Working Paper
336

TRADE LIBERALISATION, MARKET POWER AND SCALE EFFICIENCY IN INDIAN INDUSTRY

Pulapre Balakrishnan

K. Pushpangadan

M. Suresh Babu

August 2002

Working Papers published since August 1997 (WP 279 onwards)
can be downloaded from the Centre's website (www.cds.edu)

TRADE LIBERALISATION, MARKET POWER AND SCALE EFFICIENCY IN INDIAN INDUSTRY

Pulapre Balakrishnan
K. Pushpangadan
M. Suresh Babu

August 2002

We thank K. L. Krishna, Arunava Sen, Subrata Sarkar and Rajendra Vaidya for discussions. We also thank the participants of a Seminar at CDS for comments and suggestions. Errors if any would be ours.

ABSTRACT

Using information on listed firms in each of the industry groups at the two-digit level within Manufacturing this study investigates whether the radical shift in trade policy in India in 1991 resulted in a reduction in market power and/or an improvement in scale efficiency. We estimate a group-wise production function allowing for firm-specific effects. A plausible estimate of market power is obtained and the assumption of constant returns to scale is mostly rejected. As regards the effects of the trade-policy shock of 1991, evidence of a move to a more competitive market structure or of an improvement in scale efficiency is not widespread across Indian manufacturing.

JEL Classification: F12

Key words: Trade liberalisation; Market power; Scale Economies

I. Introduction

The introduction of imperfect competition into the analysis generates gains from trade inconceivable under the standard assumption of perfect competition[1] . Now, trade holds out the distinct possibility of influencing market power, defined as an excess of price over marginal cost. This occurs as the domestic price, presumably higher than the international one due to protection, is driven downward as imports become an option either due to the removal of quantitative controls or the lowering of tariffs, the central features of trade liberalisation. In this scenario, costs - determined by production relations in domestic industry - are taken to remain unchanged, contributing to a compression of the price-marginal-cost ratio. An altogether independent story of the consequences of trade for market performance can be told in terms of the Lerner index of the degree of monopoly, also known alternatively as the mark-up or the gross margin. Recall that the mark-up is inversely related[2] to the elasticity of demand and/or the number of firms in the market. Import liberalisation may be seen as introducing greater rivalry into the market and thus raising the industry-wide elasticity of demand. Now the mark-up may be expected to decline, even as the number of domestic firms remains constant.

---

1 See Helpman and Krugman (1989).

2 See Shapiro (1989).

While the decline in market power emerges directly from a consideration of economic theory, the recognition of a possible improvement in scale efficiency due to trade has emerged mainly out of discussions of the likely consequences of trade liberalisation, a policy that has increasingly gained favour internationally. However, there is no unanimity of outlook on the issue. An appraisal in Rodrik (1988) goes: “In the presence of imperfect competition and increasing returns to scale, trade liberalisation is compatible both with a magnification of the welfare gains *and* with welfare losses. It all depends on how the economy is expected to adjust, which in turn depends on the frustrating ambiguities of oligopoly theory. At one extreme we could imagine that free entry eliminates all excess profits and that liberalisation rationalizes industry structure by reducing the number of firms and forcing the remaining ones down their average cost curves. ……. But at the other extreme, we can imagine a world in which the contracting sectors tend to be those with supernormal profits and unexploited industry-wide scale economies. The protectionists’ fears may then well be justified.”[3] It is easy to see that more than the change in market power it is the improvement in scale efficiency, both consequent upon the scaling down of protection, that remains an empirical issue, in the sense of our having little recourse to prediction from economic theory.

Before ending this discussion of the likely consequences of trade reform, we would like to provide yet another mechanism by which an improvement in scale efficiency might come about, an alternative to the ‘rationalisation of capacity’ that tends to get ignored. Note that trade liberalisation also provides domestic firms a fresh option, other than just introducing the threat of disciplining by increased imports. This is

---

3 Rodrik (1988), p. 110-1.

that domestic firms are now enabled to compete on world markets, conceivably due to the availability of world-class inputs at lower prices following the reduction in tariff. Where this increased competitiveness is translated into greater market-access worldwide, and thus an expanded production opportunity, we may expect an improvement in scale efficiency. Note that this scenario depends upon production being subject to increasing returns to scale.

The pronounced move towards more liberal trade regimes in the developing countries from the nineteen seventies onwards inspired much research on the consequences. Notable among these are the one on Chile by Tybout, Corbo and de Melo (1991), Turkey by Levinsohn (1993) and the Cote d'Ivoire by Harrison (1994). These studies have focussed on the impact of trade reform on one or more variables among productivity growth, market power and scale efficiency. In this paper we investigate the impact on market power and scale efficiency in Indian industry of a significant reversal of trade policy in 1991. We believe that, in the context, India serves as a major test case, for three reasons. First, economic policy has always been pursued with some vigour in India, making the testing of its consequences - whatever the policy - particularly relevant. Secondly, when in India trade reform did eventually appear on the scene of a weak-version of the Soviet model of industrialisation under a closed foreign trade regime, it came with a bang. For, though adopted here over a decade after it had gained ascendancy in East Asia including China, the dismantling of quantitative restrictions on industrial imports was brisk and the scaling down of the tariff barrier impressive. The third reason for our belief in the relative importance of the Indian case is purely on statistical grounds. The sheer size of the Indian economy offers the researcher a bonus in terms of the sample size. For instance, in certain industry groups analysed by us the very number of firms in our sample exceeds the total number of observations for the same or comparable industry groups in the studies cited above. While individual researchers can take no credit for this, the sheer statistical advantage of large samples cannot be exaggerated.

This paper is in four sections. We first familiarise the reader with the nature of the trade reforms initiated in India in 1991. In a subsequent section the framework of analysis is laid out and the equation to be estimated derived. Next we discuss our econometric strategy, present the estimates and interpret the results. Finally, we state our conclusion. As the preparation of the data bed is a crucial part of the exercise, the construction of the variables and the sources of the data are discussed in detail in the Appendix.

II. Trade-policy Reform in India:

By any reckoning India's foreign trade regime was severely restrictive over the period 1947-91. Its several instruments may be gathered under the categories 'quantitative restrictions' (QRs) or 'tariffs'. QRs ranged from an outright ban on specific imports – for instance, consumer goods – to the 'canalization' of certain others – ranging from crude and edible oils to foodgrains, mostly necessitated by the need to maintain administered prices of these commodities within the economy. QRs extended with near symmetry also to exports, notably foodgrains. Further, a complex system of export promotion also existed, ranging from Special Import Licenses for large exporters and a duty-exemption scheme dispensing advance licenses for the import of materials and components. When it comes to considering trade reform, as opposed to changes in a regime of QRs, the lowering of a tariff barrier is more easy to comprehend, which does not of course imply its being any less restrictive due to its simplicity. In 1990-91, the unweighted average nominal tariff was 125 percent, with a peak rate of 355 percent.

The single most defining characteristic of the trade policy reforms initiated in 1991 was a progressive move away from ‘quantity’ to ‘price’ controls. In the context of India’s forty-year-old trade-policy regime, this meant a reduced dependence on QRs and an increased one on tariffs. However, a hitherto ignored link between trade and industrial policy now got to be duly emphasized, and tariff rates were to be progressively reduced as part of the scaling back of protection to domestic industry. Given the objective of this study, it may be of interest to note that the last was seen as necessary to deliver Indian industry competitive globally. The rate of reduction of the tariff was not uniform across industry groups, with the rate on capital-good imports leading the way. This has led some to point out that it had the unintended consequence of increasing the effective rate of protection on consumer goods, the rates on which were lowered at a slower pace.

At the end of a little over a decade since they were initiated, it is of interest to note the government’s own view of what the trade reforms were to achieve. It is that: “Trade policy reforms over the last decade have aimed at creating an environment for achieving rapid increase in exports, raising India’s share in world exports, and making exports an engine for achieving higher economic growth. The focus of these reforms have been on liberalization, openness, transparency and globalization with a basic thrust on outward orientation focusing on export promotion activity, moving away from quantitative restrictions and improving competitiveness of Indian industry to meet global market requirements.” (Government of India, Economic Survey 2001-2’, p. 146.) Our discussion of the reforms undertaken in India since 1991 is intended to be brief. A detailed discussion, including of phases during the four decades since 1947 is provided in Srinivasan (2000). A less detailed, but more evaluative, discussion of the measures taken since 1991 can be found in Joshi and Little (1997).

The dismantling of the regime of quantitative restrictions is not easily amenable to measurement. On the other hand, we do have data on the tariff rate applicable to Indian industry over time, for dates before and after the onset of trade reforms in 1991. These are presented in Table 1. There tariff rates – unweighted, basic and auxiliary - and for all industry groups at the two-digit level have been combined into average rates for six groups. The trade-policy reforms are indicated by the faster decline in the tariff rate since 1991. Notice though that the reduction of the tariff rate is not uniform across industries. As referred to above, it appears to have been the greatest for capital goods, here part of the group 'Metal Products, Machinery, Transport Equipment and Miscellaneous Manufacturing'. However, without exception, over the nineties the decline in the tariff rate is indeed very high across Indian industry. Data for each industry group point to a very substantial scaling down of the tariff barrier, enjoyed by Indian industry for over four decades. Its consequence for industrial performance now becomes a matter of interest.

Table 1: The nominal tariff rate in India, 1987-98

Industry groups	1987-88	1992-93	1994-95	1997-98
Food, Beverages and tobacco	126.5	76.3	44.0	35.3
Textile and Leather Products	135.4	103	59.6	40
Wood and Paper products	108.7	93.7	56.2	28
Chemical, Rubber, plastic and Petroleum products	118.7	103.5	61.0	32.1
Non- metallic mineral products	129.7	106.9	64.2	40.1
Metal products, Machinery, Transport equipment and Miscellaneous manufacturing	104.6	84.0	46.7	30.1

Source: Nouroz (2001).

In concluding this discussion we caution against the reading of every change in Indian industry since 1991 as due to trade policy reform. For, almost simultaneously there had taken place a substantial revision of industrial policy in India, which too may be expected to contribute to change. This may, however, constitute less of a problem than might be imagined to be the case before considering the details. In our view, the principal feature of the industrial policy reforms is the removal of industrial licensing. At the simplest, this may be read as enabling entry previously restricted. The pro-competition effects of this may be considered to go in the same direction as the liberalisation of trade with respect to import-competing sectors. It is our judgement though that, on balance, the competition-enhancing impact of trade policy reform is likely to be more immediately effective than that of the removal of policy-induced barriers to entry for domestic industry. The removal of such legal barriers to entry does not equal the removal of other, conceivably more substantial, for example, economic ones. On the other hand, when capacity exists overseas, imports can cross borders with ease in response to trade liberalisation. Certainly as far as market power is concerned the impact of trade is likely to be more immediate than that of domestic entry, even though a variation across the manufacturing sector may be expected with respect to this feature.

We take the view, therefore, that in the entire set of policy changes that were put into place in India since 1991, trade reforms must count for more than industrial policy reform as far as their relative competition-inducing effect is concerned. This we claim on grounds that closure remains a difficult proposition in India's manufacturing sector, where retrenchment and layoff of workers requires government authorization. The removal of legal barriers to entry need not therefore imply that economic barriers to entry have been removed, for exit as an option cannot be assumed by the firm. Thus the pro-competition effects of industrial policy changes in India are likely to have been limited, for while they abolished compulsory licensing of capacity they did not alter the feature that an implicit exit policy may have continued to restrict entry. However, while the new industrial policy may have continued to constrain competition arising out of the entry of domestic firms, the trade policy reforms at least may be expected to have introduced competition, prima facie and on the margin, via the threat of imports.

III. Methodology

A methodology due to Hall (1988) has been applied with slight modification in studies of the consequence of trade reforms for market power and scale efficiency in several countries, notably of the Cote d'Ivoire by Harrison (1994). In our investigation we have followed this method closely.

Specify the production function for firm *i* in industry *j* at time t as:

$$(1) \qquad Y_{ijt} = A_{jt} f_{it} G(L_{ijt}, K_{ijt}, M_{ijt})$$

where Y, K, L and M stand for output, capital, labour and materials inputs, respectively, A_{jt} is an industry-specific index of Hicks-neutral technical progress and fit is a parameter allowing for firm-specific differences in technology. Totally differentiating (1) and dividing throughout by Y, we have

$$(2) \qquad (dY/Y)_{ijt} = (\delta Y/\delta L)(dL/Y)_{ijt} + (\delta Y/\delta K)(dK/Y)_{ijt}$$

$$+ (\delta Y/\delta M)(dM/Y)_{ijt} + (dA/A)_{jt} + (df/f)_{it}.$$

From the first order conditions for profit maximisation of a firm in Cournot equilibrium the expression for the marginal product(s) can be written as:

$$(3a) \qquad (\delta Y/\delta L)_{ijt} = (w/p)_{jt}\{1/[1+(s_{ij}/e_j)]\} = (w/p)_{jt}\,\mu_{ij}$$

(3b) $(\delta Y/\delta K)_{ijt} = (r/p)_{jt}\{1/[1+(s_{ij}/e_j)]\} = (r/p)_{jt}\mu_{ij}$

(3c) $(\delta Y/\delta M)_{ijt} = (n/p)_{jt}\{1/[1+(s_{ij}/e_j)]\} = (n/p)_{jt}\mu_{ij}$

where p is the product price, w, r and n are the price of labour, capital and materials, respectively, s_{ij} is the market share of firm i in industry j, μ_{ij} is the price-marginal cost ratio and e_j is the price elasticity of demand for the jth industry .

Anticipating the estimation - which takes the form of estimating an industry-level productionfunction - it is assumed that the mark-up only varies across industries, implying that it is common to the firms within the industry. Now, substituting (3a)-(3c) into (2) and re-arranging terms, we have:

(4) $(dY/Y)_{ijt} = \mu_j[(wL/PY)(dL/L)+(rK/PY)(dK/K)+(nM/PY)(dM/M)]_{ijt} + (dA/A)_{jt} + (df/f)_{it}.$

Denoting the factor shares (wL/PY), (rK/PY) and (nM/PY) as α_l, α_k and α_m, respectively, (4) may be re-written as:

(5) $(dlnY)_{ijt} = \mu_j[\alpha_l(dlnL) + \alpha_m(dlnM) + \alpha_k(dlnK)]_{ijt} + (dA/A)_{jt} + (df/f)_{it}.$

Denoting[4] the sum of factor shares under imperfect competition as β/μ, where β is the returns-toscale parameter and $\beta = 1$ the constant returns-to-scale case, we can re-write (5) as a growth-rate version of the production function in intensive form in capital:

(6) $dy_{ijt} = \mu_j[\alpha_l dl+\alpha_m dm]_{ijt} + (\beta_j-1)(dK/K)_{ijt} + (dA/A)_{jt} + (df/f)_{it}$

where the variables y, l and m stand for ln(Y/K), ln(L/K) and ln (M/K), respectively.

4 For a proof see Chambers (1988, p. 70) and Harrison (1994, p. 56).

The term $(dA/A)_{jt}$ can be thought of as the rate of productivity growth for industry j. Equally, μ is the price-marginal-cost ratio, again common to all the firms in industry j. Were Equation (6) to be treated as a regression, an estimate of $(\beta_j - 1)$ not statistically significantly different from zero implies constant-returns-to-scale technology. Alternatively, a statistically significant positive coefficient implies increasing returns while a significant negative coefficient implies decreasing returns to scale. Finally, again anticipating the econometric estimation, $(df/f)_{it}$ may be decomposed into a firm-specific-effect git and a random disturbance term u_{it}. In the context of panel-data econometrics there now arises the question of whether the individual effect g_{it} is to be treated as independent[5] of the regressors (here, a firm's inputs) or not. We return to this issue when we discuss our estimation strategy. In any case, the resulting specification can be used to test for a change over time in market power μ and the scale parameter β. This may be implemented by introducing into the regression an interactive slope dummy applied to each of the variable input and the capital-stock terms in (6). We would then have:

$$(7) \qquad dy_{ijt} = B_{oj} + B_{1j}dx_{ijt} + B_{2j}[Ddx]_{ijt} + B_{3j}dk_{ijt} + B_{4j}[Ddk]_{ijt} + g_i + u_{it}$$

where

$B_o = dA/A$,

$B_1 = \mu$, B_2 = change in B_1

$B_3 = (\beta - 1)$, B_4 = change in B_3

$dx = [\alpha_l dl + \alpha_m dm]$,

$dk = dK/K$, and

D is a dummy accounting for the policy regime during a particular historical phase. Given our interest in this study the dummy takes the

---

5 See Baltagi (1995).

value zero prior to 1991 and one from that date on. As discussed 1991 is the year of the implementation of the trade policy reforms.

IV. Estimation

IV.1: The Data Base

The data for the present exercise is drawn from the database PROWESS of the Centre for Monitoring Indian Economy (CMIE). CMIE provide annual data on 7000 firms registered with the Bombay Stock Exchange, limiting itself to public limited companies. Public limited companies in India account for almost 50% of the labor force and 80% of the fixed capital of the private sector factories, contributing to around 60% of the output and 70% of the value added. Information regarding all the firms in all the industrial groups was collected.

No effort was made to balance the panel. Only firms for which unacceptable values for certain variables were encountered were excluded. The final data set as thus compiled included 3596 firms for the ten-year period 1988-89 to 1997-98. Firms in the industry groups chosen for the study account for nearly 73 percent of the value of output of the manufacturing sector and approximately 70 percent of value added in the year 1997-98, the final year for which data is available in our sample. The distribution of firms across industry groups as arranged for the present study along with the number of observations corresponding to each industry group is provided in Table A1 of the Appendix. On an average, these firms account for more than 60 percent of the output of the corresponding industrial group reported in the Annual Survey of Industries (ASI). It may legitimately be asked why we may not have worked with data from the ASI. In the present context, we emphasise that we are also interested in estimating the returns to scale. Since ASI data for the nineteen eighties is at the industry level, it is not ideally suited for the purpose. Being firm-level information, the CMIE data are preferable - though not as good as plant-level data, for returns to scale are essentially a plant-level phenomenon. In any case, as far as we are aware, our full sample of 3596 firms and panel of 18045 observations spanning the period 1988-89 to 1997-98 is among the largest assembled for the purpose thus far.

IV. 2: Results

The estimation strategy was as follows: the basic model as represented by Equation (6) was estimated both with and without firm-specific effects. From the specification ignoring effects the pooled estimator (OLS) was obtained. The fixed-effects specification was estimated, in separate rounds, by the least squares dummy variable approach (LSDV) and two-stage least squares (TSLS). TSLS is adopted to tackle the potential bias arising from violation of the orthogonality condition between the regressors and the error term. The instruments used were the one-period lagged values of each of the two input terms. The coefficients of the random-effects specification were estimated by feasible generalised least squares (GLS). The statistical package LIMDEP, Version 6 was used throughout. The results of this round of estimation are presented in Table 2.

We took the increase in the explanatory power of the specification allowing for individual effects to actually signal their existence. Therefore, even though the parameter estimates do not diverge greatly in the two instances, we now dispensed with the specification without effects in subsequent rounds. Thus we were left with a choice among three estimators. The TSLS estimates of the fixed-effects specification were mostly similar in sign and magnitude to the ones obtained by least squares (LSDV). However, when they did diverge, the level and the sign of the estimated price-marginal cost ratio was so completely out of line with the predictions of economic theory that we considered them unacceptable. There is some reason to believe that this mostly reflects a small sample size, for when the full sample of 18045 is adopted the coefficient estimates under least squares (LSDV) and two-stage least squares are similar - though, the standard errors are not – as will be noticed from Table 2. Nevertheless, the results in the case of the disaggregated data leave open the possibility that we may have used inappropriate instruments. Inappropriateness of the instruments used might arise either from their being weak in that they are uncorrelated with the endogenous variables or from their being invalid in the sense of being correlated with the errors. This situation is often encountered in the estimation of production functions, and it has been argued that in such instances the OLS estimator is actually to be preferred[6] . Based on this view and guided by the results we obtained at the disaggregated level, the TSLS estimates were not considered by us further. The choice was now left between the LSDV and GLS estimators, allowing for two different specifications of the individual effects. We followed standard practice in choosing between the fixed and the random effects models by implementing the Hausman specification test. Results from our estimation, including the Hausman-test statistic, are reported for each industry group in Table 2.

Once the issue of the appropriate specification was resolved, a test of the stability of the coefficients of the basic model as defined by Equation 6 – amounting to a test of a change in market power and of the scale parameter - was conducted on the specification chosen according to the Hausman test. The regressions are not reported here to save space (but are available upon request from the authors). Instead, a summary of the results obtained is presented in Table 3, indicating the estimated change in the two parameters across 1991-92 and whether this is statistically significant.

---

6 See Basu and Fernald (1997).

Table 2 : Production function estimates for Indian Industry
regression : $dy_{ijt} = B_{oj} + B_{1j}dx_{ijt} + B_{2j}dk_{ijt} + u_{it}$

Effects →	None	Fixed		Random
Estimator →	OLS	LSDV	TSLS	GLS
Food Products				
B_0	0.02 (8.3)			0.03 (5.8)
B_1	1.07 (91.9)	1.05 (86.8)	1.31 (10.9)	1.06 (91.7)
B_2	-0.23	-0.25	-0.25	-0.25
 R^2	(-15.7) 0.86	(-16.5) 0.91	(-0.7)	(-16.7) 0.86
Hausman (χ^2) = 6.38				
Beverages & Tobacco				
B_0	0.01 (2.9)			0.02 (3.0)
B_1	1.18 (34.9)	1.03 (27.2)	1.10 (5.1)	1.13 (34.4)
B_2	-0.39 (-11.3)	-0.37 (-13.9)	-0.30 (-2.12)	-0.32 (-12.9)
R^2	0.94	0.96		0.93
Hausman (χ^2) = 29.10				
Textiles				
B_0	0.01 (5.5)			0.01 (4.8)
B_1	1.19 (113.6)	1.16 (91.5)	0.96 (2.6)	1.19 (107.1)
B_2	-0.16 (-14.3)	-0.19 (-14.6)	0.02 (-0.03)	-0.17 (-14.6)
R^2	0.90	0.93		0.90
Hausman (χ^2) = 8.69				
Textile Products				

Effects →	None	Fixed		Random
Estimator →	OLS	LSDV	TSLS	GLS
B_0	-0.01 (-1.8)			-0.01 (-0.1)
B_1	1.31 (69.0)	1.27 (60.8)	1.10 (0.9)	1.30 (68.60
B_2	-0.05 (-2.6)	-0.04 (-1.7)	0.13 (0.1)	-0.04 (-2.2)
R^2	0.91	0.95		0.91
Hausman (χ^2) = 16.6				
Leather				
B_0	-0.0004 (-0.03)			-0.001 (-0.03)
B_1	0.92 (16.0)	0.84 (14.5)	0.72 (0.6)	0.89 (16.2)
B_2	-0.19 (-2.0)	-0.29 (-3.0)	0.28 (0.2)	-0.25 (-2.7)
R^2	0.71	0.86		0.71
Hausman (χ^2) = 4.95				
Wood				
B_0	-0.03 (-2.1)			-0.02 (-1.4)
B_1	1.40 (11.8)	1.39 (10.4)	-3.2 (-0.1)	1.39 (11.1)
B_2	0.12 (0.1)	-0.06 (-0.5)	-2.7 (-0.2)	-0.01 -(0.1)
R^2	0.69	0.73		0.69
Hausman (χ^2) = 1.25				
Paper				
B_0	0.02 (7.2)			0.03 (6.4)
B_1	1.29 (63.7)	1.26 (53.0)	0.22 (0.02)	1.28 (63.0)

Effects →	None	Fixed		Random
Estimator →	OLS	LSDV	TSLS	GLS
B_2	-0.26 (-11.8)	-0.30 (-12.5)	-0.68 (-0.3)	-0.27 (-12.3)
R^2	0.92	0.94		0.92
Hausman (χ^2) = 9.49				
Rubber				
B_0	-0.01 (-1.6)			-0.01 (-2.3)
B_1	1.11 (63.9)	1.10 (52.9)	0.87 (0.80	1.11 (60.8)
B_2	-0.20 (-10.4)	-0.20 (-9.2)	-0.56 (-0.4)	-0.19 (-9.8)
R^2	0.85	0.89		0.85
Hausman (χ^2) = 1.97				
Chemicals				
B_0	-0.004 (-2.3)			-0.002 (-1.1)
B_1	1.28 (128.1)	1.27 (109.2)	1.03 (1.3)	1.28 (122.7)
B_2	-0.06 (-6.30)	-0.07 (-6.1)	-0.24 (-0.4)	-0.07 (-6.2)
R^2	0.87	0.90		0.87
Hausman (χ^2) = 1.90				
Non-Metallic mineral products				
B_0	0.01 (2.1)			0.01 (1.5)
B_1	1.48 (53.1)	1.46 (46.9)	1.39 (3.2)	1.48 (51.4)
B_2	-0.19 (-6.6)	-0.19 (-5.7)	-0.20 (-0.11)	-0.19 (-6.2)
R^2	0.77	0.82		0.77
Hausman (χ^2) = 4.19				

Effects →	None	Fixed		Random
Estimator →	OLS	LSDV	TSLS	GLS
Basic metals				
B_0	0.02 (10.2)			0.02 (7.4)
B_1	1.23 (114.6)	1.21 (102.5)	-3.40 (-0.01)	1.22 (110.4)
B_2	-0.09 (-7.7)	-0.12 (-8.9)	-15.10 (-0.1)	-0.11 (-8.4)
R^2	0.90	0.93		0.90
Hausman (χ^2) = 8.39				
Metal Products				
B_0	0.02 (5.5)			0.02 (3.2)
B_1	1.25 (60.8)	1.21 (61.2)	1.11 (3.90	1.22 (63.5)
B_1	-0.08 (-4.1)	-0.13 (-6.6)	-1.04 (-0.5)	-0.12 (-6.2)
R^2	0.90	0.94		0.89
Hausman (χ^2) = 9.26				
Machinery				
B_0	0.01 (4.80)			0.01 (3.20)
B_1	1.26 (99.0)	1.25 (93.2)	1.35 (4.1)	1.25 (98.2)
B_2	-0.12 (-9.5)	-0.13 (-10.7)	0.22 (0.10)	-0.13 (-10.5)
R^2		0.82	0.89	0.82
Hausman (χ^2) = 4.43				
Transport				
B_0	0.02 (8.1)			0.02 (7.1)
B_1	1.25 (60.1)	1.23 (55.2)	1.78 (2.3)	1.25 (55.6)

Effects →	None	Fixed		Random
Estimator →	OLS	LSDV	TSLS	GLS
B_2	-0.19 (-10.2)	-0.20 (-9.6)	-0.26 (-1.0)	-0.19 (-10.1)
R^2	0.82	0.86		0.82
Hausman (χ^2) = 2.59				
Miscellaneous				
B_0	0.01 (1.3)			0.01 (1.1)
B_1	1.07 (25.6)	1.08 (19.6)	1.00 (2.8)	1.07 (25.6)
B_2	-0.16 (-2.5)	-0.12 (-1.7)	0.28 (0.15)	-0.16 (-2.5)
R^2	0.85	0.89		0.85
Hausman (χ^2) = 0.67				
Manufacturing				
B_0	0.01 (12.5)			0.01 (8.9)
B_1	1.19 (276.7)	1.18 (245.8)	1.11 (5.7)	1.19 (267.1)
B_2	-0.15 (-32.3)	-0.17 (-33.3)	0.12 (0.1)	-0.16 (-33.4)
R^2	0.86	0.90		0.86
Hausman (χ^2) = 31.26				

(t-statistics in parentheses)

We discuss the results of our econometric investigation in two rounds. First we comment upon the coefficient estimates; then we discuss the results of the test for their stability across policy regimes occurring in 1991.

Estimates of both the coefficients in the basic model are of interest to us. The first, being the price-marginal cost ratio, is the standard indicator of market power and the second, being the scale parameter, casts light on the technical production conditions in Indian industry. It may be noted that the implied mark-up is greater than one for every industry excepting 'Leather'. We find this unusual in terms of the prediction from economic theory. The production function for this industry group was now re-estimated with a different instrument set, but the coefficient value did not alter much. We only note that price-cost ratios of less than one may be found in earlier studies for both India and other countries[7]. As regards the estimates of the scale parameter, the coefficient on the capital stock variable is mostly statistically significant. Thus, we find constant returns to scale rejected for all the industries other than 'Wood' and 'Textile Products'. In all instances, the estimated coefficient is negative, signalling production to be taking place under decreasing returns-to-scale. It should be noted here that most of the recent studies of Indian industry report departures from constant returns to scale[8].

The results of our investigation of the stability of the coefficients of the basic model are summarised in Table 3. We comment first on the results for the price-marginal cost ratio. From the results obtained at the

7 Klette (1999), Krishna and Mitra (1998) and Harrison (1994) too report price-marginal cost ratios of less than one for certain industries.

8 Srivastava(1996) and Mamgain (2000) report either decreasing returns to scale or constant returns to scale for most of the industries. Interestingly, Mamgain argues "Given the bureaucratic procedures which govern the start up and expansion of a business in India one would have expected to see more evidence of decreasing economies of scale" (Mamgain 2000, p.61).

disaggregated level, we may speak of a mixed picture, with no change in seven out of the fifteen industry groups. Of the eight industries for which we find a statistically significant change, the ratio increases in five cases and declines in three. Thus evidence of a move to a more competitive market structure is scarce. On balance, our results point to a move to a less competitive one. Turning to the test of stability of the scale parameter – again at the disaggregated level – the results are less mixed than in the case of the price-cost ratio. Here, in nine cases out of fifteen, a clear majority, we find no change. Out of the six instances of a recorded change, there is an improvement in scale efficiency in four, with the two others showing a worsening. Of the four industries where there is an improvement in scale efficiency, for 'Basic Metals' the results indicate a move to increasing returns to scale[9] post-1991. A scenario under which this can be brought about following trade liberalisation was discussed in the Introduction.

When we now look at the estimates for the full sample of firms across the industry groups – designated 'Manufacturing' – there is a statistically significant change in both the parameters consequent upon the trade reform. What is recorded is an increase in both the price-marginal cost ratio and an improvement in scale efficiency. This of course reflects fairly closely the distribution of results at the disaggregate level.

In our view, there is no 'correct' reading of the results reported here. We propose the following reading. The estimates for 'Manufacturing' give us a picture of what is happening within Indian industry. However, partitioning the data into the various industry groups reveals very great heterogeneity across them. We therefore draw attention to both the sets of results.

---

9 This is deduced from the magnitudes of B3 and B4 in an estimate of Equation 7. The estimates, are not presented here to save space, are available from the authors upon request.

Table 3: Estimated change in market power and scale efficiency

Regression: $(dy)_{ijt} = B_{oj} + B_{1j}dx_{ijt} + B_{2j}[Ddx]_{ijt} + B_{3j}\,dk_{ijt} + B_{4j}\,[Ddk_{ijt}] + u_{it}$

D $= 0$ *for year* $<$ *1991-92 else* $D=1$

Industry	Price-Marginal Cost Ratio	Scale Parameter
Food products	+*	+*
Beverages and Tobacco	+	+
Textiles	-	+
Textile products	-	-
Leather	-	+
Paper	-	+
Wood	-	-
Chemicals	+*	+*
Rubber, plastic and petroleum products	-*	-*
Basic metals	+*	+*
Non-Metallic minerals	+*	+
Metal products	+*	+
Machinery	-*	-*
Transport	-*	+*
Miscellaneous	-	-
Manufacturing Total	+*	+*

* statistically significant at 5%.

It is of interest to compare the results here to those of other studies of the effect of trade liberalisation in India and elsewhere. In a study of Chilean manufacturing over the years 1967 and 1979 Tybout *et al* find that there is "... no evidence of *overall* improvements in productive efficiency for the manufacturing sector"[10], with estimated returns to

10 See Tybout et al (1991) p. 241.

scale higher in less than 50 percent of the industries studied. Our estimates for India are in line with this finding. Tybout et al do not investigate the behaviour of the mark-up across policy regimes. On the other hand, Harrison's study of the Cote D'Ivoire does; however, she reports a statistically significant decline in the mark-up in only one out of nine industries post-trade-reform. Harrison was not concerned with changes in scale efficiency. Immediate interest, though, must focus on how the results here relate to those of a study of Indian manufacturing by Krishna and Mitra (1998), who using an identical methodology investigate the behaviour of mark-ups and of scale efficiency. Some differences between the two studies may, however, be noted. Krishna and Mitra focus on five industries over the period 1985-1993, reporting the results for four. Our study covers a different period, being the years 1987-8 to 1997-8 and covers the entire manufacturing sector. Krishna and Mitra experiment with alternative cut-off dates to divide their sample into pre-and postliberalisation periods. For the case, where this date is the same as in our study, i.e., 1991-92, there is similarity between our results and those of Krishna and Mitra for some sectors but not others. However, it maybe stated that we do not find anything like the almost across-the-board reduction in mark-ups that these authors find for their chosen set of industries when we investigate the issue for all the industry groups at the two-digit level. At the same time, neither do we find a worsening of scale efficiency across the board as reported by them.

Having compared our findings to those of other important studies on the impact of trade on market power and/or scale efficiency internationally, we consider it appropriate to make an observation regarding the database of our study in relation to these. First, we have used a continuous panel in this study as opposed to comparing parameters of interest at different points of time as do Tybout et al. The sample size is another issue. Quite often, there are more firms in each industry studied here than there are number of observations in the Harrison study. This, of course, has to do with the fact that India has a much larger economy but, as we mention in our introduction, the statistical advantages of sample size cannot be overlooked. Finally, in comparison with Krishna and Mitra we look at a longer period since the onset of liberalisation and, while adopting the entire range of industries in Indian manufacturing, also work with a more acceptable data base with regard to the construction of the capital and labour inputs, of which readers are invited to make a comparison.

V. Conclusion

The consequences of trade reform for Indian industry may be considered to be a matter of some interest for reasons that we have already discussed at the beginning of this paper. Indeed it should prove of interest to both international-trade theorists and to those economists exclusively interested in the outcome of trade liberalisation as a policy adopted internationally since the late seventies. We have found a less than widespread and non-uniform impact on industry of trade reforms in India. While evidence of an improvement in scale efficiency is likely to attract little extra attention, for *a priori* it may be viewed as an entirely empirical issue, the finding of an increase in market power may evoke some surprise if one is to go entirely by the prediction of mainstream economic theory. However, we are able to offer two explanations of the finding of an increase in the price-marginal cost ratio since trade reforms in India. First, we may visualise a decrease in the number of domestic firms consequent upon what has been referred to as the ‘rationalisation of industry structure’, originally seen as the route to an improvement in scale efficiency and actually signalled by our results to have taken place in Indian industry since 1991. With the mark-up inversely related to the number[11] of firms, a decline in its level may be expected to follow. Secondly, outside the mainstream theory of market structure we may visualise trade liberalisation setting-off increased rivalry, which is what 'competition' is in the Austrian sense. Once again the field may be expected to be left with fewer firms post-reform, with the predictable consequence for the mark-up.

Pulapre Balakrishnan, *corresponding author, Indian Institute of Management, P.O. Calicut REC, Kozhikode 673 601, Kerala 673 601, India. His research interests are Applied maro economics & Development*

E-mail: balan@iimk.ren.nic.in.

K. Pushpangadan *is Fellow at the Centre for Development Studies, Thiruvananthapuram and had been Hindustan Lever Chair Professor in Industrial Economics at the Madras School of Economics, Chennai. His main areas of research interests are: Applied Econometrics, and Industrial Economics.*

Email contact: pushpangadan@cds.ac.in

M. Suresh Babu *is Research Associate at the Centre for Development Studies, Trivandrum. His research interests are Macroeconomics and Industrial Economics.*

Email contact : sureshbabu@cds.ac.in

11 Some independent evidence – even though at a level far more disaggregated that that of our data - of increasing concentration, as captured by the Herfindahl index, since 1991 is to be found in the annual report 'Industry: Market Size and Shares', Centre for Monitoring Indian Economy from where the data for this study has been drawn.

References

Basu, S., Fernald, J.G., 1997. Returns to scale in US production: estimates and implications, *Journal of Political Economy* 105, 249-283.

Baltagi B. H., 1995. Econometric analysis of panel data. John Wiley & Son, Chichester.

Chambers, R. G., 1988. Applied production analysis: a dual approach. Cambridge University Press, Cambridge.

Dennison, E. F., 1967. Why Growth Rates Differ: Post-War Experience in Nine Western Countries, The Brookings Institution, Washington, D.C.

Dornbusch, R., 1992. The case for trade liberalisation in developing countries, *Journal of Economic Perspectives* 6, 69-85.

Hall, R. E., 1988. The relation between price and marginal cost in U.S. industry, *Journal of Political Economy* 96, 921-47.

Harrison, A.E., 1994. Productivity, imperfect competition and trade reform: theory and evidence, *Journal of International Economics* 36, 53-73.

Helpman E., Krugman P. R., 1989. Trade Policy and Market Structure.The MIT Press, Cambridge, Massachusetts.

Joshi, V., Little, I.M.D., 1997. India's economic reforms 1991-2001. Oxford University Press, New Delhi.

Klette, T.J., 1999. Market power, scale economies and productivity: estimates from a panel of establishment data, *The Journal of Industrial Economics* 57, 451-476.

Krishna, P., Mitra, D., 1998. Trade liberalisation, market discipline and productivity growth: New evidence from India, *Journal of Development Economics* 62, 55-83.

Levinsohn, J., 1993. Testing the imports-as-market-discipline hypothesis, *Journal of International Economics* 35, 1-22.

Mamgain, V., 2000. Productivity growth in developing countries: the role of efficiency. Garland Publishing, New York.

Nouroz, H., 2001. Protection in Indian manufacturing: An empirical study. Macmillan, New Delhi.

Rodrik, D., 1988. Imperfect competition, scale economies, and trade policy in developing countries. In: Baldwin, R. (Ed.), Trade policy issues and empirical analysis. The University of Chicago Press, Chicago, pp. 109-143.

Shapiro, C., 1989. Theories of oligopoly behaviour. In: Schmalensee, R., Willig, R., (Eds.), Handbook of Industrial Organisation. North Holland, Amsterdam, pp.329-414

Srinivasan, T. N., 2000. Foreign trade policies and India's development. In: U. Kapila (Ed.), Indian Economy since Independence. Academic Foundation Press, New Delhi, pp.667-701.

Srivastava, V., 1996. Liberalization, Productivity and Competition: A Panel Study of Indian Manufacturing. Oxford University Press, New Delhi.

Tybout, J.R., de Melo, J., Corbo, V., 1991. The effects of trade reforms on scale and technical efficiency: New evidence from Chile, *Journal of International Economics* 31, 231-50.

Appendix

I. The number of firms and the number of observations, by industry group, are provided in Table A1.

Table A1

Industry:	Firms	Observations
Food products	413	1786
Beverages and Tobacco	55	272
Textiles	402	2082
Textile products	160	604
Leather	38	129
Paper	114	569
Wood	15	74
Chemicals	609	3154
Rubber, plastic and petroleum products	271	1225
Basic metals	406	2145
Non-Metallic minerals	213	1097
Metal products	135	694
Machinery	561	3024
Transport	170	1065
Miscellaneous	34	125
Manufacturing	3596	18045

II. The Construction of variables:

As the balance-sheet data is provided by the CMIE was in nominal terms, the conversion of these values into a measure of the underlying quantities was the principal data processing involved in the estimation of a production function. This involved deflating these nominal values using appropriate prices. We discuss the procedure in detail.

Output: CMIE provide information on the value of output of firms. This was deflated by the industry-specific wholesale price index. The source of price index is "Index Numbers of Wholesale Prices in India, base 1981-82=100", Ministry of Industry, Government of India.

Capital: One needs a measure of capital. While we are aware of the debates with regard to the measurement of capital, we believe that the procedure followed here lives up to the task to the extent of providing a reasonable estimate of the real capital stock. When some authors, Krishna and Mitra (1998) for instance, use as their measure of capital the net value of fixed assets deflated by some investment-goods deflator they ignore vintage. On the other hand, we follow Srivastava (1996) in attempting a measure of the firm-specific capital stock allowing for considerations of vintage.

Our data base, CMIE, provides information, from balance sheets, on gross fixed assets and its components along with depreciation. From this, investment can be obtained as the difference between the current and lagged values of assets. In principle, this enables one to use the perpetual inventory method to arrive at an estimate of capital stock for each year as follows:

$$P_{t+1} K_{t+1} = [P_{t+1}/P_t].P_t K_t(1-\delta) + P_{t+1} I_{t+1},$$

where P, K and I refer to the price, physical capital stock and investment, respectively, while δ is the depreciation rate.

However, this procedure can be applied as it is only when the base-year capital stock is P_0K_0, i.e., in the chosen base year a firm has no inherited capital, as it were. But this is seldom the case, for in any particular year a firm has a mixture of vintages, and, in the context of balance-sheet data, all valued at historic cost. The problem of arriving at a measure of the real capital stock using the perpetual inventory method is really one of valuing the base-year capital stock. It is essentially a question of converting balance-sheet data at historic cost into a measure of capital at replacement cost, while at the same time accounting for the vintage mix. The value of capital at replacement cost for the base year is arrived by revaluing the base year capital as found in the balance sheet. The method adopted for this involves an element of arbitrariness, and one at best arrives at an approximation. In constructing a ‘revaluation factor’ we depended upon the following three assumptions:

(a) We treated 1997-98 as the base year, for the maximum number of observations in our sample corresponded to this year. We assume that the earliest vintage in the capital mix dates to either the year of incorporation or 1977. The year 1977 is adopted on the basis of the Report of a Census of Machine Tools, Central Machine Tools Institute, Bangalore, 1986, which states that the life of machinery in India is on average of the duration of twenty years.

(b) The price of capital changes at a constant rate from 1977 or the year of incorporation upto1997. The actual value adopted is arrived at from a series of price deflators constructed from the CSO’s estimate of gross fixed capital formation published in the National Accounts Statistics.

(c) As with the price of capital, we assume that investment in a firm grows at a constant rate too. The growth of fixed capital formation at 1980-81 prices is applied for all the firms. Depending on the year of incorporation, firms will have different annual average growth after 1977.

The resulting revaluation factor was applied to the capital stock at book value in the chosen base year, converting it into the capital stock at replacement cost. This value was then deflated, to arrive at the real capital stock for that year. The price deflator used was the price index for Machinery and Machine Tools, as plant and machinery account for 71.5 percent of GFA[12] . Investment, arrived measured as (GFAt - GFAt-1) is now added to the estimated real capital stock in the base year to arrive at the figure for year one. The capital stock series is now updated using the perpetual inventory method. The estimation procedure is outlined here very briefly. It is elaborated upon in Srivastava (1996).

It should be noted that we use the gross value of capital in our study. Many authors use gross value, as the estimated net value is found to decline more rapidly than warranted by the facts, for in actuality capital goods are often maintained in a good condition until firms scrap them. However, use of the gross value involves a stringent assumption that the ability of a capital good to contribute to production remains constant throughout its economic life. Dennison (1967) thus argues that a correct measure of capital services falls somewhere in between the gross stock and the net stock advocating the use of a weighted average of the two with higher weight for the gross stock as the true value is expected to be closer to it. An attempt at implementing this runs into trouble in the Indian context as a measure of capital consumption is difficult to arrive at. Even when some of the arbitrariness in arriving at a depreciated capital stock may be overlooked, the data requirements are more demanding than what is available currently. We thus preferred to work with the gross value of capital.

Labor: The item ‘Wages and Salaries’ is converted into a measure of labor input of firms by administering an estimated Compensation per Worker in the industry in that year. The resulting measure is often referred to as the labor input expressed in ‘efficiency units’[13] . The average

---

12 According to Reserve Bank of India Bulletin, 1990.

13 See Tybout et al (1991), p. 245.

Compensation per Worker was computed by dividing Total Emoluments by Total Labor Hours as reported in the Annual Survey of Industries (ASI).

Materials: The materials bill is deflated by a materials-input price index. Input-Output coefficients for 1989-90 have been used as weights to combine the wholesale prices of the relevant materials. The source of the weights is CSO's input-output table for 1989-90 and appropriate price indices were taken from "Index Numbers of Wholesale Prices in India, base 1981-82=100", Ministry of Industry, Government of India.

CENTRE FOR DEVELOPMENT STUDIES

LIST OF WORKING PAPERS

[New Series]

The Working Paper Series was initiated in 1971. A new series was started in 1996 from WP. 270 onwards. Working papers beginning from 279 can be downloaded from the Centre's website (www.cds.edu)

W.P. 270 **ACHIN CHAKRABORTY** *On the Possibility of a Weighting System for Functionings* December 1996

W.P. 271 **SRIJIT MISHRA** *Production and Grain Drain in two inland Regions of Orissa* December 1996

W.P. 272 **SUNIL MANI** *Divestment and Public Sector Enterprise Reforms, Indian Experience Since 1991* February 1997

W.P. 273 **ROBERT E. EVENSON, K.J. JOSEPH** *Foreign Technology Licensing in Indian Industry : An econometric analysis of the choice of partners, terms of contract and the effect on licensees' performance* March 1997

W.P. 274 **K. PUSHPANGADAN, G. MURUGAN** *User Financing & Collective action: Relevance sustainable Rural water supply in India.* March 1997.

W.P. 275 **G. OMKARNATH** *Capabilities and the process of Development* March 1997

W. P. 276 **V. SANTHAKUMAR** *Institutional Lock-in in Natural Resource Management: The Case of Water Resources in Kerala,* April 1997.

W. P. 277 **PRADEEP KUMAR PANDA** *Living Arrangements of the Elderly in Rural Orissa,* May 1997.

W. P. 278 **PRADEEP KUMAR PANDA** *The Effects of Safe Drinking Water and Sanitation on Diarrhoeal Diseases Among Children in Rural Orissa,* May 1997.

W.P. 279 **U.S. MISRA, MALA RAMANATHAN, S. IRUDAYA RAJAN** Induced Abortion Potential Among Indian Women, August 1997.

W.P. 280 **PRADEEP KUMAR PANDA** *Female Headship, Poverty and Child Welfare : A Study of Rural Orissa, India,* August 1997.

W.P. 281 **SUNIL MANI** *Government Intervention in Industrial R & D, Some Lessons from the International Experience for India,* August 1997.

W.P. 282 **S. IRUDAYA RAJAN, K. C. ZACHARIAH** *Long Term Implications of Low Fertility in Kerala,* October 1997.

W.P. 283 **INDRANI CHAKRABORTY** *Living Standard and Economic Growth: A fresh Look at the Relationship Through the Non- Parametric Approach,* October 1997.

W.P. 284 **K. P. KANNAN** *Political Economy of Labour and Development in Kerala,* January 1998.

W.P. 285 **V. SANTHAKUMAR** *Inefficiency and Institutional Issues in the Provision of Merit Goods,* February 1998.

W.P. 286 **ACHIN CHAKRABORTY** *The Irrelevance of Methodology and the Art of the Possible : Reading Sen and Hirschman,* February 1998.

W.P. 287 **K. PUSHPANGADAN, G. MURUGAN** *Pricing with Changing Welfare Criterion: An Application of Ramsey- Wilson Model to Urban Water Supply,* March 1998.

W.P. 288 **S. SUDHA, S. IRUDAYA RAJAN** *Intensifying Masculinity of Sex Ratios in India : New Evidence 1981-1991,* May 1998.

W.P. 289 **JOHN KURIEN** *Small Scale Fisheries in the Context of Globalisation,* October 1998.

W.P. 290 **CHRISTOPHE Z. GUILMOTO, S. IRUDAYA RAJAN** *Regional Heterogeneity and Fertility Behaviour in India,* November 1998.

W.P. 291 **P. K. MICHAEL THARAKAN** *Coffee, Tea or Pepper? Factors Affecting Choice of Crops by Agro-Entrepreneurs in Nineteenth Century South-West India,* November 1998

W.P. 292 **PRADEEP KUMAR PANDA** *Poverty and young Women's Employment: Linkages in Kerala,* February, 1999.

W.P. 293 **MRIDUL EAPEN** *Economic Diversification In Kerala : A Spatial Analysis,* April, 1999.

W.P. 294 **K. P. KANNAN** *Poverty Alleviation as Advancing Basic Human Capabilities: Kerala's Achievements Compared,* May, 1999.

W.P. 295 **N. SHANTA AND J. DENNIS RAJA KUMAR** *Corporate Statistics: The Missing Numbers,* May, 1999.

W.P. 296 **P.K. MICHAEL THARAKAN AND K. NAVANEETHAM** *Population Projection and Policy Implications for Education:A Discussion with Reference to Kerala,* July, 1999.

W.P. 297 **K.C. ZACHARIAH, E. T. MATHEW, S. IRUDAYA RAJAN** *Impact of Migration on Kerala's Economy and Society,* July, 1999.

W.P. 298 **D. NARAYANA, K. K. HARI KURUP,** *Decentralisation of the Health Care Sector in Kerala : Some Issues,* January, 2000.

W.P. 299 **JOHN KURIEN** *Factoring Social and Cultural Dimensions into Food and Livelihood Security Issues of Marine Fisheries; A Case Study of Kerala State, India,* February, 2000.

W.P. 300 **D. NARAYANA** *Banking Sector Reforms and the Emerging Inequalities in Commercial Credit Deployment in India,* March, 2000.

W.P. 301 **P. L. BEENA** *An Analysis of Mergers in the Private Corporate Sector in India,* March, 2000.

W.P. 302 **K. PUSHPANGADAN, G. MURUGAN,** *Gender Bias in a Marginalised Community: A Study of Fisherfolk in Coastal Kerala,* May 2000.

W.P. 303 **K. C. ZACHARIAH, E. T. MATHEW, S. IRUDAYA RAJAN ,** *Socio-Economic and Demographic Consequenes of Migration in Kerala,* May 2000.

W.P. 304 **K. P. KANNAN,** *Food Security in a Regional Perspective; A View from 'Food Deficit' Kerala,* July 2000.

W.P. 305 **K. N. HARILAL, K.J. JOSEPH,** *Stagnation and Revival of Kerala Economy: An Open Economy Perspective,* August 2000.

W.P. 306 **S. IRUDAYA RAJAN,** *Home Away From Home: A Survey of Oldage Homes and inmates in Kerala,* August 2000.

W.P. 307 **K. NAVANEETHAM, A. DHARMALINGAM,** *Utilization of Maternal Health Care Services in South India,* October 2000.

W.P. 308 **K. P. KANNAN, N . VIJAYAMOHANAN PILLAI,** *Plight of the Power Sector in India : SEBs and their Saga of Inefficiency* November 2000.

W.P. 309 **V. SANTHAKUMAR AND ACHIN CHAKRABORTY,** *Environmental Valuation and its Implications on the Costs and Benefits of a Hydroelectric Project in Kerala, India,* November 2000.

W.P. 310 **K. K. SUBRAHMANIAN. E. ABDUL AZEEZ,** *Industrial Growth In Kerala: Trends And Explanations* November 2000

W.P. 311 **INDRANI CHAKRABORTY** *Economic Reforms, Capital Inflows and Macro Economic Impact in India,* January 2001

W.P. 312 **N. VIJAYAMOHANAN PILLAI** *Electricity Demand Analysis and Forecasting –The Tradition is Questioned*, February 2001

W.P. 313 **VEERAMANI. C** *India's Intra-Industry Trade Under Economic Liberalization: Trends and Country Specific Factors,* March 2001

W.P. 314 **U.S.MISHRA AND MALA RAMANATHAN** *Delivery Complications and Determinants of Caesarean Section Rates in India - An Analysis of National Family Health Surveys, 1992-93,* March 2001.

W.P. 315 **ACHIN CHAKRABORTY** *The Concept and Measurement of Group Inequality,* May 2001.

W.P. 316 **K. P. KANNAN AND N. VIJAYAMOHANAN PILLAI** *The Political Economy of Public Utilities: A Study of the Indian Power Sector,* June 2001.

W.P. 317 **K. J. JOSEPH AND K. N. HARILAL** *India's IT Export Boom: Challenges Ahead.* July 2001.

W.P. 318 **JOHN KURIEN AND ANTONYTO PAUL** *Social Security Nets for Marine Fisheries-The growth and Changing Composition of Social Security Programmes in the Fisheries Sector of Kerala State, India.* September 2001.

W.P. 319 **K. C. ZACHARIAH, P. R. GOPINATHAN NAIR AND S. IRUDAYA RAJAN** *Return Emigrants in Kerala: Rehabilitation Problems and Development Potential.* October 2001

W.P. 320 **N. VIJAYAMOHANAN PILLAI, K. P. KANNAN,** *Time and Cost Over-runs of the Power Projects in Kerala,* November 2001.

W.P. 321 **VEERAMANI C.** *Analysing Trade Flows and Industrial Structure of India: The Question of Data Harmonisation,* November 2001.

W.P. 322 **K. C. ZACHARIAH,** *The Syrian Christians of Kerala: Demographic and Socioeconomic Transition in the Twentieth Century,* November 2001.

W.P. 323 **V. K. RAMACHANDRAN, MADHURA SWAMINATHAN, VIKAS RAWAL,** *How have Hired Workers Fared? A Case Study of Women Workers from an Indian Village, 1977 to 1999.* December 2001.

W.P. 324 **K. P. KANNAN, N. VIJAYAMOHANAN PILLAI,** *The Aetiology of the Inefficiency Syndrome in the Indian Power Sector Main Issues and Conclusions of a Study.* March 2002.

W.P. 325 **N. VIJAYAMOHANAN PILLAI,** *Reliability and Rationing cost in a Power System.* March 2002.

W.P. 326 **K.C. ZACHARIAH, B.A. PRAKASH, S. IRUDAYA RAJAN,** *Gulf Migration Study : Employment, Wages and Working Conditions of Kerala Emigrants in the United Arab Emirates.* March 2002.

W.P. 327 **K. RAVI RAMAN,** *Bondage in Freedom, Colonial Plantations in Southern India c. 1797-1947.* March 2002.

W.P. 328 **K. P. KANNAN, K. S. HARI,** *Kerala's Gulf Connection Emigration, Remittances and their Macroeconomic Impact 1972-2000.* March 2002.

W.P. 329 **J. DEVIKA,** *Imagining Women's Social Space in Early Modern Keralam.* April 2002.

W.P. 330 **ACHIN CHAKRABORTY,** *The Rhetoric of Disagreement in Reform Debates* April 2002.

W.P. 331 **SURESH BABU,** *Economic Reforms and Entry Barriers in Indian Manufacturing.* April 2002.

W.P. 332 **K. P. KANNAN,** Th*e Welfare Fund Model of Social Security for Informal Sector Workers: The Kerala Experience.* April 2002.

W.P. 333 **K. PUSHPANGADAN** *Social Returns from Drinking Water, Sanitation and Hygiene Education: A Case Study of Two Coastal Villages in Kerala,* May 2002.

W.P. 334 **E. ABDUL AZEEZ,** *Economic Reforms and Industrial Performance an Analysis of Capacity Utilisation in Indian Manufacturing,* June 2002.

W.P. 335 **J. DEVIKA,** *Family Planning as 'Liberation': The Ambiguities of 'Emancipation from Biology' in Keralam.* July 2002.

BOOKS PUBLISHED BY THE CDS

Health Status of Kerala
P G K Panikar and C R Soman
CDS. 1984. pp 159, Hardcover , Rs.100/ $ 11 & Paperback, Rs. 75/ $ 10

Bovine Economy in India
A Vaidyanathan
Oxford & IBH. 1988. pp 209, Hardcover, Rs. 96/ $ 11

Essays in Federal Financial Relations
I S Gulati and K K George
Oxford and IBH. 1988. pp 172, Hardcover, Rs. 82/ $ 10

Land Transfers and Family Partitioning
D Rajasekhar
Oxford and IBH. 1988. pp 90, Hardcover, Rs. 66/ $ 10

Ecology or Economics in Cardamom Development (No Stock)
K N Nair, D Narayana and P Sivanandan
Oxford & IBH. 1989. pp 99, Paperback, Rs. 75/ $ 10

The Motor Vehicle Industry in India (Growth within a Regulatory Environment)
D Narayana
Oxford & IBH. 1989. pp 99, Paperback, Rs. 75/ $ 10

The Pepper Economy of India (No Stock)
P S George, K N Nair and K Pushpangadan
Oxford & IBH. 1989. pp 88, Paperback, Rs. 65/ $ 10

Livestock Economy of Kerala
P S George and K N Nair
CDS. 1990. pp 189, Hardcover, Rs. 95/ $ 10

Caste and The Agrarian Structure
T K Sundari
Oxford & IBH. 1991. pp 175, Paperback, Rs.125/ $ 14

Coconut Development in Kerala: Ex-post Evaluation
D Narayana, K N Nair, P Sivanandan, N Shanta and
G N Rao
CDS. 1991. pp 139, Paperback, Rs.40/ $ 10

Trends in Private Corporate Savings
N Shanta
CDS. 1991. pp 90, Paperback, Rs. 25/ $ 10

International Environment, Multinational Corporations and Drug Policy
P G K Panikar, P Mohanan Pillai & T K Sundari
CDS. 1992. pp 77, Paperback, Rs.40/ $ 10

Rural Household Savings and Investment: A Study of Some Selected Villages
P G K Panikar, P Mohanan Pillai & T K Sundari
CDS. 1992. pp 144, Paperback, Rs. 50/ $ 10

Indian Industrialization: Structure and Policy Issues. (No Stock)
Arun Ghosh, K K Subrahmanian, Mridul Eapen & Haseeb A Drabu (EDs).
OUP. 1992. pp 364, Hardcover, Rs.350/ $ 40

Limits To Kerala Model of Development: An Analysis of Fiscal Crisis and Its Implications.
K K George
CDS. 1999 (2nd edition) pp 128, Paperback, Rs. 160/ $ 18

Industrial Concentration and Economic Behaviour: Case Study of Indian Tyre Industry
Sunil Mani
CDS. 1993. pp 311, Hardcover, Rs. 300/ $ 34

Peasant Economy and The Sugar Cooperative: A Study Of The Aska Region in Orissa
Keshabananda Das
CDS. 1993. pp 146, Paperback, Rs.140/ $ 16

Urban Process in Kerala 1900-1981
T T Sreekumar
CDS. 1993. pp 86, Paperback, Rs.100/ $ 11

Impact of External Transfers on the Regional Economy of Kerala
P R Gopinathan Nair & P Mohanan Pillai
CDS 1994. pp 36, Paperback, Rs.30/ $ 10

Demographic Transition in Kerala in the 1980s
K C Zachariah, S Irudaya Rajan, P S Sarma, K Navaneetham,
P S Gopinathan Nair & U S Mishra,
CDS. 1999 (2nd Edition) pp 305, Paperback, Rs.250/ $ 28

Growth of Firms in Indian Manufacturing Industry
N Shanta
CDS. 1994. pp 228, Hardcover, Rs. 250/ $ 28

Floods and Flood Control Policies: an Analysis With Reference to the Mahanadi Delta in Orissa
Sadhana Satapathy
CDS. 1993 pp 98, Paperback, Rs. 110/$ 12

Growth of Market Towns in Andhra: A Study of the Rayalseema Region C 1900-C.1945
Namerta
CDS. 1994. pp 186, Paperback, Rs.125/ $ 14

Growth of Education in Andhra - A Long Run View
C Upendranath
CDS. 1994. pp 158, Paperback, Rs. 135/ $ 15

CDS M.Phil Theses (1975/76-1989/90): A Review Vol.1
G N Rao
CDS. 1996. pp 162, Paperback, Rs. 155/ $ 18

Trends In Agricultural Wages in Kerala 1960-1990
A A Baby
CDS. 1996. pp 83, Paperback, Rs. 105/ $ 12

CDS M.Phil Theses (1990/91-1993/94): A Review Vol.II
T T Sreekumar
CDS. 1996. pp 99, Paperback, Rs. 120/$ 14

Industrialisation in Kerala: Status of Current Research and Future Issues
P Mohanan Pillai & N Shanta
CDS. 1997. pp 74, Paperback, Rs. 110/ $ 12

Health, Inequality and Welfare Economics
Amartya Sen
CDS. 1996. pp 26, Paperback, Rs. 70/ $ 10

Property Rights, Resource Management & Governance: Crafting An Institutional Framework for Global Marine Fisheries
John Kurien
CDS & SIFFS, 1998. pp 56, Paperback, Rs. 50/ $10

Agrarian Transition Under Colonialism: Study of A Semi Arid Region of Andhra, C.1860-1900
GN Rao
CDS,1999. pp 133, Paperback, Rs. 170/ $19

Land Relations and Agrarian Development in India:A Comparative Historical Study of Regional Variations
Sakti Padhi
CDS,1999. pp 335, Hardcover, Rs. 425/$48

Poverty, Unemployment and Development Policy : A Case Study of Selected Issues With Reference to Kerala
United Nations, 2000 (reprint), pp 235
(available for sale in India only), Rs. 275

Performance of Industrial Clusters: A Comparative Study of Pump Manufacturing Cluster in Coimbatore (Tamil Nadu) & Rubber Footwear Cluster in Kottayam (Kerala)
P. Mohanan Pillai
CDS, 2001, pp 158, Paperback, Rs. 175/$18

Kerala's Gulf Connection: **CDS Studies on International Labour Migration from Kerala State in India**
K.C. Zachariah, K. P. Kannan, S. Irudaya Rajan (eds)
CDS, 2002, pp 232, Hardcover, Rs. 250/$25

Plight of the Power Sector in India: Inefficiency, Reform and Political Economy
K.P. Kannan and N. Vijayamohanan Pillai
CDS, 2002, Rs. 400/$40