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PRODUCTIVITY, COMPETITIVENESS, AND EXPORT GROWTH IN A LESS DEVELOPED ECONOMY: A STUDY OF INDIAN PUNJAB

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ABSTRACT

The development process has undergone varied experience with regard to growth, productivity and exports. Economic literature and empirical evidence on economic growth across developing countries are suggestive about the relation between exports and growth. These aspects of economic growth have been tested empirically while considering the industrial sector of Indian Punjab. The main conclusions which have emerged from empirical analysis is that fast industrial growth has been supported by significant technological progress which reduced the cost of production and enhanced the competitiveness of its industrial exports. The R&D expenditure is mainly adaptive in nature and affects technological progress significantly. Finally, changes in the industrial policy process have been suggested which integrate not only growing agricultural surpluses and labor force but will also ensure rapid technological growth and competitiveness of this sector.

KEY WORDS: Technology, R&D, India

Total factor productivity, competitiveness, and economic growth are linked in complex ways. Industries that have, from whatever source, higher rates of growth of output per unit of factor input are usually considered to be increasing in competitiveness, since their costs, in terms of real factor inputs, are rising less fast than are those of their competitors. An intrinsic characteristic of productivity is that it grows at a different rate in different industries, thus creating, as it rises, a dynamic change of the industrial structure, accompanied by parallel changes in the structure of its comparative advantage.

The empirical studies on manufacturing industries of less developed countries are a clear evidence of stagnating or slow growth of productivity in import-substitution industrialization which seems to have reduced comparative advantage of these countries in an international market(Chenery, et al 86). An alternative way to achieve faster and efficient industrialization obviously suggested is the outward-oriented industrialization through which the East Asian success story can be emulated. Analysts who have studied these countries closely (Pack,1994) give credit to East Asian governments for making the miracles happen, not by getting out of the way of private entrepreneurs, but by actively nurturing and protecting infant industries. They have stressed how learning and purposive R&D activity drive economic growth through the creation of new products and improvement in the quality of existing ones. India's industrial development compared

with East Asian countries is rather dismal(Ahluwalia,1985). Keeping in view its massive size, differential performance of industrial sector of different regions/states is expected. Therefore, this paper examines the relation of growth, competitiveness and export performance of the industrial sector of Indian Punjab since the mid-sixties.

I

Overviw of Punjab Economy:

Punjab economy has undergone a varied pattern of growth and structural change since the mid-sixties. During the period 1965-90, the State Domestic Product (hereafter SDP)increased by 5.45 per cent per annuam(Table 1.). Punjab has emerged as the most developed state of the Indian Union in terms of per capita income. When economic development is measured in terms of life expectancy, infant mortality rate, literacy at the age of 15 and above and per capita income, it is ranked at number 2(only next to Kerala). Besides, the state has the lowest incidence of poverty among the major states of the country. The high and sustained rate of economic growth for several years has placed the state on a high pedastal so far as the level of economic development is concerned. This has been caused by a set of several complex factors and is acompanied by diverse changes in social and economic life of the society.

The dynamics of fast growth of the state economy can

be seen from the differential performance of different sectors. The agricultural production increased at an average annual rate of 4.65 per cent during the period 1965-90. While dividing the whole period into early green revolution (1965-74) and after, agricultural production increased at lower rate(3.85 per cent) in the first period compared with second period(5.16) that is, 1975-90.It is worth mentioning that the industrial sector of the state has grown at a faster rate as compared to the other sectors of the economy. The rate of growth was 7.96 per cent per annum during 1965-90. Decomposing the overall growth rate of different sectors into sub-period shows better performance of Punjab economy except for unregistered industrial sector, services and construction, where the growth rates have been slowed down. It can be seen from table 1 that the performance of the economy singnificantly improved in thelate eighties(the only exception being services sector), the impact of political turmoil on the growth of the economy visible in the early eighties notwithstanding.

The varying growth rates of agriculture, industry and services sectors have resulted in noticeable changes in their share in the SDP. For instance the share of agriculture sector dwindled from 58.37 per cent in 1970-71 to 47.94 per cent in 1990-91. This decline is the gain of industrial sector. It is significant to note that the role of non-agricultural income was

dominant in the eighties compared with the early seventies when agricultural sector was prominant(58.37 per cent income was being generated in this sector). Labour force diversification across sectors has also shown almost similar but slower trends as have been experienced in the SDP. Despite the fast economic growth and diversification, Punjab economy has still a long way to go to develop infrastructure and basic industries sufficient to meet the increasing demands of a growing economy.

Economic prosperity in Punjab is mainly associated with the phenomenal growth of the agricultural sector since the mid-sixties, and its contribution to the SDP has been widely acknowledged. The industrial sector, which has also grown at a fast rate and has improved its share substantially in the SDP(10 percentage points), has been characterised as being woefully inadequate and backward both by social scientists and political leadership. But the fact is that with the ushering in of the green revolution, agriculture and industrial growth have gone hand-in-hand. The growth and structural chages that have been taken place within the industrial sector since the mid-sixties are described in the following section.

II

Growth and Structural Change in the Industrial Sector of Punjab:

On the eve of independence Punjab was relatively industrially backward. The position of the industrial sector

further worsened when some parts of the territory of Punjab went to Pakistan as a result of partition and 90 per cent of the skilled labour force migrated. This led to the closure of 40 per cent of the working industrial units in the state of Punjab(Pandit, 1985). After independence India embarked upon an ambitious programme of transforming its economy from a low-income agricultural to a well developed industrialized one. This strategy was based on massive public investment, especially in the industrial sector. But the industrial sector of Punjab was virtually by-passed so far as public investment was concerned and the private corporate sector did not come forward to the desired extent(Banerjee and Ghosh, 1985). In this process the industrial economy of Punjab remained deficient in so far as the location of large-sized industrial units are concerned. Thus its industrial structure is mainly constituted of small and medium-sized industries.

The industrial sector of the state produced goods and services worth Rs.12,875 crores and provided employment to 9,16,000 workers constituting 9.35 per cent of total workforce in 1990. As described earlier, this sector has grown at a rate of 7.65 per cent per annum during the period 1965-66 to 1990-91 which is quite high by Indian standards(Table 1). When we split this sector into registered and unregistered manufacturing, the registered sector has grown at a higher rate(8.55 per cent) than that of the unregistered sector(6.87 per cent). The average rate of growth for

such a long period can conceal many facts related to the short term. We have, therefore, divided the whole period into two sub-periods and then the second sub-period further into two sub-periods. The rate of growth for the first sub-period (1965-66 to 1974-75) was 6.71 per cent which was a little lower than the overall rate of growth. During this period Indian industry was under severe depression. India's industrial sector has picked up since the mid-seventies, though on 'luxury-led' model of growth (Chandrasekhar, 1988). Unlike Indian industry, Punjab's industrial sector has grown at a much more rapid rate during 1975 to 1990 which is considered to be the period of turnaround in growth in Indian industry(Table 2). But during 1975-76 to 1984-85, there was a slowdown in the growth rate of Punjab industry mainly because of the slowdown of the agricultural growth in the same period. Another important reason was that the rural elite of Punjab were becoming quality conscious and their consumption pattern underwent a change. The resultant effect is a decline in the demand for goods produced by the small industrial sector(Dhar, 1990). The impact of this kind of change can be seen in the falling share of the unregistered sector sharply after the mid-seventies(Singh, 1992). The unregistered industrial sector has become the victim because of its linkages with the larger industrial sector of the state. Punjab has been going through a turmoil, since the early eighties which has further contributed to the decline of unregistered sector. The

registered industrial sector, though, reached a higher orbit of growth(11.03 per cent) in the late eighties due to the following reasons. First, the agriculture sector has grown at higher rate, and has generated more demand for industrial goods. Second, the industrial entrepreneurs have learnt to survive in a situation of crisis. Technological progress supported by domestic R&D expenditure with a liberal import policy resulted into higher rate of growth.

The other important structural change which is taking place in the industrial economy of the state is that a tendency towards the establishment of large-sized units has set in(Singh, 1990). The industrial sector is oligopolistic but paternalistic in nature. There is a pattern of ancillarisation where sub-contracting emerges to be a dominant mode between parent plant (large one) and ancillary (small sub-contracting) units. This pattern is found both in the traditional industries like hosiery and sports, and modern industries like bicycle, tractor, and electronics. Patronage to the ancillaries is provided both by the government as well as by the large units. There have been cases of workers becoming workshop/small unit owners and small units are becoming medium range, in the due course of time(Gill, 1991).

III

Productivity, Competitiveness and Export Growth:

The impact of technological progress on reduction in the

cost of production and raising the competitiveness of an economy in international market has been widely acknowledged in economic growth literature. Therefore, sustained higher rate of economic growth can only be achieved if the resources are being utilized efficiently. The question of optimization of growth potential through resource use pattern have been posed and empirically tested in the case of Punjab in 1983(Dhesi and Ghuman, 1983). This study brought out the disturbing fact that during the early green revolution period, the growth of the industrial sector in Punjab was characterised by inefficient use of resources. A more careful and comprehensive analysis of the factor use pattern (both aggregative and disaggregative) of industrial sector of Punjab covering the period 1967 to 1981 has shown that factor inputs have been used highly inefficiently(Singh, 1985). The higher growth rate in this period was mainly associated with capital deepening which have resulted in high cost of production structure. Measuring technological progress in twenty-one three-digit census sector industries covering the period 1973-82, in another study(Singh,1990) reported however, differential performance of industries. Industries such as fertilizer and pesticides; agricultural machinery and parts; electrical apparatus, appliances and parts; and bicycle and cycle rickshaw and parts have shown a significantly positive growth in total factor productivity. The falling trend in total factor productivity has been noted in rest

of the industries. Therefore, it was concluded that except a few industry groups, the manufacturing sector of Punjab is utilising employed resources inefficiently and resulted into a high unit cost of production. Keeping in view the findings of earlier studies and their limitations in terms of exploition of data, Bhalla(1990) has computed Solow residual for the factory sector as a whole as well as two-digit industries excluding electricity covering the period 1979-86. His study showed significant technological progress by this sector. In his own words, "these relationships seem to have undergone a radical change during the eighties". However, he has not attempted to seek out the factors which are responsible for reversing the ealier trends.

To allocate the growth of output among the contribution of capital and labour inputs and changes in productivity both for factory sector as a whole and two-digit factory sector industry groups, we have used a translog index of productivity growth. This index is the difference between the growth rate of output and of capital, and labour inputs. Weights are given by average shares of each input in the value of output. The rate of growth of output is the sum of the contributions of capital and labour inputs and the rate of productivity growth. The contribution of each input is the product of average value share of input and its growth rate. Tables 3 and 4 compare the average annual growth rate of output at aggregate and in each industry with

the average annual contributions of each input and the rate of productivity growth. The combined contribution of capital and labour inputs is the predominant source of growth of output for the factory sector as a whole. It is significant to note here that combined contribution of factor input declined in the eighties and contribution of productivity growth has improved substantially. The factory sector as a whole includes both electricity and repair services which may have reduced the contribution of productivity growth to output. The notorious performance of public sector units especially in electricity is a well known phenomenon.

Higher growth of output of Punjab's factory sector is also accompanied by higher growth both in wages and labour productivity. However, with respect to unit labour cost, these effects tend to counteract each other. The matching rise of real average wages with productivity may be due to the labour legislations, higher level of skills and well organised labour force especially in electricity industry. However, the trade union movement is quite weak in other manufacturing industries(Bhangoo and Singh, 1988). During the decade of eighties, due to Punjab turmoil, the trade union activities virtually halted because of an emergency kind of situation created by both the state and millitant groups.

During the period 1979-90, the changes in productivity is a more important source of growth in ten two-digit

industries than that of the factor inputs(Table 4). For rest of the seven manufacturing industries, factor inputs have contributed predominantly to output growth. Our overall conclusion is that the contribution of capital input predominate over labour growth in accounting for output growth in manufacturing industries. Continuously rising trend of productivity growth experienced by the manufacturing industries during the eighties was mainly due to state policy of technological upgradation, modernisation and liberal import of intermediate inputs.

It is known to us through economic theory that an increase in productivity translates into lower cost per unit of output, thus increasing the firm's or industry's ability to compete successfully in domestic and international markets. We have employed the primary measure of international conpetitiveness, that is, the increase in the ratio of exports to SDP. The share of manufacturing exports in SDP has increased to 3.81 per cent compared with 1.77 per cent in 1971-72 (Table 5). It is also significant to note here that the share of exports in the manufacturing value added is 24.45 per cent. This seems to be a better measure of improved performance in international market compared with share of exports in SDP because agriculture sector's contribution in SDP is still predominant. Therefore, it can be inferred that the industrial economy of Punjab is highly integrated with the international economy. Although commodity composition of

exports have been diversified over the period, yet exports remain concentrated to few items like hosiery, bicycle, sports and machine tools(Table 6).

The relationship between productivity growth and export growth can be seen through figure 1. The industries which have significantly contributed to exports have also observed higher growth in productivity. A noteworthy feature of manufacturing industries of Punjab is that the mean output growth is found to be more correlated with productivity growth accross industries(figure 2). This implies that domestic competitiveness of the manufacturing have increased significantly over time.

IV

Impact of Domestic R&D on Total Factor Productivity:

Technological progress, analysed in the previous section, have been treated by the neoclassical theory as an exogenous process and mainly focused on capital accumulation as an endogenous source of output expansion. Recent studies on technological progress view innovation effort as a response to economic incentives(Romer, 1990; and Coe and Helpman, 1993). The innovation processes have been treated by these studies as a by product of knowledge which results from cummulative R&D expenditure. Emprical evidence on cummulative domestic R&D shows that it is an important determinant of productivity and has

supported the above mentioned progress in theory(Griliches, 1988). Futhermore, recent studies on fast growing economies like South Korea have also supported the argument that domestic capability to adapt and further develop technology is more important than external factors (Pack, 1994). However, external interaction of an economy through trade, direct foreign investment, and spillovers of external R&D are considered to be an important source of growth for a small open economy but domestic R&D is more important for large economies(Coe and Helpman, 1993).

In what follows an attempt has been made to examine factors that explain variations in total factor productivity. The variations in productivity growth have been explained and tested through the following regression equation:

$$LogTFP = a + b\ LogSD + c\ LogE + u$$

Where TFP is the Total Factor Productivity;
SD is the domestic R&D capital stock;
E is exports to external world;
b is the elasticity of total factor productivity(TFP) with respect to the domestic R&D capital stock; and
c is the elasticity of TFP with repect to exports.

Estimates of these elasticities obtained through OLS procedure are as follows:

$$\text{LogTFP} = -0.20228 + 0.14685\ \text{Log SD} + 0.34729\ \text{LogE}$$

$$(-2.008) \qquad (2.795) \qquad (1.523)$$

$$R^2 = .8431$$

$$F(2, 9)=.2418 \qquad DW=1.7118$$

Figures in parentheses are t-values.

During the period 1979-90, the elasticity of TFP with respect to domestic R&D capital stock is positive and statistically significant which shows that recent technological progress in manufacturing industries of Punjab has been achieved through incurring both domestic institutional and in house R&D by the government and the firms respectively. However, the elasticity of trade have also shown a positive trend but is insignificant. Our result on the positive contribution of domestic R&D capital stock is also supported by a study examining the success of firm level in house R&D expenditure on reduction of production cost for the bicycle industry of Punjab(Chadha and Dhawan, 1993).

The process of innovation described in theory are of two kinds. One emphasized the aspect of demand induced process(Schmokler, 1966) and the other stresses on technology opportunity and hence on quality and quantity of resources devoted to innovation(Freeman at al,1982). Our results are a pointer towards the latter factor. However, the R&D expenditure is mainly adaptive in nature and successful adaptation happens to be based on

local resources, expertise and inputs, which obviously resulted in lower costs and higher productivity. It has also been pointed out in a study (Chadha and Dhawan, 1993) that large and medium-sized enterprises were more successful in adapting technology than smaller ones. The overall conclusion which emerges from the foregoing analysis of technological progress is that internal factors are more important than the external ones in the case of Punjab.

V

Conclusions and Policy Implications:

Punjab's industrial sector has grown rapidly after the ushering in of the green revolution. However, industrial growth of the state does not match keeping in view its growing problems. The situation demands restsructuring of the industrial pattern and a process which can help in resolving the structural problems of the existing model of growth.

Small and medium scale industry, based on the traditional organizational pattern, cannot afford heavy in-house R&D expenditure. The need therefore, is to build up institutional R&D on the basis of a cooperative organizational pattern, which can provide not only a resource base for technology upgradation but also ensure the integration of the industrial units with these institutions. The resource endowment of the state has to be kept in mind while restructuring the industrial process. The new enterprises have to be based on local materials and local demands.

This kind of industrialization will be able to generate both production and expenditure linkages in the state's economy. It is relevant to recognise here that Punjab can not be industrialized along conventional lines. Priority should be given for setting up of the sunrise industries which produce skill-intensive, high-tech and high value-added items. In these industries the human resource factor is an important input in production relative to physical resources.

While deciding about the location of new enterprises, priority should be given to rural areas and that too for sufficiently large-sized units. This is contrary to the suggestions of the Eighth Five Year Plan. The suggestion is relevant because the small scale industrial units in the state are not only unable to attract and absorb the labour being displaced from the agricultural sector, but also because of the finacial and technological non-viability of many small-sized units. Large sized-enterprises are subject to enforcement of labour legislation and, therefore, provide attractive working conditions. The attractive working conditions and rural location of units will not only ensure the participation of the peasants and local labour but also save them from costly urban living conditions. This process will also enable realization the dream of converting farmers into part-time farmers on the Japanese pattern.

Beyond that, there is the whole question of

the integration of agricultural surpluses to finance industrial growth. This question enables us to look at the need to restructure the organizational pattern of the industrial sector. It needs to be mentioned here that the existing organizational pattern of the industrial structure is incapable of building up linkages between the modern industrial sector and agricultural capital. Thus, it appears to us that the most suitable organizational setup is a cooperative one. Even if cooperatives had failed in the past, their vital place in development strategy requires that they be made to succeed in the future. The suggested cooperatives as an organizational pattern for industrial development have the capacity to integrate the modern industrial sector and the vast hinterland and they can set in motion the dynamic process of the overall increase of income, consumption, employment and production as the core of self-sustaing economic growth.

References:

Ahluwalia,I.J.(1985) **Industrial Growth in India: Stagnation since the Mid-Sixties**, New Delhi: Oxford University Press.

Banerjee, D. and A. Ghosh(1985) 'Indian Planning and Regional Disparities' in A.K. Bagchi(ed.) **Economy, Society and Polity,** Calcutta: Oxford University Press.

Bhalla, G.S.(1991)'Agricultural Growth and Industrial Development: A Case Study of Punjab', New Delhi:ISID(**memeo**)

Bhangoo, K.S. and U.C. Singh(1987) 'Trade Unionism in Punjab:A Decadal Analysis', Paper Presented in the **National Seminar on Trade Uions and Industrial Relations**, Allahabad:MONIRBU.

Chadha,V. and S. Dhawan(1993) 'Technology Adaptation by Cycle Industry', **The Tribune**, June 3.

Chanderasekhar, C.P.(1988) 'Aspects of Growth and Structural Change in Indian Industry', **Economic and Political Weekly**, Annual Number.

Chenery,H.et al(1986) **Industrialization and Growth: A Comparative Study**, New York:Oxford University Press.

Coe,D.T.and E.Helpman(1993) 'International R&D Spillovers', **NBER** Working Paper No.4444.

Dhar, P.N.(1990) **Constraints on Growth: Reflections on Indian Experience**, New Delhi:Oxford University Press.

Dhesi, A.S.and B.S. Ghuman(1983) 'Productivity Trends and Factor Substitutability in the Manufacturing Sector in Punjab: Implications for Planning', **PSE Economic Analyst**, vol.III & IV.

Freeman, C. et al(1982) **Unemployment and Technical Innovation**, London:Frances Pinter.

Gill, S.S.(1991) 'Development Experience of a Fast Growing Region in a Slow Growing Backward Economy', Patiala: Dept. of Economics, Punjabi university(**memeo**).

Griliches, Zvi(1988) 'Productivity Puzzles and R&D: Another Non Explanation', **Journal of Economic Perspectives**, 2.

Pack, H.(1994) 'Endogenous Growth Theory:Intellectual Appeal and

Empirical Shortcomings', **Journal of Economic perspectives**, 1, Winter.

Pandit, M.L.(1985) **Industrial Development in Punjab and Haryana**, DELHI:B.R.Pub.Corporation.

Romer, P.M.(1990) 'Endogenous Technical Change', **Journal of Political Economy**, 98.

Sandesara, J.C.(1992) **Industrial Policy Planning-1947-1991**, New Delhi:Sage Pub.

Schmokler, J.(1966) **Innovation and Economic Growth**, Cambridge:HUP.

Singh, L.(1985) **Productivity Trends and Factor Substitutability in Punjab Industry**, Patiala: Pujabi University, unpublished M.Phil., Thesis.

Singh, L.(1990) **Industrial Growth in Punjab: An Anlysis of Growth and Structure of Wages**, Patiala: Punjabi University, Unpublished P.hD.,Dissertation.

Singh, L.(1992) 'Aspects of Growth and Structural Change in Industrial Sector of Punjab', **Man and Development**, June.

Table 1.

Trends in Net State Domestic Product at 1970-71 Prices
(Per cent per annuam)

Sector	Relative Shares		Growth Rates				
	1970	1990	1965/66 to 1990/91	1965/66 to 1974/75	1975/76 to 1990/91	1975/76 to 1984/85	1985/86 to 1990/91
Agriculture	58.37	47.94	4.65	3.85	5.16	4.13	4.76
Industry	08.78	18.81	7.96	7.05	7.69	6.33	7.16
Manufacturing	08.00	16.60	7.65	6.71	7.45	5.68	11.03
Reg.Manufacturing	03.95	09.02	8.55	5.70	9.22	7.71	9.57
Unreg.Manufacturing	04.05	07.58	6.87	7.69	5.69	4.01	10.28
Construction	06.53	02.81	2.16	1.63	1.47	1.86	3.43
Services	26.32	30.44	5.75	5.99	4.40	7.02	4.94
Total	100.00	100.00	5.45	4.94	5.10	5.17	5.11

Source: C.S.O., **Estimates of State Domestic Product**, New Delhi:GOI, Various Issues.

Table 2.

Growth Rates of Manufacturing - Punjab and India

Years	Punjab	India		
		(a)	(b)	(c)
1965-66 to 1974-75	7.65	3.7	4.3*	-
1975-76 to 1984-85	5.68	4.8	_	4.6**
1985-86 to 1990-91	11.03	-	-	6.7***

Where a stands for Sandesara's (1992) estimates.
b stands for Ahluwalia's (1985) estimates.
c stands for World Bank's(1992) estimates.
* 1966-67 to 1979-80
** 1970-80
*** 1980-91

Table 3

Growth of Output, Inputs, Total Factor Productivity and Real Wages in Punjab's Factory Sector

	1967-90	1979-90
Growth of Value added	9.04	8.43
Contribution of		
(a) Capital input	6.07	4.64
(b) Labour input	2.43	1.90
Growth of TFP	0.54	1.89
Growth of Labour Productivity	3.74	-
Growth of Real Wages	3.02	

Source : C.S.O., Annual Survey of Industries, New Delhi: Govt. of India, Various issues.

Table 4

Growth of Output and Contribution of Factor Inputs and Total Factor Productivity of Manufacturing Industries of Punjab(1979-90)

Ind.Code	Ind.Name	Value added	Inputs		TFP
			Capital	Labour	
20-21	Food products	10.13	3.58	1.54	5.01
22	Beverages,tabacco and tobacco products	11.96	3.48	1.96	6.53
23	Cotton textiles	5.36	4.40	0.42	0.54
24	Wool,silk and synthetic fibre textiles	11.81	2.71	1.96	7.15
26	Textile products	14.71	9.67	3.05	1.98
27	Wood & wood products furniture & fixture	0.33	2.51	-8.60	6.42
28	Paper and paper products	21.08	-2.74	10.67	13.14
29	Leather and fur products	11.53	3.86	4.40	3.27
30	Rubber,plastic, petroleum and coal products	26.72	17.23	3.90	6.40
31	Chemical and chemical products	7.48	-12.76	1.90	18.33
32	Non metalic mineral products	5.71	-2.20	2.72	5.20
33	Basic metal and alloys industries	6.57	0.23	0.40	6.30
34	Metal products and parts	2.65	3.82	-0.13	-1.09
35	Machinery,machine tools and parts	5.11	0.56	0.38	4.17
36	Electrical machinery apparatus,appliances	11.86	8.83	2.66	0.37
37	Transport equipment and parts	12.59	3.31	2.13	7.14
38	Other manufacturing industries	9.33	3.32	-1.43	7.44

Source: As in table 3.

Table 5.

Share of Industrial Exports in State Domestic Product and Manufacturing Value added.

Year	Per cent of SDP	Per cent of manufacturing value added
1971-72	1.77	19.93
1975-76	2.51	22.92
1980-81	2.95	23.23
1985-86	2.57	18.39
1990-91	3.81	24.45

Source: E.S.O., Statistical Abstract of Punjab, chandigarh: Govt. of Punjab, Various issues.

TABLE 6.

Changes in the Composition of manufacturing Exports and Growth.

Ind.Code	Name of industry	1975-76	1990-91	Growth
20-21	Food products	4.93	2.19	-1.21
23	cotton textile	1.88	3.82	18.92
24	Wool, silk and synthetic fibre textiles	7.74	2.95	0.52
26	Textile products	37.24	37.77	11.19
29	Leather and fur products	0.37	3.90	12.89
30	Ruber, plastic, petroleum and coal products	0.26	1.80	3.64
34	Metal products and parts	3.97	4.14	-0.19
35	Machinery, machine tools and parts	0.75	0.81	6.88
36	Electrical machinery, apparatus and parts	5.28	4.52	13.48
37	Transport equipment and parts	26.89	10.02	3.54
38	Other manufacturing industries	6.62	25.44	14.64

Source: As in table 5.

Figure 1.

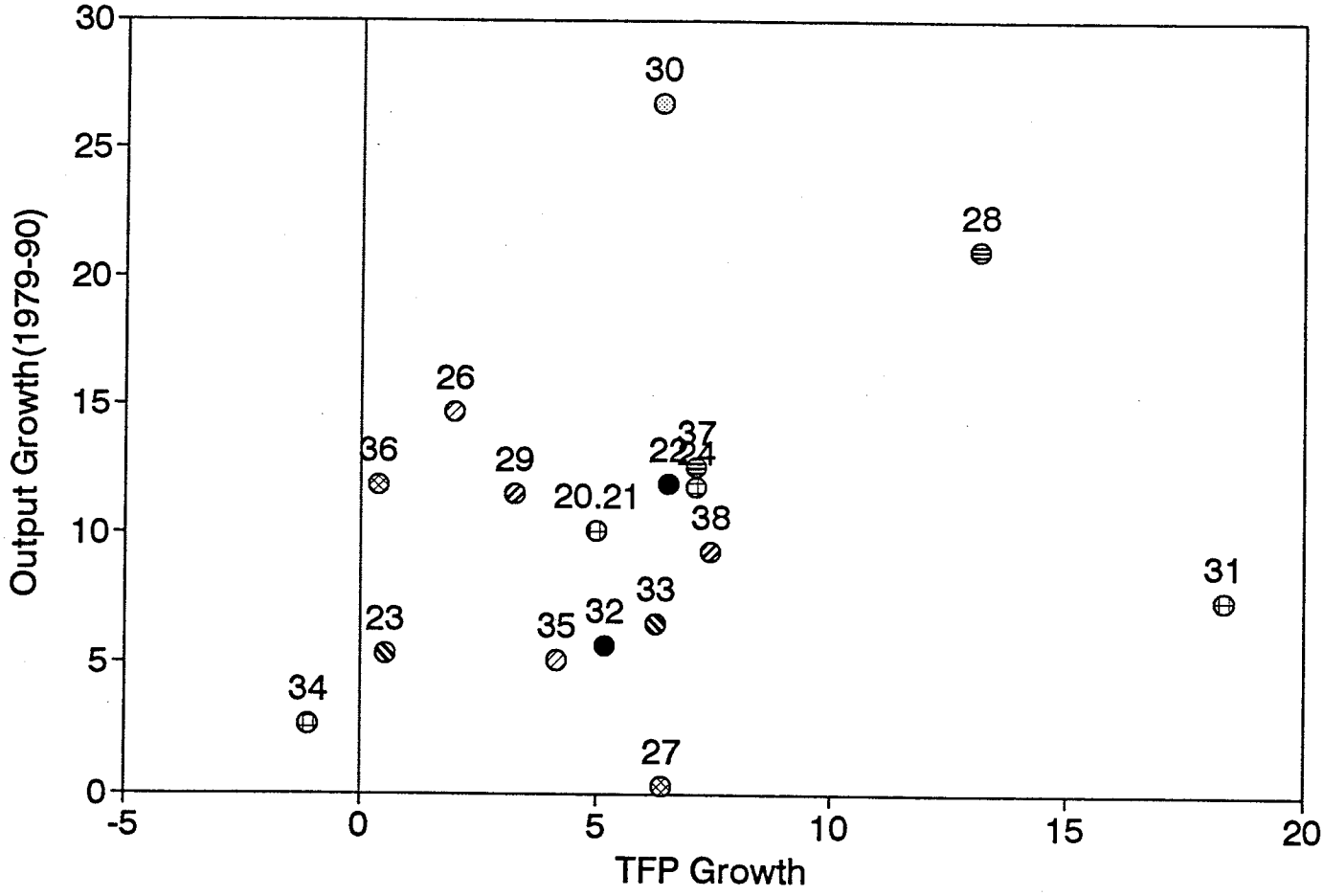
Output Growth(1979-90)
TFP Growth
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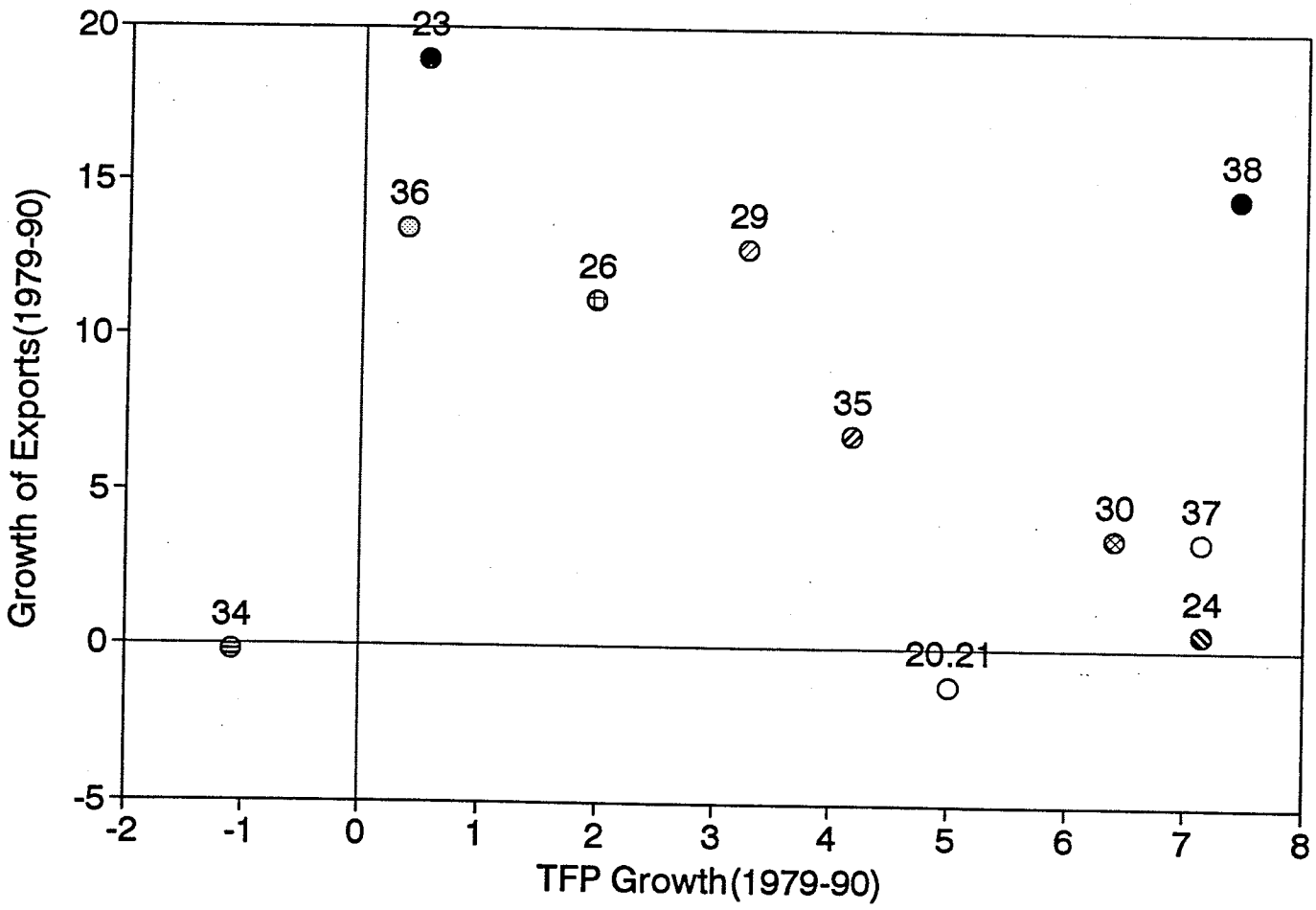
Figure 2.


Growth of Exports(1979-90)
TFP Growth(1979-90)
20
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