Sustainability of Services-Led Growth: An Input Output Analysis of the Indian Economy

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The sustainability of services as also of services-led growth of the Indian economy has been addressed in terms of the inter-sectoral linkages as emanating from the input-output transactions tables for 1993-94 both at the disaggregated level of 115 activities and the aggregated level of 10 constructed national accounts categories. At the disaggregated level, the Indian economy is found to be predominantly services-intensive with 55 per cent activities direct services-intensive and industry the most services-intensive sector. In the process, industrial activities turn out to be the major pace setter for services-growth. On the other hand, services stand out to have the largest inducing effect on the economy as per the Rasmussen measure of both backward and forward linkages. The backward and forward coefficients of variation indices, however, show that the inducing impulses from services might have worked mainly through the channel of forward linkage. However, since the forward linkage is inherently less effective than the backward linkage, the inducing impact of services on the rest of the economy could be limited. Nevertheless, as per the index of vertical integration, the services sector is found to have the largest expansionary potential (multiplying effect) on the rest of the economy. Therefore, the services-led growth augurs well for the Indian economy for sustaining the overall GDP growth. However, since the multiplier value remains less than one for all the activities including services, the expansionary potential of a services-led growth may not be over emphasised unless accompanied by growth impulses from other sources.

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Introduction

The services sector has been the mainstay of the Indian growth process in the 1990s. While the share of services has been ruling high ever since independence, it has received a major fillip only in the 1990s. Indeed, contribution of the services sector to the overall GDP growth peaked an all time high of 65.1 per cent in the 1990s up from 43.6 per cent in the 1980s. As a result, the services share in GDP went up by a spectacular 7.9 per cent in a single decade of the 1990s touching the mark of 48.5 per cent in 2000-01 while the sector took about four decades to improve its share by 12.6 per cent to 40.6 per cent in 1990-91 from 28.0 per cent in 1950-51. The ascendancy of services has had a stabilising effect on the growth process itself. To quote from the Reserve Bank's *Report on Currency and Finance, 2000-01*, ''…it is the services sector which has kept the GDP growth around 6.0 per cent in the 1990s when industry and agriculture sectors did not perform relatively well'' (p. iii – 44). Thus, ''the services sector has been the most dynamic sector of the Indian economy, especially over the last ten years'' (*National Statistical Commission*, 2001, art 7.1.2).[1]

Another notable feature of the 1990s is the emergence of information technology (IT) related services. On this count, India has come to be increasingly recognised as a post-industrial society and as a knowledge-based economy. Such optimism is possibly routed to the recent spurt

in software exports and the perceived potential of trade in services such as IT, communications and entertainment. Indeed, in conjunction to the domestic economy, services, hitherto considered non-tradable, have provided a significant source of comfort to the country's balance of payments in the 1990s. The Reserve Bank's *Report on Currency and Finance, 2000-01* has explicitly recognised this development: ''As against a deficit of US $ 0.2 billion in 1990-91 that partly exacerbated the external payments imbalances during that year, the net invisible surplus has grown over time to around US $ 12-13 billion in the recent period, imparting resilience and sustainability to current account deficits and overall balance of payments during the 1990s'' (p.vi -6).

The preponderance of services in the Indian economy, however, runs counter to the conventional wisdom on development at least on two counts (Madheswaran and Dharmadhikary, 2000). The well-known sequence of structural transformation from an agrarian economy to a predominantly service economy *en route* an industrial economy as noticed in the developed world has not been witnessed in India. While the share of agriculture in GDP has registered a secular decline from 57.7 per cent in 1950-51 to 24.2 per cent in 2000-01, the void has not been filled in by industry even though it has improved its share to 27.3 per cent in 2000-01 from 14.8 per cent in 1950-51. On the other hand, services sector has come to occupy the position of a prime mover in the Indian economy with its share at 48.5 per cent in 2000-01 as against 28.0 per cent in 1950-51. The observed dominance of services ahead of industry with the decline of agriculture has, however, given rise to apprehension as to whether the sequence of the growth process would be reversed in the future particularly when industry is yet to achieve adequate growth. Such apprehension seems to have gained a ground in the absence of preponderance of services in the country's employment. In 1999-00, services have accounted for around 23.5 per cent of total employment in the country. On the other hand, agriculture still continues to account for a major share of employment despite its secular decline in terms of share in GDP. In the developed world, however, rise and dominance of a sector in GDP has been accompanied by its simultaneous ascendancy in employment. The observed counter-factuals in terms of sequence of growth and employment as also the apparent imbalance between the two have been an added concern in the Indian growth process.

The spectacular performance of the services sector in the 1990s has once again raked up the issue of its plausibility and sustainability (Acharya, 2002b). The issue has attracted an added attention in view of the fact that a part of the services growth is reckoned to be 'spurious' as reflecting the revaluation of contribution from public administration and defence in line with the Fifth Pay Commission's recommendations. The impact of such wage hike on GDP has found place even in official documents including the *Economic Survey, 1998-99:* ''…fully one percentage point of growth of 5.0 per cent in GDP for 1997-98 is attributed to the 20 per cent increase in real value added in the 'public administration and defence' sub-sector arising chiefly from pay increases to government servants'' (p.1). Subsequent sobering of the growth performance of the economy seems to have extended credence to such concerns.

Indeed, the high growth momentum of the 1990s seems to have petered out in the new millennium with the growth fatigue finally catching up the services sector. The GDP growth crashed to an abysmal 4.0 per cent in 2000-01, the lowest since 1992-93, under the weight of the services growth touching the rock bottom of 4.8 per cent, a level witnessed only in the crisis year

of 1991-92. Although a modicum of recovery set in during 2001-02 both for the services sector and the GDP, the sudden deceleration of the services sector has brought the question of its sustainability at the centre-stage.

Even in the financial press, the question being hotly debated has been: how long can the services growth remain immune to the happenings in agriculture and industry? For example, S. S. Anklesaria Iyer (2002a; 2002b) in a series of articles in *The Economic Times* has welcomed the rapid growth of services in the 1990s. In his view, 'as the industry-less growth is here to stay, our ability to compensate for industrial failure with services success is a strength, not a weakness'. On the other hand, Acharya (2002a; 2002c) has been sceptical of the idea of services-led growth. In his words, '…India's services sector can't enjoy fast and sustained growth. It can, but only in tandem with a fast growing industrial sector…Services cannot, by themselves, assure rapid and sustained growth of the Indian economy.'

As the Indian economy is currently passing through a phase of industrial slowdown coupled with a cyclical downturn in agriculture, a perceptive view on the services growth assumes prescriptive importance in steering the economy on to the path of recovery. It is against this backdrop, the present study sets out its focus on the sustainability of services growth as also of the overall services-led growth process. Specifically, the study is built around the following quests: what is the services intensity of the various sectors of the economy? How strong are the backward and forward linkages of services with the rest of the sectors? Are the strong backward and forward linkages of services, if any, an outcome of large transactions with a few sectors or an outcome of broad-based transactions with many sectors? What is the expansionary potential of services on non-services in terms of the multiplying effect on the rest of the economy? Which services have the largest multiplier effect on the economy?

The rest of the study is organised as follows. Section I presents a select survey of literature on the role of services in the growth process with special reference to India. Section II offers a snapshot of the observed relationship between the services and the major macro aggregates including income, consumption, capital and export in the Indian economy. Section III discusses the methodological background and data sources. Section IV presents the empirical findings coupled with their possible interpretations. Section V concludes the study.

Section I
Services Sector and Economic Growth: A Select Survey of Literature

The role of services in the development process is marked by a long controversy. In fact, the debate dates back to Adam Smith who was of the view that services 'perish in the very instant of their performance and seldom leave any trace or value behind them'. As such, services have drawn for themselves a tag of unproductive activity from the classical economists. Until recently, services used to be treated accordingly by the erstwhile socialist or centrally planned economies and classified as 'non-material production' as against the productive 'material production' in their national accounts statistics.

While services have long come out of such categorisation, the debate seems to have shifted its focus to the level of productivity. While Fisher (1935) and Clark (1940) attributed the

preponderance of services in the developed world to its level of income, they recognised the low productivity in services as a factor behind the faster employment growth in services than in industry. Fuchs (1965) also came to a similar conclusion for the US economy in the 1960s. Such productivity differentials formed the basis of the well-known 'cost disease' hypothesis of services propounded by Baumol (1967). Higher productivity in industry was visualised to raise wages even in services more than the productivity growth, leading to a chronic tendency for costs and prices of services to increase relative to goods. In view of the post-1973 productivity slowdown in the US, increasing tertiarisation of the US economy has been a cause for concern (Triplett & Bosworth, 2000).

The reported low productivity in services has however been questioned, among others, by Griliches (1992). The low level of services productivity is advocated to be a fall-out of mis-measurement of services output. Besides, factors like technological change, deregulation and increased competition are set to raise productivity at least in select services (Maclean, 1996). Even Baumol *et al* (1985) have recognised the case of 'progressive' services with substantial productivity gains. Besides, the 'asymptotically stagnant' services initially register productivity gains followed by standardisation and stagnation in productivity. Nevertheless, there is now increasing recognition that the very act of service even involves externalities for user or the user's goods in terms of gain in productivity or its potential (Hill, 1977). In fact, such over-bearing feature of services makes the estimation exercise daunting and more so for the newly arrived activity of information technology (IT)-related services as the national statistical systems are largely designed to capture developments only in the goods sector. This has led to a situation of low measured productivity despite increased use of computers and IT, which is otherwise expected to boost the productivity growth. This incongruity is popularly known as the Solow productivity paradox. While several attempts have been made to explain the paradox, the exact role of distortions in official statistics therein remains controversial (Diewert, *et al*, 1999).

Yet another popular scepticism perceives services as innovation laggards and primarily consumers of innovation in manufacturing (Miles, 1993). However, increasingly such a view has come to be questioned in recent period. In contrast to a manufacturing innovation in terms of new or improved product/process, innovation in services often relates to how, where and when a service is delivered (Howells, 2000). Productivity-enhancing investment in ICT (*i.e.*, information and communication technology), regulatory reform and growing tradability of services are among the major factors contributing to innovations in services (Pilat, 2000a).

A logical corollary to the concerns of productivity and innovation has been the view that high growth, be that of services or the service-oriented economies, is not sustainable. The decline in manufacturing and the corresponding shift to services is widely held to be unsupportable in the long run since services depend critically on manufacturing for their existence. Such well-entrenched notion of parasitic and dependent services has recently come under increasing scrutiny (Bryson and Daniels, 1998). Rather than services following and supporting manufacturing, manufacturing is seen as flowing to those countries and areas where the services infrastructure is efficient and well developed (OECD, 2000). Besides, the increasing resembling of services with commodities has enabled the former to emerge as the major driving force in economic growth. Thus, the conclusion that service economies are naturally sluggish seems to be premature (US Department of Commerce, 1996).

Be that as it may, the growing role of services in national economies is clear and unequivocal particularly for the developed world, which could better be labelled as post-industrial society (Bell, 1967). A variety of explanations are put forward in the literature to explain such an orientation. To begin with, the building block of the Fisher-Clark hypothesis of increasing tertiarisation with increased income has been a variant of the Engel's Law that the income elasticity of demand for services is greater than that of demand for goods. While early empirical works have found support to such hypothesis, recent studies such as Falvey and Gemmell (1996) have tended to reject the income-elastic demand for services overall but confirm a wide range of income elasticity estimates (above and below unity) across different types of services. Indeed, in contrast to a post-industrial society, Gershuny (1978) has even advocated a self-service economy, wherein self-service activities with the help of consumer durables are visualised to replace the purchased consumer services. The increased use of consumer durables is expected to enhance the demand for intermediate services such as servicing and repair of household equipments. The Gershuny effect is found to operate in a number of developed and developing economies including Brazil (Flores, 1995). The thesis has also been questioned both on theoretical and empirical grounds. For example, Silver (1987) has argued that increasing woman participation in workforce reduces the time available for self-service within the household. On the other hand, emergence of a broad-based prosperous middle class coupled with an ageing population is found to boost the demand for consumer services in the Asia (Wirtz, 2001).

The process towards increasing specialisation and vertical disintegration has entailed focusing on core competencies combined with outsourcing of peripheral activities (Stigler, 1956). The externalisation of non-core activities, formerly carried out in-house and counted as industrial output, is believed to be the engine of services growth and, by the same token, decline of industry. Such contracting out renders the firm's cost structure flexible necessitated by a shorter product cycle and changing taste pattern. However, externalisation is found to have only marginally influenced the growth of small business service firms of the UK (Bryson, *et al*, 1993). Yet another accounting explanation of the services growth can be traced to the work of Browne (1986). With the increasing monetisation of the economy, a major chunk of household activities is outsourced from the market. The measured growth of national income is, therefore, biased upward since such shifts in production do not result in a corresponding increase in total output of the combined household and market sectors.

With the increasing complexities of modern industrial organisations, manufacturing activities have become more and more service intensive both upstream (*e.g.*, design and R & D) and downstream (*e.g.*, marketing and advertising) (Pilat, 2000b). Competitive advantage of a firm now depends more on providing specialised services like financing and after-sales facilities than on production, which has increasingly become routinised. On the other hand, new in-house services have come up to extend an interface with the outside provider of services on externalisation of the latter (UNCTAD, 1989, p. 145). All these are arguably reflected in increased demand for intermediate services. In the case of Canada, however, intermediate services have not registered substantial increase (*Economic Council of Canada*, 1991).

The ascendancy of services in the developed world has often been accompanied by

deindustrialisation as in the case of the UK. Kaldor (1966) was of the view that a mature economy could continue to benefit from economies of scale 'not through a fast growth in manufacturing industry as a whole, but through greater international specialism … or in other words by increasing the degree of interdependence of British industry with the industries of other countries' (p. 122). Thus, management and service functions may be located in one country while manufacturing activities in another. Such a process has possibly worked out in rapid industrialisation of the developing world and de-industrialisation of the developed world.

In the Indian context, the increasing share of services in GDP has been a source of controversy ever since independence. Rao (1954) discounted it as an indicator of development in the context of a developing country. Nevertheless, the dominance of services was traced back to factors such as the increasing role of government in economic planning and execution, the historical role of urban middle class in wholesale trade and distribution, and the demonstration effect of high income countries (Panchamukhi, *et al*, 1986). The sustainability of a service-led growth was once again questioned by Shah (1987) and Mitra (1988). Bhattacharya and Mitra (1989; 1990) also felt that the service-led growth could have serious implications for inflation, income distribution and balance of payments since income (employment) might have grown faster than employment (income) in the organised (un-organised) services. Besides, '…income from service sector is growing much in excess of the demand generated for the services by the commodity sector' (p. 2449). However, in view of the similar pattern of growth both in net material product and NDP during 1950-51 to 1983-84, Datta (1989) refuted the view of overgrowth of the services sector. Given the limited role of services in employment generation and absorption, policy intervention was advocated in some circles (Mazumdar, 1995, and Arunachalam and Kumar, 2002). Bhowmik (2000) highlighted the fact that about 50 per cent industries in the Indian economy were direct and direct plus indirect services intensive in 1991-92. Besides, services appeared to be the most growth-inducing and generated a higher value added in other industries than in their own.

Section II
Services Sector in the Indian Growth Process: A Few Stylized Facts

The preponderance of services over industry is not a recent phenomenon for the Indian economy but has been in place since the beginning of 1950s (Table 1). Such predominance of services over industry could be an outcome of the de-industrialisation process pursued in British India (Bagchi, 1982). While the decline of the primary sector, *i.e.*, largely agriculture, is in keeping with the conventional wisdom on development, the preponderance of services ahead of industry stands out as a departure from the past. Nonetheless, the Indian experience is not a standalone case. A number of developing countries such as Zambia, Chad, Sudan, Kenya and Pakistan have also undergone a similar phase in their development process.

Table 1: Agriculture, Industry and Services: Shares in GDP

(Per cent)

Year	Agriculture	Industry	Services
1	2	3	4
1950-51	57.2	14.8	28.0
1960-61	54.7	16.6	28.7

1970-71	48.1	19.9	32.1
1980-81	41.8	21.6	36.6
1990-91	34.9	24.5	40.6
2000-01	24.2	27.3	48.5
2001-02	24.3	26.7	49.0

Source: Central Statistical Organisation.

Moreover, the decline in growth of GDP has in general not been accompanied by a reduction in share of services (Table 2). This observation runs counter to the established theories but is in keeping with the growth experience of the developed world (Chandrasekhar and Ghosh, 2000). The visible hand of the government as reflected in planning and production in the economy as a whole could have contributed to such a development (Mazumdar, 1995).

Table 2: Services and GDP: Growth and Share

(Per cent)

Year	Services Growth	GDP Growth	Services Share
1	2	3	4
1951-52	2.7	2.3	28.1
1960-61	5.9	7.1	28.7
1970-71	4.9	5.0	32.1
1980-81	4.5	7.2	36.6
1990-91	5.3	5.6	40.6
2000-01	4.8	4.0	48.5
2001-02	6.5	5.4	49.0

Source: Central Statistical Organisation.

The services sector entered the decade of 1990s with a growth of 5.3 per cent, even lower than the GDP growth of 5.6 per cent in 1990-91 (Table 3). In the following year of the balance of payments crisis when both agriculture and industry encountered a negative growth, services posted a positive growth of 4.8 per cent, ensuring an overall GDP growth of 1.3 per cent. During the boom phase of 7 per cent plus GDP growth, *i.e.*, from 1994-95 to 1996-97, the growth in services as well ruled over 7 per cent. In the subsequent years till 2001-02, the services growth remained higher than those of the other sectors barring 2000-01 when it crashed to a mere 4.8 per cent primarily gravitated by the negative growth in non-bank financial companies. Overall, the services sector posted a growth of 7.6 per cent in 1990s up from 6.6 per cent in 1980s.

As per the *Economic Survey, 2000-01,* liberalisation of the economy in the 1990s and encouragement of private investment in industry and infrastructure have induced sustained high growth in services sector. A rapid increase in expenditure on public administration and defence, social services, and rural extension services also has an impact on the growth of services sector. Besides, IT software and services has emerged as one of the fastest growing segments of the economy with a compound annual growth of over 50 per cent during 1990s (Rastogi, 2002).

Table 3: Sectoral and Overall GDP Growth Since 1990-91

(Per cent)

Year	Agriculture	Industry	Services	GDP
1	2	3	4	5
1990-91	4.1	7.7	5.3	5.6
1991-92	-0.02	-0.6	4.8	1.3
1992-93	5.8	4.0	5.4	5.1
1993-94	4.1	5.2	7.7	5.9
1994-95	5.0	10.2	7.1	7.3
1995-96	-0.9	11.6	10.5	7.3
1996-97	9.6	7.1	7.2	7.8
1997-98	-2.4	4.3	9.8	4.8
1998-99	6.2	3.4	8.3	6.5
1999-00	1.3	5.3	9.5	6.1
2000-01	-0.2	6.3	4.8	4.0
2001-02	5.7	3.3	6.5	5.4
Memo Item				
1990-00	3.3	5.8	7.6	5.8
1980-90	4.4	6.8	6.6	5.8

Source: Central Statistical Organisation.

In commensurate with the value added, services share in private final consumption expenditure has witnessed a steady increase from 10.2 per cent in 1950-51 to 29.0 per cent in 2000-01 (Hansda, 2002). The share of services export as a per cent of merchandise export has also improved from 13.8 per cent in 1950-51 to 45.1 per cent in 2001-02. On the other hand, the share of services in net fixed capital stock has declined from as high as 68.4 per cent in 1950-51 to 45.3 per cent in 1999-00. Similar trend is observed in its share of gross capital formation (*i.e.*, investment), which has decreased from 57.7 per cent in 1950-51 to 39.6 per cent in 1999-2000. The absorption of labour in services has also not been that encouraging.

While the various sources of growth vent out conflicting signal for services, the sector has come to occupy the dominant position in the Indian economy by the end of 1990s. Probably greater intersectoral linkages as reflected in the growing intermediate use of services as against their final use have been the major contributor to the services growth (Table 4). The intermediate use of services output has grown from 31.2 per cent in 1968-69 to 38.5 per cent in 1993-94 when its final use has declined from 68.8 per cent to 61.5 per cent over the same period. The increased intermediate use of services output has taken place in the production of both commodities and services. It is towards such exploration of intersectoral linkages, the following section discusses the methodology of the present study.

Table 4: Percentage Distribution of Services Output

Item	Year	Commo-dities	Services	Intermediate Use	Final Use	Total Output
1	2	3	4	5	6	7
Services	1968-69	21.8	9.4	31.2	68.8	100.0
	1973-74	21.2	9.4	30.6	69.4	100.0
	1978-79	23.4	15.5	38.9	61.1	100.0
	1983-84	24.4	13.1	37.5	62.5	100.0
	1989-90	27.8	12.8	40.6	59.4	100.0

1993-94	26.8	11.7	38.5	61.5	100.0

Source: *Input-Output Transactions Table 1993-94,* CSO (2000).

Section III
Data Base and Methodology

Given the line of inquiry as set out *ab initio*, the empirical quest has been pursued in an input-output framework. For the purpose, CSO's latest Input-Output Transactions Table (IOTT), which pertains to the year 1993-94, has been utilised. As per the IOTT, 1993-94, the economy is disaggregated into 115 activities, of which 22 activities are in agriculture, 80 in industry and 13 in services. The analysis is carried out both at the level of 115 activities and at the aggregated level. For the later, 115 activities are clubbed into 10 broad categories in line with the sectorisation of national accounts statistics.

The basic input-output relation can be presented in the following matrix notation: $X = AX + F$ (1)

where $X = (x_1, \ldots, x_N)'$ is the vector of gross output; $A = (a_{ij})$ is the matrix of technical input-output coefficients and $F = (f_1, \ldots, f_N)'$ is the vector of final demand. Equation (1) states that gross output, X, is the sum of intermediate demand, AX, and final demand, F. From equation (1), it follows that

$$X = (I - A)^{-1} F \quad (2)$$

if (I – A), known as the Leontief matrix, is non-singular and where I is the identity matrix. The matrix $(I - A)^{-1}$ is known as the Leontief inverse matrix, which represents the direct and indirect requirements of gross output in each line of activity to support one unit of final demand in each line of activity.

As a first approximation of the inter-sectoral linkages, sectoral intensity of an activity is often employed in the literature (*e.g.*, Proops, 1988). While such intensity could be defined in a variety of ways, the popular ones run in terms of output or final demand. Specifically,

GX = Sectoral intensity in relation to output (3)

G^*F = Sectoral intensity in relation to final demand (4)

$$G^* = G\,(I - A)^{-1} \quad (5)$$

where G is the vector of direct input requirements from a sector (i.e., agriculture, industry or services) to produce one unit of gross output by an activity and G^* is the vector of direct and indirect input requirements from a sector to produce one unit of output for final demand.

The widely used measures of inter-sectoral dependence are the backward, forward and total linkage indices *a la* Rasmussen (1956). Backward linkage of a sector measures the inducement to production in other sectors, which is absorbed as an input to the former. On the other hand, forward linkage of a sector measures the extent to which the sector provides inputs for utilisation by other sectors. The sectors having large total linkage is called the key sectors for the purpose of investment allocation with a view to ensuring a faster industrialisation.

The sum of elements in the i^{th} row of the total requirement matrix $(I - A)^{-1}$ is normally taken to be the measure of forward linkage. Such measure of forward linkage assumes a uniform increase in demand by one unit for all the sectors, which is however unlikely to materialise in practice. Weighting the total requirement matrix by the share in final demand is claimed to avoid the problem (Claus, 2002). Accordingly, each element of $(I - A)^{-1}$, say b_{ij}, is weighted to generate b_{ij}^{w}, the typical element of the final demand weighted Leontief inverse where $b_{ij}^{w} = b_{ij} f_i / \Sigma_{i=1}^{N} f_i$

The sum of elements in the i^{th} row of the final demand weighted Leontief inverse, *i.e.*, $b_{i.}^{w} = \Sigma_{j=1}^{N} b_{ij}^{w}$, which is nothing but the forward linkage, shows the increase in output of the i^{th} sector used as inputs for producing an additional unit of final demand output, given each sector's share in total final demand. The inter-industry comparison of forward linkages can be made by constructing an index of the forward linkage as follows:

$$U_{i.}^{w} = (1/N) b_{i.}^{w} / (1/N^2) \Sigma_{i=1}^{N} b_{i.}^{w} \quad (6)$$

The numerator of equation (6) measures the average stimulus to other sectors, according to each sector's share in total demand, resulting from a unit increase in final demand for output of the i^{th} sector. The denominator measures the average stimulus to the entire economy resulting from a unit increase in final demand for output of all sectors.

Similarly, an index of the backward linkage is derived the following way:

$$U_{.j}^{w} = (1/N) b_{.j}^{w} / (1/N^2) \Sigma_{j=1}^{N} b_{.j}^{w} \quad (7)$$

where sum of the elements in the j^{th} column, i.e., $b_{.j}^{w} = \Sigma_{i=1}^{N} b_{ij}^{w}$ stands for the input requirements for a unit increase in the final demand for output of the j^{th} sector given each sector's share in total final demand. Those sectors having each of the indices of backward and forward linkages greater than unity are considered the key sectors of the economy. Alternatively, sectors having the sum of indices of backward and forward linkages, *i.e.*, the total linkage equal to or exceeding the value of 2 may be treated as the key sectors (Anjaneyulu and Prakash, 1994).

The above indices of backward and forward linkages being the averages are sensitive to extreme values. A sector, which buys (sells) large amounts only from (to) a few sectors, may end up having a high backward (forward) linkage index. In order to account for such dispersion in intermediate (final) demand, the linkage indices are supplemented by the following coefficient of variation indices (Rasmussen, 1956):

$$V_{i.}^{w} = [(1/N) \Sigma_{j=1}^{N} \{b_{ij}^{w} - (1/N) b_{i.}w\}^{2}]^{1/2} / (1/N) b_{i.}w \quad (8)$$

$$V_{.j}^{w} = [(1/N) \Sigma_{i=1}^{N} \{b_{ij}^{w} - (1/N) b_{.j}w\}^{2}]^{1/2} / (1/N) b_{.j}w \quad (9)$$

The numerators in (8) and (9) are the standard deviations and the denominators the averages. The coefficient of variation index, $V_{i.}^{w}$ ($V_{.j}^{w}$) measures the relative evenness with which the i^{th} (j^{th}) industry sells (purchases) to (from) other sectors. A relatively large value of $V_{i.}^{w}$ ($V_{.j}^{w}$) means that the i^{th} sector sells (purchases) output (inputs) to (from) only a few industries in the economy. Obviously, the key sectors with low coefficient of variation index score a point in priority over the sectors with high coefficient of variation index.

The Rasmussen measures of inter-sectoral linkages have been criticised in the literature on a number of grounds. The backward and forward linkages are even shown to be mutually inconsistent, among others, by Cella (1984). Against such a backdrop, Heimler (1991) has put forward an alternative index of vertical integration, which measures the multiplying effect of each activity on the gross output of the rest of the economy.

As we are interested in the multiplying effect of the services sector for the year 1993-94, let us partition the matrix $A = (a_{ij})$ in four sub-matrices:

$$X_n = A_{nn}X_n + A_{ns}X_s + F_n \quad (10)$$

$$X_s = A_{sn}X_n + A_{ss}X_s + F_s \quad (11)$$

where X_n and X_s are the respective vectors of gross output of non-services and services activities, A_{nn} and A_{ss} are the matrices of technical coefficients for self-consumption in non-services and services activities respectively, A_{ns} and A_{sn} are the respective matrices of technical coefficients in respect of use of non-services in services and *vice versa*, and F_n and F_s are the vectors of final demand for non-services and services respectively.

Equations (10) and (11) can be respectively solved for X_n and X_s, treating the other as exogenous:

$$X_n = (I - A_{nn})^{-1}A_{ns}X_s + (I - A_{nn})^{-1}F_n \quad (12)$$

$$X_s = (I - A_{ss})^{-1}A_{sn}X_n + (I - A_{ss})^{-1}F_s \quad (13)$$

The first member of the right hand side of (12) [(13)] represents the direct and indirect effect of gross output of services [non-services] on that of non-services [services]. The latter can be multiplied by a diagonal matrix of value added coefficients (say, va_n) to obtain the value added of non-services (say, VA_n) needed directly and indirectly to produce services gross output:

$$VA_n = va_n\ (I - A_{nn})^{-1}A_{ns}X_s \quad (14)$$

$$VA_s = va_s\ (I - A_{ss})^{-1}A_{sn}X_n \quad (15)$$

where value added coefficient refers to value added divided by production activity-wise.

The expansionary potential of services on non-services and, in turn, on services can be gauged by constructing an index of vertical integration the following way:

$$Int_s = VA_n / TVA_s \quad (16)$$

$$Int_n = VA_s / TVA_s$$

where TVA_s stands for total value added of services. The index Int measures the indirect effect of services on non-services and, in turn, on services, providing a dimension free measure of the multiplier of each on the value added of the rest of the economy. The activity for which Int is the highest can be ranked as the key sector of the economy in terms of its ability to generate value added in other activities.

Section IV

Empirical Findings

Sectoral Intensity

The sectoral intensity of activities provides a ready-reckoner of the inter-sectoral linkages between agriculture, industry and services. While the details on sectoral intensity for all the 115 activities are presented in Appendix Table 1, Table 5 reports the summary observations. As per the direct measure of intensity (G), 34 out of 115 activities or 30 per cent activities have had the agricultural intensity above the average of 7 per cent of gross output. The sector of agriculture itself has turned out to be the most agriculture-intensive sector with 68 per cent of agricultural activities having the agriculture intensity above the average as against 23 per cent and 8 per cent of industrial and services activities respectively. Only one out of 13 services activities, *viz.*, hotels and restaurants has the agricultural intensity above the average. This implies that services activities hardly draw their inputs from agriculture while such linkage is relatively strong between industry and agriculture. In terms of variation in intensities, range in agricultural intensity has been higher than that of services intensity but less than that of industrial intensity. The picture has remained more or less the same in terms of the direct and indirect measure of intensity (G*).

Table 5: Distribution of Activities with Above Average Sectoral Intensity

(No. of Activities)

Item	Agriculture Intensive		Industry Intensive		Services Intensive	
	G	**G***	**G**	**G***	**G**	**G***
1	2	3	4	5	6	7
1. Agricultural Activity	15 (68)	15 (68)	0 (0)	0 (0)	1 (5)	1 (5)
2. Industrial Activity	18 (23)	22 (28)	57 (71)	55 (69)	56 (70)	59 (74)
3. Services Activity	1 (8)	1 (8)	3 (23)	3 (23)	6 (46)	2 (15)
4. Total (1+2+3)	34 (30)	38 (33)	60 (52)	58 (50)	63 (55)	62 (54)
Memo Items#						
Average Intensity	7	12	29	59	15	30
Minimum to Maximum Intensity Range	0 to 74	0 to 88	0 to 76	-14 to 154	0 to 41	0 to 68

Figures in bracket are percentage share in the respective sectoral total of activities. G: Direct intensity; G*: Direct plus indirect intensity; #: As percent to gross output.

In terms of the direct measure of intensity (G), 60 out of 115 activities or 52 per cent

activities have reported higher than the average industrial intensity of 29 per cent of gross output. Notably, not a single agricultural activity has the above average industrial intensity. The industrial sector with 57 out of 80 industrial activities or 71 per cent of its activities has been the most industry intensive when only 3 services activities out of 13, *viz.*, medical and health, railway transport services, and other transport services, have the above average industry intensity. In other words, neither agricultural nor services activities seem to be much dependent on industry for input. However, the industrial intensity of the economy stands out to be of high order with 50 per cent of the total number of activities displaying the above average industrial intensity even in terms of the direct and indirect measure of intensity (G*). The extent of variation in industrial intensity has been the most, possibly reflecting wide variation in technology at the activity level. Besides, the industrial intensity has turned out even negative for the activity of rubber production while the same has been more than 100 per cent for 17 industrial activities in terms of the direct and indirect measure of intensity (G*).

With 63 out of 115 activities or 55 per cent activities having the above average services intensity, the predominance of services intensive activities is clear in the economy. Interestingly, unlike agriculture and industry, services sector *per se* is not the most services intensive sector. It is the industrial sector, which has turned out to be relatively services intensive in its 56 out of 80 industrial activities (*i.e.*, 70 per cent industrial activities). On the other hand, 6 out of 13 services activities, *i.e.*, 46 per cent services activities have had the services intensity above the average of 15 per cent of gross output. Only one agricultural activity, *viz.*, animal services (agricultural) has the above average services intensity. As per the direct and indirect measure of services intensity (G*), the number of industrial activities with the above average services intensity has gone up to 59 (*i.e.*, 74 per cent of industrial activities) while that of services activities has declined to 2 with the overall number of activities down to 62 from 63. The average services intensity has also doubled to 30 per cent of gross output while the upper limit of variation in services intensity has increased to 68 per cent of gross output for ships and boats from 41 per cent for office computing machines. Three industrial activities, *viz.*, office computing machines, ships and boats, and coal tar products stand out the most services intensive in terms of both direct, and direct and indirect measures of services intensity. On the other hand, public administration and ownership of dwellings have the lowest services intensity under both the definitions of services intensity. The average level of services intensity has been higher than that of agricultural intensity but stands lower than that of industrial intensity. The range of variation in services intensity turns out to be the lowest among all types of sectoral intensity. On the whole, the majority of activities and more so of the industrial activities turn out to be relatively services-intensive in the Indian economy.

At the aggregate level of 10 categories, three categories, *viz.*, allied activities, agriculture and manufacturing, in terms of direct measure, and four categories, *viz.*, the former three and construction, in terms of direct and indirect measure of intensity, have turned out to be relatively agriculture-intensive (Table 6). None of the aggregate categories of services are agriculture-intensive. Similarly for the industrial intensity, three industrial categories, *viz.*, electricity, gas & water supply; manufacturing and construction, and one services category, *viz.*, transport, storage and communication have had the industrial intensity above the average both in terms of direct, and direct and indirect measures of industrial intensity. Both the agricultural categories - agriculture and allied activities – are found to be not industry-intensive. On the other hand, industry has turned out to be more services-intensive than services. Three industrial categories

out of four, *viz.*, manufacturing, construction, and electricity, gas and water supply, and two services categories out of four, *viz.*, transport, storage & communication, and trade, hotels & restaurants are found to be services-intensive in terms of direct measure of intensity. In terms of direct and indirect measure however, only one services category - transport, storage & communication – has the services intensity above the average. No agricultural category has been services-intensive. Thus, in keeping with the activity-wise trend, services and industry are found, at the aggregate level, more inter-dependent than services and agricultural sectors. Nonetheless, dominance of the services sector is clear even at the aggregate level.

Backward and Forward Linkages

As per the Rasmussen index of backward linkage accounting for both direct and indirect linkages, 46 out of the total of 115 activities (i.e., 40 per cent) – seven out of 22 agricultural activities (*i.e.*, 32 per cent), 31 out of 80 industrial activities (*i.e.*, 39 per cent) and eight out of 13 services activities (*i.e.*, 62 per cent) –have had relatively large index value (Appendix Table 2). Clearly, the services activities have the largest inducing effect on the rest in terms of backward linkage. Activity-wise, construction from industry, trade and other transport services from services, and animal services (agricultural) and other crops from agriculture have had large backward index value in that order. The index value of backward linkage has varied between – 0.23 for crude petroleum & natural gas and 4.59 for construction.

Similarly, in terms of the index of forward linkage, 15 out of the total of 115 activities (*i.e.*, 13 per cent) – 5 out of 22 agricultural activities (*i.e.*, 23 per cent), 3 out of 80 industrial activities (*i.e.*, 4 per cent) and 7 out of 13 services activities (*i.e.*, 54 per cent) –have reported high forward linkage index. Once again, the services activities are endowed with relatively large forward linkage. Activity-wise, forward linkage effects of trade and other transport services from services, other crops from agriculture, construction from industry and other services from services have been relatively high in that order. The index value of forward linkage has varied between -2.43 for crude petroleum & natural gas and 37.95 for trade.

Even in terms of the total of backward and forward linkage indices, a larger proportion of activities in services (69 per cent) than in industry (8 per cent) or agriculture (27 per cent) stand out to be the key sectors of the economy with the total index value higher than two. The top five activities in terms of the total index value are trade and other transport services from services, construction from industry, other crops from agriculture, and other services from services. Clearly, the first four activities are the ones having high backward as well as forward linkage. In total, 21 out of 115 activities (*i.e.*, 18 per cent) can be termed as the key sectors of the economy with the total index value greater than two.

At the aggregate level, manufacturing, construction, agriculture, personal, social & other services; and transport, storage & communication are the key sectors in terms of the backward linkage (Table 7). On the other hand, only manufacturing and agriculture are the key sectors of the economy in terms of the forward linkage. Clearly, the high linkage of services at the activity level seems to have been overshadowed by aggregation.

Table 6: Sectoral Intensity – Aggregate Categories

Sector	Ga	Rank	G*a	Rank	Gi	Rank	G*i	Rank	Gs	Rank	G*s	Rank
1	2	3	4	5	6	7	8	9	10	11	12	13
Agriculture	0.131	2	0.172	3	0.092	7	0.211	8	0.057	10	0.122	8
Allied activities	0.179	1	0.220	1	0.039	10	0.127	9	0.068	8	0.121	9
Mining & quarrying	0.000	9	0.028	9	0.190	5	0.358	5	0.070	7	0.152	7
Manufacturing	0.091	3	0.179	2	0.420	2	0.811	1	0.185	2	0.385	1
Construction	0.024	5	0.095	4	0.362	3	0.706	3	0.202	1	0.381	2
Electricity, gas & water supply	0.004	8	0.038	8	0.453	1	0.800	2	0.166	4	0.330	3
Transport, storage & communication	0.023	6	0.074	5	0.282	4	0.560	4	0.175	3	0.317	4
Trade, hotels & restaurants	0.034	4	0.060	6	0.091	8	0.214	7	0.160	5	0.227	5
Financing, insurance & real estate	0.000	10	0.006	10	0.044	9	0.089	10	0.061	9	0.087	10
Personal, social & other services	0.016	7	0.048	7	0.152	6	0.301	6	0.090	6	0.167	6
Average Intensity	0.050		0.092		0.212		0.418		0.123		0.229	

G: Direct sectoral intensity; G*: Direct and indirect sectoral intensity; a: agriculture; i: industry; s: services.

Table 7: Backward & Forward Linkage Indices – Aggregate Categories

	Sector	B. Index	Rank	F. Index	Rank
	1	2	3	4	5
1	Agriculture	1.26	3	1.54	2
2	Allied activities	0.81	7	0.53	7
3	Mining & quarrying	0.26	10	-0.18	10
4	Manufacturing	2.24	1	4.32	1
5	Construction	1.46	2	0.67	5
6	Electricity, gas & water supply	0.48	8	0.07	9
7	Transport, storage & communication	1.03	5	0.64	6
8	Trade, hotels & restaurants	0.90	6	0.98	3
9	Financing, insurance & real estate	0.45	9	0.50	8
10	Personal, social & other services	1.11	4	0.92	4
Average Index		1		1	

B: Backward Linkage; F: Forward Linkage.

Dispersal of Backward and Forward Linkages

In order to take into account the variation in the index of linkage, both the backward and forward coefficient of variation indices have been calculated (Appendix Table 3). A relatively large value of such indices implies that a sector purchases (sells) inputs only from (to) a few sectors in the economy. As per the backward coefficient of variation index, 5 out of 13 services activities (*i.e.*, 38 per cent), 45 out of 80 industrial activities (*i.e.*, 56 per cent) and 12 out of 22 agricultural activities (*i.e.*, 55 per cent) have their index value below the average of 5.50 per cent. The low proportion of services activities with low backward coefficient of variation in contrast to the high proportion of services activities with high backward linkage implies that the strong backward linkage of the majority of services owes to the large inter-sectoral purchases from only a few sectors rather than widespread purchases from many different activities. Notably, all the five top performers in terms of the backward linkage index have as well a high backward coefficient of variation index.

However, in terms of the forward coefficient of variation index, seven out of 13 services activities (*i.e.,* 54 per cent) as against 27 out of 80 industrial activities (*i.e,* 34 per cent) and eight out of 22 agricultural activities (*i.e.,* 36 per cent) have the index value below the average of 6.91 per cent. Thus, high proportion of services activities with high forward linkage is also accompanied by high proportion of services activities with low forward coefficient of variation. In other words, the strong forward linkage of the majority of services owes to the widespread sale to many different activities. Interestingly, the five top performers in terms of the forward linkage have also a low forward coefficient of variation. Thus, the inducing impulses from the services sector appear to have worked mainly through the channel of forward linkage with the rest of the economy.

At the aggregate level, mining & quarrying, manufacturing; transport, storage & communication; agriculture; trade, hotels & restaurants, and personal, social & other services have low backward coefficient of variation (Table 8). Therefore, the sectors identified with high backward linkage seem to be purchasing inputs from a wide spectrum of sectors as reflected in the low backward coefficient of variation. Construction turns out to be the only exception. The majority of services sectors have a low backward coefficient of variation at the aggregate level in contrast to the trend obtained at the activity level. On the other hand, transport, storage & communication; electricity, gas & water supply; construction, allied activities, trade, hotels & restaurants; personal, social & other services have low forward coefficient of variation index. In other words, the sectors with high forward linkage are found to have high forward coefficient of variation index, *i.e.*, selling inputs to only a few sectors. Thus, the trend at the aggregate level differs from the activity level both in terms of linkage index and coefficient of variation index.

Table 8: Backward & Forward Coefficient of Variation Indices: Aggregate Categories

	Sector	V_i^w	Rank	V_i^w	Rank
	1	2	3	4	5
1	Agriculture	1.85	4	2.35	8
2	Allied activities	3.13	8	1.68	4
3	Mining & quarrying	-4.71	1	3.47	10
4	Manufacturing	1.09	2	2.53	9
5	Construction	2.64	7	1.59	3
6	Electricity, gas & water supply	10.42	10	1.57	2
7	Transport, storage & communication	1.76	3	1.55	1
8	Trade, hotels & restaurants	1.88	5	1.93	5
9	Financing, insurance & real estate	3.40	9	2.34	7
10	Personal, social & other services	2.32	6	1.99	6
	Average Index	2.38		2.10	

V_i^w and V_j^w are respectively the forward and the backward coefficient of variation indices.

Vertical Integration

In order to provide a dimension-free measure of the multiplier of each sector on the value added of the rest of the economy, the index of vertical integration has been calculated activity-

wise (Appendix Table 3). 14 out of the 115 activities having the index value higher than the average are reported in Table 9. Out of the 14 activities, 7 activities belong to services, followed by 6 from industry and 1 from agriculture. The top 3 activities in terms of the index value turn out to be trade, banking and other transport services, all belonging to the services sector. Indeed, out of the total of 13 services activities, as many as 7 have large multiplier effect on the rest of the economy. On the other hand, out of the total of 80 industrial activities, only 6 provide a strong stimulus on the rest of the economy whereas only one activity out of the total of 22 agricultural activities, *viz.*, other crops, does so. Clearly, services sector stands out to be more growth inducing than industry or agriculture. However, the multiplier value remains less than one for all the 115 activities, implying that the value added indirectly induced is less than the direct value added by each. Further, the activities – animal services (agricultural) from agriculture, mica from industry, and ownership of dwellings and public administration from services – appear to have no inducing effect on the rest of the economy. Only one activity – plastic products from industry – indicates a possible negative impact. Notably, the top five performers in terms of the total of backward and forward linkages, *viz.*, trade, other transport services and other services from the services sector, construction from industry, and other crops from agriculture are also found to have relatively high stimulus for the rest of the economy in terms of the index of vertical integration.

Table 9: Activities with Index of Vertical Integration Above the Average

Activity	Index	Sector	Rank
1	2	3	4
Trade	0.118427	Services	1
Banking	0.053505	Services	2
Other transport services	0.046273	Services	3
Crude petroleum, natural gas	0.026344	Industry	4
Other services	0.023001	Services	5
Electricity	0.018460	Industry	6
Railway transport services	0.016679	Services	7
Other crops	0.014095	Agriculture	8
Communication	0.011990	Services	9
Insurance	0.011414	Services	10
Construction	0.010982	Industry	11
Coal & lignite	0.008537	Industry	12
Miscellaneous manufacturing	0.007211	Industry	13
Drugs & medicines	0.004917	Industry	14

Average Index	0.003878	

At the aggregate level of 10 categories, three categories from services, *viz.*, trade, hotels & restaurants; transport, storage & communication; and financing, insurance & real estate, and one category from industry, *viz.*, manufacturing have the index value above the average, indicating a clear dominance of services in terms of the multiplying effect on the rest of the economy *vis-à-vis* industry or agriculture (Table 10). In contrast to the position at the activity level, the stimulus of construction on the rest of the economy turns out the smallest at the aggregate level. Interestingly, manufacturing has been the single common category in terms of the backward/forward linkages as well as the index of vertical integration.

Table 10: Index of Vertical Integration – Aggregate Categories

	Sector	Index	Rank
	1	2	3
1	Agriculture	0.034825	5
2	Allied activities	0.012048	9
3	Mining & quarrying	0.023378	7
4	Manufacturing	0.062276	4
5	Construction	0.010932	10
6	Electricity, gas & water supply	0.020909	8
7	Transport, storage & communication	0.073804	2
8	Trade, hotels & restaurants	0.113444	1
9	Financing, insurance & real estate	0.063660	3
10	Personal, social & other services	0.032675	6
	Average Index	0.044795	

Section V
Concluding Observations

The growth of services as also the services-led growth of the Indian economy has been addressed in the study from the angle of sustainability. For the purpose, the study has primarily focused upon the inter-sectoral linkages as emanating from the input-output transactions tables for 1993-94 both at the aggregated level of 10 constructed national accounts categories and the most disaggregated level of 115 activities. While the aggregative analysis presents a variation from the disaggregated one, the Indian economy is found to be predominantly services-intensive at the disaggregated level with 55 per cent (54 per cent) activities direct (direct and indirect) services-intensive. The average services intensity stands doubled to 30 per cent of gross output with the switchover to direct and indirect services-intensity from direct services-intensity. The range of variation in services-intensity turns out the lowest among the three types of sectoral

intensity defined in the study. While services and agriculture do not seem to share much inter-dependence, industry is observed to be the most services-intensive with 70 per cent (74 per cent) of its activities being direct (direct and indirect) services-intensive. While 46 per cent (15 per cent) of services activities stand out services-intensive, 23 per cent (23 per cent) of services activities report industry-intensive. Thus, while the industrial activities seem to be predominantly permeated with the services content, by the same token, they turn out to be the major pace setter for services-growth. In other words, sustained services-growth requires a growing industry too.

The inter-sectoral linkages are explored further in terms of the popular Rasmussen indices of backward and forward linkages as also their variation. Once again, 62 per cent (54 per cent) of services activities as against 39 per cent (4 per cent) of industrial activities and 32 per cent (23 per cent) of agricultural activities report strong inducing effect on the economy in terms of the backward (forward) linkage. The top 5 key sectors in terms of the total of backward and forward linkage indices turn out to be trade, other transport services and other services, construction and other crops. The strong backward linkage of services is found to be attributable to the large inter-sectoral purchases from only a few sectors. In contrast, the strong forward linkage of services is accompanied by widespread sales to many different activities. Thus, the inducing impulses from services might have worked mainly through the channel of forward linkage. However, since the forward linkage is inherently less effective than the backward linkage, the inducing impact of services on the rest of the economy could be limited.

Finally, the expansionary potential of services on non-services and services, in turn, has been examined by computing the index of vertical integration, which provides a dimension-free measure of the multiplier of each activity on the value added of the rest of the economy. Seven, six and one respectively out of 13 services, 80 industrial and 22 agricultural activities are found to have the largest expansionary potential. The top three activities in terms of the index value turn out to be trade, banking and other transport services, all belonging to the services sector. Further, the top five performers in terms of the total of backward and forward linkages are also found to have a relatively high index value of vertical integration. Clearly, the services sector stands out more growth inducing than industry or agriculture. Therefore, for sustaining the overall growth process, the services-led growth augurs well for the Indian economy in so far as the growth impulses originate in services *vis-à-vis* industry or agriculture. However, since the value added indirectly induced on the rest of the economy falls short of the direct value added by each activity including from services, the expansionary potential of services-led growth may not be over-emphasised unless accompanied by growth impulses from other sources.

Notes:

[1]Contrary to the popular view, Nagaraj (2000) however holds that ‘‘since the secondary sector growth rate has modestly slowed, the tertiary sector has become the fastest growing sector in the 1990s – but not because its growth rate has improved in that decade, statistically significantly’’ (p 2833).

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Appendix Table 1: Sectoral Intensity - Sector and Activity-wise

	Activity	Ga	Rank	G*a	Rank	Gi	Rank	G*i	Rank	Gs	Rank	G*s	Rank
	1	2	3	4	5	6	7	8	9	10	11	12	13
	Agriculture												
1	Paddy	19.8	14	28.3	12	11.3	80	31.9	79	7.8	86	18.3	80
2	Wheat	15.3	19	21.3	18	17.4	73	43.8	67	7.2	88	19.1	77
3	Jowar	11.9	25	20.8	19	6.6	93	19.1	92	6.4	89	14.0	90
4	Bajra	11.8	26	20.1	21	8.1	91	21.8	87	6.3	90	14.1	89
5	Maize	12.3	24	19.9	23	8.9	88	23.4	85	6.1	92	14.2	88
6	Gram	11.7	27	16.3	30	5.1	103	13.7	100	3.7	106	8.4	104
7	Pulses	22.4	11	33.6	9	10.5	83	29.5	82	8.0	83	19.0	78
8	Sugarcane	6.7	35	8.6	43	5.4	102	12.9	101	3.6	109	7.3	109
9	Groundnut	16.8	17	25.5	15	8.4	90	24.1	84	6.2	91	14.9	87
10	Jute	8.9	31	13.6	32	1.8	112	6.6	111	3.4	110	6.9	111
11	Cotton	7.7	34	11.9	37	9.1	87	22.3	86	4.6	100	11.0	96
12	Tea	5.8	38	7.4	44	1.7	113	5.2	113	2.8	111	4.9	113
13	Coffee	14.6	20	18.9	24	4.1	108	12.5	102	5.4	96	10.3	98
14	Rubber	0.0	105	0.4	113	6.2	96	14.0	99	2.0	113	5.1	112
15	Coconut	5.4	39	6.9	45	4.9	106	12.4	103	3.8	105	7.4	108
16	Tobacco	4.0	42	6.5	47	6.2	98	14.7	96	3.6	108	7.9	107

17	Other crops	9.5	30	14.1	31	6.6	94	17.7	94	4.3	102	10.1	99
18	Milk & milk products	14.0	21	17.5	27	2.4	111	7.5	110	5.3	97	8.8	101
19	Animal services (agricultural)	73.7	1	88.2	1	4.6	107	26.1	83	21.4	17	35.6	53
20	Other livestock products	21.4	13	27.0	13	3.3	109	11.1	105	7.3	87	12.5	94
21	Forestry & logging	0.5	61	1.0	105	5.0	105	11.1	106	4.2	103	7.2	110
22	Fishing	2.0	48	3.3	64	9.4	86	19.0	93	3.9	104	9.4	100
	Industry												
23	Coal & lignite	0.0	104	2.1	84	26.0	65	50.8	64	9.4	80	20.8	76
24	Crude petroleum, natural gas	0.0	103	0.7	110	10.1	85	20.3	91	3.7	107	8.5	102
25	Iron ore	0.0	102	1.9	88	20.5	67	41.4	69	8.0	82	16.6	84
26	Manganese ore	0.0	108	0.9	106	5.1	104	10.8	107	5.5	95	8.3	105
27	Bauxite	0.0	110	0.9	107	6.2	95	17.4	95	10.1	79	15.3	85
28	Copper ore	0.0	111	1.9	87	20.2	68	40.7	70	7.8	85	16.6	83
29	Other metallic minerals	0.0	112	1.7	94	18.6	70	36.3	73	4.9	99	12.8	92
30	Lime stone	0.0	113	1.8	91	18.0	71	35.1	75	5.7	94	13.3	91
31	Mica	0.0	114	5.6	50	28.9	60	58.1	59	13.3	69	25.3	71
32	Other non-metallic minerals	0.0	99	1.4	101	7.2	92	14.7	97	4.5	101	8.2	106
33	Sugar	53.4	3	59.2	5	6.2	97	21.7	88	18.2	39	28.3	66
34	Khandsari, boora	52.0	4	61.1	3	11.0	81	31.0	81	16.5	51	28.6	65
35	Hydrogenated oil (vanaspati)	40.2	6	58.1	6	29.4	59	62.3	55	18.5	35	37.5	47
36	Edible oils other than vanaspati	57.0	2	73.2	2	10.8	82	34.8	76	11.4	76	25.7	70
37	Tea & coffee processing	29.5	8	36.6	8	12.0	79	36.2	74	33.9	4	50.6	7
38	Miscellaneous food products	45.7	5	60.5	4	15.6	76	38.5	72	17.8	43	32.8	59
39	Beverages	9.7	29	17.2	29	28.1	61	55.0	63	19.5	28	34.8	57
40	Tobacco products	18.9	15	23.1	17	16.9	74	42.6	68	22.7	11	36.7	48
41	Khadi, cotton textiles (handlooms)	1.8	50	10.3	40	33.4	52	60.0	58	12.0	74	29.6	63
42	Cotton textiles	25.4	9	32.8	10	21.4	66	55.8	62	27.6	7	46.6	12
43	Woolen textiles	8.1	33	18.0	26	40.6	43	78.2	44	22.2	13	45.0	15
44	Silk textiles	12.3	23	20.1	22	27.2	62	57.2	60	18.9	33	35.9	51
45	Art silk, synthetic fiber textiles	3.3	44	9.5	42	48.2	20	100.1	17	20.3	23	45.7	14
46	Jute, hemp, mesta textiles	18.2	16	24.0	16	17.5	72	47.8	66	32.3	5	49.5	8
47	Carpet weaving	5.1	40	12.2	35	31.0	56	62.0	56	19.3	30	37.7	46
48	Readymade garments	1.3	54	11.8	38	45.7	33	85.9	38	18.5	36	43.6	20
49	Miscellaneous textile products	4.8	41	13.3	34	40.3	45	78.9	43	21.5	16	44.4	16
50	Furniture & fixtures-wooden	15.5	18	18.8	25	20.1	69	39.1	71	12.2	72	22.3	75
51	Wood & wood products	23.2	10	26.1	14	14.8	77	31.7	80	13.3	68	22.9	74
52	Paper, paper prods. & newsprint	6.5	36	12.1	36	46.7	27	94.0	32	20.5	21	43.9	18
53	Printing &	0.2	66	5.0	55	40.7	42	83.9	40	15.8	58	36.5	49

	publishing												
54	Leather footwear	6.0	37	13.5	33	34.3	51	64.6	53	22.4	12	41.7	28
55	Leather & leather products	10.5	28	20.1	20	38.5	47	77.7	46	23.3	10	47.4	11
56	Rubber products	8.3	32	10.3	39	43.2	38	-14.3	115	21.4	19	12.1	95
57	Plastic products	0.3	62	4.1	60	50.0	15	100.7	16	10.4	78	30.7	61
58	Petroleum products	0.1	68	1.5	100	75.6	1	96.6	26	8.9	81	18.6	79
59	Coal tar products	0.1	71	3.2	65	53.9	8	95.3	29	39.6	3	60.6	3
60	Inorganic heavy chemicals	1.6	53	4.6	58	43.0	39	83.9	41	19.0	32	38.3	41
61	Organic heavy chemicals	1.7	51	5.6	51	48.6	19	94.9	31	16.7	49	37.8	42
62	Fertilizers	0.2	65	4.5	59	60.0	4	108.4	10	18.0	40	40.1	33
63	Pesticides	0.0	76	5.5	52	59.0	5	122.4	4	15.7	59	42.7	24
64	Paints, varnishes & lacquers	0.6	59	5.0	54	48.8	18	96.4	27	16.6	50	38.5	40
65	Drugs & medicines	1.7	52	6.4	48	44.4	37	89.4	35	20.5	20	43.0	22
66	Soaps, cosmetics & glycerin	3.0	45	9.9	41	50.2	14	99.5	18	16.1	55	39.5	37
67	Synthetic fibers, resin	1.1	56	5.1	53	49.6	16	97.4	22	14.3	66	35.1	55
68	Other chemicals	22.0	12	31.0	11	36.7	49	76.1	47	19.0	31	39.6	36
69	Structural clay products	1.1	55	3.2	66	40.6	44	68.6	50	21.4	18	35.8	52
70	Cement	0.1	74	2.4	73	46.7	26	84.2	39	24.4	8	42.7	23
71	Other non-metallic mineral prods.	0.3	63	2.3	77	40.0	46	72.6	49	20.1	25	35.4	54
72	Iron, steel & ferro alloys	0.0	83	1.6	96	53.7	9	113.1	6	21.5	15	49.1	9
73	Iron and steel casting & forging	0.1	75	1.9	89	60.9	3	129.0	3	16.8	48	47.5	10
74	Iron & steel foundries	0.0	84	1.8	93	62.1	2	136.6	2	17.8	42	50.7	6
75	Non-ferrous basic metals	0.0	85	2.2	81	56.6	7	113.9	5	14.3	65	37.8	43
76	Hand tools, hardware	0.1	73	1.9	86	42.6	40	92.7	34	17.5	45	39.5	39
77	Miscellaneous metal products	0.1	70	1.9	90	51.6	11	112.3	7	16.4	52	42.2	27
78	Tractors and agri. implements	0.0	80	2.2	82	51.0	13	109.6	9	16.2	53	41.2	30
79	Industrial machinery (F&T)	0.0	77	2.3	80	51.5	12	111.5	8	17.3	47	42.7	25
80	Industrial machinery (others)	0.0	79	2.7	70	45.1	35	103.0	14	28.7	6	56.1	4
81	Machine tools	0.0	82	2.0	85	47.2	23	102.6	15	15.6	60	39.8	35
82	Office computing machines	0.0	81	3.0	68	32.1	54	67.6	52	41.1	1	61.0	2
83	Other non-electrical machinery	0.0	86	1.8	92	44.7	36	96.8	24	17.6	44	40.5	32
84	Electrical industrial machinery	0.0	89	2.3	75	46.2	28	103.1	13	19.6	26	43.8	19
85	Electrical wires & cables	0.0	97	3.9	62	58.0	6	154.2	1	12.6	71	53.6	5
86	Batteries	0.1	69	3.1	67	52.1	10	106.9	11	14.2	67	36.4	50
87	Electrical appliances	0.0	78	2.3	78	45.3	34	96.7	25	18.2	37	40.0	34

88	Communication equipments	0.0	87	2.3	76	45.7	31	96.2	28	15.9	56	37.7	44
89	Other electrical machinery	0.1	72	2.9	69	45.7	32	97.9	21	19.6	27	42.4	26
90	Electronic equip-ments (incl. TV)	0.0	98	2.5	72	49.1	17	104.1	12	17.9	41	41.6	29
91	Ships & boats	0.0	93	3.8	63	32.7	53	83.3	42	41.0	2	67.6	1
92	Rail equipments	0.0	95	1.6	97	45.7	29	95.1	30	7.8	84	27.6	68
93	Motor vehicles	0.0	91	2.4	74	46.9	25	97.3	23	20.3	22	43.6	21
94	Motor cycles & scooters	0.0	94	2.1	83	47.8	22	98.3	19	18.2	38	40.8	31
95	Bicycles, cycle-rickshaw	0.0	88	2.3	79	48.0	21	98.3	20	21.8	14	46.5	13
96	Other transport equipments	0.6	60	2.6	71	45.7	30	92.8	33	10.8	77	30.1	62
97	Watches & clocks	0.0	92	1.7	95	36.7	48	77.7	45	23.8	9	44.3	17
98	Miscellaneous manufacturing	1.8	49	4.9	57	42.3	41	86.8	36	14.6	63	33.9	58
99	Construction	2.4	47	4.9	56	36.2	50	75.6	48	20.2	24	39.5	38
100	Electricity	0.1	67	1.6	98	47.0	24	86.6	37	17.4	46	35.0	56
101	Gas	13.5	22	17.4	28	1.1	114	6.2	112	12.1	73	16.6	82
102	Water supply	0.0	90	1.2	104	26.8	64	48.6	65	2.6	112	12.7	93
	Services												
103	Railway transport services	0.0	96	1.2	103	30.3	57	62.6	54	14.7	62	28.3	67
104	Other transport services	3.0	46	5.7	49	30.0	58	61.1	57	19.4	29	32.5	60
105	Storage & warehousing	0.0	107	0.8	109	15.9	75	33.6	77	15.9	57	24.8	72
106	Communication	0.0	109	0.5	111	10.2	84	20.7	90	6.0	93	10.9	97
107	Trade	0.2	64	1.6	99	8.4	89	21.1	89	16.2	54	23.1	73
108	Hotels & restaurants	30.8	7	43.1	7	14.5	78	32.4	78	14.3	64	26.8	69
109	Banking	0.0	106	0.5	112	3.0	110	7.8	109	11.8	75	15.0	86
110	Insurance	0.0	100	0.9	108	5.5	100	14.1	98	13.2	70	17.9	81
111	Ownership of dwellings	0.0	101	0.3	114	5.5	99	9.7	108	0.0	114	2.2	114
112	Education and research	0.7	58	1.4	102	5.5	101	12.2	104	5.0	98	8.5	103
113	Medical & health	1.1	57	4.0	61	31.6	55	67.9	51	18.9	34	37.7	45
114	Other services	3.7	43	6.7	46	27.2	63	56.4	61	15.0	61	29.2	64
115	Public administration	0.0	115	0.0	115	0.0	115	0.0	114	0.0	115	0.0	115
	Average Sectoral Intensity	7.4	–	11.6	–	28.8	–	59.4	–	14.6	–	29.6	–

Appendix Table 2: Backward, Forward & Total Linkages – Activity-wise Indices

	Activity	Backward Index	Rank	Forward Index	Rank	Total Index	Overall Rank
	1	**2**	**3**	**4**	**5**	**6**	**7**
	Agriculture						
1	Paddy	2.42	6	2.41	7	4.83	6
2	Wheat	1.47	19	1.18	14	2.65	15
3	Jowar	0.63	81	0.14	53	0.76	76
4	Bajra	0.54	88	0.06	70	0.60	89

5	Maize	0.57	86	0.11	57	0.68	82
6	Gram	0.40	97	0.16	47	0.56	90
7	Pulses	1.01	44	0.34	34	1.36	41
8	Sugarcane	0.52	91	0.64	24	1.15	47
9	Groundnut	0.53	89	0.13	55	0.67	84
10	Jute	0.25	107	0.01	87	0.26	107
11	Cotton	0.36	100	0.05	71	0.41	101
12	Tea	0.17	111	0.01	88	0.19	111
13	Coffee	0.46	93	0.03	81	0.49	94
14	Rubber	0.10	113	0.00	104	0.10	113
15	Coconut	0.33	102	0.14	49	0.47	97
16	Tobacco	0.22	108	0.00	93	0.22	110
17	Other crops	2.53	5	11.26	3	13.79	4
18	Milk & milk products	2.03	9	2.03	8	4.07	7
19	Animal services (agricultural)	2.60	4	0.00	102	2.60	16
20	Other livestock products	1.50	18	1.74	11	3.24	12
21	Forestry & logging	0.50	92	0.57	26	1.07	54
22	Fishing	0.58	85	0.41	28	1.00	60
	Industry						
23	Coal & lignite	0.44	94	0.03	77	0.48	95
24	Crude petroleum, natural gas	-0.23	115	-2.43	115	-2.66	115
25	Iron ore	0.36	99	0.02	84	0.38	103
26	Manganese ore	0.13	112	0.00	96	0.13	112
27	Bauxite	0.25	106	0.00	98	0.25	108
28	Copper ore	0.34	101	0.00	94	0.34	104
29	Other metallic minerals	0.32	103	0.00	100	0.32	105
30	Lime stone	0.41	96	0.01	91	0.42	100
31	Mica	0.55	87	0.00	101	0.55	92
32	Other non-metallic minerals	-0.12	114	-0.68	114	-0.81	114
33	Sugar	1.19	32	0.39	30	1.58	30
34	Khandsari, boora	1.39	23	0.04	74	1.43	37
35	Hydrogenated oil (vanaspati)	1.80	12	0.07	63	1.87	24
36	Edible oils other than vanaspati	1.32	26	0.39	29	1.71	28
37	Tea & coffee processing	1.34	25	0.22	43	1.55	32
38	Miscellaneous food products	2.38	7	0.96	17	3.34	11
39	Beverages	1.04	41	0.15	48	1.19	46
40	Tobacco products	1.07	39	0.32	36	1.38	40
41	Khadi, cotton textiles (handlooms)	0.97	50	0.14	51	1.11	52
42	Cotton textiles	1.78	13	1.68	13	3.46	9
43	Woolen textiles	1.19	31	0.06	69	1.25	44
44	Silk textiles	0.98	47	0.03	80	1.02	56
45	Art silk, synthetic fiber textiles	1.55	16	0.74	21	2.28	20
46	Jute, hemp, mesta textiles	1.12	36	0.01	89	1.13	50
47	Carpet weaving	0.95	53	0.03	83	0.97	63
48	Readymade garments	1.53	17	0.32	35	1.85	26
49	Miscellaneous textile products	1.23	28	0.19	45	1.42	38
50	Furniture & fixtures-wooden	0.61	84	0.06	65	0.68	83
51	Wood & wood products	0.62	82	0.06	67	0.68	81
52	Paper, paper prods. & newsprint	1.02	43	-0.02	105	1.00	57
53	Printing & publishing	0.98	49	0.23	42	1.21	45
54	Leather footwear	1.16	33	0.14	52	1.29	43
55	Leather & leather products	1.40	21	0.13	54	1.54	33
56	Rubber products	0.28	105	0.23	41	0.51	93
57	Plastic products	0.87	63	0.05	72	0.91	67
58	Petroleum products	0.19	110	0.21	44	0.40	102
59	Coal tar products	0.94	55	-0.11	109	0.83	74

60	Inorganic heavy chemicals	0.74	75	-0.14	110	0.61	88
61	Organic heavy chemicals	0.73	76	-0.25	112	0.47	96
62	Fertilizers	0.75	74	-0.20	111	0.55	91
63	Pesticides	0.98	48	0.01	92	0.99	61
64	Paints, varnishes & lacquers	0.88	61	0.04	73	0.92	66
65	Drugs & medicines	1.20	30	0.36	32	1.56	31
66	Soaps, cosmetics & glycerin	1.24	27	0.28	38	1.53	34
67	Synthetic fibers, resin	0.75	73	-0.05	107	0.70	80
68	Other chemicals	1.47	20	0.29	37	1.75	27
69	Structural clay products	0.66	79	0.00	97	0.66	85
70	Cement	0.83	67	0.01	86	0.84	72
71	Other non-metallic mineral prods.	0.85	66	0.28	39	1.13	49
72	Iron, steel & ferro alloys	1.01	45	0.48	27	1.49	35
73	Iron and steel casting & forging	0.89	58	0.01	90	0.91	68
74	Iron & steel foundries	0.93	56	-0.08	108	0.85	71
75	Non-ferrous basic metals	0.70	78	-0.27	113	0.43	99
76	Hand tools, hardware	0.79	71	0.07	64	0.86	70
77	Miscellaneous metal products	1.11	37	0.77	19	1.88	22
78	Tractors and agri. implements	0.96	51	0.13	56	1.09	53
79	Industrial machinery (F&T)	0.91	57	0.07	62	0.99	62
80	Industrial machinery (others)	1.00	46	0.07	61	1.07	55
81	Machine tools	0.82	68	0.06	66	0.88	69
82	Office computing machines	0.76	72	0.00	95	0.76	77
83	Other non-electrical machinery	1.15	34	0.73	22	1.88	23
84	Electrical industrial machinery	1.03	42	0.37	31	1.40	39
85	Electrical wires & cables	1.40	22	0.08	60	1.48	36
86	Batteries	0.80	70	0.03	78	0.84	73
87	Electrical appliances	0.87	62	0.10	59	0.97	64
88	Communication equipments	0.86	65	0.14	50	1.00	58
89	Other electrical machinery	0.81	69	-0.02	106	0.78	75
90	Electronic equipments (incl. TV)	1.06	40	0.26	40	1.32	42
91	Ships & boats	1.12	35	0.03	79	1.15	48
92	Rail equipments	0.61	83	0.02	85	0.63	87
93	Motor vehicles	1.22	29	0.63	25	1.86	25
94	Motor cycles & scooters	0.95	52	0.17	46	1.12	51
95	Bicycles, cycle-rickshaw	0.89	59	0.10	58	1.00	59
96	Other transport equipments	0.64	80	0.00	103	0.64	86
97	Watches & clocks	0.71	77	0.04	75	0.75	78
98	Miscellaneous manufacturing	1.10	38	0.98	16	2.08	21
99	Construction	4.59	1	10.31	4	14.91	3
100	Electricity	0.86	64	1.86	10	2.72	14
101	Gas	0.42	95	0.04	76	0.45	98
102	Water supply	0.89	60	0.06	68	0.95	65
	Services						
103	Railway transport services	0.94	54	0.76	20	1.71	29
104	Other transport services	2.62	3	18.01	2	20.63	2
105	Storage & warehousing	0.29	104	0.00	99	0.29	106
106	Communication	0.40	98	0.34	33	0.75	79
107	Trade	3.55	2	37.95	1	41.50	1
108	Hotels & restaurants	1.80	11	0.73	23	2.53	18
109	Banking	0.52	90	2.45	6	2.98	13
110	Insurance	0.20	109	0.03	82	0.23	109
111	Ownership of dwellings	2.13	8	1.87	9	4.00	8
112	Education and research	1.39	24	1.17	15	2.55	17
113	Medical & health	1.56	15	0.80	18	2.36	19
114	Other services	1.82	10	6.19	5	8.01	5

115	Public administration	1.73	14	1.73	12	3.45	10

Appendix Table 3: Indices of Backward & Forward Coefficient of Variation and Index of Vertical Integration - Activity-wise

	Activity	IBCV	Rank	IFCV	Rank	IVI	Rank
	1	2	3	4	5	6	7
	Agriculture						
1	Paddy	8.52	106	8.48	57	0.002962	21
2	Wheat	7.24	99	8.73	63	0.001613	30
3	Jowar	4.67	10	10.52	103	0.000027	105
4	Bajra	4.72	12	10.51	102	0.000028	103
5	Maize	4.57	8	10.38	98	0.000058	98
6	Gram	4.91	23	9.26	71	0.001462	32
7	Pulses	4.76	16	10.02	85	0.000575	51
8	Sugarcane	6.96	95	6.32	38	0.000813	45
9	Groundnut	4.83	20	6.61	41	0.000948	43
10	Jute	4.91	24	8.55	59	0.000211	74
11	Cotton	4.75	15	6.14	37	0.002102	25
12	Tea	4.74	13	8.54	58	0.000333	63
13	Coffee	4.43	6	10.36	96	0.000030	101
14	Rubber	6.95	94	-9.15	2	0.000891	44
15	Coconut	5.33	52	10.14	88	0.000096	90
16	Tobacco	5.17	44	9.58	76	0.000165	77
17	Other crops	9.53	111	2.79	21	0.014095	8
18	Milk & milk products	8.12	104	8.10	49	0.003336	17
19	Animal services (agricultural)	7.21	98	5.77	34	0.000000	113
20	Other livestock products	6.16	83	4.80	28	0.003135	20
21	Forestry & logging	6.55	91	5.57	32	0.002909	22
22	Fishing	7.25	100	10.00	84	0.000429	59
	Industry						
23	Coal & lignite	4.74	14	2.57	20	0.008537	12
24	Crude petroleum, natural gas	-22.17	2	-2.53	13	0.026344	4
25	Iron ore	4.97	31	9.37	74	0.000237	72
26	Manganese ore	4.84	21	10.32	93	0.000068	96
27	Bauxite	4.98	33	10.43	99	0.000038	100
28	Copper ore	4.93	28	10.16	89	0.000082	93
29	Other metallic minerals	4.67	11	8.68	62	0.000402	60
30	Lime stone	4.95	30	9.89	82	0.000117	85
31	Mica	5.54	64	10.68	112	0.000000	111
32	Other non-metallic minerals	-28.16	1	-4.94	8	0.003196	19
33	Sugar	5.45	61	9.72	78	0.000149	79
34	Khandsari, boora	5.64	71	10.05	87	0.000029	102
35	Hydrogenated oil (vanaspati)	5.79	74	10.61	108	0.000016	109
36	Edible oils other than vanaspati	4.93	29	8.37	56	0.000242	71
37	Tea & coffee processing	5.75	73	10.35	95	0.000284	66
38	Miscellaneous food products	4.76	17	9.38	75	0.000329	64
39	Beverages	4.59	9	10.49	101	0.000163	78
40	Tobacco products	4.79	18	10.65	109	0.000027	104
41	Khadi, cotton textiles (handlooms)	4.97	32	9.26	72	0.000105	87
42	Cotton textiles	5.56	67	4.82	29	0.001136	39
43	Woolen textiles	4.79	19	9.07	68	0.000112	86
44	Silk textiles	4.91	25	10.17	90	0.000077	95
45	Art silk, synthetic fiber textiles	5.28	49	7.56	46	0.000595	50
46	Jute, hemp, mesta textiles	6.08	81	8.26	53	0.000270	67

47	Carpet weaving	5.12	42	10.66	111	0.000003	110
48	Readymade garments	4.85	22	10.44	100	0.000079	94
49	Miscellaneous textile products	4.98	34	7.39	44	0.000488	57
50	Furniture & fixtures- wooden	5.04	37	9.87	81	0.000671	46
51	Wood & wood products	5.02	36	5.70	33	0.002137	24
52	Paper, paper prods. & newsprint	5.82	75	-4.68	9	0.002614	23
53	Printing & publishing	5.13	43	8.67	61	0.001888	29
54	Leather footwear	5.61	70	10.59	106	0.000027	106
55	Leather & leather products	6.17	84	9.03	67	0.000174	75
56	Rubber products	11.87	114	6.42	39	0.002096	26
57	Plastic products	5.19	45	62.02	115	-0.001281	115
58	Petroleum products	24.39	115	3.08	23	0.003640	16
59	Coal tar products	6.91	93	-6.30	5	0.000099	88
60	Inorganic heavy chemicals	6.69	92	-4.31	11	0.001162	38
61	Organic heavy chemicals	7.09	97	-4.38	10	0.001387	34
62	Fertilizers	7.81	103	-5.10	7	0.000498	55
63	Pesticides	6.18	85	8.20	51	0.000123	83
64	Paints, varnishes & lacquers	6.2	87	6.50	40	0.000551	53
65	Drugs & medicines	5.4	57	7.66	47	0.004917	14
66	Soaps, cosmetics & glycerin	5.11	40	9.81	79	0.000084	92
67	Synthetic fibers, resin	6.33	88	-5.35	6	0.001171	37
68	Other chemicals	5.37	56	3.04	22	0.001496	31
69	Structural clay products	6.52	90	9.71	77	0.000302	65
70	Cement	6.07	80	8.78	64	0.000490	56
71	Other non-metallic mineral prods.	5.36	54	8.17	50	0.000391	61
72	Iron, steel & ferro alloys	5.85	76	2.32	19	0.003663	15
73	Iron and steel casting & forging	5.88	77	5.99	36	0.000368	62
74	Iron & steel foundries	6.33	89	-6.34	4	0.000574	52
75	Non-ferrous basic metals	7.08	96	-3.42	12	0.001927	28
76	Hand tools, hardware	5.55	66	6.74	42	0.001269	35
77	Miscellaneous metal products	5.25	47	4.60	27	0.001262	36
78	Tractors and agri. Implements	4.99	35	10.04	86	0.000054	99
79	Industrial machinery (F&T)	5.56	68	9.21	69	0.000137	82
80	Industrial machinery (others)	4.91	26	8.20	52	0.000256	68
81	Machine tools	5.31	51	9.31	73	0.000223	73
82	Office computing machines	5.05	39	10.56	105	0.000022	107
83	Other non-electrical machinery	5.36	55	5.95	35	0.001060	42
84	Electrical industrial machinery	5.11	41	7.20	43	0.000479	58
85	Electrical wires & cables	5.57	69	8.27	54	0.000524	54
86	Batteries	6.19	86	10.36	97	0.000149	80
87	Electrical appliances	5.42	60	8.91	65	0.000251	70
88	Communication equipments	5.41	58	9.02	66	0.000660	48
89	Other electrical machinery	5.95	78	-7.75	3	0.000255	69
90	Electronic equipments (incl. TV)	5.34	53	9.83	80	0.000094	91
91	Ships & boats	5.45	62	10.25	91	0.000067	97
92	Rail equipments	6.08	82	7.42	45	0.003270	18
93	Motor vehicles	5.21	46	7.86	48	0.002010	27
94	Motor cycles & scooters	5.27	48	10.31	92	0.000121	84
95	Bicycles, cycle- rickshaw	5.7	72	10.34	94	0.000145	81
96	Other transport equipments	5.97	79	-10.06	1	0.000612	49
97	Watches & clocks	5.04	38	10.66	110	0.000018	108
98	Miscellaneous manufacturing	5.41	59	4.53	26	0.007211	13
99	Construction	8.89	108	3.94	25	0.010982	11
100	Electricity	5.54	65	1.47	16	0.018460	6
101	Gas	4.31	4	10.60	107	0.000173	76
102	Water supply	7.33	101	9.24	70	0.001435	33

	Services						
103	Railway transport services	4.92	27	3.22	24	0.016679	7
104	Other transport services	8.58	107	1.29	15	0.046273	3
105	Storage & warehousing	4.42	5	9.96	83	0.000667	47
106	Communication	5.28	50	4.90	30	0.011990	9
107	Trade	9.83	112	0.98	14	0.118427	1
108	Hotels & restaurants	4.43	7	8.27	55	0.001113	40
109	Banking	8.19	105	1.77	17	0.053505	2
110	Insurance	4.04	3	5.00	31	0.011414	10
111	Ownership of dwellings	9.45	110	10.68	114	0.000000	112
112	Education and research	8.92	109	10.55	104	0.000098	89
113	Medical & health	5.53	63	8.59	60	0.001060	41
114	Other services	7.34	102	2.21	18	0.023001	5
115	Public administration	10.68	113	10.68	113	0.000000	114
	Average Index	**5.50**		**6.91**		**0.003878**	

IBCV: Index of Backward Coefficient of Variation; IFCV: Index of Forward Coefficient of Variation; and IVI: Index of Vertical Integration.

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