Informality in Indian Manufacturing

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PRELIMINARY

This paper characterizes informality in output and employment in the Indian economy for the period 1978-2005, with a special emphasis on the manufacturing sector. We first present statistics on growth and employment for India as well as for three sectors - agriculture, industry and services- for the time period 1950-2005. We also present data on employment in informal and formal enterprises using National Sample Survey data and highlight how informality in both formal and informal enterprises has grown over the years. This is further confirmed by comparing India with 40 other developing countries, where we find that the share of informal employment in non-agricultural employment is the highest among all the countries, and Indian manufacturing is a sector where the degree of informality is strikingly high. We document informality in Indian manufacturing carefully by examining detailed data on value added, employment, capital-labor ratios and trade at the 3 digit level for the manufacturing industries during the 1978-2010 period and highlight those industries in which informality has been increasing and dominant. Importantly, the level of informality in Indian employment has remained persistently high despite the rapid growth in GDP and GDP per capita seen since 1991, which is when India initiated the process of liberalizing the domestic industrial policy as well as its trade policy.

Key Words: Informality, enterprises, manufacturing

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1 Introduction

The objective of this paper is to characterize informality in output and employment in the Indian economy for the period 1978-2005, with a special emphasis on the manufacturing sector. We first present statistics on growth and employment for India as well as for three sectors - agriculture, industry and services- for the time period 1950-2005. We also present data on employment in informal and formal enterprises and highlight how informality in both formal and informal enterprises has grown over the years. This is further confirmed by comparing India with 40 other developing countries, where we find that the share of informal employment in non-agricultural employment is the highest among all the countries, and Indian manufacturing is a sector where the degree of informality is strikingly high. We document informality in Indian manufacturing carefully by examining detailed data on value added, employment, capital-labor ratios and trade at the 3 digit level for the manufacturing industries during the 1978-2010 period and highlight those industries in which informality has been increasing and dominant. Importantly, the level of informality in Indian employment has remained persistently high despite the rapid growth in GDP and GDP per capita seen since 1991, which is when India initiated the process of liberalizing the domestic industrial policy as well as its trade policy. While the real GDP per capita growth averaged about 5% pre 1990, it jumped to 6% during the decade of the 90s and then increased further to 7.5% during the decade of 2000s. However, this rapid growth in output did not translate into growth in employment - employment growth post 1990 is not significantly different from pre 1990. This pattern of growth in India has been referred to as 'jobless growth'.

In India, the informal sector is defined to consist of all unincorporated private enterprises owned by individuals or households engaged in the sale and production of goods and services operated on a proprietary or partnership basis and with less than ten total workers. An enterprise is an undertaking engaged in the production and/or distribution of some goods and/or services meant mainly for the purpose of sale, whether fully or partly. There are three

kinds of enterprises - i) Own-account enterprise: An enterprise, which is run without any hired worker employed on a fairly regular basis. If such an enterprise is engaged in manufacturing and/or repairing activities, it is termed an own account manufacturing enterprise (OAME). ii) Non-directory establishment: An establishment (an enterprise employing at least one hired worker on a fairly regular basis) employing less than six household and hired workers. If such an establishment is engaged in manufacturing and/or repairing activities, it is termed non-directory manufacturing establishment (NDME). iii) Directory Establishment: An establishment which has employed six or more household and hired workers. If such an establishment is engaged in manufacturing and/or repairing activities, it is termed directory manufacturing establishment (DME). We also distinguish the informal sector from the informal worker. Informal workers consist of those working in the informal enterprises or households, excluding regular workers with social security benefits, and the workers in the formal sector without any employment/social security benefits provided by the employers.

Kuznets (1966) noted that one of the principal characteristics of modern economic growth was a series of shifts in the structure of production: from small to large firms; from self employment to wage work; and from unincorporated enterprises to large corporations. Lewis (1965) and Rostow (1960) also recognized these changes in the structure of employment and production. Interestingly, they believed that this was a disequilibrium phenomenon and small firms will eventually vanish (see Fafchamps (1994)).

In contrast, in a series of studies of commissioned by the International Labor Organization in developing countries (the results of which are summarized in Sethuraman (1981)), it was found that participants in the informal sector do not look for better opportunities in the formal sector -The informal sector exists as a source of employment in its own right. Rauch (1991) and Gollin (2008) develop models where informality exists in equilibrium. However, in Gollin (2008) informality declines with growth in GDP per capita as he finds an inverse relatonship between real GDP per capita and the level of informality in the data - both across countries and for Japan over time.

Looking at the composition of employment, according to the National Commission for Enterprises in the Unorganised Sector (NCEUS), informal or unorganized mode of employment accounted for 91% of total employment in India in 1994-95. In 2004-05, informal employment accounted for 92% of total employment. Thus, not only did employment growth remained stagnant the informal segment of the workforce did not decline at all. This stands in sharp contrast with the evidence presented by Gollin (2008), and the popular perception based on historical evidence that as countries develop informality declines.

1.1 Why Should We Care about Informality?

Why should informality be of importance? This boils down to the issue of which mechanisms are the most important for creation of informal sector, and how these mechanisms have different implications for growth. La Porta and Shleifer (2008) highlight three main mechanisms.

The first is the romantic view (de Soto (1989); *The Mystery of Capital. Why Capitalism Triumphs in the West and Fails Everywhere Else* (2000)). According to this view unofficial firms are either actually or potentially extremely productive but are held back by government taxes and regulations, as well as by lack of secure property rights and access to finance. The key aspect of this view is that unofficial firms are similar to official firms with respect to characteristics not affected by government policies, such as the characteristics of their entrepreneurs (for example, their education).

The second is the parasite view (McKinsey Global Institute - *The Hidden Dangers of the Informal Economy* (2004) and Baily et al. (2005)). Here, unofficial firms are viewed primarily from the perspective of their illegality. The substantial cost advantage that informal firms gain by avoiding taxes and regulations more than offsets their low productivity and small scale. This cost advantage allows unofficial firms to undercut the prices of official firms. Informal firms, then, hurt growth both because their small scale makes them unproductive and because they take away market share from bigger, more productive formal competitors. According to this view, government policy should aim to eradicate informal firms by reducing

tax evasion and increasing the enforcement of government regulations.

The third is the dual view (Rauch (1991)). This view asserts that unofficial firms are very different from official firms in their characteristics that are not affected by government policies. Productive entrepreneurs are willing to pay taxes and bear the cost of government regulation in order to advertise their products, raise outside capital, and access public goods. Such entrepreneurs find it more profitable to run the bigger, official firms than the smaller, unofficial ones. In contrast, the increase in firm value that less able entrepreneurs or managers could generate by operating formally is not large enough to offset the additional costs from taxes and regulations. The strong prediction of the dual view is that managers and assets are matched through a sorting process that results in low-ability managers being paired with low-quality assets. This view does not see the unofficial firms as threatening the official ones, because they are hugely inefficient and hence unlikely to be able to charge lower prices for the same products. Indeed, official and unofficial firms operate largely in different markets and have different customers. It sees the hope of economic development in policies, such as human capital, tax, and regulatory policies, that promote the creation of official firms (new people/firms, not previously unofficial firms), letting the unofficial ones die as the economy develops.

La Porta and Shleifer (2008) find evidence in support of the dual view. High productivity comes from formal firms, and in particular from large formal firms. Productivity is much higher in small formal firms than in informal firms, and it rises rapidly with the size of formal firms. Besides being larger, formal firms tend to use more capital, have different customers, and market their products and use external finance to a greater extent than do informal firms. Most important difference between formal and informal firms is that formal firms are run by much better educated managers.[1] The authors do not find evidence that informal firms tend to become formal as they grow. Rather, virtually none of the formal firms in their sample had ever been informal.

[1]They do not find much difference in the human capital of employees.

Table 1: Growth Rate of GDP and Employment (in percentage)

Growth Rate of GDP at factor cost (base year 1999-2000)				
Source	1950-80	1981-90	1991-2000	2001-08
Central Statistical Organization (CSO)	3.6	5.4	6.1	7.6
Growth Rate of Employment				
Source	1950-1980	1981-1990	1991-2000	2001-2007
Bosworth, Collins and Virmani	1.9	1.9	1.5	2.9
Planning Commission Report		2.9	1.4	1.9

2 GDP, Employment and Informality: An Overview

The Indian economy has seen a steady acceleration in the growth rate of GDP since the 1950s (top panel of Table 1). While the pre 1990 growth rate of GDP is often referred to as the "Hindu" growth rate (about 5%), the post 1990 growth experience has been comparatively much better. During 2000-2009, the growth rate of GDP averaged 7.6 percent annually. In comparison, the growth in employment has been extremely small. Long time series data on employment is not readily available, but based on two sets of estimates - Bosworth et al. (2007) and the report of the Planning Commission - one can clearly conclude that growth in employment has been virtually stagnant, at least till 2000 (bottom panel of Table 1).[2] In fact, the 1990s saw a decline in the growth rate of employment, as compared to the previous period. This is noteworthy because the 1990s was the decade when significant domestic as well as external liberalization reforms were undertaken. We also look at data from the National Sample Survey Organisation's (NSSO) 50th and 61st rounds of employment surveys. We find that unemployment rates have shown a secular increase, from 1993-94 to 2004-05, by every measure of employment (see Appendix C for definitions), as shown in Table 2.

Breaking down the statistics on GDP and employment growth by sectors also presents a similar picture. Table 3 and Table 4 show growth rates of GDP and employment for the three principal sectors sectors of the economy - namely, agriculture, industry and services. Looking at the statistics on GDP growth in Table 3, one can notice that aggregate growth has

[2]Planning Commission report is titled "Targeting Ten million Employment Opportunities per year over the Tenth Plan Period".

Table 2: Unemployment Rates in percentage based on Different Measurements

Measurement	1993-94	2004-05
UPS	2.6	3.2
UPSS	1.9	2.4
CWS	3.6	4.4
CDS	6	8.2
MCWS	5.3	6.7

Source: NSSO 50th and 61st Round Survey on Employment-Unemployment. Computed.

Table 3: Growth Rate of GDP at factor cost in percentage (base year 1999-2000) by Sector

Sector	1950-51 to 1979-80	1980-81 to 1990-91	1991-92 to 1999-2000	2000-01 to 2008-09
Agriculture & allied activities	1.93	3.39	3.72	3.04
Agriculture	2.01	3.51	3.79	2.89
Industry	5.41	6.72	6.36	6.18
Mining & Quarrying	4.54	8.43	4.17	4.81
Manufacturing	5.27	6.20	6.63	6.65
Electricity, Gas & Water Supply	9.57	8.58	7.04	4.32
Services	4.47	6.33	7.57	8.23
Construction	4.68	4.59	5.26	9.64
Trade, Hotel, Transport & Communications	5.05	5.90	8.36	9.76
Finance, Insurance, Real Estate & Business Services	3.53	9.08	7.90	8.23
Community, Social & Personal Services	4.31	5.91	7.17	4.96

Source: Central Statistics Organisation

been driven more by services rather than industry post 1991. This fact is further supported by looking at the growth rates of the shares of output in the three sectors. Between 1991-2005, the average annual growth rate of the share of output in Industry was negative and measured -0.1 percent, while that of the share of output in services was 1.7 percent (Table 7 in Verma (2012)). When looking at employment growth in Table 4, we find that (i) employment growth rate declined considerably in agriculture in the 1990s and the 2000s as compared to the 1983 - 1993/94 period; (ii) employment growth in manufacturing, a large sub-sector within the industrial sector, was small for most of the time period, particularly in the late 1990s until 2002, but showed some signs of an increase in the 2002-2007 period; (iii) employment growth in different sub-sectors within services has been larger and the 2002-2007 period recorded significantly larger growth rates for most sub-sectors. Overall, the sectoral picture also shows that employment growth has been significantly lower than value added growth, especially in agriculture and industry.

Table 4: Growth Rate of Employment in percentage by Sector

Sector	1983 to 1993-94	1993-94 to 1999-2000	1999-2000 to 2000-01	2001 to 2002	2002 to 2007
Agriculture & allied activities					
Agriculture	2.23	0.02	0	0.03	0.04
Industry					
Mining & Quarrying	3.68	-1.91	-1.52	0.46	1.93
Manufacturing	2.26	2.58	1.85	0.85	3.3
Electricity, Gas & Water Supply	5.31	-3.55	-2.44	1.92	4.32
Services					
Construction	4.18	5.21	4.51	2.3	6.81
Trade, Hotels, & Restaurants	3.8	5.72	4.28	3.62	4.96
Transport, Storage & Communication	3.35	5.53	4.35	3.67	6.49
Finance, Insurance, Real Estate & Business Services	4.6	5.4	5.82	7.11	6.4
Community, Social & Personal Services	3.85	-2.08	-1.95	1.74	1.9

Source: Planning Commission Report

We now examine the trend in aggregate employment growth by looking at employment growth in the formal and informal sectors of the economy. Table 5 shows the break up of formal and informal workers by formal and informal enterprises based on NSSO 55th and 61st Round Survey on Employment-Unemployment and estimates of the National Commission for Enterprises in the Unorganised Sector (NCEUS). Both, in 1999-2000 and 2004-05, about 92 percent of all workers were informal. Almost all workers in informal enterprises were informal for both years. Interestingly, even in the formal sector the share of informal workers increased from 23 million in 1999-2000 to about 29 million in 2004-05, an increase of 25 %. In contrast, formal employment in the formal sector grew by only 6% between the same time period, increasing from 32 million to 34 million. Hence, one can see that most of the increase in the formal sector employment across the two years (from 54.9 to 62.6 million) was on account of informal employment. This has been referred to as 'informalisation' of the formal sector.

Data on formal enterprises[3] also paints a similar picture. Two main sources of data on formal enterprises in India are (i) the Employment Market Information (EMI) data of the Director General Employment & Training (DGET) of the Ministry of Labour and

[3]In India, formal enterprises are those factories registered under Sections 2m(i) and 2m(ii) of the Factories Act, 1948. These include factories that employ 10 or more workers and use power, or factories that employ 20 or more workers without using power.

Table 5: Relationship between Sector and Type of Employment (UPSS), All Workers

Sector	Employment		
	Informal/Unorganized Worker	Formal/Organized Worker	Total
	1999-2000		
Informal/Unorganized	393.7(99.5)	1.8(0.5)	341.5 (100.0)
Formal/Organized	23.1 (42.1)	31.8(57.9)	54.9(100)
Total	362.8(91.5)	33.6(8.5)	396.4 (100.0)
	2004-05		
Informal/Unorganized	391.8(99.6)	1.4(0.4)	393.2(100)
Formal/Organized	28.9(46.2)	33.7(53.8)	62.6(100)
Total	420.7(92.3)	35.0(7.7)	455.7(100)

Note: employment numbers are in millions, numbers in parenthesis are in percent
Source: NSSO 55th and 61st Round Survey on Employment-Unemployment, computed by NCEUS.

Employment, and (ii) the Annual Survey of Industries (ASI). The quality of the EMI-DGET data is inferior as compared to that of the ASI data, but the coverage of sectors is much smaller in the ASI data (largely manufacturing).[4] The NCEUS, using the EMI-DGET data, find that there has been a gradual decline in the share of formal sector employment in India. Formal sector employment as ratio of the total workforce was 7.9 percent in 1983, 7.3 percent in 1993-94 and 5.8 percent in 2004-05.[5] Like the DGET data, the ASI data also show that formal industrial employment has seen very little growth for close to quarter of a century. It was characterized by a stagnant phase in the 1980s, followed by increase in the early to mid-1990s, a decline thereafter, and some recovery and growth for 2004-05[6].

The evidence on the growth of employment in the informal sector, as well as growth of total employment, in the period since 2004-05 is quite mixed. Goldar (2009) and Mitra (2009) calculated employment growth using firm level data on formal/registered firms,[7] and find that there has been consistent employment growth during 2005-06, 2006-07 and 2007-

[4]All enterprises and establishments employing more than 25 workers are required to report employment data on a mandatory basis for the EMI, while units employing between 10 and 25 workers may do so on a voluntary basis. Questions have been raised in the past on the reliability due to increasing under coverage and under reporting over the years.

[5]Importantly, public sector employment witnessed a greater decline - from 5.4 percent of the workforce in 1983 to 5.2 percent in 1993-94 and then to 3.9 percent in 2004-05. Private organized sector employment also declined, albeit slower relative to the public sector, - from 2.5 percent in 1983 to 2.1 percent in 1993-94 and just 1.8 percent in 2004-05.

[6]See Chapter 2 in the *The Challenge of Employment in India: An Informal Economy Perspective* (2009).

[7]Obtained from Capital line data and Centre for Monitoring the Indian Economy (CMIE) data

08 in the manufacturing sector, while in the service sector no clear trend is visible. These findings are, however, not supported by the results of overall employment data available from the NSSO annual survey on employment-unemployment conducted during 2005-06. The NCEUS undertook an alternative exercise to estimate the workers by industry, sector and status of employment based on estimates of employment elasticity calculated during 1993-94 and 2004-05. They found that growth of employment in the informal sector was significantly higher than that in the formal sector for all three sectors-agriculture, industry and services. The same trend was seen in all the years up to 2008-09. The NCEUS estimates are given in Table 19. The last column in the table displays the annualized growth rates of formal, informal and total employment in agriculture, industry and services, as well as the entire economy. For the agriculture sector, almost entire employment growth was due to growth of informal employment. In industry and services, informal employment growth exceeded growth of formal employment by a substantial margin in each year. Even at the economy wide level, the growth rate of total employment was largely on account of faster growth of informal employment.

In sum, the picture that emerges is one where even though employment growth at the economy wide level has been small, informal employment has grown significantly - whether seen in the principal sectors of economic activity or in the informal and formal enterprises.

3 India versus other Countries - A comparison

In this section, we compare India with other developing countries. We use data from the International Labor Organization (ILO) to examine how informality correlates with the level of development in a country, as measured by the GNI per capita, PPP, in international dollars (data taken by the World Development Indicators collected by the World Bank). The ILO collected data on informality from 40 countries for the 2004-2010 period which are presented in Table 16[8].

[8]The informality measures presented here were prepared on the basis of data obtained from a range of sources: responses to a questionnaire, which the ILO Department of Statistics had sent to countries to request data and meta-data on employment in the informal economy; special tabulations of national

Three sets of graphs are presented below: the first graph plots the GNI per capita versus share of informal employment (informal jobs) in non-agriculture employment (employment excluding agriculture, hunting, forestry and fishing). A look at the graph reveals that informality and GNI per capita are negatively correlated. The measured correlation coefficient is about -0.54. For these countries, the average GNI per capita was about 6,903 international dollars while the average share of informality in non-agricultural employment was 54%. India showed the highest share of informality in employment. In the year 2009-2010, the share of informal employment was 83.5% of all non-agricultural employment in India while her per capita income was about 4,320 international dollars. The lowest share of informality was seen in Serbia. In 2010, Serbian per capita income was about 11,540 international dollars and the share of informality was about 6.07%.

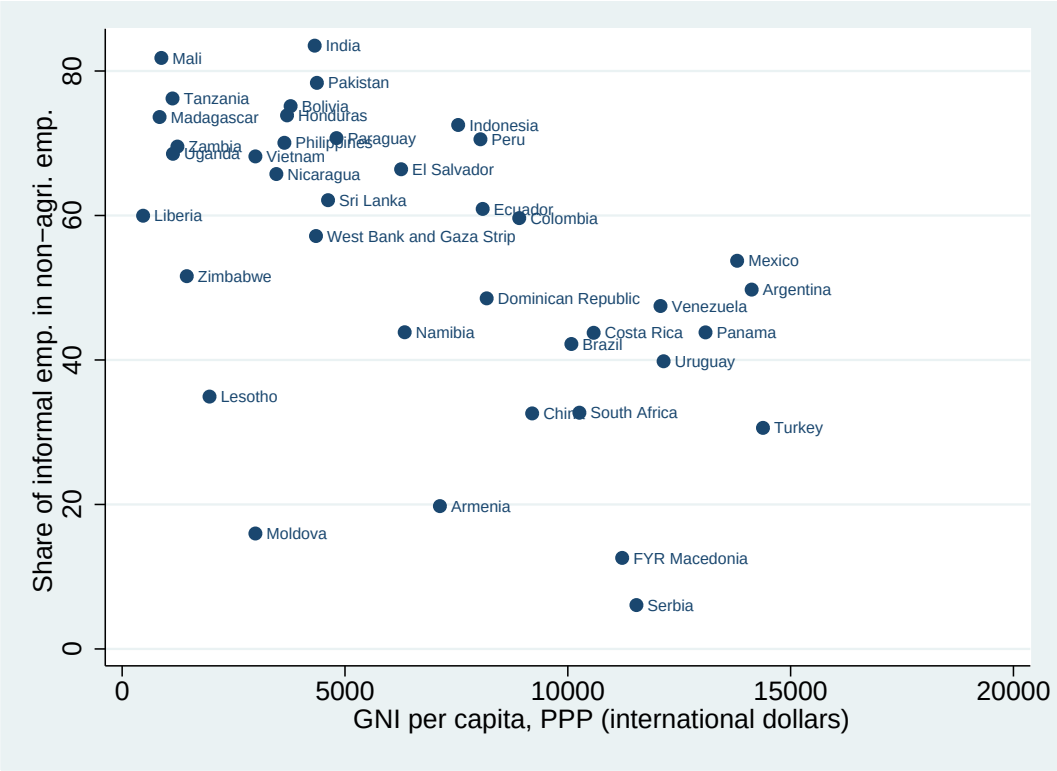

Figure 1: Share of Informal Employment in Non-agriculture Employment

survey data accessible to the ILO and to WIEGO, including the household survey micro-data base held by the ILO/SIALC (Panama) for Latin American countries; extracts from survey reports, etc. The primary data source were national labor force surveys in most cases, and informal sector surveys, living standards measurement surveys or other household surveys in some other cases.

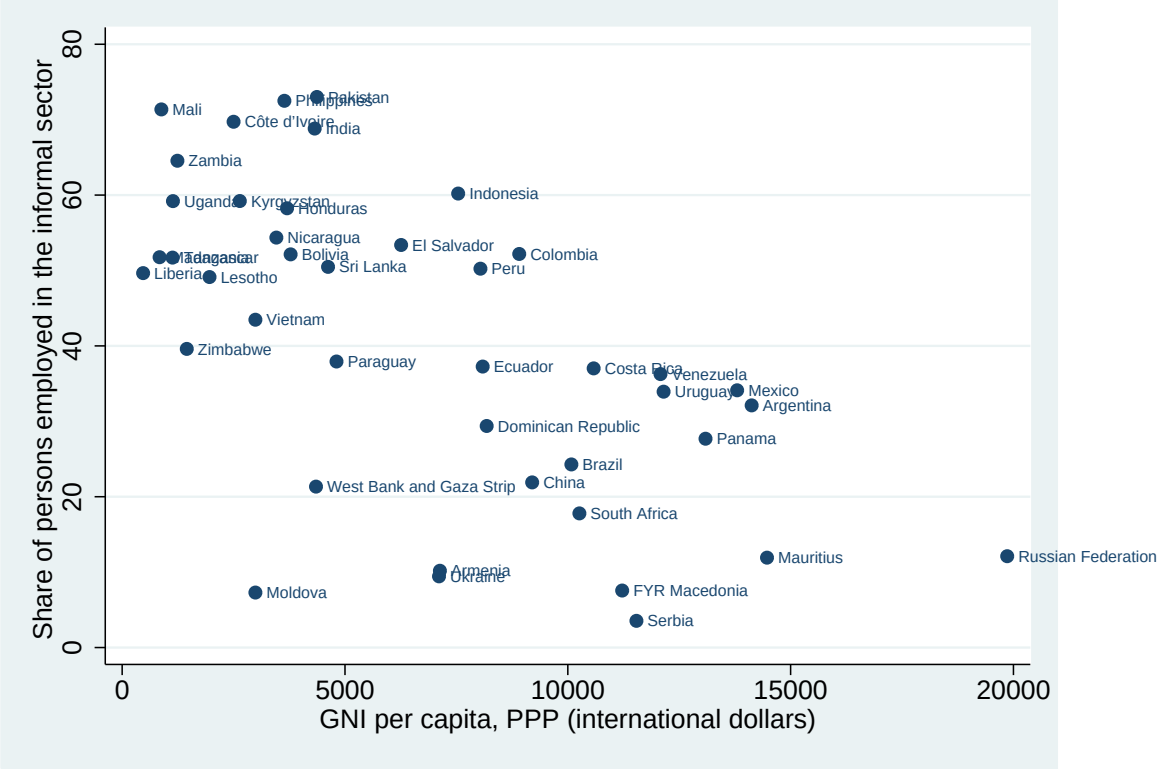

Figure 2: Share of Persons employed in the Informal Sector

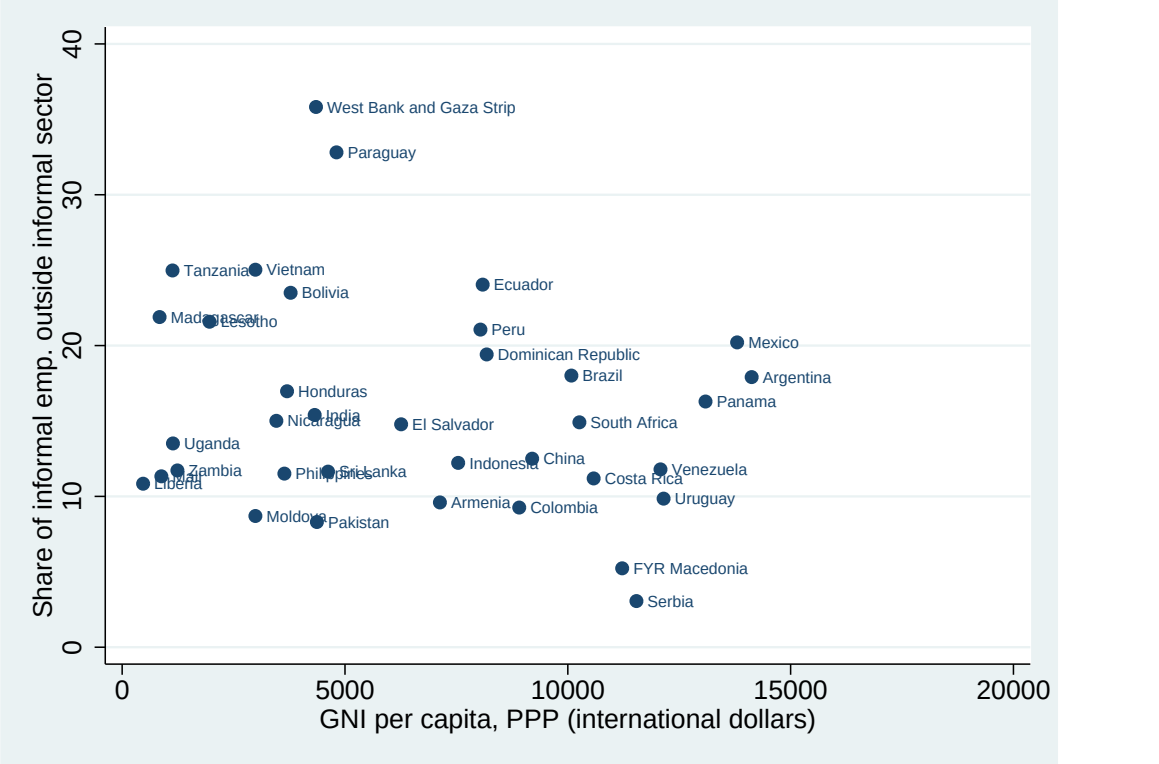

Figure 3: Share of Persons in Informal Employment outside the Informal Sector

The second graph shows the GNI per capita versus the informal sector's share in total employment. The relationship between them is negative with the correlation coefficient measuring about -0.62. The average share of the informal sector in non-agricultural employment among these countries was about 41%. The informal sector's share was highest for Pakistan, 73%, followed closely by Philippines at 72.5%, while the per capita income was 4,370 dollars in Pakistan in 2009-2010 and about 3,640 dollars in Phillipines in 2008. Using this measure of informality again highlights India as a country which witnesses a relatively high share of employment in the informal sector, about 69%. The lowest share of the informal sector in employment was seen in Serbia - about 3.5 % in 2010.

The third graph depicts the relationship between GNI per capita and the share of persons in informal employment outside the informal sector. The relationship is weakly negative where the correlation coefficient is about -0.21. The average share of informal employment outside the informal sector was about 16%. West Bank and the Gaza strip and Paraguay are countries which recorded highest informality outside the informal sector. The measured shares were 36 and 33 % with average per capita incomes of 4,350 and 4,810 dollars, respectively. The lowest level of informality outside the formal sector was seen in Serbia, about 3 %. Using this measure, India resembles the average country where the share of informality outside the informal sector was about 15%.

We also compare India with some large developing economies, Argentina, Brazil, China, Mexico, Phillipines, South Africa and Thailand, to examine informality by nature of economic activity. Table 6 presents data on the decomposition of informal employment across the following industries- manufacturing, construction, trade, transportation, and other services (other than trade and transportation). When looking at this decomposition, India stands out as the country where the manufacturing sector accounts for nearly a quarter (24.4%) of all non-agricultural informal employment. The share of Chinese manufacturing in non-agricultural informal employment is the lowest among all countries, 8%, about one-third of what is seen in India. In most countries, activities such as trade and other

Table 6: Decomposition of non-agricultural informal employment

GNI per capita, PPP	Argentina 2009 14,125	Brazil 2009 10,080	China 2010 9,200	India 2009-10 4,320	Mexico 2009 13,800	Phillipines 2008 3,640	South Africa 2010 10,260	Thailand 2010 12,720
Kind of activity								
All non-agricultural activities	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Manufacturing	12.6	13.2	8.0	24.4	14.8	12.9	8.5	11.4
Construction	13.9	14.3	4.4	23.1	13.5	10.6	12.3	10.1
Trade	30.3	27.9	38.0	23.9	41.5	36.2	31.1	41.9
Transportation	6.5	5.3	6.2	9.4	5.9	14.5	6.4	5.4
Services other than trade or transportation	36.7	39.3	43.3	18.0	24.2	25.8	41.7	31.2

Table 7: Share of informal employment in non-agricultural employment

	Argentina 2009	Brazil 2009	China 2010	India 2009-10	Mexico 2009	Phillipines 2008	South Africa 2010	Thailand 2010	Average Cross-Country
Kind of activity									
All non-agricultural activities	49.7	42.2	32.4	83.6	53.7	70.1	32.7	42.3	50.8
Manufacturing	42.9	31.7	17.1	87.1	42.9	61.8	19.4	21.2	40.5
Construction	77.6	67.5	35.2	97.6	77.8	87.2	47.8	46.6	67.2
Trade	64.4	45.0	59.6	97.2	65.8	86.7	42.7	66.1	65.9
Transportation	48.2	39.0	21.8	84.5	57.1	85.5	34.6	49.8	52.6
Services other than trade or transportation	39.4	39.9	27.6	59.9	39.9	50.6	28.7	36.0	40.3

services account for the highest share of non-agricultural informal employment, with India being slightly different. While trade accounts for a large share of non-agricultural informal employment in India (23.9%), the service sector accounts for much less - 18% of informal employment[9].

We also look at the share of informal employment in non-agricultural employment in different activities for these countries in Table 7. Using this indicator as well, Indian informality is striking. The share of informal employment in all non-agricultural activities is highest in India, 83.6%, whereas the cross-country average share is about 51%. In contrast, share of informal employment in manufacturing in China is about 17%. While sectors such as construction and trade in India are nearly completely informal, informality in Indian manufacturing is strikingly high - 87% - more than twice the average share of 40.5%.

The comparison with other large developing countries reveals that informality within India and in particular within Indian manufacturing is compelling - in order to understand it completely, we need to look at the industries which constitute the manufacturing sector.

[9]We also present data on the decomposition of non-agricultural formal and total employment by activity in the appendix. See Tables 17 and 18

4 Labor Productivity of the Manufacturing Sector

In order to build the longest time series on the shares of gross value added (GVA) and employment in the informal sector, we utilize data from - (i) NSS Reports - 51st Round (1994-95), 56th Round (2000-01), 62nd Round (2005-06) and 67th Round (2010-11) and (ii) A report titled 'The Restructuring of the Unorganised Sector in India', funded by the Planning Commission (see Bhalla (2003)). While the NSS reports use National Industrial Classification (NIC) 98 codes, Bhalla (2003) uses NIC 87 codes at the 2 digit level and documents data for the periods 1978-79, 1984-85, 1989-90 using the Reports of the NSS 33rd, 40th and 45th Rounds. In order to form a complete time series using the two sources, we map the NIC 87 codes into the NIC 98 codes using the concordance provided on the MOSPI website. Table 20 shows the NIC 98 codes and industry descriptions. The data appendix provides the details of the data sources and how we aggregate the NIC codes in order to get a complete time series.

Figure **??** shows the evolution of aggregate labor productivity of the manufacturing sector along with the labor productivity of formal and informal segments of the manufacturing sector. It also shows the evolution of the share of informal sector in total manufacturing sector employment. Labor productivity in each year is measured as real value added per worker, which is computed by first dividing the nominal gross value added in each year by employment in that year and then deflating the resulting series using the Wholesale Price Index (1993-94 prices) in that year for manufacturing industries. Aggregate productivity experienced faster growth after the initiation of the liberalization reforms in 1991, with the sharpest increase taking place after 2000-01. The figure also reveals that most of the increase in aggregate productivity was driven by the productivity growth in formal segment of manufacturing - formal sector productivity was greater than the informal sector productivity in all periods and it grew at a much faster rate, especially after 2000-01. The formal sector labor productivity was about 5.4 times that of the informal sector in 1978-79, and this productivity gap widened to 13.4 by 2010-11. The employment share of the informal sector

does not witness much change when we compare the share in 1984-85 with that in 2010-11 - measuring about 86%. However, there were some large changes in the intervening period - (i) a large increase from 1978-79 to 1984-85 (of 10% points), (ii) then a modest decline till 1994-95, (iii) followed by a modest increase between 1994-95 and 2000-01, and (iv) then a sustained decline till 2010-11 (of about 8.5% points). But even by the final time period of 2010-11, the share was about 78%.

As the next step, we measure the contribution of the formal and informal sector to aggregate labor productivity growth in the manufacturing sector. In order to do this, we express the labor productivity in the manufacturing sector ($\frac{Y}{L}$) as a weighted average of the labor productivity in the informal manufacturing sector ($\frac{Y_I}{L_I}$) and the labor productivity in the formal manufacturing sector ($\frac{Y_F}{L_F}$) where the weights are the shares of informal and formal sectors in total manufacturing sector employment.

$$\frac{Y}{L} = \left(\frac{Y_I}{L_I}\right)\left(\frac{L_I}{L}\right) + \left(\frac{Y_F}{L_F}\right)\left(\frac{L_F}{L}\right) \quad , \tag{4.1}$$

where $\frac{L_I}{L}$ and $\frac{L_F}{L}$ denote the share of informal and formal sector in total employment, respectively. Differentiating this equation with respect to time yields the following expression

$$\widehat{\left(\frac{Y}{L}\right)} = \left(\widehat{\left(\frac{Y_I}{L_I}\right)} + \widehat{\left(\frac{L_I}{L}\right)}\right) s_I + \left(\widehat{\left(\frac{Y_F}{L_F}\right)} + \widehat{\left(\frac{L_F}{L}\right)}\right) s_F \quad , \tag{4.2}$$

where $\widehat{X}$ denotes the average annualized growth rate of variable X between two years, and s_I and s_F denote the share of informal and formal sector in total manufacturing value added. To be clear, $s_F = 1 - s_I$. We take s_I to be the average of the values across the same two years for which we calculate average annual growth rates. The first term on the right hand side measures the contribution of the informal sector to aggregate manufacturing sector labor productivity growth, while the second term on the right side gives the contribution of the formal sector. The results from this decomposition exercise are presented in Table 8. The last column of this table summarizes the result of this decomposition by giving us the contribution of the informal sector to aggregate labor productivity growth. We see that for

Table 8: Labor Productivity in Indian Manufacturing - Informal versus Formal

Year	Growth Rate (%) of					Share of	Contribution of
	Output per Worker			Share in Employment		Informal sector	Informal Sector to
	Aggregate	Informal	Formal	Informal	Formal	in Value Added	Productivity Growth
1978-79	-	-	-	-	-	-	-
1984-85	-3.10	0.89	2.93	1.99	-8.63	0.3027	28
1989-90	6.18	1.18	6.93	-0.28	1.71	0.3186	5
1994-95	7.65	2.43	6.34	-0.59	3.18	0.2438	6
2000-01	2.38	5.63	5.22	0.75	-4.09	0.2384	64
2005-06	9.35	3.68	7.55	-0.62	3.71	0.2322	8
2010-11	11.46	9.10	5.88	-1.42	6.40	0.1800	12

most years the contribution is less than 20%. A simple average across all time periods of the last column comes out to be 20%, saying that on average the informal sector accounted for about one-fifth of the aggregate productivity growth between 1978-79 and 2010-11.

Given that both the level as well as the growth of labor productivity is lower in the informal sector compared to the formal sector, high levels of informality can also be seen as a drag on aggregate productivity. This is also the popular view of the informal sector - informal enterprises are less productive than formal enterprises and, therefore, one way of improving aggregate manufacturing productivity is to lower the incidence of informality. To see how much of drag does informality impose on the aggregate productivity growth in the Indian manufacturing sector, we use $s_F = 1 - s_I$ to re-arrange terms in (4.2) and re-write it as:

$$\widehat{\left(\frac{Y}{L}\right)} = \underbrace{\left[\left(\widehat{\frac{Y_F}{L_F}}\right) + \left(\widehat{\frac{L_F}{L}}\right)\right]}_{\text{Formal}} + \underbrace{\left[\left(\left(\widehat{\frac{Y_I}{L_I}}\right) - \left(\widehat{\frac{Y_F}{L_F}}\right)\right) + \left(\left(\widehat{\frac{L_I}{L}}\right) - \left(\widehat{\frac{L_F}{L}}\right)\right)\right] s_I}_{\text{Drag from Informal}} \quad . \tag{4.3}$$

The first term (in the square parenthesis) on the right hand side gives the part of aggregate productivity growth that comes from the formal sector. The second term on the right hand side captures the drag imposed on aggregate productivity due to informality. The first component of this second term captures the labor productivity growth rate differential between the informal and the formal sector. The second component of this term captures the growth differential between informal and formal sector shares in total manufacturing sector employment. For informality to impose a drag on aggregate productivity the sum of

Table 9: Labor Productivity in Indian Manufacturing

Year	Growth Rate (%)					Share of	Drag due to
	Aggregate	Formal Sector		Difference Between Informal and Formal		Informal sector	to Informal Sector
	$\widehat{\left(\frac{Y}{L}\right)}$	$\widehat{\left(\frac{Y_F}{L_F}\right)}$	$\widehat{\left(\frac{L_F}{L}\right)}$	$\widehat{\left(\frac{Y_I}{L_I}\right)} - \widehat{\left(\frac{Y_F}{L_F}\right)}$	$\widehat{\left(\frac{L_I}{L}\right)} - \widehat{\left(\frac{L_F}{L}\right)}$	in Value Added	$\left(\%\text{ of }\widehat{\left(\frac{Y}{L}\right)}\right)$
1978-79	-	-	-	-	-	-	-
1984-85	-3.10	2.93	-8.63	-2.04	10.62	0.3027	84
1989-90	6.18	6.93	1.71	-5.75	-1.98	0.3186	-40
1994-95	7.65	6.34	3.18	-3.91	-3.77	0.2438	-24
2000-01	2.38	5.22	-4.09	0.41	4.84	0.2384	53
2005-06	9.35	7.55	3.71	-3.87	-4.33	0.2322	-20
2010-11	11.46	5.88	6.40	3.22	-7.83	0.1800	-7

these two components must be negative. Even then, the importance of this drag could be lowered as the share of the informal sector in value added (s_I) declines, as is usually the case in the typical path of economic development. For the developed economies since s_I is close to zero, the drag imposed by informality is close to zero. On the other hand, for the less developed economies and extremely poor economies, which are at an early stage of development, s_I is very large and therefore this drag could be very large. When the economy is at an intermediate stage of development such as India, then both the informal and formal sector contribute towards aggregate growth. Table 9 presents the results of (4.3)).

The second, third and the fourth columns of this table reproduce the growth rates of aggregate output per worker as well as the growth rates of output per worker and share of employment in the formal sector from Table 8. The fifth and sixth column measure the difference between the informal and formal sectors' output per worker and employment share, respectively. We see that for most years labor productivity grew faster in the formal than the informal sector, i.e. the growth rate of output per worker in the informal sector was less than the formal sector. Together with the fact that the growth rate of informal sector's employment share was also smaller than that of the formal sector for most periods in the sample, this implies that the informal sector acted as a drag on aggregate labor productivity growth for most time periods. The decline in the informal sector's share in value added over time acted to reduce this drag.

There are two time periods - 1984-85 and 2000-01 - during which the informal sector had positive contribution towards aggregate productivity growth. In 1984-85, this was mainly

due to much faster growth rate of the employment share of the informal sector, 1.99% than that of the formal sector, -8.63%, despite the relatively slower productivity growth in the informal sector (0.89%). In 2000-01, on the other hand, both the productivity growth rate differential and the employment share growth rate differential were positive, resulting in a positive contribution. Interestingly, while the productivity growth rate differential has been negative throughout the pre-liberalization era it turned mildly positive in 2000-01 and strongly positive in 2010-11. These are also the periods during which the formal sector labor productivity has witnessed a decline compared to other time periods (except compared to 1984-85). Going back to Table 8, we see that the informal sector labor productivity growth was remarkable in 2010-11, measuring about 9%. The period between 2005-06 and 2010-11 was the period of a global slowdown and it is clear that the formal manufacturing sector in India also underperformed during this time period. However, the informal sector experienced the most rapid increase in labor productivity during this period of global downturn.

A look at the difference in the growth rates of employment shares between the informal and formal sector presents a similar picture - For most time periods, the share of employment in the informal sector grew slower than its counterpart in the formal sector. Indeed in the final time period, the difference in the employment shares was largest- i.e. growth in employment share of the formal sector exceeded than of the informal sector by about 8 %. There are two time periods in which the reverse happened. In 1984-85 and 2000-01, the employment share of the informal sector grew much faster - it's growth rate exceeded that of the formal sector by about 10 percentage points, while in 2000-01 the difference was about 5 %.

5 Informality within manufacturing

Table 10 displays the share of informal workforce in total employment for different industries within manufacturing during 1978-79 to 2010-11. The average informal share in workforce across all group of industries was in the range of 65-75% for the entire period. We divide sub-sectors intro three categories : (i) *High* - these are industries where the share of informal employment was higher than 66 percent in 1978-79, the initial time period of

Table 10: Measuring Informality - Share in Workforce (in %)

Sectors	1978-79	1984-85	1989-90	1994-95	2000-01	2005-06	2010-11
	High						
Food and Beverages	76	89	87	85	88	87	83
Textiles	80	90	85	83	89	88	86
Wood and Furniture	98	99	99	99	99	98	97
Leather	89	93	86	82	78	76	56
Non-metal Products	84	88	89	88	90	83	79
Metal Products	83	87	87	88	88	85	78
Other Manufacturing	94	96	97	97	95	92	93
	Medium						
Paper	53	64	75	70	77	77	73
Chemicals	36	53	59	43	51	61	40
Rubber and Plastics	58	57	61	59	74	49	54
	Low						
Metals and Alloys	22	22	20	20	24	19	15
Machines and Transport	30	35	56	53	56	51	26
Mean	67	73	75	72	76	72	65
Median	78	88	86	82	83	80	75
St Dev	26	26	23	24	22	23	27

our sample. This is the largest among all three groups and includes Food and Beverages, Textiles, Wood and Furniture, Leather, Non-metal products, Metal products and Other manufacturing industries (ii) *Medium* - these are industries where the share of informality in the initial time period ranged between 33 and 66 percent. This group includes Paper, Chemicals, and Rubber and Plastics (iii) *Low* - these are industries where the share of informal employment in the initial time period was less than 33 percent. This group includes Metals and Alloy, and Machines and Transport equipment industries.

When we examine the share of informal workforce in employment in the high and medium industries, we observe a wave like pattern of increases and decreases in informality. Informality in workforce in most industries initially increased between the first and second sub periods, thereafter declining until mid 90s. Consequently between 1995 and 2000 informality rose again, followed by en eventual decline by the end of the sample period. The high informal industries such as Food and Beverages, Textiles, Non-metal products, Metal

Table 11: Measuring Informality - Share in Gross Value Added (in %)

Sectors	1978-79	1984-85	1989-90	1994-95	2000-01	2005-06	2010-11
	High						
Food and Beverages	37	52	42	33	39	35	26
Textiles	34	52	35	28	44	42	43
Wood and Furniture	91	93	93	86	86	78	81
Leather	46	73	47	41	41	37	23
Non-metal Products	36	34	31	28	33	29	22
Metal Products	40	62	51	37	45	47	29
Other Manufacturing	54	65	73	62	56	52	57
	Medium						
Paper	16	25	30	19	23	21	24
Chemicals	4	6	6	2	2	3	2
Rubber and Plastics	7	13	11	9	10	3	3
	Low						
Metals and Alloys	4	5	4	2	3	2	1
Machines and Transport	5	15	12	9	12	8	3
Mean	31	41	36	30	33	30	26
Median	35	43	33	28	36	32	23
St Dev	26	29	27	25	24	24	24

products, as well as the Medium informal industries such as Paper, Chemicals, Rubber and Plastics displayed such a trend. In the Food and beverage industry, the share of informal workforce rose from 76 percent in 1978-79 to 89 percent in 1984-85, falling to 85 percent in 1994-95, rose again to 88 percent in 2000-01 and finally fell to 83 percent by 2010-11. Textiles saw an initial rise of informality from 80 percent in 1978-79 to 90 percent in 1984-85, subsequently the share declined to about 83 percent in 1994-95, only to rise back up to about 89 percent in 2000. From 2000 until 2010 the informal share in textiles started diminishing slightly reaching 86 percent in the last part of our sample period. Non - metal and metal product industries departed from this wave like trend and experienced increasing shares of informality in the workforce, from about 83-84 percent in 1978-79 to about 90 percent in 2000-01, after which the downward dip started and informality declined to 78-79 percent by 2010-11. In the Paper industry, the share of informal workforce was relatively small to start off with - about 53 percent in 1978-79, and increased by about 20 percentage points to 75

percent in 1989-90, dipping a little to 70percent in 1994-95, rising again to reach 77 percent later in 2005-06 percent, and finally decreasing to 73 percent by 2010-11. The Chemical industry had a very small share of informal workforce initially, about 36 percent in 1978-79 which grew to 59 percent in 1989-90, thereafter it fell to about 43 percent in 1994-95 and increased again peaking at 61 percent in 2005-06. This rising wave was followed by a trough in which the share fell to 40 percent in the final sub-period. Rubber and Plastics witnessed initial fluctuations in their share - informality averaged about 58 percent in the initial part of the sample period until 1994-95. Later this share grew to 74 percent in 2000-01. Subsequently, informality declined to 50 percent in 2005-06, only to increase again to 54 percent by 2010-11.

Among the High informal group, wood and furniture and other manufacturing industries always showed very high shares of informality across the entire sample period. The share of informal workforce in other manufacturing industries averaged at about 95 percent for most time periods. The Wood and Furniture industry was entirely informal - the share of informal workforce was highest and stayed there, about 99 percent from mid 1980s till 2000, and dipped minutely to about 97 percent in 2010-11. The Leather industry displayed a different trend - it is an example of an industry where the informal share in workforce increased only between the first and second time period, from 89 to 93 percent. Thereafter, from 1984-85 informality in the leather industry declined consistently. From 93 percent in 1984-85, the share started diminishing, reaching a low of 56 percent by 2010.

Among the Low informal group, machines and transport equipment experienced rising levels of informality till 1989-90, declining to 53 percent in 1994-95 and rising back up to 56 percent in 2000-01, after which the slide started and informality fell to 26 percent by 2010-11. The share of informal workforce grew from 30 percent in 1978-79 to 56 percent in 2000-01, and then started declining to reach 26 percent by 2010-11. The second industry in this low group, metals and alloy remained at relatively low levels of informality for the entire sample period. The share of informal workforce was about 22 percent in 1978-79, declined

slightly to 20 percent by mid 90s, increasing to 24 percent in 2000-01. Thereafter informality started decreasing and by 2010-11, the share of informal workforce had fallen to 15 percent. The trends of informal shares in workforce across the sample period for the three groups are shown in Figure 4.

Table 11 presents the shares of gross value added by the informal sector for the sample period. We group the industries in the same categories as done in Table 10. The average share of informal value added across all industries was in the 30 - 40 percent range for most years, although by the end of the sample period it had reached its lowest level of 26 percent. Figure 5 shows the time trends for the shares of informality in gross value added for the three groups. For most industries, we observe the same wave like pattern of periods of rising informality followed by periods of falling informality. In the Food and beverages industry, value added by the informal sector was 37 percent in the initial year, rose to about 52 percent in 1984-85 and then decreased to about 33 percent in 1994-95, rising again to 39 percent in 2000-01 and finally falling sharply to about 26 percent by 2010-11. Similarly, the metal products industry experienced an initial increase from 40 to 62 percent, and then the share fell to 37 percent in 1994-95. It started rising and increased to about 47 percent by 2005-06 after which it slumped to 29 percent in 2010-11. The Leather industry also saw a sharp rise in informal value added between the first and second sub-periods, growing from 46 to about 73 percent; thereafter the share fell consistently to reach its lowest level of 23 percent by 2010-11. Informality in value added in the non-metal products industry measured at 36 percent in the initial time period and declined steadily to about 28 percent by 1994-95, rising back up to 33 percent in 2000-01, and subsequently falling to 22 percent by 2010-11. The other manufacturing industries witnessed an initial increase in informality, from 54 to about 73 percent in 1989-90, but thereafter informality started its downward trend - by the final sub-period it was close to the initial year value, 57 percent.

The Textile industry displayed an interesting trend - the informal value added share initially rose significantly from 34 percent in 1978-79 to 52 percent in 1984-85, then it started

falling rapidly to reach 28 percent by 1994-95, increasing again to 44 percent and staying roughly at that level by 2010-11. Hence, by the last time period, informal share in value added actually *rose* relative to its initial value. The wood and furniture industry looks very informal when looking at value added, much like the case with employment. In the initial years, the share of informal value added was higher than 90 percent and started to fall from mid 90s onwards reaching 80 percent by 2010-11. In the Paper industry the share of informal value added grew from 16 percent in 1978-79 to about 30 percent in 1994-95. Then, it declined to 19 percent in 1994-95 after which it started to rise and by 2010-11 the share was 24 percent - higher than the initial value. So like textiles, informality in value added *increased* relative to its initial value.

Industries such as chemicals, rubber and plastics, metals and alloy as well as machines and transport had small informal shares of value added in the initial years, which became even smaller by the final time period. In these industries, the share of value added by the informal sector was less than 10 percent in 1978-79, increasing in the next two time periods. Consequently following 1989-90, informality started to fall and fell to less than 5 percent by 2010-11.

Figure 5 shows the time trends for the levels of informality in gross value added for the same groups. On an average, we see positive correlation between levels of informality in employment and levels of informality in gross value added i.e. sectors that exhibit high informality levels in employment also exhibit high levels of informality in gross value added. An interesting pattern that is visible for both, informality in employment and in value added, is that while informality declined in the initial part of the sample period until 1994-95 for most industries, it increased between 1994-95 and 2000-01, and then declined again in the last part of the sample period. The year 1991 marked the beginning of market oriented liberalization reforms in India. Although most of the major reforms were implemented in the following 3 to 4 years after 1991, the process was slow and gradual. It is likely that the effects of these reforms were visible after 2000, when we start observing a decline in

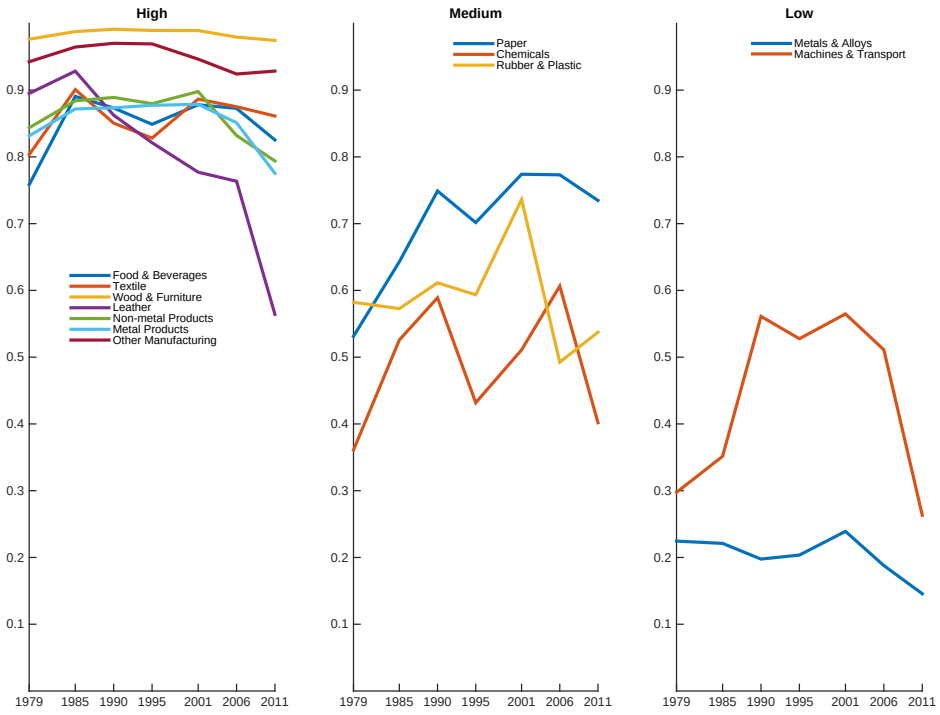

Figure 4: Informal Share in Workforce

informality.

The above discussion highlights that while informality in both work force and value added was declining for most industries after 2000, informality in workforce still remained high and persistent even by the end of the sample period.

5.1 Capital Intensity

One of the key aspects of the economic reforms initiated in 1991 was financial liberalization. This was aimed at improving the allocation of capital as well increasing the access to capital. The effects of these reforms can be seen clearly on the Credit to GDP ratio as shown in Figure **??**. Private credit to GDP ratio rose steadily from 1975 to 1989, albeit at a very modest rate. Thereafter, owing to the balance of payments crisis in 1990, it witnessed a decline till the mid 90s. From the mid 90s till 2012 private credit has increased at a much faster rate than GDP, especially after 2000.

The reforms led to a decline in the cost of capital relative to labor causing firms to

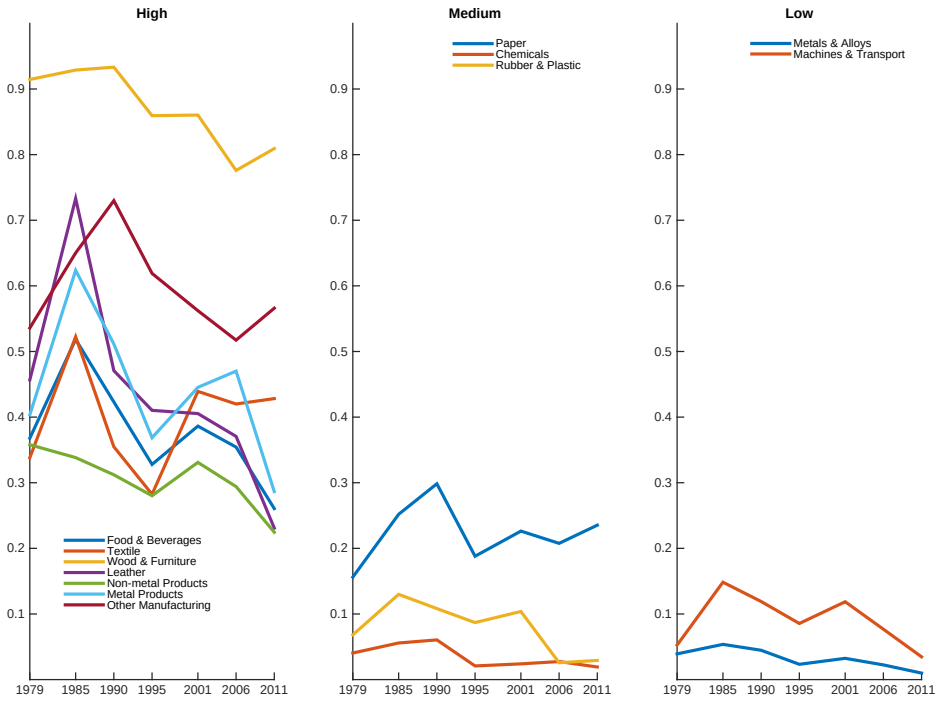

Figure 5: Informal Share in Gross Value Added

substitute towards a more capital intensive production process. The rise in capital intensity of Indian manufacturing has been well documented in the literature. See, for example, Goldar (2000) and Kapoor (2014). It has been argued that the rising capital intensity would have a negative effect on employment generation in the organized sector, which in turn could cause workers to look for employment in the informal sector.

In Figure 6, we analyze cross-sector heterogeneity and heterogeneity over time, with the objective of evaluating whether (a) more capital intensive sectors have higher levels of informality, and (b) sectors that experienced faster growth in capital intensity saw bigger increase in informality levels. Capital intensity is defined as the ratio of capital stock to workers in a sector in formal manufacturing. The computation of these ratios from the Annual Survey of Industries (ASI) data is explained in Appendix XX.

Focusing on the level of capital-labor ratio, we find that for most sub-periods, the median capital-labor ratio for the high informality industries is lower than that of medium

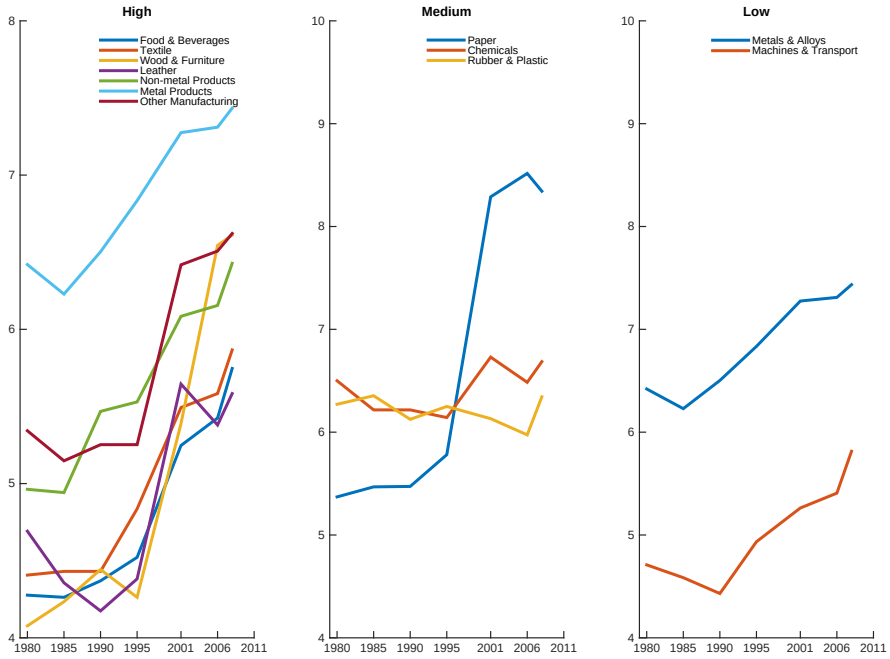

Figure 6: Log of Capital to Labor Ratio (in 1993-94 Rs, per person)

informality industries, which in turn is lower than the capital intensity of low informality industries. In other words, on average high capital intensity is associated with low informality. Examining further how this pattern changed over time, we find that for the entire sample period (1980-2008) the average annual growth in median capital intensity has been the fastest for the high informal sectors. While growth rates increased for all sector types from pre-liberalization to post-liberalization period, the increase was sharpest for the high informality industries. In fact, during the 2000s the industries in medium and low informality categories experienced a decline in the growth rate of capital intensities as compared to the 90s. This growth slow down allowed the median capital intensity level of persistently high informality industries to catch up with those of the medium informality industries by 2008. These two observations are confirmed in Table 12.

Thus, while it is true that high informality levels were associated with low capital-intensity in the 1980s this association has weakened over time due to the more rapid increase in capital intensity of the persistently high informality sectors post 1990.

Table 12: Pattern in Capital Intensity by Informality Type

Median Capital Intensity (in 1993-94 Rs, per person)			
Year	High	Medium	Low
1980 - 1981	113	372	363
1984 - 1985	112	369	303
1989 - 1990	138	348	376
1994 - 1995	159	395	534
2000 - 2001	341	649	819
2005 - 2006	571	524	860
2007 - 2008	681	685	1014
Median Growth in Capital Intensity (in %)			
Time Period	High	Medium	Low
Full sample: 1980-2008	6.64%	2.20%	3.74%
Pre-Liberalization: 1980-1990	2.06%	-0.68%	0.35%
Post-Liberalization: 1990-2008	9.27%	3.84%	5.67%
Post-Liberalization - I: 1990-2001	8.57%	5.84%	7.34%
Post-Liberalization - II: 2001-2008	9.03%	0.69%	2.71%

5.2 Labor productivity Differences Between Formal and Informal Sectors

We use data on GVA and employment in formal and informal enterprises for each sub-sector of the manufacturing sector to plot the evolution of labor productivity gap between formal and informal enterprises - ratio of GVA per worker in the formal sector to that in the informal sector. This is shown in Figure 7 for high, medium and low informality type sub-sectors.

We make the following key observations: (i) formal enterprises displayed higher labor productivity compared to informal enterprises within the same broad sub-sector; (ii) both high informality and low informality industries had similar levels of productivity gap as measured by the difference in the GVA per worker ratio, although the low type sub-sectors see a sharp decline during the early 80s and then experienced a sustained increase in the productivity gap; (iii) the magnitude of the productivity gap in the medium informality industries was larger relative to those in the high and low informal groups, and this gap increased over time owing largely to two industries - chemicals, and rubber and plastics (iv) most industries in the high group saw an increase in productivity gap up to the mid 90s followed by a decline; (v) Leather industry showed a steady bridging of the productivity gap between the formal and informal enterprises during 1985 to 2011.

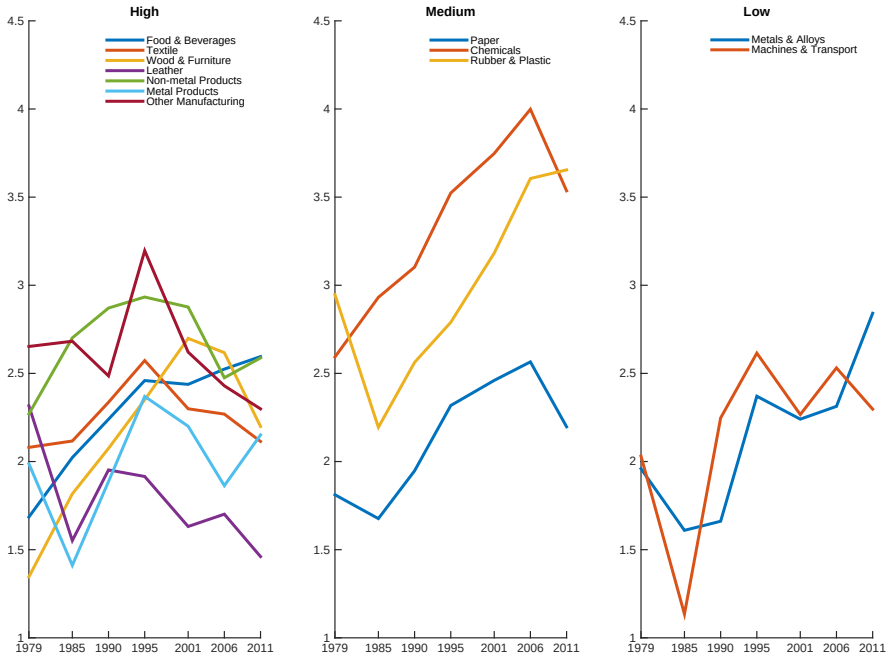

Figure 7: Log of Ratio of Formal to Informal Sector Labor Productivity

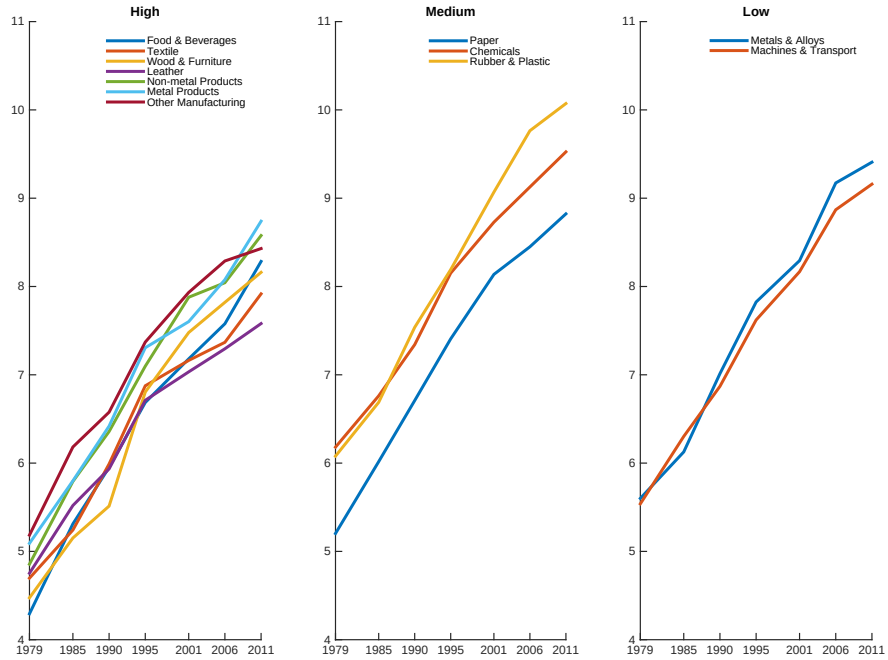

Figure 8: Log of Formal Sector Labor Productivity

Table 13: Median Formal-to-Informal Labor Productivity Ratio by Informality Type

Year	High	Medium	Low
1978-79	8	12	7
1984-85	8	7	4
1989-90	10	10	7
1994-95	12	13	12
2000-01	13	18	10
2005-06	12	25	11
2010-11	9	22	14

Figure 8 shows that the formal sector labor productivity increased steadily for almost every industry within manufacturing. Thus, increase in productivity gap up between the formal and informal industries until the mid 90s, followed by a decline thereafter for most sub-sectors of the high group is likely to be attributable to a relatively slower labor productivity growth in the informal sector until the mid 90s, followed by a period of relatively faster growth until the end of the sample period. Interestingly, this hump shaped pattern in the productivity gap of the high informal industries, as seen in Figure 7, is also observed in the informality in employment for this group, as can be observed in Figure 4.

5.3 Trade and Informality

In 1991 India's economy was liberalized following a balance-of-payments crisis. For the first time, there were systematic policy reforms adopted which suggested a move away from the state driven model of growth towards a more market driven model of growth. These reforms entailed deregulation of entry of firms, easing of rules governing hiring and firing of workers, reduction in the size of the state owned enterprises, entry of private players in certain key sectors - banking, insurance, communication, aviation, and energy - and financial sector reforms to improve allocation of capital. Reforms were also implemented on the external sector front - reduction in tariffs and non-tariff barriers, reduction in the scope of import licensing system, move towards more flexible exchange rate regime, and beginning of an effort to liberalize the capital account.

In this section we try to assess whether the increase in trade resulting from from the reforms is correlated with changes in informality. The effect of trade on informality is complex and may work through many channels in opposing directions. First, an increase

in import competition may result in firm exit, and those who exit are likely to be at the lower end of the productivity distribution. Thus, informal firms which mostly display lower levels of measured productivity may exit more in response to trade liberalization, causing a decline in informality. The expansion of the relatively more productive formal firms reinforces the decline in informality. Second, in order to compete with imports or compete with other exporters in foreign markets, domestic firms may switch to more flexible mode of employment, i.e. hire more contract labor, which would cause an increase in informality. Formal workers may be fired by formal firms and these workers may move to the informal sector for employment. As emphasized in Goldberg and Pavcnik (2003), the reallocation effects of trade will depend on the degree of labor market frictions.

We start by analyzing the correlation between industry level tariff rates and the levels of informality - across sectors and over time. Table 15 shows the average tariff rates (in percent) for the different manufacturing industries from 1988 to 2009. We use output tariffs which have been collected from the World Integrated Trade Solution (WITS) database at the 3 digit product level. The decline in tariffs started even before 1991. In fact, the drop in tariff rates between 1988 and 1990 is the largest during our entire period of analysis. Post 1991, the biggest reduction in tariffs took place between 1992 and 1997. Interestingly, the decline in tariffs after 1991 is not monotonic. While tariff rates declined for all sectors between 1988 and 1997, they rose for all sectors during the period 1997 to 1999; thereafter they resumed the downward trend.

As shown earlier informality, both in employment and gross value added, followed a wave like pattern - while it decline till the mid 90s, it increased between 1994-95 and 2000-01, and then started to decline again after 2000-01. The evolution of informality levels tends to correlate positively with the evolution of average tariff rates. However, the tariff data is available at greater frequency as compared to data on informality. Therefore, the positive correlation may still be prone to a timing mis-match, especially for the period between 1994-95 and 2000-01. The same problem makes it difficult to carry out cross-sectional analysis

Table 14: Average Output Tariff Rates by Sectors in Manufacturing

Sector	1985	1990	1995	2001	2006	2011
	High					
Food and Beverages	110.16	116.95	69.30	51.19	35.49	38.14
Textiles	84.38	85.39	55.82	31.19	15.02	9.88
Wood and Furniture	79.03	68.87	49.89	33.78	14.60	9.43
Leather	93.98	93.98	53.30	30.68	14.38	9.57
Non-Metal Products	83.85	96.32	56.69	33.45	14.78	9.13
Metal Products	126.35	162.96	46.74	34.21	14.77	9.62
Other Manufacturing	85.58	93.26	50.35	31.96	14.66	9.45
	Medium					
Paper	38.98	49.19	35.16	17.85	12.71	8.93
Chemicals	98.86	104.28	52.20	32.60	15.37	8.43
Rubber and Plastics	78.71	84.53	47.53	30.09	13.16	7.66
	Low					
Metals and Alloys	105.09	99.92	40.03	31.67	17.07	5.91
Machines and Transport	77.76	90.60	51.59	30.10	13.82	9.42
	Average Tariff Rate for 3 Types of Sectors					
High	94.76	102.53	54.58	35.21	17.67	13.60
Medium	72.19	79.33	44.97	26.85	13.74	8.34
Low	91.42	95.26	45.81	30.89	15.45	7.67

Source: Natarajan (2011), WITS Database, World Bank.

period by period. Even then, the data tend to show poor cross-sectional correlation between levels of informality and tariff levels - high tariff level sectors do show systematically high or low informality levels. Overall, there does seem to be some evidence to suggest that an increase in openness over time is positively associated with decline in informality, and it needs to be investigated further.

Figures 9 and 10 try to capture the effects of liberalization reforms on degree of openness across different industries by looking at imports to gross output and exports to gross output ratios. Data on exports and imports have been obtained from the WITS database while data on gross output in the formal manufacturing industries have been taken from the Central Statistical Organization[10]. We observe that for most industries in all the three categories, the

[10]Gross output data for unregistered manufacturing industries are not available

Table 15: Average Input Tariff Rates by Sectors in Manufacturing

Sector	1985	1990	1995	2001	2006	2011
	High					
Food and Beverages	92.26	99.29	50.24	37.78	24.66	23.05
Textiles	93.04	94.50	53.69	30.83	15.05	9.52
Wood and Furniture	88.91	86.55	49.45	32.79	14.62	8.94
Leather	97.48	98.07	52.48	30.93	14.48	9.24
Non-Metal Products	91.34	98.80	48.98	31.29	14.50	8.56
Metal Products	107.60	103.90	41.59	30.92	16.58	6.50
Other Manufacturing	103.68	102.53	46.77	31.86	15.64	7.60
	Medium					
Paper	64.91	86.37	46.28	27.27	13.57	8.92
Chemicals	98.48	101.17	51.21	32.19	15.19	8.72
Rubber and Plastics	99.90	102.81	51.02	32.05	15.01	8.50
	Low					
Metals and Alloys	101.68	100.28	41.50	31.13	16.37	6.61
Machines and Transport	98.75	98.26	46.86	31.65	15.25	7.86
	Average Tariff Rate for 3 Types of Sectors					
High	96.33	97.66	49.03	32.34	16.50	10.49
Medium	87.76	96.78	49.50	30.50	14.59	8.71
Low	100.21	99.27	44.18	31.39	15.81	7.23

Source: Natarajan (2011), Authors' Calculations.

imports to gross output have been increasing steadily over time. Among the high informal category, Metal Products, Wood and Furniture as well as Other Manufacturing industries showed a remarkable increase from the late 90s onwards, although the latter two industries witnessed a small decline from 2006 to 2008. The increase in imports to output ratio in the Metal products industry was striking - in 1989 the ratio measured about 15 percent and by 2008 imports stood at 60 percent of gross output. Among the medium informal industries while Paper experienced a steady increase in imports to gross output ratio, the pattern in Rubber and Plastics and Chemical industry was slightly different. In both of them imports to gross output ratio grew steadily until 1997, then they declined till early 2000s, after which it started increasing again; by the final time period the ratios for both sectors end up at higher levels compared to their initial levels. Among the low informal industries, Metals and

Alloys displayed a pattern where imports to gross output first increased dramatically from 1989 till about 1997, and then started declining between 1997 to 2001. It rose back again in the later years and by 2008, imports to gross output had grown more than three-fold relative to the 1989 level.

The trend in exports to gross output ratio is also positive for most industries, but they do not exhibit the rapid pick-up as seen in imports to gross output. Two exceptions here are - Wood and Furniture and the Leather industry. Wood and Furniture showed a remarkable increase in export to gross output ratio after the late 90s. Exports were around 10 percent of gross output in the mid 90s and started to increase by 2000; by 2007 exports had grown to about 50 percent of gross output, falling slightly to 40 percent by 2008. Leather had traditionally been the leading export sector in India recording values of export to gross output as high as 80 percent in the initial part of the sample period, but in the first half of the 90s, this ratio decreased and reached 65 percent by 2000. Subsequently, this falling trend got reversed and exports started increasing, displaying remarkable growth - exports as a ratio of gross output increased to about 100 percent by 2008. Rubber & Plastics industry had smaller values of exports to output in the early years, but registered a rapid increase starting in the late 90s and grew to about 30 percent by 2008. In the Textile industry, one of India's principal export industries - the export to output ratio witnessed a steady increase throughout the sample period, doubling from 20 percent in 1989-90 to about 40 percent by 2008.

Comparing these patterns with patterns in informality, we can observe that while Other Manufacturing shows some decline in informality in labor, Wood & Furniture industry exhibits virtually no change since the mid-90s. On the other hand, the Metal Products industry shows a significant reduction in informality in labor - falls from 88 percent in 2001 to 78 percent in 2011. Among the medium informality industries, the Leather industry exhibits a continuous decline after 1985, and this decline became sharper after 2006. The pick-up in Leather industry exports to output ratio, and to some extent in the imports to

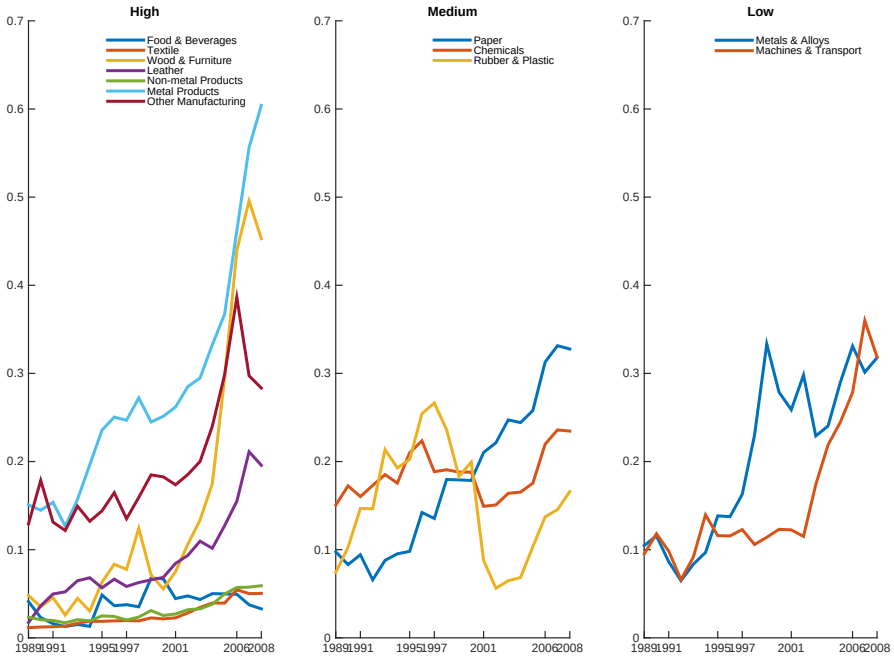

Figure 9: Imports to Gross Output Ratio

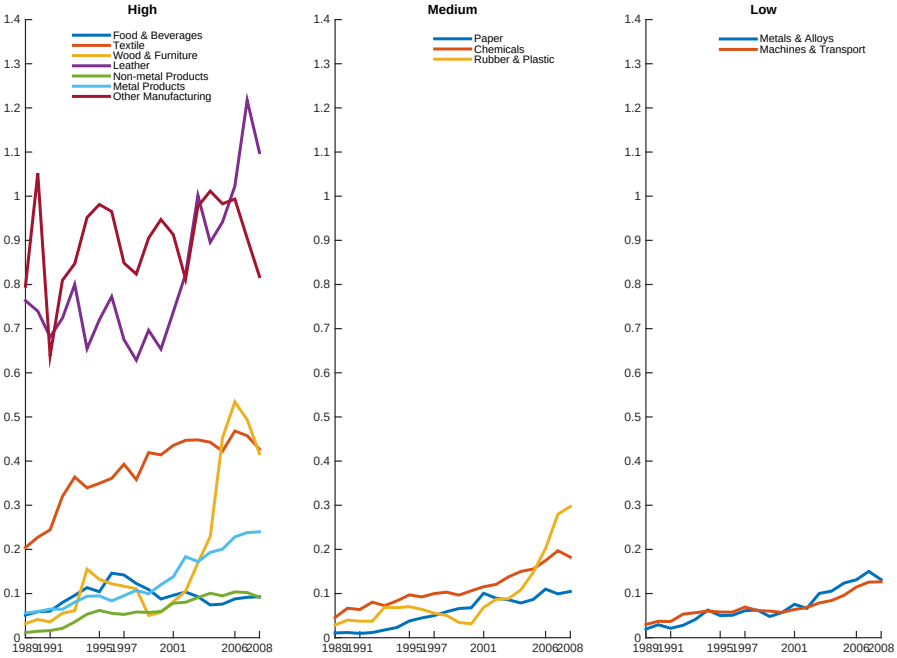

Figure 10: Exports to Gross Output Ratio

output ratio as well, occurs at the end of the 90s. Rubber, and Plastic shows a significant drop in informality after 2001 and this coincides with the rapid increase in imports and exports to output ratio after 2001. Interestingly between 1995 and 2001 when informality increases sharply in this sector, the exports to output ratio also declines sharply. Lastly, among the low informality industries we see a sharp reduction in informality in employment for machinery and transport equipment after 2001. This coincides with a sharp increase in the import to output ratio after 2001.

Based on the evidence so far we can conclude that the correlation between openness and informality is not strong across all industries. However, for some sectors increase in openness of sectors, as measured by import to gross output and export to gross output ratios, contributed to a decline in informality. Almost all such sectors exhibited a sharp increase in openness level at some point after the liberalization process started in the early 90s and this increase tends to be correlated with a decline in informality. Furthermore, among the sectors that exhibit association between informality and openness, the sharp uptick in import to output ratio is better correlated with decline in informality in employment than the uptick in export to output ratio.

References

Baily, Martin, Diana Farrell, and Janna Remes, "Domestic Services: The Hidden Key to Growth," *McKinsey Global Institute*, 2005.

Bhalla, Sheila, "The Restructuring of the Unorganised Sector in India," *Institute for Human Development, Funded Under the Planning Commission Scheme of Socio-Economic Research*, 2003.

Bosworth, Barry, Susan M. Collins, and Arvind Virmani, "Sources of Growth in the Indian Economy," *NBER Working Papers 12901, National Bureau of Economic Research, Inc.*, 2007.

de Soto, Hernando, *The Other Path: The Invisible Revolution in the Third Worlds*, New York: Harper and Row Publishers, 1989.

Fafchamps, Marcel, "Industrial Structure and Microenterprises in Africa," *Journal of Developing Areas*, 1994, *97* (4), 808–27.

Goldar, B, "Growth in Organized Manufacturing in India," *Economic and Political Weekly*, April 2000, *35* (14), 1–7.

Goldar, B.N., "Impact of Trade on Employment Generation in Manufacturing in India," *Report Submitted to the National Commission for Enterprises in the Unorganised Sector (NCEUS), New Delhi.*, 2009.

Goldberg, Koujianou Pinelopi and Nina Pavcnik, "The Response of the Informal Sector to Trade Liberalization," *Working Paper*, 2003.

Gollin, Douglas, "Nobody's Business by My Own: Self Employment and Small Enterprise in Economic Development," *Journal of Monetary Economics*, 2008, *55*, 219–233.

Kapoor, Radhicka, "Creating Jobs in India's Organised Manufacturing Sector," *Working Paper 286, Indian Council For Research on International Economic Relations*, 2014.

Kuznets, Simon, *Modern Economic Growth: Rate, Structure and Spread*, New Haven: Yale University Press, 1966.

Lewis, Arhtur W., *Theory of Economic Growth*, New York: Harper Torchbooks, 1965.

Mitra, A., "Impact of Trade on Employment Generation in Services in India," *Report Submitted to the National Commission for Enterprises in the Unorganised Sector (NCEUS), New Delhi.*, 2009.

Porta, Rafael La and Andrei Shleifer, "The Unofficial Economy and Economic Development," *NBER Working Paper No. 14520*, 2008.

Rauch, J. E., "Modelling the informal sector informally," *Journal of Development Economics*, 1991, *35* (Rauch, J.E), 33–47.

Rostow, W. W., *The Stages of Economic Growth*, Cambridge: Cambridge University Press, 1960.

Sethuraman, S.V., *The Urban Informal Sector in Developing Countries*, International Labor Office, Geneva, 1981.

The Challenge of Employment in India: An Informal Economy Perspective

The Challenge of Employment in India: An Informal Economy Perspective, *National Commission for Enterprises in the Unorganized Sector, 2009.*

The Hidden Dangers of the Informal Economy

The Hidden Dangers of the Informal Economy, *McKinsey Quarterly*, 2004, (3), 26–37.

The Mystery of Capital. Why Capitalism Triumphs in the West and Fails Everywhere Else

The Mystery of Capital. Why Capitalism Triumphs in the West and Fails Everywhere Else, *New York: Basic Books, 2000.*

Verma, Rubina, *"Can Total Factor Productivity Explain Value Added Growth in Services," Journal of Development Economics, 2012, 99, 163–177.*

A Appendix 1 - Tables

Table 16: Measuring Informality across 40 Countries

Country	Year	GNI per capita, PPP (current international $)	Share of		
			informal jobs in total employment (%)	persons employed in informal sector (%)	persons in informal employment outside informal sector (%)
Liberia	2010	470	59.97	49.65	10.84
Ethiopia	2004	540			
Madagascar	2005	840	73.63	51.76	21.89
Mali	2004	880	81.81	71.36	11.33
Tanzania	2005-2006	1130	76.20	51.71	24.98
Uganda	2010	1,140	68.54	59.20	13.51
Zambia	2008	1,240	69.54	64.55	11.72
Zimbabwe	2004	1,450	51.60	39.60	
Lesotho	2008	1,960	34.93	49.13	21.58
Cte d'Ivoire	2008	2,500		69.72	
Kyrgyzstan	2009	2,640		59.21	
Moldova	2009	2,990	15.98	7.29	8.70
Vietnam	2009	2,990	68.18	43.47	25.03
Nicaragua	2008	3,460	65.74	54.36	15.01
Philippines	2008	3,640	70.06	72.50	11.51
Honduras	2009	3,700	73.86	58.25	16.97
Bolivia	2006	3,780	75.14	52.14	23.50
India	2009-2010	4,320	83.51	68.82	15.40
West Bank & Gaza Strip	2010	4,350	57.16	21.34	35.82
Pakistan	2009-2010	4370	78.36	73.01	8.30
Sri Lanka	2009	4,620	62.12	50.48	11.64
Paraguay	2009	4,810	70.71	37.93	32.81
El Salvador	2009	6,260	66.40	53.38	14.78
Namibia	2008	6,340	43.84		
Ukraine	2009	7,110		9.44	
Armenia	2009	7,130	19.77	10.18	9.60
Indonesia	2009	7,540	72.53	60.20	12.22
Peru	2009	8,040	70.55	50.24	21.06
Ecuador	2009	8,090	60.91	37.26	24.04
Dominican Republic	2009	8,180	48.53	29.38	19.41
Colombia	2010	8,910	59.64	52.19	9.26
China	2010	9,200	32.60	21.90	12.50
Egypt	2009	9,490			
Brazil	2009	10,080	42.21	24.28	18.01
South Africa	2010	10,260	32.70	17.79	14.91
Costa Rica	2009	10,580	43.76	37.02	11.19
FYR Macedonia	2010	11,220	12.60	7.56	5.23
Serbia	2010	11,540	6.07	3.54	3.06
Venezuela	2009	12,080	47.47	36.26	11.79
Uruguay	2009	12,150	39.82	33.93	9.85
Thailand	2010	12,720			
Panama	2009	13,090	43.82	27.69	16.29
Mexico	2009	13,800	53.73	34.11	20.21
Argentina	2009	14,125.57	49.74	32.11	17.91
Turkey	2009	14,380	30.60		
Mauritius	2009	14,470		11.92	
Russian Federation	2010	19,860		12.11	
AVERAGE	6903.52	54.21	40.66	15.88	

Table 17: Decomposition of non-agricultural formal employment

	Argentina 2009	Brazil 2009	China 2010	India 2009-10	Mexico 2009	Phillipines 2008	South Africa 2010	Thailand 2010
GNI per capita, PPP	14,125	10,080	9,200	4,320	13,800	3,640	10,260	12,720
Kind of activity								
All non-agricultural activities	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Manufacturing	16.6	20.9	18.7	18.4	22.9	18.6	17.1	31.1
Construction	4.0	5.0	3.9	2.9	4.5	3.6	6.5	8.5
Trade	16.6	24.9	12.4	3.5	25.0	13.0	20.2	15.8
Transportation	6.9	6.1	10.7	8.8	5.1	5.8	5.9	4.0
Services other than trade or transportation	56.0	43.1	54.4	61.2	42.4	58.9	50.2	40.7

Table 18: Decomposition of non-agricultural total employment

GNI per capita, PPP	Argentina 2009 14,125	Brazil 2009 10,080	China 2010 9,200	India 2009-10 4,320	Mexico 2009 13,800	Phillipines 2008 3,640	South Africa 2010 10,260	Thailand 2010 12,720
Kind of activity								
All non-agricultural activities	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Manufacturing	14.6	17.7	15.2	23.4	18.6	14.6	14.3	22.8
Construction	8.9	9.0	4.1	19.8	9.3	8.5	8.4	9.1
Trade	23.4	26.1	20.7	20.5	33.9	29.2	23.8	26.8
Transportation	6.7	5.8	9.2	9.3	5.5	11.9	6.1	4.6
Services other than trade or transportation	46.4	41.5	50.8	25.1	32.7	35.7	47.4	36.7

Table 19: NCEUS employment estimates (in million) & Annualized Growth Rates

	Sector	2004-05	2005-06	2005-07	2005-08	2008-09	CAGR (%)
Agriculture	Formal	4.98	5	5.02	5.04	5.06	0.4
	Informal	208.03	211.58	213.98	216.98	218.53	1.2
	Total	213.02	216.58	219	222.02	223.59	1.2
Industry	Formal	23.23	23.91	24.69	25.31	25.72	2.6
	Informal	54.84	57.82	61.44	64.22	65.85	4.7
	Total	78.07	81.72	86.13	89.54	91.57	4.1
Services	Formal	30.43	31.06	31.75	32.43	33.06	2.1
	Informal	79.61	84.45	90.05	95.68	100.87	6.1
	Total	110.04	115.51	121.8	128.1	133.94	5.0
Total	Formal	58.64	57.97	61.46	62.78	63.84	2.1
	Informal	342.49	353.85	365.47	376.88	385.26	3.0
	Total	401.13	413.82	426.93	439.66	449.09	2.9

Table 20: National Industry Classification (NIC) 98

NIC 98	Description
15	Manufacture of food products and beverages
16	Manufacture of tobacco products
17	Manufacture of textiles
18	Manufacture of wearing apparel; dressing and dyeing of fur
19	Tanning and dressing of leather; manufacture of luggage, handbags, saddler, harness and footwear
20	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plating materials
21	Manufacture of paper and paper products
22	Publishing, printing and reproduction of recorded media
23	Manufacture of coke, refined petroleum products and nuclear fuel
24	Manufacture of chemicals and chemical products
25	Manufacture of rubber and plastics products
26	Manufacture of other non-metallic mineral products
27	Manufacture of basic metals
28	Manufacture of fabricated metal products, except machinery and equipment
29	Manufacture of machinery and equipment n.e.c.*
30	Manufacture of office, accounting and computing machinery
31	Manufacture of electrical machinery and apparatus n.e.c.*
32	Manufacture of radio, television and communication equipment and apparatus
33	Manufacture of medical, precision and optical instruments, watches and clocks
34	Manufacture of motor vehicles, trailers and semi-trailers
35	Manufacture of other transport equipment
36	Manufacture of furniture; manufacturing n.e.c.*
37	Recycling

Table 21: Description of Sectors and NIC codes

Sector	NIC 87	NIC 98	NIC 2008
Food products, beverages, tobacco and related products	20-21+22	15+16	M2+M3+M4
Textiles and textile products, including wearing apparel	23+24+25+26	17 +18	M5+M6
Wood, Wood Products, Furniture and Fixtures"	27	20+0.5*36	M8+M23
Paper, paper products, printing, publishing and allied industry	28	21+22	M9+M10
Leather and leather products	29	19	M7
Basic chemicals and chemical products (except products of petroleum and coal)	30	24	M12+M13
Rubber, plastic, petroleum and coal products, and processing nuclear fuels	31	23+25	M14+M11
Non-metallic mineral products	32	26	M15
Basic metal and alloy industries	33	27	M16
Metal products and parts except machinery and transport equipment	34	28	M17
Machines, machine tools, transport equipment, parts and repairs	35, 36, 37, 39	29+30+31+32+34+35	M18+M19+M20+M21+M22
Other manufacturing industries	38	33+0.5*36	M24

B Appendix 2 - Figures

C Appendix 3 - Data Description

C.1 Measurement of Labor Force

Usual Principal Status (UPS): the status of an individual during a reference period of one year. Thus, a person is classified as belonging to labour force, if she/he had been either working or looking for work during longer part of the 365 days preceding the survey. The UPS measure excludes from the labour force all those who are employed and/or unemployed for a total of less than six months.

Usual Principal and Subsidiary Status (UPSS): to widen the UPS concept to include even those who were outside the labour force on the basis of the majority time criterion but had been employed during some part of the year on a usual basis. In the NSSO 61st Round Survey, all those who were either un-employed or out of labour force but had worked for at least 30 days over the reference year were treated as subsidiary status workers and hence included in the labour force. UPSS is, thus, a hybrid concept incorporating both the major time criterion and priority to work status.

Current Weekly Status (CWS): The concept of Current Weekly Status (CWS) has been in use in the labour force surveys in India even before 1970. It was primarily because the agencies like International Labour Organization (ILO) use estimates of employment and unemployment rates based on weekly reference period for international comparisons. In India a person is classified to be in labour force as per CWS if s/he has either worked or is seeking and/or available for work at least for one hour during the reference period of one week preceding the date of survey.

Current Daily Status (CDS): The employment status during the seven days is recorded in terms of half or full intensities. An hour or more but less than four hours is taken as half intensity and four hours or more is taken as full intensity. It embodies the time utilisation, and does not accord priority to labour force over outside the labour force or work over

unemployment, except in marginal cases. A disadvantage is that it related to person-days, not persons. Hence it had to be used with some caution.

Modified CWS (MCWS): It follows a two-step procedure. First, it assigns individuals to the labour force if the majority of their half-days were in the labour force. Second, within the labour force, it uses the majority time principle to classify individuals among the two activity statuses, employed and unemployed. Only in a few cases, where the majority time rule does not give a unique solution, the criterion of priority for labour force and employment is invoked. The decision whether a person is employed or unemployed, follows the analogy of the usual principal status. Thus a person is first classified according to whether or not in the labour force on the basis of majority time, and then applied the same majority time criterion to decide whether the person is employed or unemployed.

C.2 Constructing informal sector's share in GVA and Employment

Bhalla (2003) reports the share of value added in employment and value added in each 2 digit NIC 87 code for rural and urban areas (Table 2.2.1). Using these shares along with data on the total employment and GVA (Table 2.1.3) in each 2 digit category of NIC 87 code, we calculate the absolute values of number of people employed as well as the GVA in each 2 digit NIC category. The original aggregate GVA data reported are in constant prices (1993-94 prices). So we convert the real GVA into nominal GVA by using the WPI for each NIC industry. This method then gives us estimates of informal employment and value added for the years 1978-79, 1984-85, 1989-90 using NIC 87 codes.

From the NSSO reports, we have data on employment and GVA at the 3 digit level of NIC 87 codes for 1994-95 which we map into 4 digit NIC 98 code using the concordance as provided by the MOSPI[11] (Annex III). The 4 digit NIC codes are then reduced to 2 digit level. For later rounds in 2000-01 and 2005-06, data is reported using NIC 98 codes. The last round in 2010-11 reports data using NIC 2008 codes, which are very similar to the 98 codes. A summary of the NIC 87, 98 and 2008 codes as well as how we combine the categories is

[11] http://mospi.nic.in/Mospi_New/upload/nic_98_9apr08.htm

provided in Table 21

Table 22: Informality in Employment and Output

	(1) Employment	(2) Output	(3) Employment	(4) Output
Log(GVA per worker - Formal/Informal)	0.183**	-0.461**	0.125**	-0.387***
	(0.085)	(0.206)	(0.051)	(0.119)
Log(Capital/Labor)	-0.373***	-0.861***	0.020	0.109
	(0.058)	(0.140)	(0.031)	(0.072)
Log(Output Tariff)	-0.403	-0.679	0.157	0.373
	(0.266)	(0.644)	(0.142)	(0.328)
Log(Input Tariff)	0.181	0.169	-0.141	-0.104
	(0.260)	(0.629)	(0.237)	(0.546)
Sector FE	No	No	Yes	Yes
Year FE	No	No	Yes	Yes
Observations	60	60	60	60
R^2	0.44	0.51	0.97	0.98

Note: Standard errors are in parenthesis. $*\ p < 0.05$, $**\ p < 0.01$, $***\ p < 0.001$

Table 23: Informality in Employment and Output - With Output and Input Tariffs

	(1) Employment	(2) Output	(3) Employment	(4) Output
Log(GVA per worker - Formal/Informal)	0.207**	-0.416*	0.125**	-0.387***
	(0.089)	(0.216)	(0.051)	(0.119)
Log(Capital/Labor)	-0.402***	-0.925***	0.020	0.109
	(0.059)	(0.143)	(0.031)	(0.072)
Log(Output Tariff)	-0.359	-0.591	0.157	0.373
	(0.326)	(0.794)	(0.142)	(0.328)
Log(Input Tariff)	-0.020	-0.293	-0.141	-0.104
	(0.750)	(1.827)	(0.237)	(0.546)
Year FE	Yes	Yes	Yes	Yes
Sector FE	No	No	Yes	Yes
Observations	60	60	60	60
R^2	0.49	0.55	0.97	0.98

Note: Standard errors are in parenthesis. $*\ p < 0.05$, $**\ p < 0.01$, $***\ p < 0.001$

Table 24: Informality in Employment and Output - With Exports and Imports

	(1) Employment	(2) Output	(3) Employment	(4) Output
Log(GVA per worker - Formal/Informal)	0.115	-0.650**	0.046	-0.426**
	(0.107)	(0.260)	(0.064)	(0.172)
Log(Capital/Labor)	-0.269***	-0.606***	0.010	0.055
	(0.080)	(0.196)	(0.041)	(0.110)
Log(Imports/Gross Output)	-0.061	-0.136	0.016	0.094
	(0.070)	(0.172)	(0.061)	(0.163)
Log(Exports/Gross Output)	0.056	0.185	-0.012	-0.029
	(0.054)	(0.132)	(0.037)	(0.099)
Year FE	Yes	Yes	Yes	Yes
Sector FE	No	No	Yes	Yes
Observations	60	60	60	60
R^2	0.42	0.52	0.98	0.98

Note: Standard errors are in parenthesis. $* \ p < 0.05$, $* * \ p < 0.01$, $* * * \ p < 0.001$