the formal or tradable sector.

The Kaldor-Verdoorn technical progress function assumes that the growth rate of labor productivity in the modern sector is linear in terms of output growth:

$$\hat{\varepsilon}_{LM} = \bar{\varepsilon}_{LM} + \gamma_0 \hat{X}_M \quad (1)$$

where, γ_0 is the Kaldor-Verdoorn coefficient or the elasticity of labor productivity in respect to demand, and $\bar{\varepsilon}_{LM}$ is the productivity trend term which responds to human capital growth, industrial policy, technological advancement or international openness. Replacing the growth rate of labor productivity with relation (1) we see that the growth of employment in the modern sector depends on the slope of the KV schedule (or the KV coefficient) and the growth rate of output in the sector as well as on the initial or incoming growth rate of labor productivity according to:

$$\hat{L}_M = (1 - \gamma_0) \hat{X}_M - \bar{\varepsilon}_{LM} \quad (2)$$

From (2) formal employment growth is positive if effective demand grows at a rate large enough to cover incoming growth rate of labor productivity and a potential high KV coefficient. It makes sense now to ask what drives output growth. From a Keynesian perspective, it is the effective demand that leads to output growth in the tradable sector in the short-run. Sources of demand in this model are investment, I , and exports, E , while savings (out of profits only since workers do not save) act as leakages and therefore affect output negatively. For the sake of brevity we bypass the complete derivation of the output relation and present here the expression for output growth as it appears in Rada (2007):

$$\hat{X}_M = (1 - \mu_1) \hat{E}_M + \mu_1 \hat{I}_M + \mu_2 \sigma [\hat{\omega}_M - \hat{\varepsilon}_{LM}] - (1 - \mu_2) \hat{e}_r \quad (3)$$

where $\mu_1 = I/(I + E)$ and $\mu_2 = s\pi/(s\pi + e_r a)$, $\hat{\omega}_M$ is the growth rate of formal wage and \hat{e}_r is the rate of currency depreciation. In (3) it is assumed that the growth rate of savings, \hat{S} , is negatively³ related with the wage share, $\hat{S} = -\sigma \hat{\psi}$, where $\hat{\psi} = \hat{\omega}_M - \hat{\varepsilon}_{LM}$ is the growth rate of wage share and σ is the marginal effect of an increase in the wage share on the saving rate. Next, the model predicts that investment and exports growth rates respond positively to higher demand (or output growth) and negatively to a loss in profitability as measured by the growth rate in the wage share according to the following behavioral functions:

$$\hat{I} = \hat{I}_0 + \phi_X \hat{X}_M - \phi_\psi \hat{\psi}_{LM} \quad (4)$$

$$\hat{E} = \hat{E}_0 + \theta_X \hat{X}_M - \theta_\psi \hat{\psi}_{LM} + \theta_e \hat{e}_r \quad (5)$$

where \hat{I}_0 and \hat{E}_0 are the trend in the growth rates of investment demand and exports respectively. In addition, in (5) exports are assumed to be stimulated by a depreciation of the exchange rate through increased competitiveness on the external markets. Using (4) and (5) one can solve for \hat{X}_M :

$$\hat{X}_M = \chi_1 \hat{I}_0 + \chi_2 [\hat{\epsilon}_{LM} - \hat{w}_M] + \chi_3 \hat{e}_r + \chi_4 \hat{E}_0 \quad (6)$$

$$\text{where: } \chi_1 = \frac{\mu_1}{1 - \mu_1 \phi_x + (1 - \mu_1) \theta_x}, \quad \chi_2 = \frac{(1 - \mu_1) \theta_\psi + \mu_1 \phi_\psi - \mu_2 \sigma}{1 - \mu_1 \phi_x + (1 - \mu_1) \theta_x}, \quad \chi_3 = \frac{(1 - \mu_1) \theta_e - (1 - \mu_2)}{1 - \mu_1 \phi_x + (1 - \mu_1) \theta_x},$$

$$\chi_4 = \frac{1 - \mu_1}{1 - \mu_1 \phi_x + (1 - \mu_1) \theta_x}$$

χ_1, χ_4 have to be positive in order to have economic sense. This condition is met unless the accelerator ϕ_x is considerable larger than unity, not the empirically relevant case. The other two coefficients, χ_2, χ_3 can take either signs. $\chi_2 < 0$ or it is positive but very small when the wage share has a weak impact on investment and exports, and there is a high propensity to save out of profits. In this case the economy is said to be wage-led. Alternatively, when χ_2 is significantly larger than zero, economic activity is being profit-led. "The sign of χ_3 depends on how strongly the depreciation stimulates exports relative to the increase in the costs of imported inputs and income redistribution effects" (Rada, 2007). Using (1), (2) and (6) the model allows us to solve simultaneously for the three variables of interest:

$$\hat{X}_M = \frac{1}{1 - \gamma_0 \chi_2} [\chi_2 (\bar{\epsilon}_{LM} - \hat{w}_M) + \chi_1 \hat{I}_0 + \chi_3 \hat{e}_r + \chi_4 \hat{E}_0] \quad (7)$$

$$\hat{\epsilon}_{LM} = \frac{1}{1 - \gamma_0 \chi_2} [\bar{\epsilon}_{LM} + \gamma_0 (\chi_1 \hat{I}_0 + \chi_3 \hat{e}_r - \chi_2 \hat{w}_M + \chi_4 \hat{E}_0)] \quad (8)$$

$$\hat{L}_M = \frac{1}{1 - \gamma_0 \chi_2} [(1 - \gamma_0) (\chi_1 \hat{I}_0 - \chi_2 \hat{w}_M + \chi_3 \hat{e}_r + \chi_4 \hat{E}_0) - (1 - \chi_2) \bar{\epsilon}_{LM}] \quad (9)$$

Using (7)-(9) comparative statics can now be conducted to see how output, employment and productivity respond to shifts in the exogenous variables. Higher incoming productivity, $\bar{\epsilon}_{LM}$, raises

overall labor productivity but it has uncertain effects on output and employment growth. In the wage-led case (when $\chi_2 < 0$) both employment and output decline. In the strongly profit-led case (when $\chi_2 > 1$) higher incoming productivity leads to output and employment growth. Similar exercises can be done for the other exogenous variables. Visually the model is described by figure 1(a) and (b) borrowed from Rada and Taylor (2006).

Figure 1(a) and (b) here

Employment growth is determined at the intersection of the output and Kaldor-Verdoorn schedules, and along each employment growth contours, which are drawn at a 45^0 angle, its growth rate is constant. As can be easily observed the growth of employment is higher as the equilibrium moves on the south-east contours. An increase in labor productivity shifts the KV schedule upwards and creates jobs only if the slope of the output schedule, $d\hat{\varepsilon}_{LT} / d\hat{X}_T = 1 / \chi_2$ is smaller than 45^0 . This is the case of a strongly profit-led economy when $\chi_2 > 1$.

2.2 The long-run dynamics

This section discusses the dynamics of the model in the long-run. Following Kaldor (1957) the model assumes a retardation mechanism acting on the cumulative effect of output growth on productivity. More specifically, the retardation is captured by a declining value of the KV coefficient as a result of “decreasing” increasing returns’ (Vaciago, 1975, Pieper, 2003). It is further assumed that the KV technical progress slows down as the economy approaches maturity which is measured here by the share of formal employment in total employment, λ , and generically written as:

$$\gamma_0 = f(\lambda) \tag{10}$$

As the economy heads towards maturity, characterized by a dominant formal sector, lower labor surplus limits the system’s ability to enjoy economies of scale. Rada (2007) chooses “a concave function (possibly quadratic) such that the technical progress coefficient increases strongly when there is significant underutilization of resources and economies of scale in the presence of strong feedbacks between structural dynamics and macroeconomic performance”. The growth rate of formal

employment share, $\hat{\lambda} = \hat{L}_M - n$, together with relation (9) reduces the model and the analysis in the long-run to one non-linear differential equation:

$$\dot{\lambda} = \lambda \left[\frac{(1-f(\lambda))A-B}{1-f(\lambda)\chi_2} - n \right] = \left(\frac{\lambda}{1-f(\lambda)\chi_2} \right) (A-B-n+f(\lambda)(n\chi_2-A)) \quad (11)$$

where $A = \chi_1 \hat{I}_0 - \chi_2 \hat{\omega}_M + \chi_3 \hat{e}_r + \chi_4 \hat{E}_0$ and $B = (1-\chi_2)\bar{e}_{LM}$.

In the case of a quadratic function for $f(\lambda)$, the differential equation in (11) has three fixed points all of which have to meet the restriction $0 \leq \lambda^* \leq 1$ in order to be economically meaningful. The three root-case is interesting from economic point of view because it describes the situation of an underdevelopment trap when $\lambda^* = 0$ and there is no modern or formal sector, the case of structural heterogeneity when the economy settles at the middle equilibrium point, or the case of sustainable development and growth when the economy approaches and reaches the upper equilibrium point characterized by a large share of formal employment in overall employment. Weak stability conditions and their economic meaning become more evident in the context of the empirical analysis conducted for the Chinese and Indian economies presented in the following sections.

3. Economic Performance and Structural Change: China and India during the 1990s

The empirical analysis starts with a quick look at the economic performance of the two economies during the 1990s and in particular the performance of the formal or modern sector. Despite the sheer size of their population, China and India have become the economic miracles of the developing world in the 1990s when both countries consistently recorded impressive growth rates of both output and labor productivity. But as Felipe et al. (2008) point out their growth and development patterns differed in many respects, especially in regard to the pace of capital accumulation. China's strong growth in investment demand and high investment shares are the staples of its rapid economic expansion. India, on the other hand, has had a much lower investment rate which may have restricted its ability to catch up with China's fast growth.

China and India have followed different directions also in respect to the structural changes of their economies and in particular the pace of job creation in the high productivity formal sector. In

addition to several indicators that describe the economic performance of the two economies during the 1990s, table 2 shows their record of structural change measured here in terms of the share of formal employment in total employment.

Table 2 here
China and India's economic performance during the 1990s

During the 1990s formal sector in China grew at an average rate of 12%. This rapid growth was the result of significant improvements in labor productivity, but which took place together with job creation in the sector at an annual rate of 2.5 %⁴. Because its labor force, n , increased by 12% annually over the period, the formal sector expanded its share in total employment from 36% in 1990 to 42% by 2000 (Ghose, 2005, Rada, 2009). Nonetheless, the performance of the Chinese economy was not uniform over the entire decade. With the onset of the restructuring of state-owned enterprises in 1996 the creation of formal jobs in the urban areas decelerated rapidly. In fact between 1995 and 2000 the share of formal sector employment declined by 2 percentage points, from 44% to 42.3% as both output and investment demand expanded at slower pace compared to the first half of the decade.

Job creation in the formal sector in India was stagnant throughout the 1990s despite the fact that, as shown in table 2 output in the sector expanded annually at a rate of 6.6%. Labor productivity grew at 6.1% which left little need for additional employment in the sector. Consequently the share of formal employment declined slightly and by 2000, roughly 92.5% of India's labor force remained employed in the informal sector (see Indian Ministry of Labour)⁵.

A comparison of labor productivity in the two sectors for each country suggests that a transfer of labor from the subsistence to the modern sector has tremendous implications for economic growth. The Chinese worker in the formal sector is about 2.8 times more productive than the informal worker, while in India a formal worker is able to produce the output of more than eight informal workers. Under these conditions the prospect of robust economic growth for the two countries is largely dependent on the capacity of the economy to create high-productivity formal jobs for the underutilized informal labor. This capacity in turn depends on how fast aggregate demand expands. Two of the most essential components of effective demand for the developing countries are exports and

investment, the latter being essential in the direct expansion of actual productive capacity necessary to accommodate a higher number of workers. During the 1990s, China has performed better than India in respect to both exports and investment growth. The difference is especially striking when it comes to the pace of annual investment growth: 14.1% for China versus 6.3% for India. But, as Felipe et al. (2008) conclude there are real challenges facing both economies. For China the task at hand is how to continue the expansion of capital accumulation necessary for the structural transformation of its economy, in spite of declining profit rates and negative growth of capital productivity. In the case of India future performance is contingent on more rapid capital accumulation and therefore demand such that changes, of the sort discussed above, are initiated in the basic structure of the economy.

4. Comparative Statics for the Model in the Short-run

The next two sections discuss different policy scenarios that address the question of structural transformation of the Chinese and Indian economies. The goal is to suggest along broad lines effective measures that can stimulate an increase in the share of formal employment and therefore overall economic growth.

4.1 Parameters

I start with a presentation of main parameters and variables that enter the simulations exercise for the model in the medium-run. Since the working of the informal sector is derived as a residual the focus here is only on the dynamics of the formal sector as discussed in section 2.1. Tables 3(a) and (b) provide the estimates for the parameters included in equations (7)-(9). These parameters are obtained either directly from the base year data set provided by the SAMs (see Appendix on data sources and estimation) for the two economies or are estimated using several criteria: available statistics for the main variables that enter the model, previous knowledge from econometric studies, and parameterization/calibration techniques. The latter calculates values for the parameters such that the model in the base year gives final estimates for productivity, output and employment growth that come close to the actual numbers.

Table 3(a) and (b) here

Main parameters and incoming growth rates of exogenous variables

Most of the parameters are derived from the base year SAMs for the two economies estimated by Rada (2009) and from available statistics in the National Accounts Statistics. The formal sector's profit share, π , is 0.43 in China and 0.39 in India, while the investment share, $\mu_1 = I/(I + E)$, is 56% in China and 51% in India. Domestic savings relative to the share of imported inputs, μ_2 , are 59% in China and 40% in India. A comparison of the two main sources of savings, domestic and foreign, suggests that the Indian economy is more dependent on external resources.

As it has been already mentioned the model's initial assumption that households conduct no savings is being relaxed in the simulations and instead households in China are assumed to save a staggering 40% of their income as per data from the Flow of Funds (table 3-21, National Bureau of Statistics of China 2003), while in India households save somewhere around 22%. Taking into account the income shares for the two factors of production, capital and labor, the economy-wide propensity to save is computed from $s = \psi s_w + (1 - \psi) s_\pi$. In China the overall saving rate comes to $s = 47\%$ while for India it equals 24%. Based on these parameters the elasticity of saving rate, σ , with respect to the wage share as given by $-(\psi / s)(s_r - s_w)$ and takes a value of 0.18 in China and 0.11 in India.

The remaining parameters were more or less decided ad hoc based on plausible values and information from other studies (Naastepad 2006). The effect of output growth on the growth rate of investment, ϕ_X is usually somewhere around unity. A higher wage share has a negative impact on investment growth, ϕ_ψ and export growth, θ_ψ . Higher values for these parameters make the economy profit-led. External demand is chosen to be highly elastic with respect to a depreciation of the exchange rate as given by the coefficient θ_e . Finally, increased domestic demand does not crowd out exports but in fact may stimulate them. This stylized fact can be explained using the Kaldor-Verdoorn relationship that higher output growth leads to higher productivity and therefore to increased competitiveness as costs are expected to decline -- and assuming that wages grow less than

productivity. For this reason I choose a value of 0.1 for θ_X for China and 0.4 for India. The Kaldor-Verdoorn coefficient which measures the impact of an increase in the aggregate demand on the productivity growth is usually found to be between 0.4 and 0.6 (McCombie 1983, Thirlwall 1983). In the medium-run simulations the coefficient takes the upper limit of 0.6 for both China and India a choice based on the fast productivity growth observed in the two economies over the past two decades.

The parameters just described are further used to calculate $\chi_1, \chi_2, \chi_3, \chi_4$. These four structural parameters determine the effects that investment and export trends, \hat{I}_0, \hat{E}_0 , growth rate of wages, \hat{w} , labor productivity trend, $\bar{\varepsilon}_{LM}$ and real exchange rate depreciation, \hat{e}_r have on output growth. The values of these exogenous variables appear in table 3(b) and, aside growth rate of wages, they are selected to depict plausible long-run trends⁶. In the simulation for the long-run dynamics the growth rates of some of these variables are assumed to be lower⁷.

Expansion of autonomous investment, \hat{I}_0 , which has an incoming value of 3% in China and 2.5% in India stimulates output growth in both countries as long as χ_1 is positive. Based on the values obtained for χ_1 , a 1 percentage point increase in \hat{I}_0 in China leads to a 1.44 percentage point increase in \hat{X}_T , and a bit more than 1.5 percentage point rise in India. Lower or higher wage share that follows from labor productivity rising at a faster rate compared to wages, stimulates output growth with a magnitude given by the χ_2 parameter. A positive value for χ_2 signals a profit-led economy. In this case a faster increase in wages relative to productivity has contractionary effect on the economy.

A real exchange rate depreciation stimulates output growth only in China where $\chi_3 = 0.07$ is positive. In India depreciation of the currency has a negative impact on output growth due to a higher dependence on imported inputs which end up raising production costs.

3.2 Medium-run Dynamics in the Formal Sector

The medium-run analysis of the formal sector in the two economies has at its core numerical results obtained based on equations (7)-(9) and the parameters and exogenous variables from tables 3 (a) and (b). The simulations results appear in table 4 below.

The base run scenario replicates the growth rates of output, productivity and employment observed during 1995-2000 by using either actual or long-run plausible values for the growth rates of autonomous investment, wage, exchange rate and the productivity trend. For example, applying the model to the Indian economy a 2.5% growth rate in autonomous investment, 10% growth in wages, a real depreciation of the rupee of 2% and a labor productivity trend equal to 2.5% determine a 7.42% annual expansion in the formal sector's output. This value for \hat{X}_M is in fact very close to the actual growth rate of output observed during 1995-2000. From the KV relationship labor productivity growth is calculated to be 7.45%. In terms of job creation, the base run simulation predicts that the Indian economy loses formal jobs at a rate of -0.03%. As a result the formal sector's share in overall employment declines.

Table 4: Comparative statics for the model in medium-run

The remaining exercises in table 4 capture the effects that changes in exogenous variables have on the output, productivity and employment growth and therefore on the share of formal sector's employment in the two economies. The results provide some insights into what policies would be most effective to attain both economic growth and development.

Investment demand shock

Empirical evidence and analysis provided by UN's 2006 *World Economic and Social Survey* suggests that the structural transformation from primary to secondary and finally tertiary sectors in the rapidly growing East Asian economies for the last few decades was supported by a significant amount of fixed investment. In the model presented in this paper a higher rate of growth of autonomous investment has an expansionary effect on all three variables: output, labor productivity and employment. For example, in China, a 0.5 percentage point increase in the rate of investment contributes to 0.8 percentage point increase in the rate of output growth. Based on the KV relation,

productivity expands now at 9.3% while employment is created at a rate of 1.2%. Assuming that population or labor force grows at 1%, the end result is that a permanent increase of 0.5 percentage points in the rate of investment is sufficient to allow the expansion of formal sector's employment.

Same is true for India. If investment were to increase from 2.5% to 3.5% the rate of growth of output would rise from 7.4% to 9.6% while jobs would be created at a rate of 0.8% which is considerably higher compared to the stagnation in formal employment recorded prior to the investment shock.

Incoming productivity shock

A higher productivity trend, $\bar{\varepsilon}_{LM}$, following better industrial policies or improved human capital causes the KV schedule to shift upwards. Both productivity and output are now growing faster, while the new equilibrium point is situated on a higher employment growth contour where the rate of job expansion is lower. Nonetheless, if a positive exogenous shock to $\bar{\varepsilon}_{LM}$ is accompanied by a rise in investment, the negative effects on job creation is attenuated. In fact, as shown in table 4, if the trend in labor productivity in China increases by 1 percentage points (from 3% to 4%), an expansion in investment growth of 1.5 percentage points (from 3% to 4.5%) is sufficient to lead to an acceleration in the growth rate of formal jobs.

Wage shock

A positive value for χ_2 in both economies signals a profit-led economic activity. In this case a redistribution of income towards profits following a decline in the growth rate of wages is expected to stimulate investment and therefore economic growth. From the value for χ_2 in table 3(a) one can observe that India is slightly more profit-led compared to China. Results in table 4 show that in India a 3 percentage points decline in the growth rate of wage leads to 2.1 and 1.3 percentage points increase in output and productivity growth respectively. Employment in the formal sector is now created at a rate of 0.8%. In China a redistribution of income towards profit stimulates the three variables but its effect is weaker when compared to India.

Depreciation shock

Finally, a depreciation of the currency can be expansionary if the positive effect on exports is strong enough to counteract the less desirable effects of higher costs of imported inputs. The simulation results show that the exchange rate depreciation has a weak but positive impact on output growth in China, as captured by χ_3 . A $\chi_3 < 0$ in India on the other hand implies that economic activity is expected to suffer following a depreciation of the rupee. The difference in depreciation effects between the two economies is not unexpected given the record of the two economies in respect to trade. During the 1990s the Indian economy remained more dependent on imported inputs and has consistently run a trade deficit. China on the other hand has pursued an active policy of export-led growth which was paired with an aggressive process of industrialization.

4. Long-run Dynamics

This section discusses the long-run dynamics for the Chinese and Indian economies. From the onset it is necessary to acknowledge the limitations that the model presents us with. First, the way the model is setup brings up challenges in terms of the model's stability features and consequently robustness of the parameters. This limitation could be dealt with by introducing additional breaks that will limit certain destabilizing effects present in the model. Secondly, the parameters discussed in the previous section provide three positive equilibrium points that make economic sense, however changes in incoming variables that appear in table 3(b) can lead to non-positive equilibrium points⁸. Thirdly, the model takes a longer time than expected to reach the steady-state, an issue that is yet to be resolved. Finally, as for any long-run analysis one should be aware that changes in the structural parameters may inflict changes in the qualitative features of the model.

The results for the long-run dynamics after shocks have been applied to several exogenous variables are presented in figure 2. The first set of graphs describes the base run story which follows from solving the model using the values for exogenous variables and parameters from tables 3(a) and (b). In addition a retardation mechanism is imposed on the KV coefficient which now depends on the share of formal sector's employment λ through a quadratic equation $\gamma_0 = -a\lambda^2 + b\lambda + c$. γ_0 in the

base year is calculated by using the values for a, b, c from table 5 and the base year λ . γ_0 in the base year becomes 0.61 for China and 0.45 for India.

Table 5: Retardation parameters

The long-run dynamics and the retardation mechanism are easy to understand in the light of the base run simulation results. For illustrative purposes I discuss here in more detail the case for China. For the year 2000 and using the statistics obtained for the Chinese economy there are three positive roots for the differential equation (11) as follows: $\lambda_1 = 0, \lambda_2 = 0.26$ and $\lambda_3 = 0.89$. Stability analysis shows both numerically and visually (see top left graph in diagram) that the middle solution $\lambda_2 = 0.26$ is an attractor. Since the actual position of the Chinese economy is at the right of λ_2 the economy is set to converge towards it. In other words if no changes take place either in terms of structural parameters or in the growth rates of investment, wage, exports, the trend in productivity or the real exchange rate, output in the formal sector does not grow at a rate that is fast enough for the sector to attract labor above the rate of increase in labor supply. The outcome is a decline in formal sector's share in total employment. Eventually, λ approaches and settles at 0.26 as a result of the retardation mechanism discussed in section 2.2. When applied to the Indian economy the model exhibits similar qualitative features in the sense of having a stable middle solution. Based on the parameters and the incoming value for the exogenous variables the Indian economy is as well positioned at the right of the stable equilibrium point. Convergence to equilibrium takes place together with a decline in the formal sector's share of employment. The base run simulations confirm the actual trends in formal employment for both economies as discussed above. Despite good economic performance recorded by China and India in the recent decades, job creation still lags significantly in India and to some extent for the recent period in China. The model presented in this paper shows that in the absence of policy shocks that would stimulate aggregate demand and structural change, these economies are likely to experience further deterioration in respect to their ability to produce formal jobs.

So what are these policies? I answer this question by analyzing how each economy might respond to an impulse in exogenous variables as a result of macro or sectoral policies. The goal here is to assess how the non-zero fixed points shift in respect to the actual position of the economy. Intuitively, the scope of the exercise is to understand what policies would induce a change in the dynamics of the system such that the stable equilibrium point moves as far as possible to the right of where the economy is situated. The arrows in the graphs embedded in figure 2 signal the direction towards which the formal sector's employment share is set to move.

Investment demand shock

A higher rate of growth of autonomous investment is expected to have strong positive effects on both economies. The outcome of a 0.5 percentage point rise in \hat{I}_0 can be visualized in the system's dynamics, or $\hat{\lambda}$, as captured by the dotted curve which has now "jumped" to the right such that the middle equilibrium point acquires a higher value. An economic policy that stimulates investment would move both economies on higher output growth trajectories. Because the effect on productivity growth is less than unity (since $\gamma_0 < 1$) there is a net increase in the demand for labor. In both cases the expansion in job creation in the sector is large enough to shift the new stable fixed point towards which the economy would now converge further to the right. For China the new value for λ_2 is 0.38 which remains below the actual value in the share of formal employment for year 2000 when $\lambda = .42$. Thus, a stronger expansion in the rate of autonomous investment is necessary to avoid a decline in the share of formal employment. In India on the other hand a 0.5 percentage point increase in the investment rate is sufficient to accelerate formal employment and shift the equilibrium λ to 0.19.

Real wage shock

Because both economies are profit-led, a higher rate of growth of wages in the formal sector triggers a decline in demand for investment and exports which feeds back negatively into the rate of growth of output. Lower economic activity implies less demand for labor. The dynamics is captured by a downward shift in $\hat{\lambda}$ such that the middle, stable equilibrium point acquires now a lower value relative to the base run. The numerical analysis shows that a \hat{w} higher by 1 percentage point is

sufficient to induce a decline in formal employment share of 4 and 7 percentage points (relative to the base run) for China and India respectively. The lesson to be learned is that policies have to be sensitive to distributive issues otherwise an initially well intended reform to better off labor could lead to unwanted long-run results. Nonetheless, such policy can still be implemented in combination with measures that target components of aggregate demand. Additional incentives to investment demand and exports can work in this case to counter the negative effects of costs associated with higher wages.

Incoming productivity shock

Industrial policies or investment in labor-saving technology enhances the trend in labor productivity, $\bar{\epsilon}_{LM}$ but also hurts the ability of the formal sector to raise employment in excess of labor force growth. The economy moves towards a lower λ_2 as depicted by the third set of graphs in figure 2. In this particular exercise both output and productivity continue to expand. Not the same is true for formal employment which suffers in the aftermath of an increase in labor productivity. This situation can be characterized as the jobless growth observed in many developing economies.

Depreciation shock

A depreciation of the currency, $\hat{\epsilon}$, has opposite effects in the two economies. In China faster depreciation of the yuan relative to the dollar has an expansionary effect on the economy as exports grow enough to counteract the negative effects from higher costs associated with imported inputs. In India a depreciation policy of the rupee has negative effects on the economic activity in the long-run given that $\chi_3 < 0$.

Labor force shock

A lower labor force growth, n , has a positive impact on the share of formal employment as noticed from equation (11). Compared to the base run China's share of employment is expected to increase to 31% following a decline of 0.15 percentage points in the growth rate labor force. In India a \hat{L} lower by 0.3 percentage points leads to a 10 percentage points increase in λ . We should be cautious praising such result as it leads to a controversial outcome that lower labor force growth is always "beneficial". In fact recent debates on the issues related to population ageing in many

industrialized countries point to the negative effects that a lower labor supply may have on economic growth (see upcoming *World Economic and Social Survey 2007*).

5. Conclusions

The work presented in this paper tries to identify macroeconomic policies that can lead a developing economy towards good economic performance in terms of higher output production as well as creation of productive, well-paid jobs. It was mentioned in the introduction that even when economic growth in output terms is significant a transfer of labor from low to higher productivity and better paid jobs does not take place. The adoption of technological knowledge from more advanced economies often allows productivity gains to become large enough such that production happens without the need to increase labor inputs. For all countries but in particular developing ones the jobless growth brings about dim prospects for better standard of living for the majority of the labor force which is stuck in the low productivity, low pay jobs. But at the same time the adoption of better technology by the developing countries is a necessary ingredient for sustained economic growth and improved efficiency. This dilemma between increased productivity on one hand and more jobs on the other hand is nonetheless a matter of successful implementation of not only pro-growth but also socially relevant economic policies. History proves that several developing economies were successful in setting off a virtuous spiral of dynamic structural change where both labor transfers between sectors and productivity growth take place. In much of the literature (see Amsden (2003), Wade (2003)) the key to the success in many East-Asian economies is found in the interplay between the developmental state and markets. The markets and integration in the global economy are necessary because of many positive externalities that they provide and which are related to technological transfer, financing and access to larger markets. At the same time the involvement of the state is essential to provide a developmental vision needed to shape macroeconomic policies and ignite dynamic structural changes that can prevent detrimental social and economic outcomes such as the loss of good jobs.

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Tables and Figures:

SAM for an economy with formal/informal sectors	Costs		Use of Income				TOTALS		
	Formal (A)	Informal (B)	Formal Households (C)	Business (D)	Informal households (E)	Exports (G)	Investment (H)	(I)	
(1) Formal			Formal HH consumption of formal goods Formal HH consumption of informal goods	Formal goods consumption	Informal HH consumption of formal goods Informal HH consumption of informal goods	Foreign Demand	Capital accumulation of formal goods	Formal sector output	
(2) Informal								Informal sector output	
(3) Labor(F)	Wages of formal HH Profits	Wages and operating surplus of informal HH							Formal HH income
(4) Business (F)				Business sector income					
(5) Labor (I)								Informal HH income	
(6) Imports	Imported inputs							Payments to the rest of the world	
(7) Savings			Formal HH saving	Corporate sector saving	Informal HH saving	Foreign saving	Total capital accumulation	0	
(8) TOTALS	Formal sector output	Informal sector output	Use of formal HH income	Use of business income	Use of informal HH income	Receipts from the rest of the world	0		

Table 1: A Social Accounting Matrix for an open, two-sector economy

	Output		Productivity		Employment		Wage	Inv	Exports	Formal employment share		Relative labor productivity
	\hat{X}_M	\hat{X}_S	$\hat{\epsilon}_{LM}$	$\hat{\epsilon}_{LS}$	\hat{L}_M	\hat{L}_S	\hat{w}_M	\hat{i}	\hat{E}	$\lambda_{1990/91}$	λ_{2000}	$(\epsilon_{LM}/\epsilon_{LS})_{2000}$
China	12.2	6.82	9.42	6.74	2.53	0.07	8.9	14.1	16.0	36.5	42.3	2.84
India	6.6	5.06	6.11	3.15	0.45	2.21	5.4	6.3	12.8	8.4	7.2	8.37

Table 2: China and India's economic performance during the 1990s

Sources: See data appendix

Note: Initial series for output, investment, exports and wages are in 1990 yuan for China and 1993/94 rupee for India.

Parameters Formal Sector	China	India
γ_0	0.60	0.60
s	0.47	0.24
s_r	0.55	0.26
s_w	0.40	0.22
ψ	0.57	0.61
π	0.43	0.39
μ_1	0.56	0.52
μ_2	0.59	0.40
$1 - \mu_1$	0.59	0.48
$1 - \mu_2$	0.59	0.60
σ	0.18	0.11
ϕ_x	1.00	0.90
ϕ_y	0.20	0.20
θ_x	0.10	0.40
θ_e	1.00	1.00
θ_w	0.20	0.20
χ_1	1.44	1.55
χ_2	0.23	0.46
χ_3	0.07	-0.37
χ_4	1.11	1.41

Table 3(a)

Variables- base year	China	India
\hat{w}	10.3%	10.4%
\hat{e}_r	2.0%	2.0%
\hat{e}_{SLM}	3.0%	3.0%
i_0	3.0%	2.5%
n	1.0%	1.9%

Table 3(b)

Table 3 (a),(b): Main parameters and incoming growth rates of exogenous variables

Source: See data appendix.

			Output growth	Productivity growth	Employment growth
Base run		China	9.7%	8.8%	0.9%
		India	7.42%	7.45%	0.0%
Investment growth	3% → 3.5%	China	10.5%	9.3%	1.2%
	2.5% → 3.5%	India	9.6%	8.7%	0.8%
Productivity growth	3% → 4%	China	9.9%	10.0%	0.0%
	3% → 4%	India	8.1%	8.8%	-0.8%
Productivity and Investment	3% → 4%, 3% → 4.5%	China	12.6%	11.6%	1.0%
	3% → 4%, 2.5% → 4%	India	11.3%	10.8%	0.5%
Wage growth	10% → 7%	China	10.6%	9.3%	1.2%
	10% → 7%	India	9.6%	8.7%	0.8%
Depreciation	2% → 4%	China	9.8%	8.9%	0.9%
	2% → 4%	India	6.4%	6.8%	-0.4%

Table 4: Comparative statics for the model in growth terms

Retardation Parameters	China	India
a	-0.70	-0.70
b	0.80	0.80
c	0.40	0.40
γ_0	0.61	0.45

Table 5: Retardation parameters

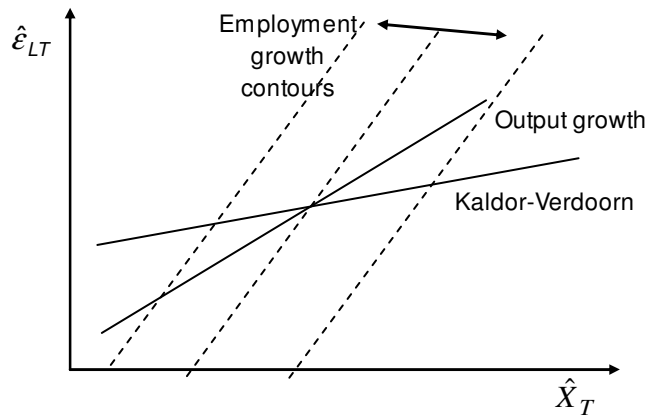


Figure 1a: Productivity, Output and Employment Determination in the Modern Sector (when slope is smaller than 45°)

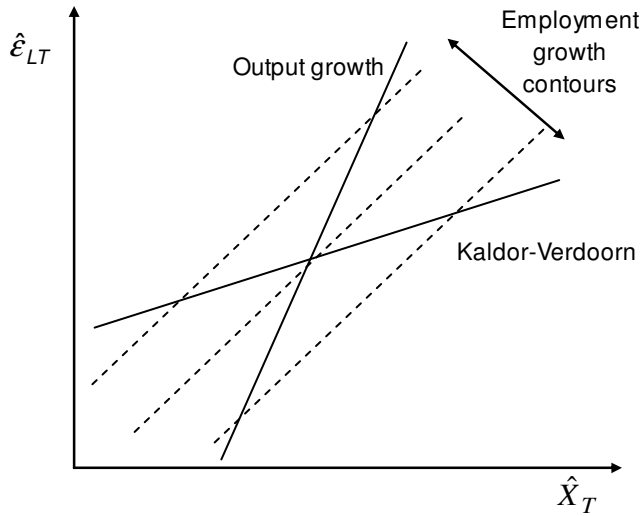
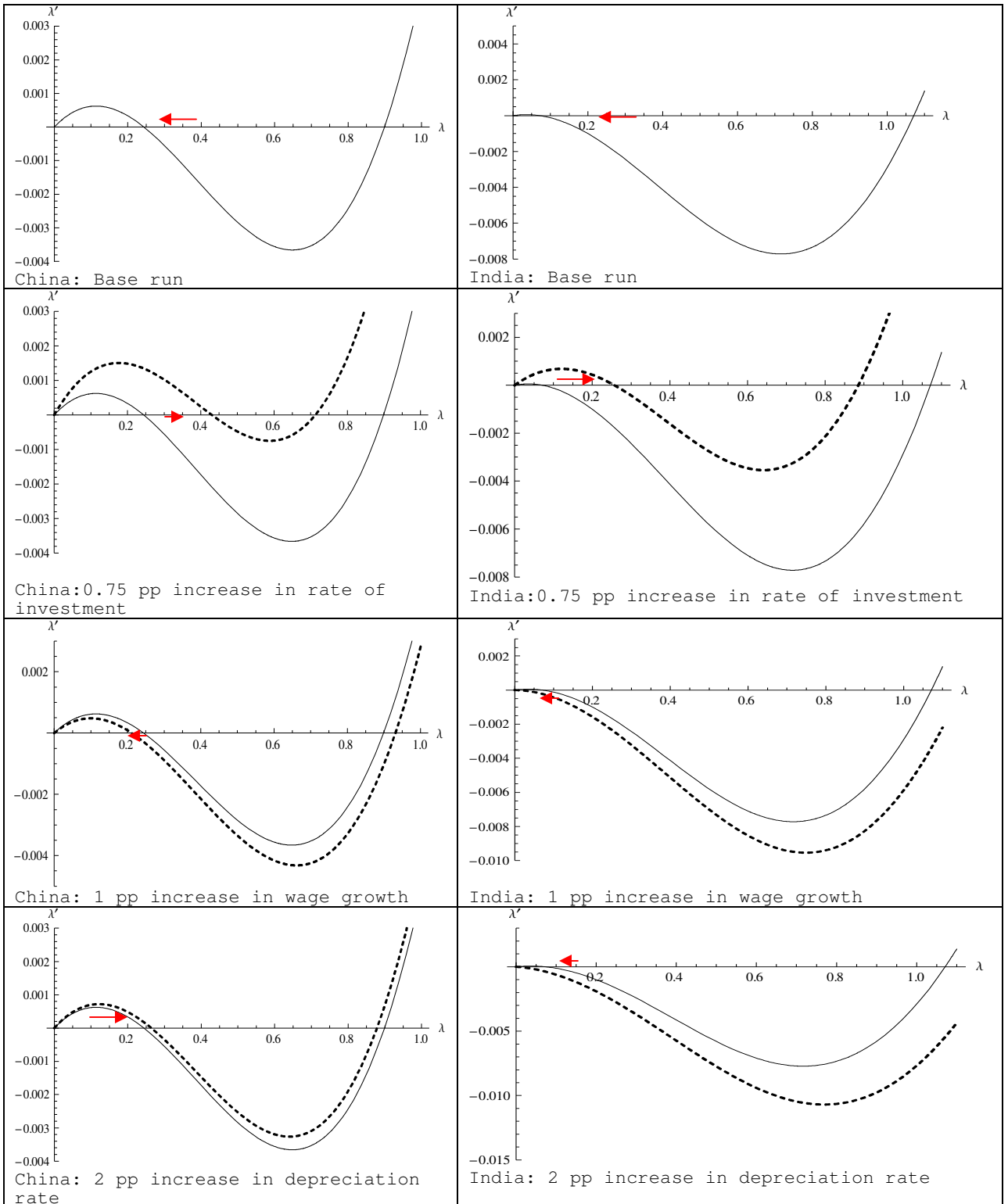


Figure 1b: Productivity, Output and Employment Determination in the Modern Sector (when slope is larger than 45°)



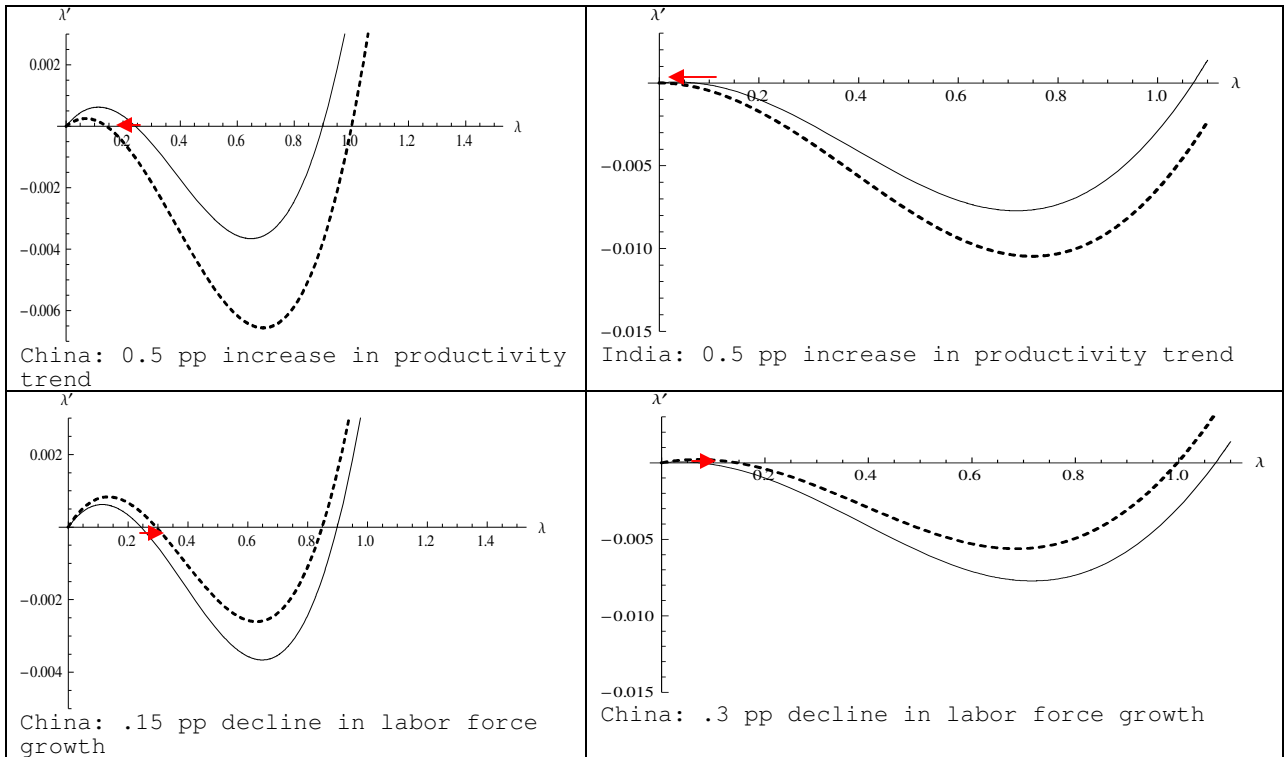


Figure 2: Long-run dynamics

Data Appendix:

Table 2:

China: Data for output, investment and exports is from Recent Trends and Prospects for Major Asian Economies (table 3.1) provided by *The Institute the International Center for the Study of East Asian Development* (http://www.icsead.or.jp/7publication/eaep_e.html). Data on formal/informal employment is from Ghose (2005). Total wage bill for the formal/informal sectors was estimated using employment data from Ghose (2005), data on the levels of wages in the formal sector provided in China Statistical Yearbook (2003) and own estimations of levels of wages in the informal sector (see Rada, 2009). Data for output was then divided into formal/informal using the shares of formal/informal wage bill for the entire economy.

India: Data for output, formal employment, investment and exports is from Key Indicators 2004 provided by the *Asian Development Bank* (ADB) (www.adb.org/statistics). Informal employment was calculated as a residual between total employment provided by Key Indicators of the Labor Market provided by *International Labor Organization*, and formal employment from ADB. Formal wages are taken from Compensation of Employees in the Organized Sector, *National Accounts Statistics* published by the Ministry of Statistics and Programme Implementation. Overall output was divided into formal/informal shares using the organized/unorganized factor incomes from Statement 76.1: Factor incomes by Kind of Economic Activity, *Central Statistical Organization*.

Table 3:

Data on investment shares, saving propensities and income shares are from the Social Accounting Matrices for the formal/informal sectors estimated by Rada (2009). Data for growth rate of formal wage comes from the same sources as data in table 2. For the long-run simulation I used 5% as the growth rate of wage in the formal sector. Long-run values for investment and

productivity trends are chosen to depict plausible values. Investment rate used in the long-run simulations was lowered further to 2.5% and 2% for China and India respectively.

¹ See United Nations, *World Economic and Social Survey 2006*, UN, New York.

² Due to "... dynamic economies of scale of a microeconomic character, associated with learning and induced innovations; those associated with the exploitation of intra- and intersectoral external economies [...]; and the positive links generated by variations in underemployment." (Ocampo 2005)

³ The assumption holds if savings out of profits are higher than out of wages, and usually that is the case for both developed and developing countries.

⁴ The transfer of labor to the formal sector was slowed down considerably in the second half of the decade -- trend that will be mirrored in the simulations -- when restructuring reforms implemented in the Chinese economy have led to the closing down of many industrial facilities which employ the majority of formal sector's labor.

⁵ The failure to set off changes in the basic structure of the labor markets calls into question the sustainability of the development process in India as it limits the system's ability to deal with large scale poverty. While progress in fighting poverty in India was real during the 1990s, there was also a large increase in inequality between regions and occupations. Deaton and Dreze, (2002) find out that southern and western states tend to be doing much better in terms of poverty reduction. This outcome is not surprising as most of the high-productivity, higher paid jobs are found in the information technology and business services sectors largely located in these states.

⁶ The growth rate of wages in the two countries will take a more reasonable value for the long-run simulation exercise presented in the next section.

⁷ The candidates are the wage which is assumed to still maintain a healthy growth rate of 5% over the long run and the investment trend which is set to 2.5% in China and 2% in India.

⁸ Non-positive roots for equation (11) for state variable λ do not have economic meaning and therefore their occurrence can not be incorporated into the analysis.