

A Tale of Two States¹

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Abstract

In this paper we study the economic evolution between 1960 and 1995 of two states in India – Maharashtra and West Bengal. During this period West Bengal, which was one of the two richest states in India in 1960, has gone from a relative per capita income of about 100 percent of Maharashtra, to a relative income of around 60 percent. Our diagnostic analysis reveals that a large part of the blame for West Bengal's development woes can be attributed to: (a) low aggregate productivity (b) poorly functioning labor markets and sectoral misallocations. We find that sectoral productivity and labor market allocation wedges were strongly correlated with political developments in West Bengal, namely the increasing vote share of the leftist parties.

KEYWORDS: Indian states, development

JEL CLASSIFICATION: O11, O14

1 Introduction

When India gained independence from Britain in 1947 the two richest states in the country were Maharashtra and West Bengal. Till 1960 their relative standing remained unchanged. However, by 1995 West Bengal had regressed to about the middle of the income distribution across Indian states while its per capita income had declined to about 60 percent of Maharashtra. In this paper we first document the specifics of this dynamic evolution and then attempt a statistical decomposition of the data patterns. Our diagnostic analysis reveals that a large part of the blame for West Bengal's development woes can be attributed to: (a) low aggregate productivity; and (b) labor market distortions – some factors depressed the marginal product of labor in the manufacturing sector in West Bengal. We find that while the greater political power of the left (with its strong rural and labor constituencies) in West Bengal were correlated with productivity and labor market distortions, they did not translate into productivity gains for agriculture or into a reduction in the incidence of poverty (relative to Maharashtra).

Comparing the sectoral evolution of West Bengal and Maharashtra during this period reveals that two major differences between the states were their performances in the agricultural and manufacturing sectors. Manufacturing's share of output was almost identical across the two states in 1960. By 1995 however, while the output share of manufacturing in Maharashtra increased, in West Bengal it declined from 22 percent to 15 percent. In other words, West Bengal experienced a process of *de-industrialization* during this period. In agriculture, both states started out with output shares of around 40 percent in 1960. Between 1960 and 1995 agriculture's share of output declined in both states. However, the agricultural decline in West Bengal was half the size of the decline in Maharashtra. In the

other major sector, services, the performance of the states was similar with the output share of services rising from 32 percent in 1960 to about 45 percent by 1995.¹

Motivated by this evidence on the asymmetric sectoral evolution in West Bengal and Maharashtra, we conduct a diagnostic exercise on the two states. In particular, we analyze the data through the prism of a multisector neoclassical growth model. The primary goal of this exercise is to identify the margins that may have been responsible for the performance disparity. We find that about 2/3 of the output difference in the manufacturing and services sectors between the two states in 1995 can be attributed to differences in sectoral total factor productivity. The rest is attributable to the labor market wedges. The labor market wedges show that marginal product of labor in the manufacturing sector in West Bengal were too low. Interestingly, we find that agricultural productivity in West Bengal relative to Maharashtra actually declined between 1960 and 1995. The declining relative agricultural productivity was offset by an increase in the relative agricultural share of the labor force during this period. This positive agricultural employment effect offset the relative productivity decline thereby arresting the decline in agricultural's share of output in West Bengal.

Guided by the diagnostic results, we investigate a couple of alternative explanations for the difference in the relative performance of West Bengal. We find that our measured wedges are strongly correlated with political developments in West Bengal, namely the increasing vote share of the leftist parties over the last 35 years. The vote share of the leftist parties, in turn, is positively correlated with the incidence of industrial action, strikes, lockouts etc.. The incidence of industrial action in West Bengal (measured by the ratios of days lost to days worked) increased sharply in the mid-1960s and thereafter has remained at about three

¹Agriculture, manufacturing and services comprise about 90 percent of output of these two states during this period.

times the level in Maharashtra. This suggests to us that an increase in the bargaining power of labor in West Bengal may have been a significant ingredient in the relative decline of West Bengal.

We find the results interesting on two counts. First, we are unable to find a similar example of two regions within the same country, who were jointly at the top of the income distribution at some point in time, exhibiting such a marked difference in economic performance over a 35 year period. Indeed, even looking at the cross-country income data it is hard to find similar cases. As pointed out by Kehoe and Ruhl (2003), there are a couple of cases like New Zealand and Switzerland which showed 40 percent declines in per capita incomes relative to the USA between 1960 and 2000. However, New Zealand (4 million people in 2000) and Switzerland (7 million) are tiny when compared with West Bengal (80 million) and Maharashtra (97 million). Second, the correlation of the measured wedges in sectoral labor allocation conditions and sectoral productivity with the vote share of the leftist parties point to promising avenues for quantifying the effects of aggressive pro-labor industrial work rules as well as state sanctioned industrial action.

Our paper is closely related to some recent work by Besley and Burgess (2003) [2]. [2] use the same data to study the evolution of the manufacturing sector across Indian states. Based on a detailed study of amendments to labor regulations in different states, [2] construct an index which classifies each state as being either pro-labor, neutral or pro-employer. They find that pro-worker legislation reduced growth of manufacturing output, investment and employment. Moreover, pro-labor regulation also slowed down the rate of poverty reduction. While our results are consistent with the findings of [2], we should note that their index classifies both West Bengal and Maharashtra as being pro-labor. Hence, their index is not directly informative about the different development patterns of these two

states.²

The paper is also related to a recent paper by Banerjee et al (2002) [1]. The focus of the work of [1] was on compiling a list of policy initiatives which could be used by policymakers to redress the economic problems that West Bengal has faced in recent years. In order to suggest possible remedies the authors also attempted some diagnostics on West Bengal. Two of their conclusions regarding West Bengal's recent history are related to our work and hence merit some review. First, [1] suggest that the performance of the agricultural sector in West Bengal had been excellent. Second, [1] suggest that the West Bengal's performance in reducing the incidence of poverty has been outstanding. We take issue with both these conclusions.

Our examination of the data suggests that the conclusions of [1] are a function of the initial date they choose to evaluate the time series evidence. As was pointed out above, agricultural productivity in West Bengal relative to Maharashtra declined between 1960 and 1995. However, if one only focuses on the period since 1980 then there was an improvement in relative agricultural productivity. Similarly, relative to Maharashtra, the number of people under the poverty line both in rural and urban areas of West Bengal remained unchanged between 1960 and 1995 even though there was a definite improvement in the relative poverty numbers post-1980 period. Hence, during the entire period 1960-95, we do not find any improvement on either of these margins in West Bengal.

Lastly, we find that human capital attainment has suffered significantly due to the last three decades stagnation in West Bengal. We find that across all population age groups the

²As further support for our diagnosis of the labor market being the problem in West Bengal, [2] report that "West Bengal was also a state which had the greatest body of pro-labor regulation passed in state legislature."

share of the population with graduate, post-graduate, and technical degrees has declined in West Bengal. This is particularly striking given that West Bengal started out as one of the most educated states in India. The large decline in educational attainment levels of the 20-24 age group also suggests that labor productivity in West Bengal may remain low for sustained periods in the immediate future even if investment in physical capital picks up in the coming years.

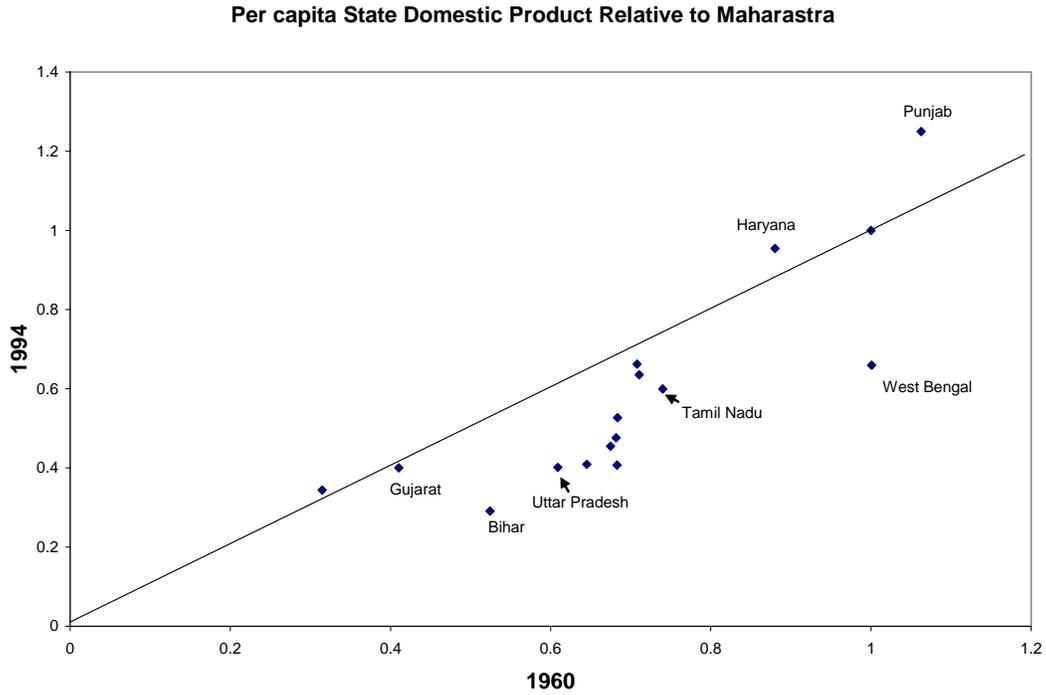
In the next section we describe the data and document the relative evolution of the two states. In Section 3 we use a standard neoclassical growth model to conduct some diagnostic tests on the data while Section 4 evaluates some potential explanations for the diagnostic results. Section 5 discusses some ancillary issues while the last section concludes.

2 Data Patterns

Our data mostly comes from the detailed India data set put together by the Economic and Political Weekly. This data covers both state-level sectoral and aggregate data. The data for the manufacturing sector in the two states essentially relies on the Annual Survey of Industries for various years. We also have sectoral employment data from the Census of India which is conducted every ten years. The electoral data that we use comes from the Election Commission of India.

Figure 1 shows the state-wise distribution of per capita incomes across India in 1960 and 1994. The figure expresses the per capita income of all states relative to Maharashtra which was the second richest state in 1960. The graph makes clear three facts. First, in 1960 West Bengal was the third richest state in India with a per capita income that was almost 100 percent of Maharashtra. Second, by 1994 West Bengal had regressed to about the middle of the distribution with a per capita income that was about 60 percent of

Figure 1: Income distribution across Indian states

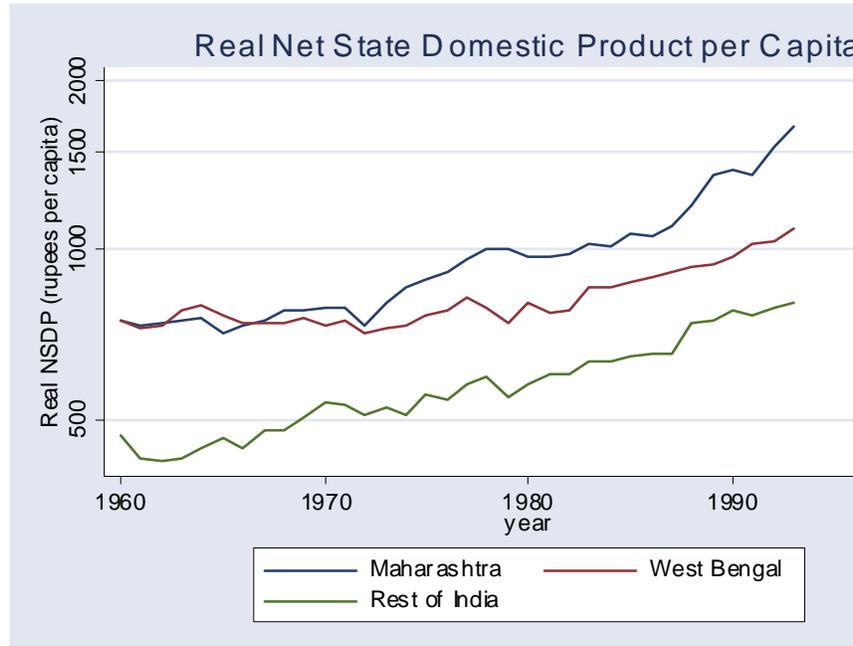


Maharashtra. Meanwhile Maharashtra remained the second richest state in 1994. Third, the fall in West Bengal’s relative income between 1960 and 1995 was the largest proportional change in absolute value across all the states.

In Figure 2 we plot the time series evolution of the per capita state domestic product (SDP) of Maharashtra, West Bengal, and the rest of India. The plot shows that the decline in the relative per capita income of West Bengal was due to the slowdown in growth in West Bengal rather than a growth pick-up in Maharashtra. The plot reveals that during this period West Bengal’s per capita SDP converged toward the average per capita income of the rest of India while Maharashtra maintained its income gap relative to the rest of India.

It is worth pointing out that the population dynamics in West Bengal and Maharashtra followed very similar paths. Thus, West Bengal’s population has been roughly 87% of

Figure 2: Income in West Bengal, Maharashtra and the rest of India



Maharashtra throughout the sample period. Figure 3 shows the population evolution of the two states.

A fall in income of this magnitude in such a short period of time by a leading economy is rare. To put this in perspective, in Figure 4 we plot the cross-country distribution of per capita income relative to the USA in 1960 and 2000. As first pointed out by Kehoe and Ruhl (2002), the Penn World Tables show that two countries which suffered similar declines (40%) in per capita income as West Bengal were New Zealand and Switzerland. However, what makes the case of West Bengal stand out is its sheer size. While the populations of New Zealand and Switzerland in 2000 are 7.2 million and 3.9 million, the corresponding populations of West Bengal and Maharashtra are 80.2 million and 96.7 million. Hence, the relative decline in West Bengal affected the living standards of a populace which was twenty times larger than New Zealand.

Figure 3: Population dynamics

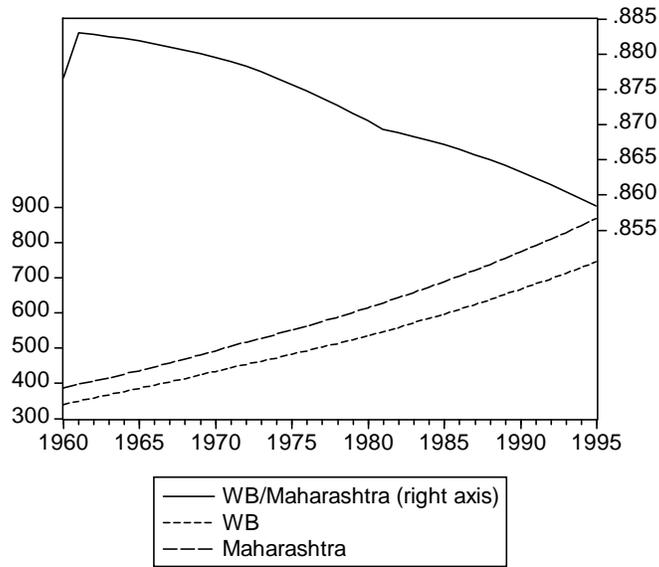
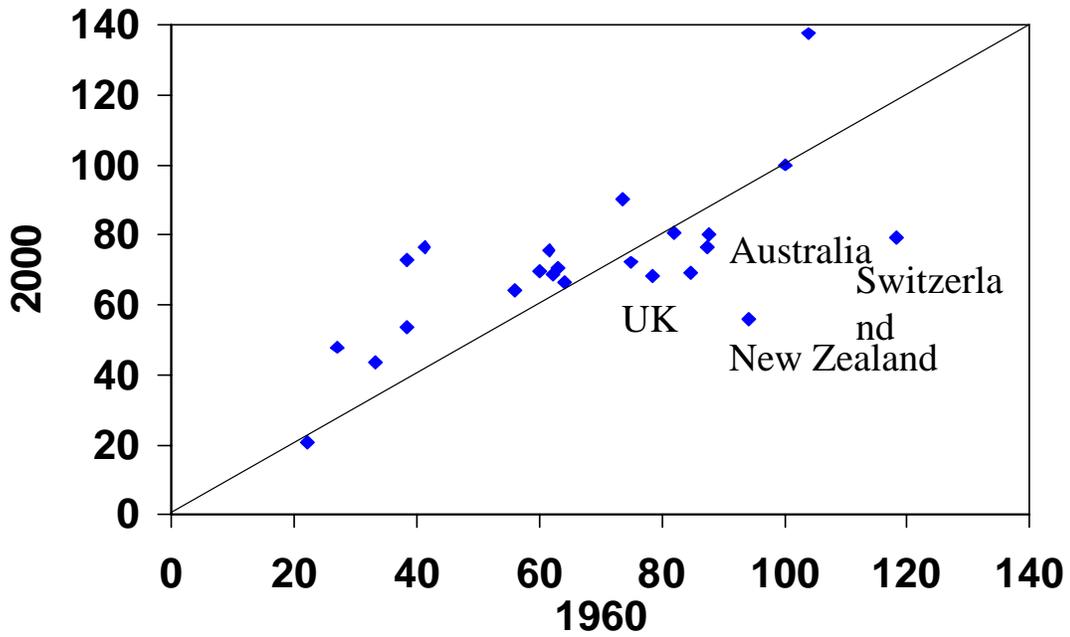


Figure 4: World income distribution



We next turn to a sectoral assessment of the relative performance of the two states. In particular, we are interested in determining whether the poor performance of West Bengal was driven primarily by poor performance in some specific sector or was it broad based. Accordingly, in Figure 5 we compare the sectoral shares of GDP across the two states. The figure reveals that while agriculture's share of output declined in both states, the decline was much more pronounced in Maharashtra. The second major difference between the states was in the evolution of the manufacturing sector. In Maharashtra manufacturing increased its share of output between 1960 and 1995, while West Bengal experienced a de-industrialization during this period with manufacturing's share of output declining from 20 percent in 1960 to 15 percent in 1995. On the other hand, the share of services in output increased similarly in both states.

The impact of the de-industrialization in West Bengal on the evolution of its per capita income between 1960 and 1995 is best illustrated by a counterfactual exercise. The ratio of manufacturing output in West Bengal to Maharashtra declined from 0.78 in 1960 to 0.34 in 1995. If the manufacturing sector in West Bengal had just held its position relative to Maharashtra during this period at 0.78, the additional output produced would have increased West Bengal's per capita GDP in 1995 by 20 percent. This would have raised West Bengal's per capita GDP in 1995 to 76 percent of Maharashtra instead of the actual 63 percent. Most strikingly, West Bengal would have been the fourth richest state in the country in 1995.

In order to get a closer view of the manufacturing sectors in the two states we now turn to a more detailed study of the manufacturing sectors in West Bengal and Maharashtra. We do this by analyzing survey data on the registered manufacturing sector. The advantage of the survey data on registered manufacturing is that it contains detailed data on capital, investment and employment. We should note that registered manufacturing comprises, on

Figure 5: Sectoral share of output

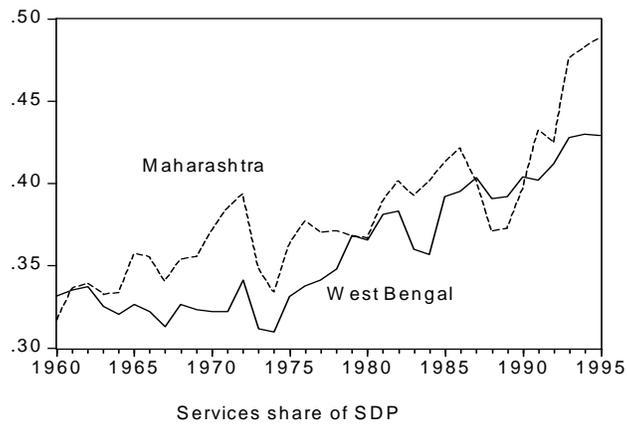
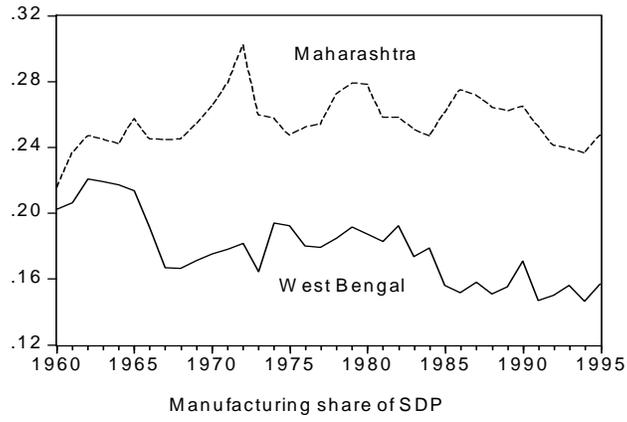
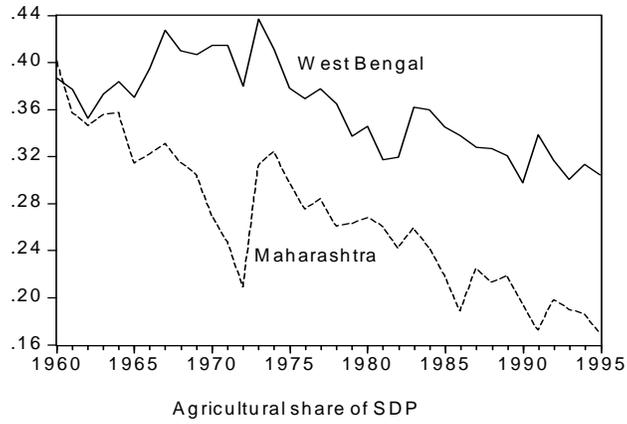
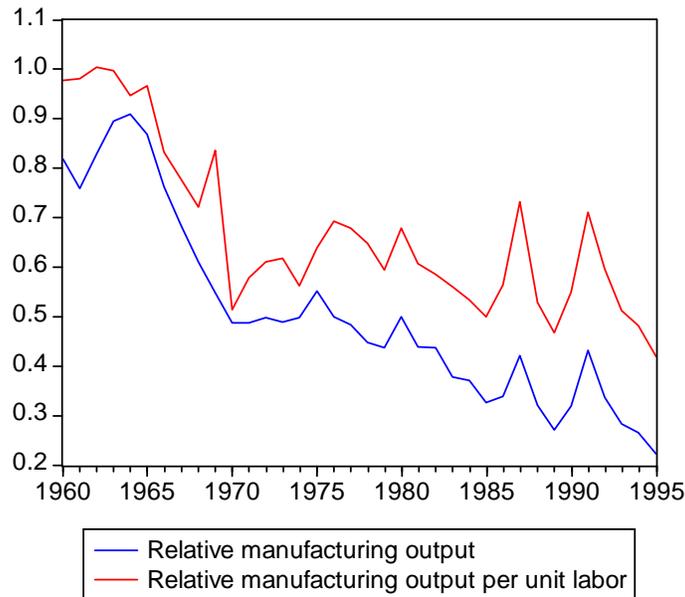


Figure 6: Registered manufacturing output



average, 80 percent of the manufacturing sectors in West Bengal and Maharashtra.

Figures 6-8 show the evolution of manufacturing output as well as manufacturing output per unit labor, investment and capital, hours worked and employment in West Bengal relative to Maharashtra over the period 1960-95. The unified message of these figures is that starting from an initial position of being on par with Maharashtra, there was a secular decline in both output and inputs in the manufacturing sector in West Bengal throughout the period. The picture is probably most dramatic for investment and installed capital. For both these series, West Bengal was actually ahead of Maharashtra in 1960 but had declined to about 40% of Maharashtra by 1995. Clearly, owners of capital let the installed capital depreciate over time without investing in new capital during this period.

The last issue that we investigate is the evolution of the industrial composition of the manufacturing sector. In particular, it could be the case that a sector which experienced

Figure 7: Investment and capital

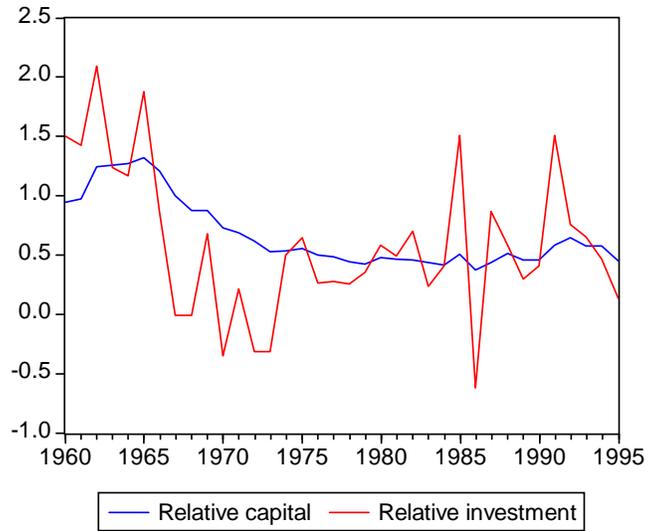
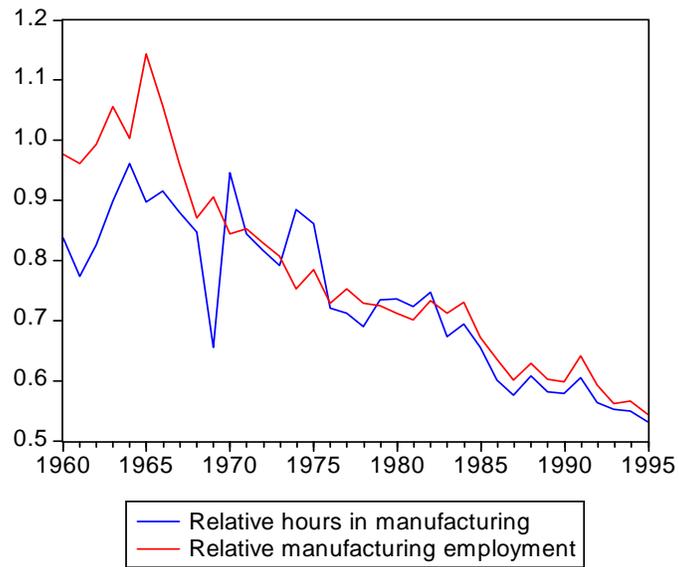


Figure 8: Hours and employment



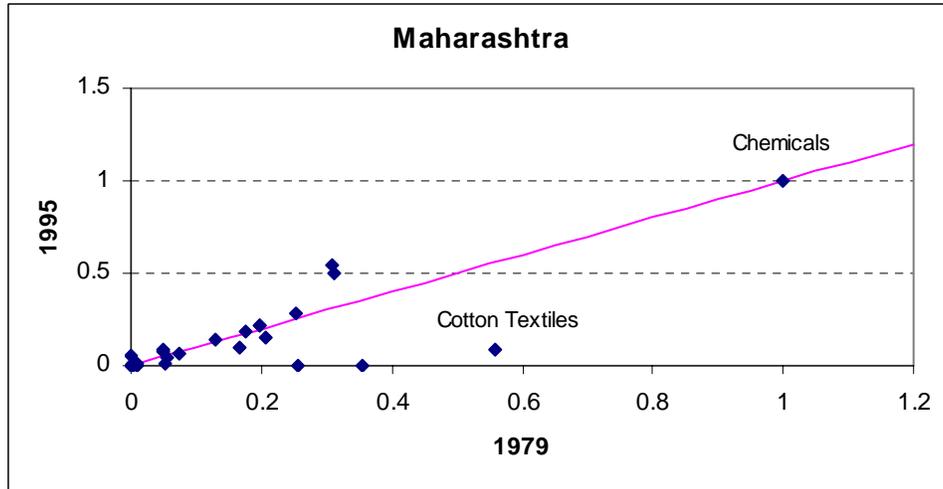
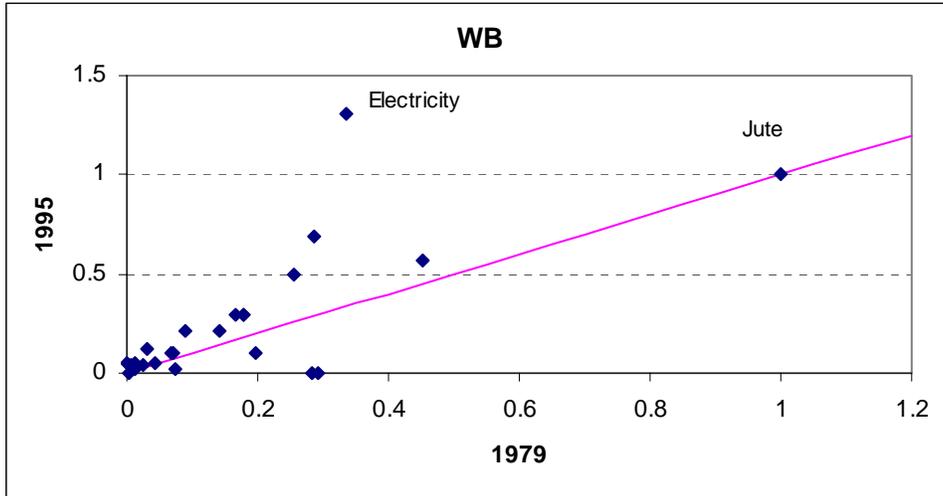
a contraction in both states drove the dynamics in West Bengal because manufacturing in West Bengal was concentrated in that sector. In Figure 9 we plot for both states the sectoral outputs in 1979 and 1995. Note that the sectoral outputs for each state are expressed relative to output of the largest manufacturing sector in that state in 1960. For West Bengal, the largest sector was Jute while in Maharashtra it was Chemicals. Figure 9 shows that a compositional shift cannot account for the disparity in manufacturing across the two states. In West Bengal the sectoral composition of manufacturing remained relatively unchanged between 1979-95 while this composition did undergo some change in Maharashtra. In fact Maharashtra was very highly concentrated in textiles at the beginning of the period. But the textile industry suffered a big contraction in the 1970s and 1980s which induced a shift in the sectoral composition in Maharashtra.³

3 Model-based Diagnostics

Having documented the key features of the post-independence development paths of West Bengal and Maharashtra, we now turn to some diagnostic exercises to determine the potential margins which contributed the most to the actual data patterns. In this exercise we are guided by the recently popularized methods of Cole and Ohanian (2002, 2004) and Chari, Kehoe and McGrattan (2004). We follow these authors in using the neoclassical growth model as a diagnostic device to isolate the areas/markets that are the likely source of the discrepancy between the two states. This diagnostic method consists of computing the wedges in the first order conditions of the neoclassical model and determining the conditions that deviated the most from optimality. The difference between our exercise and the exercises

³Our data on the various sub-sectors within manufacturing goes back only till 1979. This prevents us from extending the sectoral comparison back to 1960.

Figure 9: Composition of registered manufacturing



in the papers mentioned above is that we are going to study the data through the prism of a multi-sector version of the neoclassical model rather than the standard one sector growth model. This reflects the fact that our review of the broad data patterns in the two states suggests that differential sectoral evolutions in the two states may be a crucial ingredient in understanding the overall performance differential between Bengal and Maharashtra.

Consider an economy (country) composed of a number of constituent states. Each state has four sectors of production – a final good sector, and three intermediate goods sectors: agriculture, manufacturing and services. Each state is assumed to be *small* and takes as exogenous the prices of goods that are tradable across states within the country. The manufacturing and agricultural goods are assumed to be freely tradeable while the services and final goods are non-tradable. The agriculture, manufacturing and services goods are inputs into a production technology which produces a non-traded final good that can both be consumed as well as converted into storable capital.

The representative household in each state maximizes the present discounted value of lifetime utility with instantaneous utility being given by

$$u(c, l) = \log c + \psi \log(\bar{l} - l)$$

where c is consumption per person, l is labor supply (hours worked), and \bar{l} is the total endowment of labor hours available to the agent. The optimization is done subject to the budget constraint:

$$c_t + k_{t+1} = w_{at}l_{at} + w_{mt}l_{mt} + w_{st}l_{st} + (r_t + 1 - \delta)k_t + \Pi_t + \Pi_t^a + \Pi_t^m + \Pi_t^s + T_t$$

where k is the capital stock per person, δ is the depreciation rate while w_i is the wage rate in sector i ($i = a, m, s$). r is the interest rate while $\Pi, \Pi^a, \Pi^m,$ and Π^s are dividends from

final goods, agriculture, manufacturing, and service sector firms. $T = p_a T_a + p_m T_m$ denotes unilateral transfers of the tradable agricultural and manufacturing goods from the rest of the world. Note that we are using the final good as the numeraire good so that all prices are expressed in units of the final good. In addition to the budget constraint, households also face the time endowment constraint: $l_m + l_a + l_s = l$. The representative household's problem leads to two first-order conditions:

$$\chi \frac{c_t}{l - l_t} = w_t \tag{1}$$

$$\frac{1}{c_t} = \beta \left[\frac{r_{t+1} + 1 - \delta}{c_{t+1}} \right] \tag{2}$$

$$w_{at} = w_{mt} = w_{st} = w_t \tag{3}$$

These are standard optimality conditions with equation (1) determining the optimal consumption-leisure choice while (2) is the intertemporal Euler equation determining savings. Equation (3) shows that wages must be equalized across sectors since labor reallocation across sectors is costless.

We assume that the production technologies in the four sectors of the economy are given by

$$y_m = k^\alpha (x_m l_m)^{1-\alpha}$$

$$y_a = (x_a l_a)^\mu$$

$$y_s = (x_s l_s)^\sigma$$

$$y = \hat{y}_s^\theta \hat{y}_m^\gamma \hat{y}_a^{1-\gamma-\theta}$$

where y_j is total output of good $j = a, m, s$ while y is the output of the final good. \hat{y}_j is the total input of good $j = a, m, s$ in producing the final good. Note that usage of goods a and m in any state can exceed total production of the good in that state since these intermediate

can be traded. x_j ($j = a, m, s$) is the level of the labor augmenting technology factor. We are assuming here that the agriculture and service sectors are Ricardian in that they only use labor to produce while the manufacturing sector uses both labor and capital. This modelling assumption reflects a major data limitation in that we do not have capital use data for any sector aside from manufacturing.

Perfectly competitive firms in each sector maximize profits which are given by:

$$\Pi_t = y_t - p_{at}\hat{y}_{at} - p_{mt}\hat{y}_{mt} - p_{st}\hat{y}_{st}$$

$$\Pi_t^a = p_{at}y_{at} - w_{at}l_{at}$$

$$\Pi_t^m = p_{mt}y_{mt} - w_{mt}l_{mt} - r_t k_t$$

$$\Pi_t^s = p_{st}y_{st} - w_{st}l_{st}$$

Final goods firms choose \hat{y}_{at} , \hat{y}_{mt} and \hat{y}_{st} to maximize Π subject to the production technology for producing y . The first order conditions for optimal \hat{y}_{st} , \hat{y}_{mt} and \hat{y}_{at} are, respectively,

$$\frac{\theta y_t}{\hat{y}_{st}} = p_{st} \tag{4}$$

$$\frac{\gamma y_t}{\hat{y}_{mt}} = p_{mt} \tag{5}$$

$$\frac{(1 - \gamma - \theta)y_t}{\hat{y}_{at}} = p_{at} \tag{6}$$

Firms in the manufacturing sector choose k and l_m to maximize profits subject to the production technology. Their first order conditions are

$$\alpha p_{mt} \frac{y_{mt}}{k_t} = r_t \tag{7}$$

$$(1 - \alpha)p_{mt} \frac{y_{mt}}{l_{mt}} = w_t \tag{8}$$

The first equation above is the optimal capital-use condition while the second condition determines optimal labor use. Lastly, agriculture and service sector firms choose labor to

maximize profits. Their optimality conditions are

$$\mu p_{at} \frac{y_{at}}{l_{at}} = w_t \quad (9)$$

$$\sigma p_{st} \frac{y_{st}}{l_{st}} = w_t \quad (10)$$

3.1 Equilibrium conditions

Noting that the services good and the final good are non-traded, the market clearing conditions for these goods dictates that their domestic consumption must equal their domestic production. Hence, we must have

$$c_t + k_{t+1} = y_t + (1 - \delta)k_t$$

$$\hat{y}_{st} = y_{st}$$

where the first equation is the market clearing condition for the final good while the second equation is the corresponding condition for the services good.

We also have a balanced trade condition which follows from the budget constraints and market clearing conditions. For each state we must have

$$p_{at}(y_{at} + T_{at} - \hat{y}_{at}) = p_{mt}(\hat{y}_{mt} - y_{mt} - T_{mt})$$

Hence, total exports have to equal total imports period by period. Recall that a hat over a variable indicates the use of that variable in the state while variables without hats indicate the level of production of the relevant good in the state.

Substituting in the market clearing condition for services into equation (4), one can solve for the state-specific price of services, p_s . In turn, one can use p_s along with the zero profit

condition for the final goods sector to solve for p_m . Thus, we have

$$p_{st} = \frac{\theta c_t}{y_{st}} \quad (11)$$

$$p_{mt} = \left[\Gamma \left(\frac{p_{at}}{p_{mt}} \right)^{\theta+\gamma-1} p_{st}^{-\theta} \right]^{1/1-\theta}, \quad \Gamma \equiv \theta^\theta \gamma^\gamma (1-\gamma)^{1-\gamma} \quad (12)$$

In the light of the above, we can use the first order conditions (1)-(3), and (7)-(10) to derive the following set of equilibrium relationships:

$$\frac{p_{at}}{p_{st}} = \left(\frac{1-\alpha}{\sigma} \right) \frac{y_{st}/l_{st}}{y_{at}/l_{at}} \quad (13)$$

$$\frac{p_{st}}{p_{mt}} = \left(\frac{1-\alpha}{\sigma} \right) \frac{y_{mt}/l_{mt}}{y_{st}/l_{st}} \quad (14)$$

$$\frac{\chi c_t}{\bar{l} - l_t} = (1-\alpha) p_{mt} \frac{y_{mt}}{l_{mt}} \quad (15)$$

$$\frac{c_{t+1}}{c_t} = \beta \left(\alpha p_{mt+1} \frac{y_{mt+1}}{k_{t+1}} + 1 - \delta \right) \quad (16)$$

Lastly, we can compute the sectoral productivity levels (in labor augmenting form) as

$$X_{at} \equiv x_{at}^\mu = \frac{y_{at}}{l_{at}^\mu} \quad (17)$$

$$X_{mt} \equiv x_{mt}^{1-\alpha} = \frac{y_{mt}}{k_t^\alpha l_{mt}^{1-\alpha}} \quad (18)$$

$$X_{st} \equiv x_{st}^\sigma = \frac{y_{st}}{l_{st}^\sigma} \quad (19)$$

Equations (11)-(19) hold for each state under study at each date. Moreover, given our data, we can measure all the variables in each of these nine equations for each state and date.

Before proceeding further a couple of explanations for our modelling choices are in order. A number of specific modelling assumptions are driven by the availability of data (or lack thereof). In particular, we do not have non-labor input use by any sector other than manufacturing. This forced us to model the production technology of agriculture and services as using only labor. Also, we do not have state level time series data on savings

or investment. Our investment data is only for the manufacturing sector. Lastly, while we do have data on the relative price of agriculture to manufacturing (p_a/p_m) at the aggregate India level, we do not have corresponding data on the price of services. This forced us to impute the price data from the available quantity data. Unfortunately, for each state we only have production data by sector but no consumption data by sector. Moreover, even though there is obviously trade across states in a number of commodities, we do not have cross-state trade data. This necessitated the modelling of the services and final goods as non-traded goods.

Given the consumption data and the output of services, we can use equations (11) and (12) to impute the equilibrium prices p_s and p_m . The four key first-order-conditions of the model (for which we do have the appropriate quantity data) are given by equations (13)-(16).⁴ Following Cole and Ohanian (2004) we can divide the left hand side of each first order condition by the corresponding right hand side to get a measure of the deviation of that condition from the optimum. Thus, for each margin we get one wedge for each state

⁴We should note that there are two additional first order conditions given by equations (6) and (5). Given the relative price p_a/p_m we can use these two conditions to solve for $\frac{\hat{y}_a}{\hat{y}_m}$. Given y and y_s , one can then use the production function for final goods to solve for \hat{y}_a and \hat{y}_m individually. Substituting these into the balanced trade condition one can deduce the implicit values of transfers $T = p_a T_a + p_m T_m$ that would make the national income accounting hold exactly.

for every date. In particular, we have

$$\begin{aligned}\theta_t^{l,as,i} &= \frac{p_{at} \mu y_{at}/l_{at}}{p_{st} \sigma y_{st}/l_{st}} \\ \theta_t^{l,sm,i} &= \frac{p_{st} \sigma y_{st}/l_{sat}}{p_{mt} (1 - \alpha) y_{mt}/l_{mt}} \\ \theta_t^{l,i} &= \frac{\frac{\chi c_t}{l-l_t}}{(1 - \alpha) p_{mt} \frac{y_{mt}}{l_{mt}}} \\ \theta_t^{I,i} &= \frac{c_{t+1}^i}{c_t^i \beta} \left[\frac{1}{\alpha p_{mt+1} \frac{y_{mt+1}}{k_{t+1}} + 1 - \delta} \right]\end{aligned}$$

where $i = \text{West Bengal, Maharashtra}$. $\theta^{l,as,i}$ is the wedge in the optimality condition for labor allocation between agriculture and services while $\theta^{l,sm,i}$ is the corresponding wedge in the labor allocation between service and manufacturing sectors. Numbers less than one for these wedges would indicate that the marginal product of labor in manufacturing is too high. Note that the wedge in the optimal labor allocation condition between agriculture and manufacturing is given by the ratio $\frac{\theta_t^{l,as,i}}{\theta_t^{l,sm,i}}$. $\theta^{l,i}$ is the wedge in the optimal labor-leisure condition with numbers less than one indicating that the marginal product of labor is higher than the marginal disutility from labor.⁵ Lastly, $\theta^{I,i}$ is the wedge in the intertemporal Euler equation with a number below one indicating that savings are sub-optimally low. Note that since we do not have state-specific interest rate data, we have chosen to substitute the marginal product of capital into the Euler equation (2). Hence, a test of whether or not the Euler equation holds reduces to a joint test of the Euler equation and the firm's optimal capital conditions holding simultaneously.

Before proceeding further it is worth noting that the difference in output across states has

⁵Note that the measurement of the wedge in the optimal labor-leisure condition, $\theta^{l,i}$, is itself sensitive to the wedges in the inter-sectoral labor allocation conditions. Thus, if $\theta^{l,sm,i}$ is systematically different from unity then the measured $\theta^{l,i}$ would depend on whether we use the value marginal product of labor in agriculture, manufacturing or services in the denominator of the expression for $\theta^{l,i}$.

to be attributable to either wedges in the first order conditions or to productivity differences between the states. If all the wedges were one then, by construction, per capita output would be identical across the states. Alternatively, if there are no wedges in the first order conditions then the entire difference in per capita incomes between the states would be attributed to the productivity difference alone. Crucially, in this event, there would be no difference in the steady state levels of labor supply and capital per efficiency unit of labor, k . The only difference would be in the levels of the per capita variables and wages. On the other hand, if there are wedges in one or more of the first order conditions then the steady state allocations of the stationary variables would be different across the states.

We compute the wedges by using the follow standard values for the key parameters of the model:

Parameter	Value
α	1/3
μ	0.95
σ	0.9
θ	0.4
γ	0.2
β	0.96
\bar{l}	5000 hours
ψ	2.24
δ	0.04

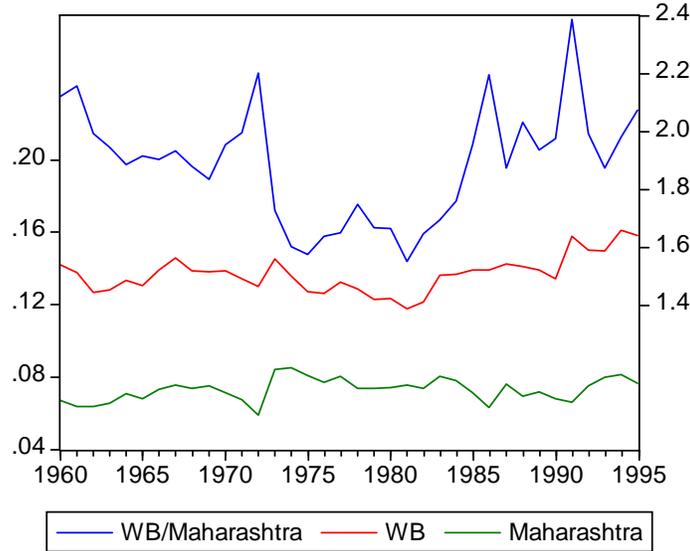
Some of the our assumed parameter values need elaboration. The parameter values for α, β and δ are standard. ψ and \bar{l} are taken from Chari, Kehoe and McGrattan (2004).

We picked θ and γ , the shares of services and manufacturing in total output based on the average shares of these sectors in total output in these two states during the period 1960-95. The parameters μ and σ are more problematic since we don't have any estimates of these to go on. We chose these high numbers based on the notion that most of the input into the agriculture and services sectors is labor time. Note that for a given output and labor input in these two sectors, a higher value for the parameters μ and σ imply a lower estimated number for productivity.

Figures 10-12 show the evolution of the two sectoral labor allocation wedges and the Euler equation wedge respectively from 1960 to 1995. In all three pictures we measure the state-specific wedges on the left axis and the relative wedge (measured as the ratio of the wedge for West Bengal to Maharashtra) on the right axis. There are three key messages that emerge from these figures. First, the wedge in the optimal labor allocation condition between agriculture and services (Figure 10) behaved very similarly in the two states during this period. This is clear from the fact that the relative wedge in 1995 was almost identical to its value in 1965. Thus, labor supply misallocation between agriculture and services is not a factor in understanding the differences in aggregate output between the states.⁶ Second, the wedge depicted in Figure 11 shows that the marginal product of labor in manufacturing was too low relative to the services sector in both states. However, in Maharashtra by the end of the period the wedge was approaching unity, i.e., it was approaching the optimal point. In West Bengal on the other hand, the decline in the wedge was nowhere near as sharp. As a result starting from a relative wedge of one in 1960, the wedge in West Bengal was almost

⁶The fact that wedge for each state is significantly lower than unity reflects a well known characteristic of developing countries: the excess concentration of the workforce in agriculture. The key point here is that this margin didn't worsen during the period nor did it differ across the two states.

Figure 10: Labor allocation wedge between agriculture and services



twice that in Maharashtra by 1995. Thus, low labor productivity in manufacturing appears to have been an important part of the differential evolution of the states.⁷ Third, Figure 12 shows that the Euler equation held fairly well over this period since the investment wedge was reasonably close to one for most of the time for both states. Note that in the light of Footnote 6 above and the fact that the observed wedges in inter-sectoral labor allocations are systematically different from one, we ignore the measured labor wedge θ^l .

We next turn to the evolution of the sectoral productivity factors in the two states. Figures 13-15 show the evolution of productivity measured in labor augmenting form in agriculture, manufacturing and services sectors. As before we measure the state-specific

⁷Note that since the wedge in labor allocation between agriculture and services remained relatively stable in both states while the wedge between services and manufacturing changed a lot, it follows that the wedge between agriculture and manufacturing must also have changed appreciably during the period 1960-95 since it is a ratio of the first two wedges.

Figure 11: Labor allocation wedge between services and manufacturing

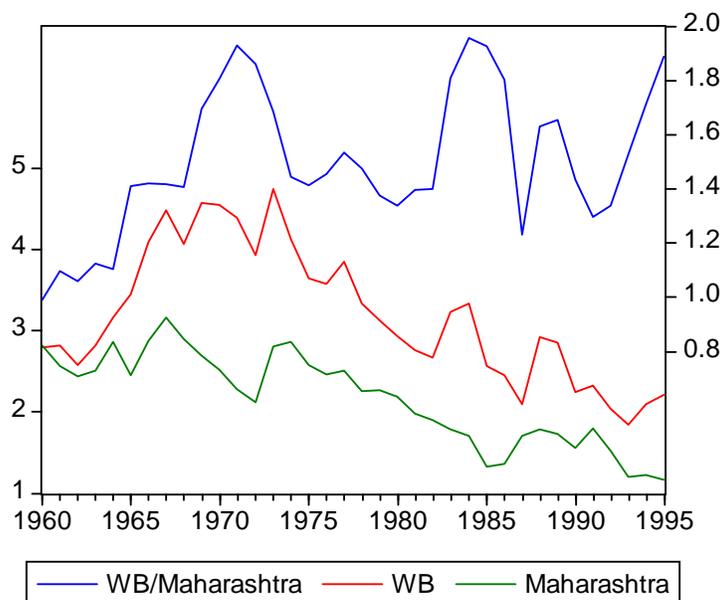
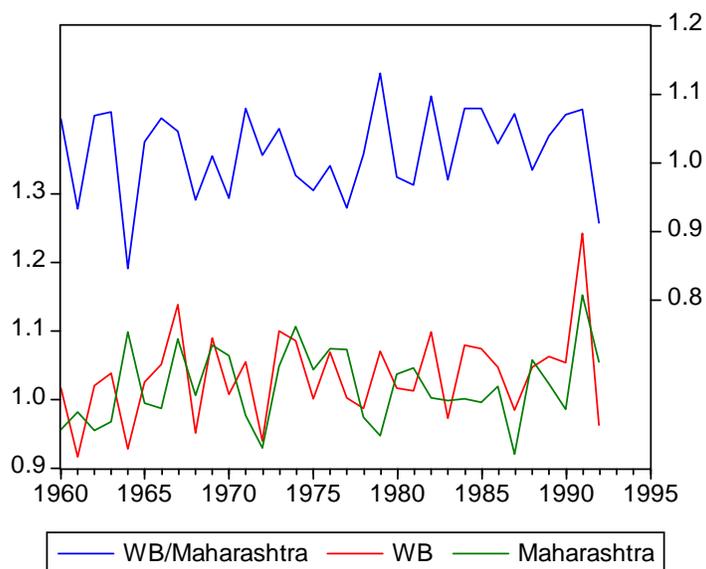


Figure 12: Intertemporal savings wedge



productivities on the left axis and the relative sectoral productivity of West Bengal on the right axis. The figures reveal three basic facts. Agricultural productivity behaved very similarly in the two states. Agriculture in West Bengal was more productive throughout the period. However, the relative position didn't change much during this period. If anything, West Bengal's productivity advantage was marginally eroded during this period. The picture is quite different in the manufacturing and services sectors. In manufacturing, West Bengal's productivity declined from 85% of Maharashtra in 1960 to about 45% by 1995. The main factor driving the movement in relative productivity was a virtually stagnant manufacturing productivity in West Bengal. Similarly in the services sector, West Bengal's relative productivity declined from about 90% of Maharashtra in 1960 to 60% in 1995. The main driver of relative productivity in services was a sharp productivity pick-up in Maharashtra starting in the late 1980s.

The diagnostic exercise above reveals three key features. First, differentials in labor-augmenting productivity growth accounts for upwards of 2/3 of the relative decline in manufacturing and services sectors in West Bengal. Thus, about 2/3 of the decline in manufacturing output of West Bengal relative to Maharashtra between 1960 and 1995 can be attributed to productivity differences between the two states while the rest of the decline is attributable to problems in the labor market. To see this note that relative productivity in West Bengal fell by about 48% between 1960 and 1995. During the same period relative manufacturing output declined by about 73%. Hence, productivity accounts for about $2/3 (= 48/73)$ of the decline in relative manufacturing output while labor market problems account for the rest. Similarly, in the services sector, relative output in West Bengal fell about 45% between 1960 and 1995 while relative productivity declined by about 31%. Hence, productivity accounts for about 70% of the relative decline in the services sector in West Bengal during this period

Figure 13: Agricultural productivity

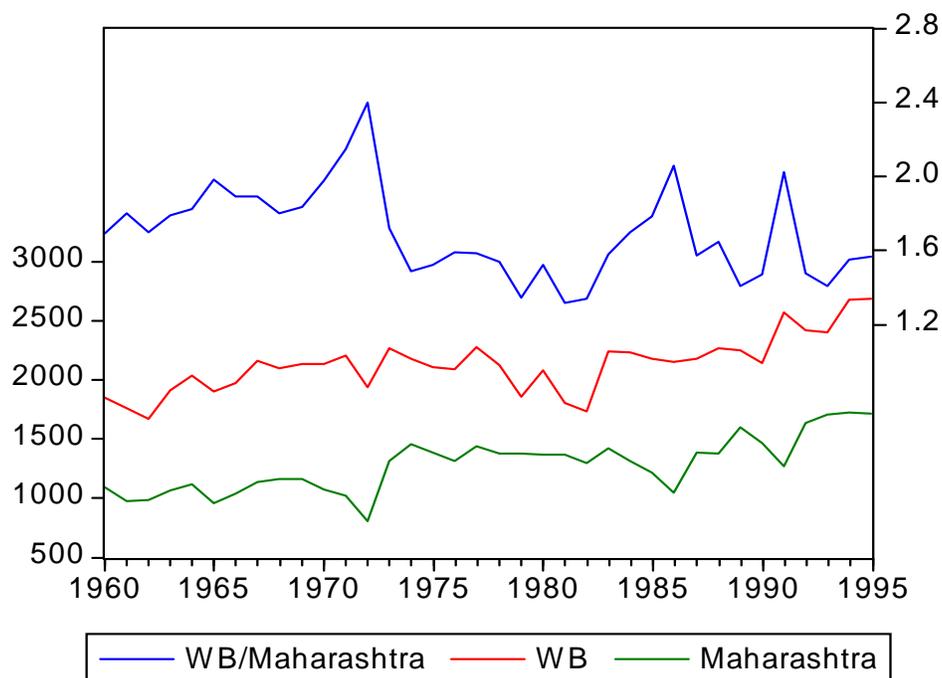


Figure 14: Manufacturing productivity

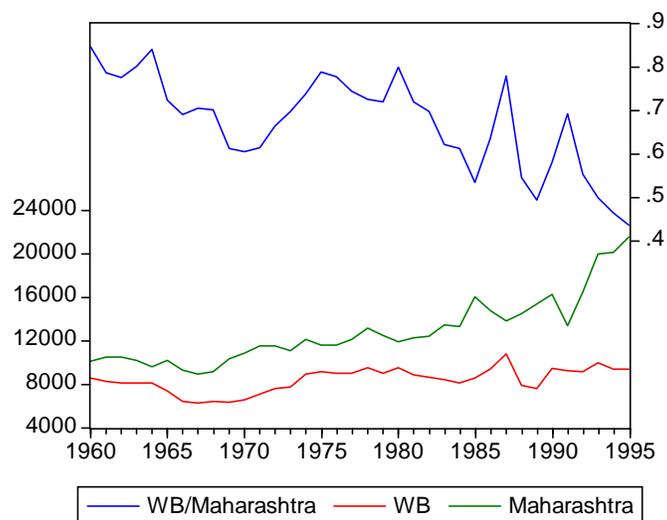
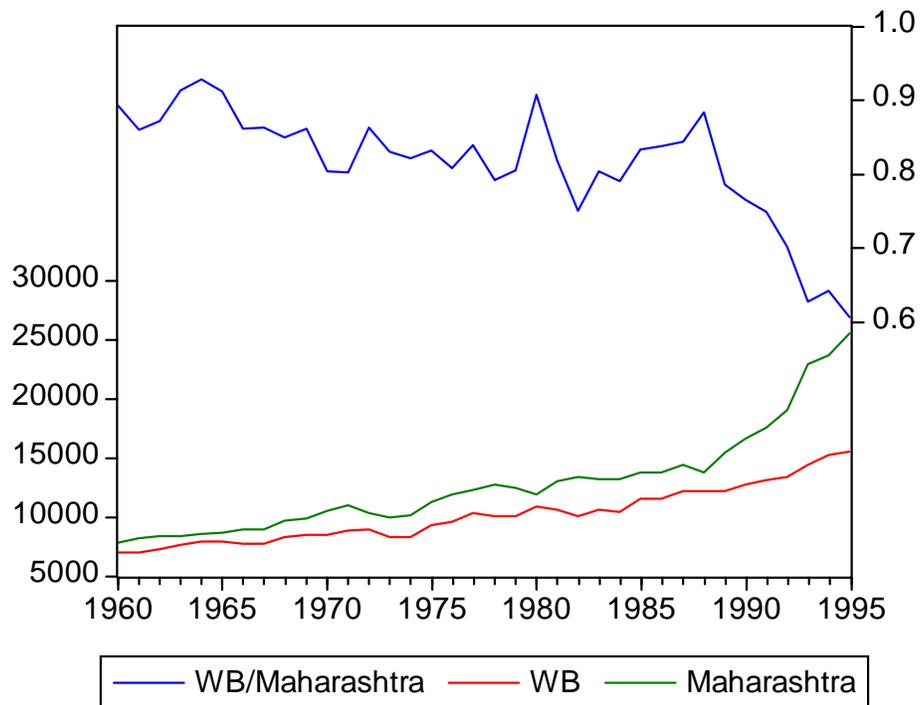


Figure 15: Services productivity



while factor market distortions account for the rest.

Second, relative to Maharashtra, there were some systematic factors in West Bengal which kept the marginal product of labor in manufacturing too low. Hence, labor market distortions specific to the manufacturing sector may have been a contributing factor.

Third, the agricultural sector reveals a picture very different from the other two sectors. While relative agricultural productivity in West Bengal declined about 7% between 1960 and 1995, relative agricultural output actually increased about 18% during the period. This expansion was accounted for by a 30% increase in relative agricultural employment in West Bengal. Hence, there appear to have been some pro-agricultural labor force factors in play during this period.

4 Proximate Explanations

Having described the economic dynamics in the two states, we now turn to studying the potential explanations for the observed disparity between the West Bengal and Maharashtra. In this we will be guided by the diagnostic exercises carried out above. Of particular interest to us is to identify factors specific to West Bengal that could have simultaneously depressed total factor productivity in manufacturing and services, reduced the marginal product of labor in manufacturing, and increased incentives for labor employed in agricultural in the state. The usual practise in exercises like these is to look for specific policies that could have caused these outcomes. The complicating factor here is the compulsion of electoral politics in India. The strong socialistic bent of the country since gaining independence from Britain in 1947 has caused political parties across most of the ideological spectrum to converge on a similar set of stated economic policy goals. These stated goals typically include being pro-labor, pro-rural, pro-agriculture, pro-small scale industries, etc. Hence, examining *stated*

policies across states in India often doesn't reveal the true picture. Thus, even though Besley and Burgess (2003) found that West Bengal was the state with the highest number of pro-labor changes in labor regulations, they ended up classifying both West Bengal and Maharashtra as being pro-labor. Rather, in our opinion, the key difference across states is the implementation record: which policies are implemented and how rigorously are they implemented. But this is precisely what makes the mapping between policies and outcomes hard.

In order to make some progress on understanding the different outcomes between West Bengal and Maharashtra, we start by describing the political history of these two states. With the exception of some brief interludes, between 1960 and 1995 Maharashtra was governed almost throughout by the Congress party.⁸ The Congress party was also the ruling party at the federal level during most of this period. The prevailing ideology of the Congress party was socialism with a strong belief in the paternalistic role of the state, self-reliance, infant industry protection etc.. Till 1977, West Bengal's political history reads very much like Maharashtra's with the state being ruled almost throughout by the Congress party (except for a short two year interlude between 1969 and 1971 when a leftist coalition called the United Front ruled the state government). However, since 1977 West Bengal has been governed uninterrupted by a leftist coalition called the Left Front led by the Communist Party of India (Marxist) making it the longest running government in the country. It is instructive to note that the leftist vote share in West Bengal grew rapidly from 18 percent

⁸Thus, for two years between 1978 and 1980, Maharashtra had a government led by the Janata party which was itself a coalition of smaller parties with similar political ideologies to the Congress. In fact, a number of the leading politicians associated with the Janata party were themselves ex-Congress party members.

in 1951 to 32 percent in 1962 to 46 percent in 1971 to 49 percent in 1995.

Since the Leftist political parties are the biggest supporters of labor and the rural poor, one candidate explanation for the differential performance between the two states is that the politics of West Bengal caused it. It is important to reiterate that despite the similarity between the stated political and economic objectives of both the leftist parties as well as the socialism oriented Congress party, there may well be a difference in policy implementation between a government run by a party that courts labor votes and a government that is run by labor interests itself. We assess the potential of this margin by examining the interaction of the political power of the left with the wedges that we identified above.

In Figures 16 and 17 we plot the vote share of the Leftist parties in West Bengal along with the two labor allocation wedges involving the manufacturing sector: agriculture to manufacturing, and services to manufacturing. The correlation of the vote share with the two wedges is 0.34 and 0.51 respectively.⁹ We chose not to plot the vote share with the agriculture/services labor allocation wedge and with the savings (Euler equation) wedge since we have already seen that these two wedges did not show much movement during the period under study.

In Figures 18, 19 and 20 we plot the Leftist vote share against the productivity wedges in agriculture, manufacturing and services sectors in West Bengal (relative to Maharashtra).

⁹The leftist vote share is defined as the combined vote share in local Assembly elections of the following parties: Communist Party of India, Communist Party of India (Marxist-Leninist), Communist Party of India (Marxist-Leninist) (Liberation), Communist Party of India (Marxist), Forward Block, Forward Block (Socialist), Farward Block, Forward Block (MG), Forward Block (RG), Forward Block (Marxist), Revolutionary Socialist Party. We have data for the Assembly elections in 1951, 1957, 1962, 1967, 1971, 1972, 1977, 1982, 1987, 1991, 1996, and 2001. We generated an annual series for the vote share by filling in for the years between elections using the average annual growth rate of the share between successive elections.

Figure 16: Leftist vote share and Agriculture/manufacturing wedge

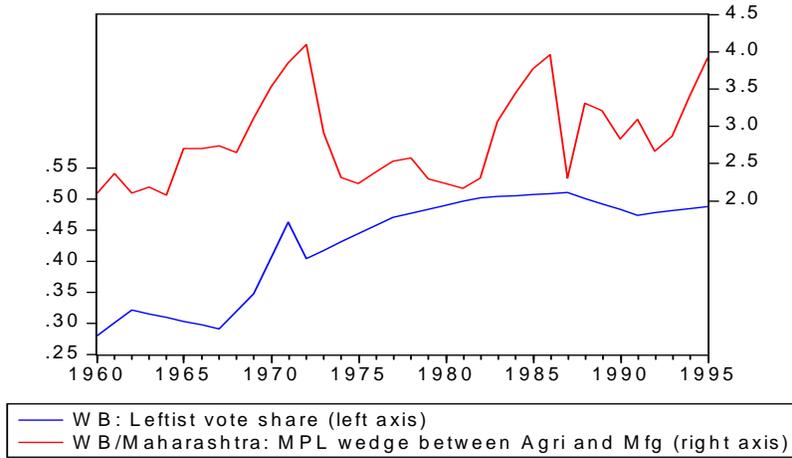


Figure 17: Leftist vote share and Service/manufacturing wedge

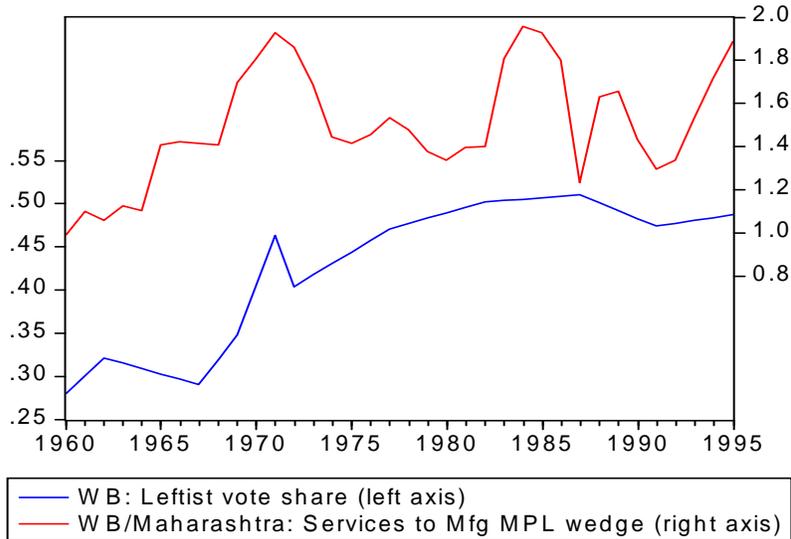
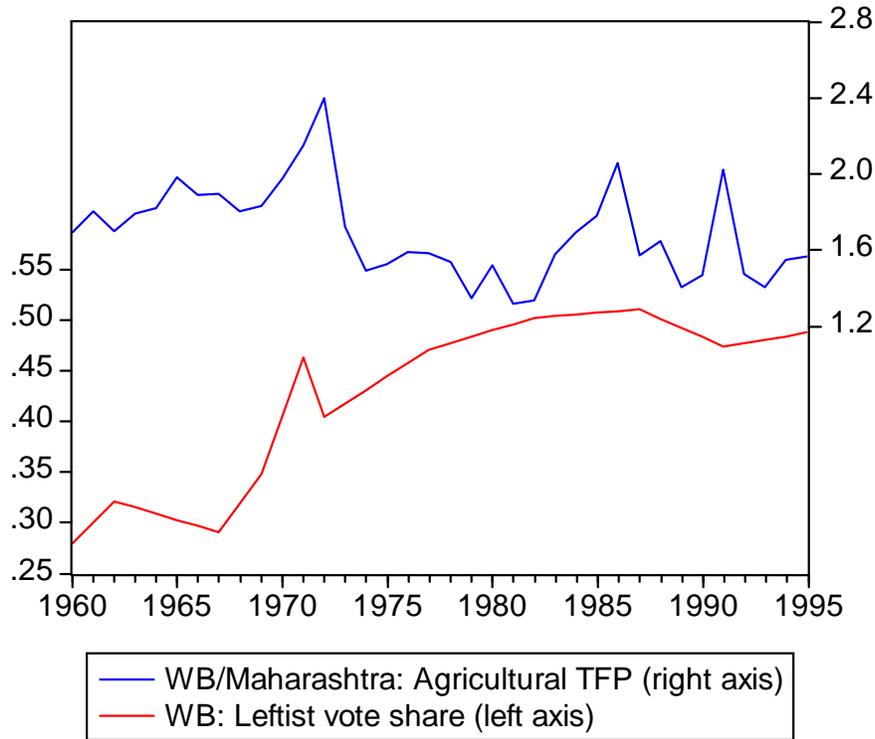


Figure 18: Leftist vote share and relative agricultural productivity in Wet Bengal



All three figures show a strong negative relationship between the vote share and the wedges with correlations of -0.44, -0.49 and -0.55, respectively. Clearly, leftist votes didn't translate into productivity gains in general. The only nuancing to the picture comes from the agricultural sector where since 1977 there has been a slight gain in productivity. This is noteworthy as the Left Front (the leftist coalition) came to power in 1977. However, relative agricultural productivity in West Bengal 1995 was still lower than in 1960 despite these productivity gains in the last eighteen years of our sample period.

Given the pattern of comovement between the leftist vote share and the different wedges in West Bengal, the obvious next step is to determine what exactly happened in response to the growing political strength of the left. The first suspect is that an increasing leftist vote

Figure 19: Leftist vote share and relative manufacturing productivity in West Bengal

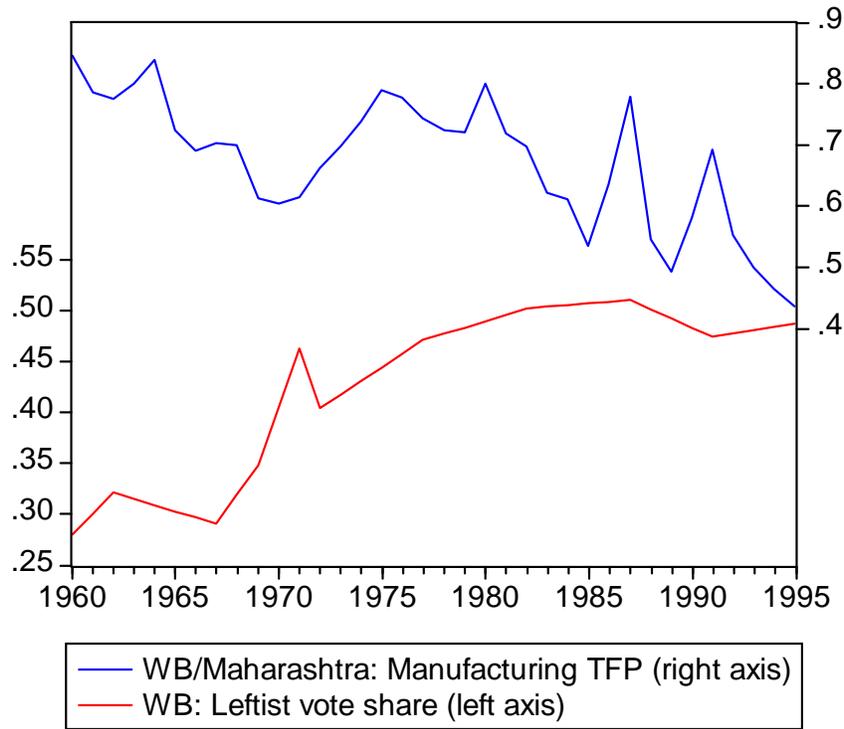


Figure 20: Leftist vote share and relative services productivity in West Bengal

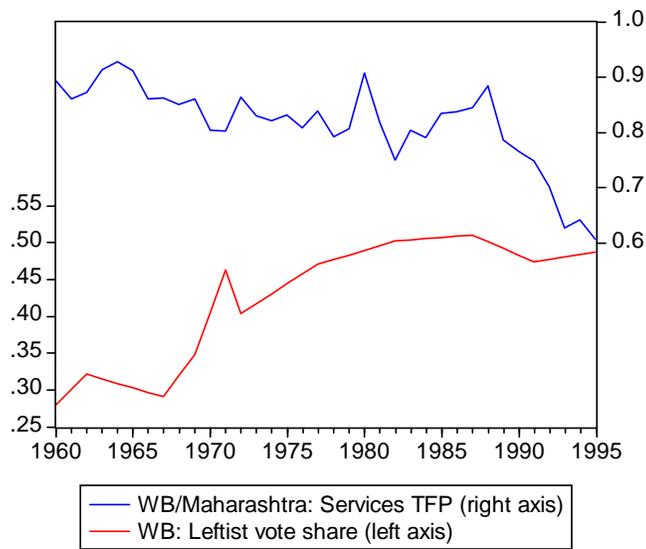
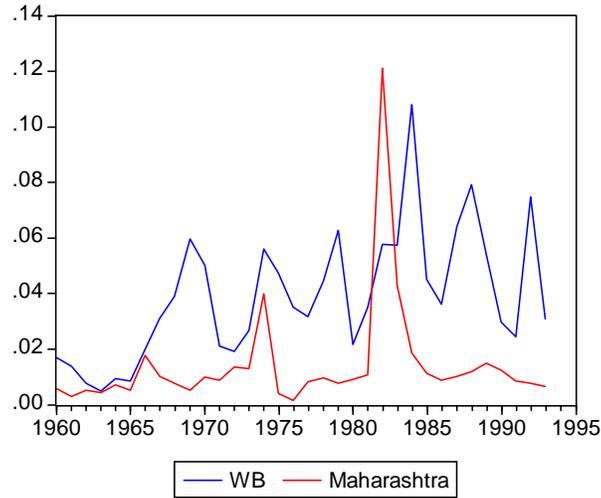


Figure 21: Mandays lost due to industrial action

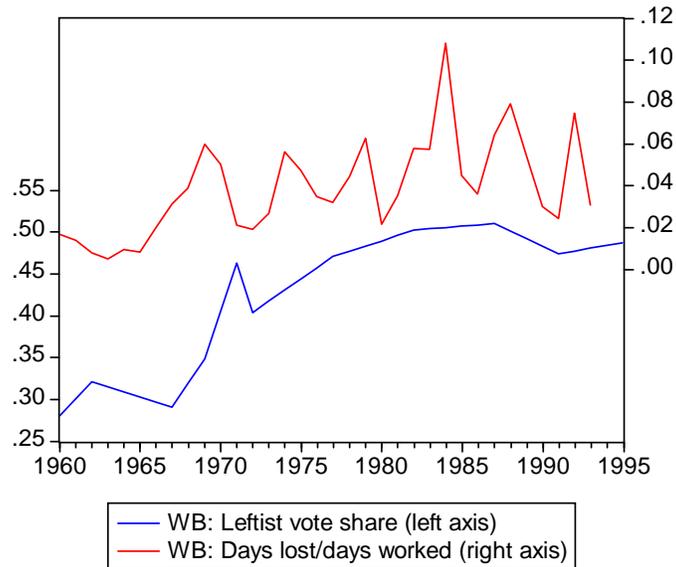


share may have been accompanied by rising bargaining power of the trade unions. This may have induced more aggressive trade union demands for higher wages, more labor-friendly work rules etc.. To examine this possibility, in Figure 21 we look at the ratio of mandays lost to mandays worked in West Bengal and Maharashtra between 1960 and 1995. The figure is revealing. The level of industrial action in the two states was almost identical till 1966. Starting in 1967 there was a sharp spike in industrial action in West Bengal. Thereafter the mandays lost ratio in West Bengal was always higher than in Maharashtra (with the exception of one year, 1982, which saw a brutal strike in Maharashtra). During the period the mean for the mandays lost ratio in West Bengal was almost three times that in Maharashtra.¹⁰

The fact that days lost due to industrial action in West Bengal started rising in the late

¹⁰To put these numbers in perspective, it is worth noting that Maharashtra was not exactly a state with a particularly docile labor force. The level of trade union power in the textile industry in Maharashtra was extremely high with some of the state trade union leaders like Mr. Datta Samant having a national profile.

Figure 22: Leftist vote share and industrial action in West Bengal



1960s is interesting as that was precisely the time that the leftist coalition first came to power in the state, albeit for a short period of time. In 22 we plot the leftist vote share against the ratio of mandays lost to mandays worked in West Bengal. As is obvious, the more powerful the left became the greater was the incidence of labor action, strikes etc. – the correlation between the leftist vote share and mandays lost ratio is 0.59. Another sign of increasing labor power in West Bengal during this period was rapid expansion in the number of registered trade unions in West Bengal from 2057 in 1957 to 4808 in 1970, i.e., a 2.5 fold rise. During the same period the number of registered trade unions in Maharashtra only increased from 1586 to 2560.¹¹

Before concluding this section we want to briefly examine a political economy argument that may be made to explain the difference between the two states. The political economy argument would hold that a key ingredient in the development path of a state is the provision

¹¹Unfortunately, our data on trade unions in West Bengal does not extend beyond 1970.

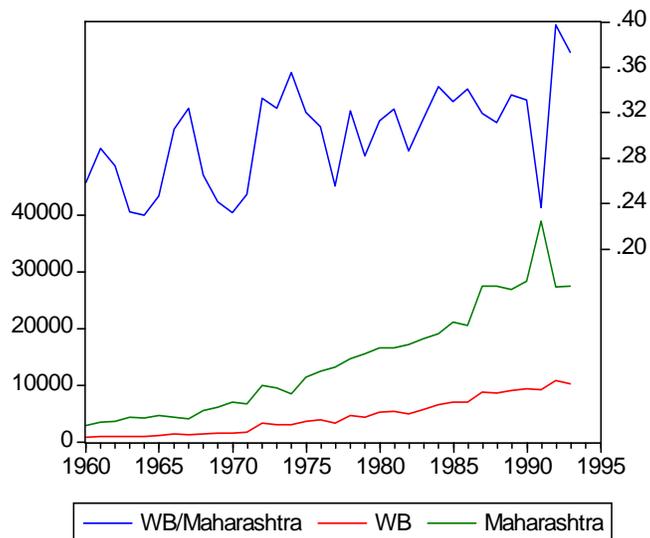
of public capital in the form of economic and social infrastructure. While this development expenditure is determined by state governments, they are often at the mercy of the federal government for the allocation of funds.¹² In particular, a state with a government headed by a party different from the party in power at the federal level would be in a disadvantageous position. West Bengal has been ruled by a coalition of Leftist parties for the last 27 years. These parties have never been in power or even shared power at the federal level (except for two very brief periods totaling about five years). Thus, due to its political leanings, West Bengal may have been starved for funds with which it could finance development spending. To investigate the potential of this argument, Figure 23 plots development spending in West Bengal relative to Maharashtra.¹³ As is obvious from the graph, there is hardly any variation in development expenditure across the two states during this period. Hence this explanation cannot account for the disparity in economic performance between the two states.

While Figure 23 shows that the development spending by the respective state governments was roughly similar, it may still be the case that the federal government discriminated against West Bengal by underproviding federally funded infrastructure in the state. One

¹²In India a large part of the budgetary funds comes from the states' share of national tax revenues. The specific share is determined by a binding recommendation of the Finance Commission. However, a second key component of any state budget is the allocation of discretionary funds to the states from the federal government. This component is distinct from the statutory component.

¹³Development expenditure is defined as expenditure (on the Revenue account) on economic and social services by state governments. The economic services include agriculture and allied activities, rural development, special area programs, irrigation and flood control, energy, industry and minerals, transport and communications, science, technology and environment. The social services include education, medical and public health, family welfare, water supply and sanitation, housing, urban development, labor and labor welfare, social security and welfare, nutrition, relief on account of natural calamities. This series is available from the World Bank dataset on Poverty in India: <http://www.worldbank.org/poverty/data/indiaper.htm>

Figure 23: Development spending

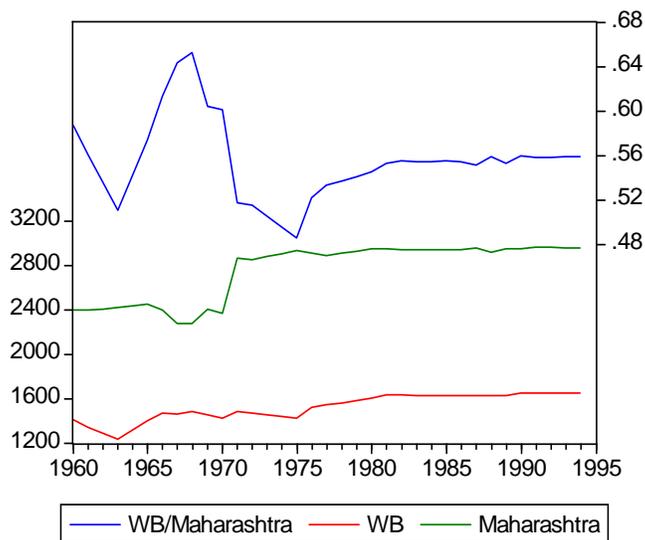


measure of federally funded infrastructure is the national highway network. In Figure 24 we plot the kilometers of national highways in West Bengal relative to Maharashtra. Once again, the figure makes clear that there is not much variation in this ratio during this period. Hence, this argument doesn't appear to be very compelling either.

5 Some ancillary considerations

The sustained rule over the last twenty seven years by a leftist coalition in West Bengal raises a couple of other potential issues. First, did it have any impact on the human capital stock in West Bengal? If so, what implication does it have for our productivity decompositions? We address this issue by constructing state specific human capital stocks using the Mincer wage regressions. Our education data comes from the Indian census data. Figure 25 shows the constructed human capital stocks for Maharashtra, West Bengal and India as a whole. The figure makes clear that in terms of the human capital stocks there wasn't a big change

Figure 24: Federally funded roads

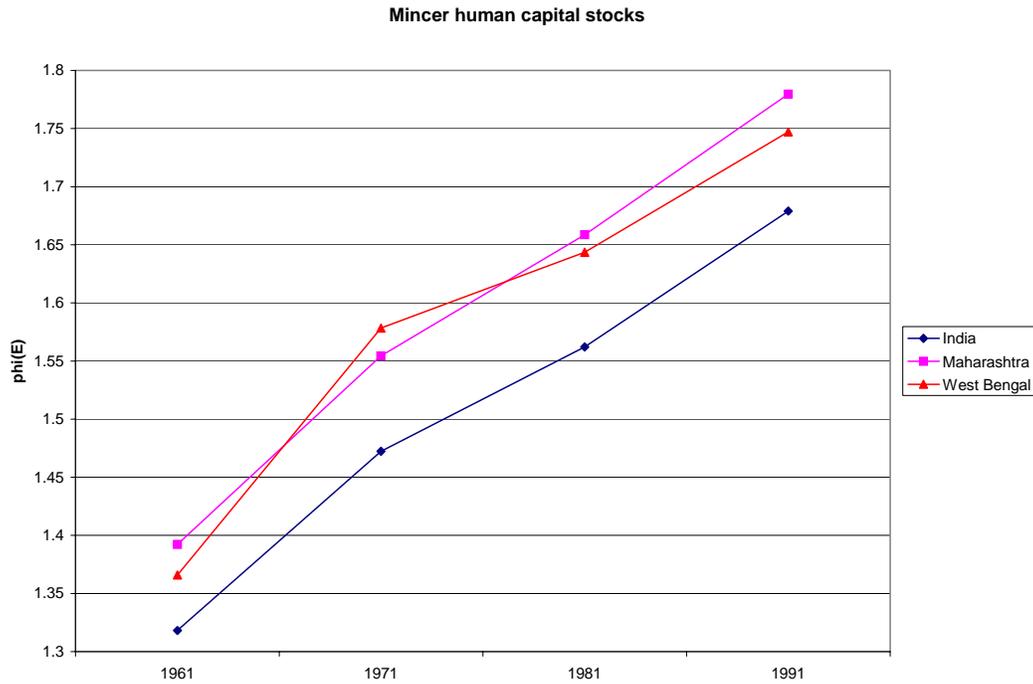


during this period. Maharashtra started out marginally ahead and ended marginally ahead. Given that the relative human capital stock in West Bengal didn't change much during the period suggests that our productivity decompositions are robust to controlling for human capital.

However, this aggregate measure of the stock of human capital masks considerable variation in educational attainment by age group. This issue is particularly relevant on because a key component of the leftist philosophy in West Bengal was equalization of education opportunities. One of the methods adopted to achieve this goal was to move faculty from traditional centres of academic excellence to other institutions spread around the state in order to equalize the quality of educational institutions. The effect of this policy can be seen in the three figures shown below. In these figures we depict the share of the population by age group with graduate and post-graduate degrees in West Bengal relative to Maharashtra.

As these figures make clear, the effect of the leftist educational policies have been unam-

Figure 25: Human capital stocks

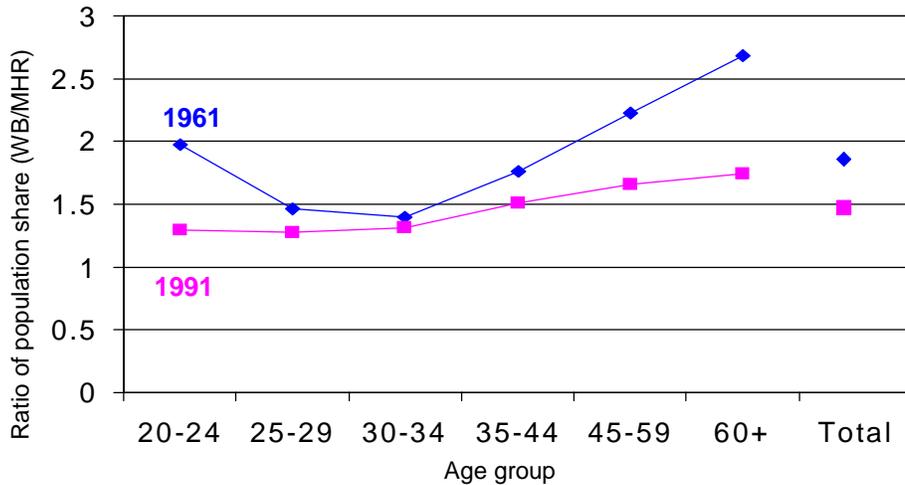


biguously devastating. In all three categories, West Bengal has seen a systematic decline in relative educational attainment. In almost all age-groups and degrees, West Bengal's share of graduates has declined. The effect is probably most dramatic in the 20-24 age group where the decline has been the most precipitous. Given that this 20-24 age group is going to be the primary work force over the next thirty years, it suggests that worker productivity may stay sluggish for a while even if investment in physical capital picks up in the coming years.

A second issue relates to the effect of pro-labor leftist government on poverty or inequality within West Bengal. Thus, it could be argued that while the main social benefit of leftist political power and policies are in these social statistics of development rather than in income. We have already seen that in terms of education and humanc capital stocks, West Bengal

Figure 26: Population with graduate degrees

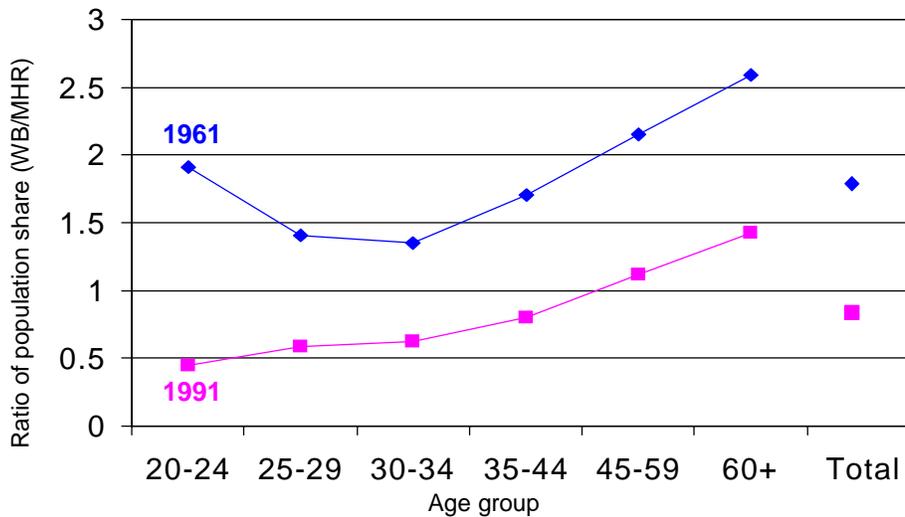
Population Share of Persons with Graduate Degrees:
West Bengal Relative to Maharashtra
1961 vs 1991, by Age Group



*population share=number of persons with graduate degrees in age group i/total population of age group i.
Source: Census of India, 1961 and 1991

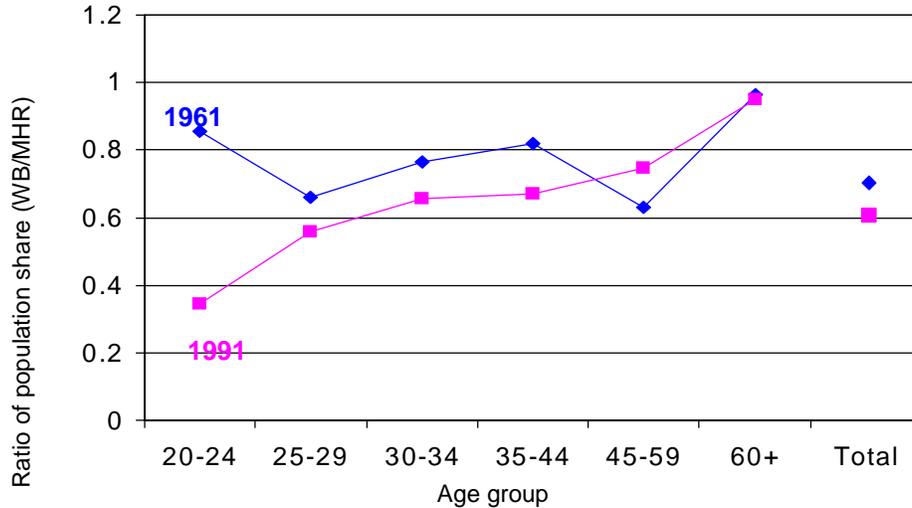
Figure 27: Population with post-graduate degrees

Population Share* of Persons with Post-Graduate Degrees:
West Bengal Relative to Maharashtra
1961 vs 1991, by Age Group



*population share=number of persons with post-graduate degrees in age group i/total population of age group i.
Source: Census of India, 1961 and 1991

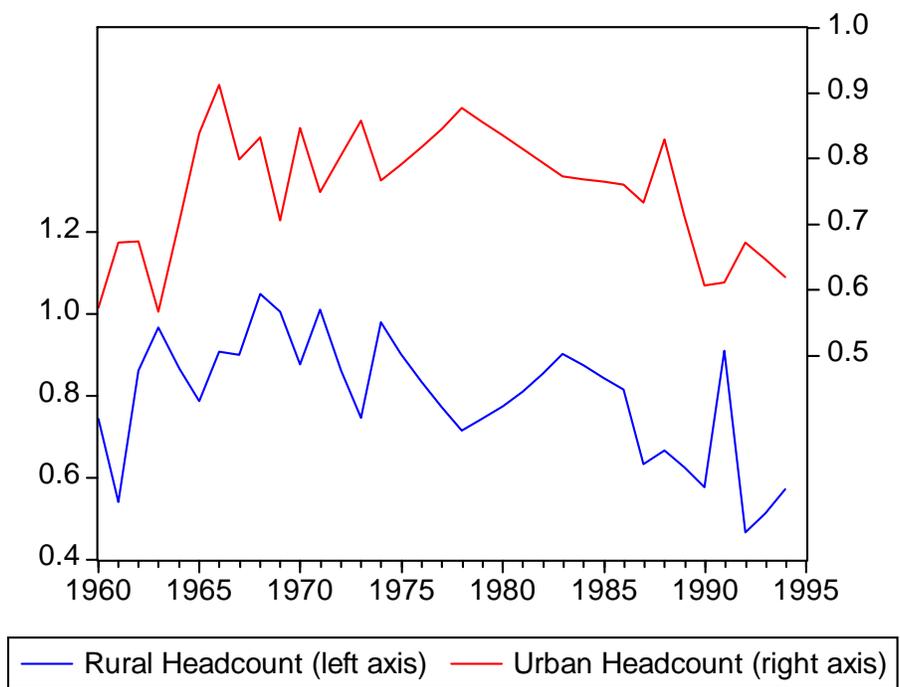
Figure 28: Population with technical degrees
 Population Share* of Persons with Technical Degrees**:
 West Bengal Relative to Maharashtra
 1961 vs 1991, by Age Group



*population share=number of persons with technical degree in age group i/total population of age group i.
 **includes medical, engineering, technology, agriculture, dairying, veterinary and teaching degrees
 Source: Census of India, 1961 and 1991

showed no relative improvement during the period 1960-95. In Figure 29 we plot the evolution of the rural and urban headcount index in West Bengal relative to Maharashtra. This index measures the fraction of the population whose income is below the poverty line. It is clear that that while West Bengal starts out with lower poverty incidence in both rural and urban areas, there is not much improvement in either during this period (relative to Maharashtra). In both rural and urban areas of Bengal, relative poverty incidence worsened between 1960 and 1980 and then started improving thereafter. But over the entire period, there wasn't much change.

Figure 29: Relative poverty: West Bengal/Maharashtra



6 Conclusions

In this paper we have contrasted the development paths of two Indian states, West Bengal and Maharashtra, between 1960 and 1995. Starting from an initial position more or less identical to Maharashtra, West Bengal's relative income had dropped to about 60 percent of Maharashtra by 1995. Our diagnostic tests on the model suggest that while productivity differences can account for about 2/3 of the gap between the states, the rest is likely to be due to problems in the labor market in West Bengal. In particular, there appear to have been some factor(s) that raised wages in West Bengal above the levels dictated by the neoclassical growth model's first order conditions. The strong correlations of our estimated labor market and productivity wedges with the vote share of the Leftist parties in West Bengal suggest that increasing labor power during this period in West Bengal may have been the proximate cause of the diverging economic performance of the two states.

While the diagnostic exercises in the paper suggest that the problems are likely to be in the labor market, in order to assess the quantitative importance of this margin one needs to formalize and quantify a political-economy model in which declining investment and output can coexist with rising labor power for relatively sustained periods of time in a voting environment. This is the subject of our future work in this area.

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