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Export Competitiveness, Labour Laws, and Gender Differences in Job Dynamics: Analysis of Manufacturing Industries across Indian States

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Keywords: Gross job flows, real exchange rate, competitiveness, gender

JEL Code: F16, F41, J16

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1. Introduction

Increased participation of women in productive employment is a prerequisite for achieving gender equality and other sustainable development goals. Internationally, some progress has been made in this respect with 48% of women being engaged in paid employment in 2015 compared to 40% in the late 1990s (UN Women, 2015). Yet, female labour force participation in India, a country home to about 17% of the world's women, is abysmally low compared to other countries with similar levels of development[i]. Against this background, using plant level data, we first obtain gender-wise (for females and males) estimates of job dynamics – job creation, destruction and reallocation – across 32 Indian states and Union territories and 62 formal manufacturing industries for 1998-99 to 2014-15[ii]. Next, we econometrically analyse the factors that determine of job dynamics for males and females across industries and over time. In light of major changes in India's trade and exchange rate regimes during the period under study, our econometric analysis focuses on the impact of changes in export competitiveness. Specifically, we analyse whether industry-level changes in export competitiveness, mediated through exchange rate fluctuations, explain the variation in job dynamics for men and women. We also examine whether this relationship is conditional on state level variation in labour laws and industry characteristics such as contract worker use and trade openness.

This paper contributes to the existing literature in two ways. For one thing, , the focus of the present paper, for the first time in the Indian context, is on the question of job dynamics, as opposed to the usual focus on static net employment measures. Previous studies dealing with the question of how changes in exchange rates affect job dynamics– for example, Gourinchas (1999) for France, Gourinchas (1998) and Klein et al (2003) for USA, Moser et al (2010) for Germany, and Ribiero (2004) for Brazil – have not examined whether the impact differs across gender groups. We address this gap by analysing whether the effect of exchange rate fluctuations on job dynamics are gender differentiated.

Fluctuations in real exchange rates constitute an important source of internationally generated competitiveness shocks for firms, particularly for those that compete in international markets. In response to such shocks, firms may adjust their workforce by changing 'net' employment levels through the channel of job creation, job destruction or both. For example, in response to a negative international shock, firms may reduce hiring (i.e. reduce job creation), may increase firing (i.e. increase job destruction) or could do both. While the final effect of a negative shock through any or all the above channels is clearly a decline in the level of net employment, the associated adjustment costs for workers depend crucially on the specific channel through which the adjustment process mainly takes place. Therefore, it is important to focus on the measures of job dynamics – job creation and job destruction - rather than net employment changes. Further, empirical evidence from several countries confirms that, consistent with some variants of heterogeneous firm models, simultaneous occurrence of job creation and destruction within industries (job reallocation) is quite common and can entail significant adjustment costs to workers (Davis et al, 1998; Gourinchas, 1998; Ribiero, 2004). Therefore, in addition to job creation and destruction rates, we also analyse job reallocation rates.

Labour market institutions can play an important role in determining the relative importance of different channels through which the adjustment process occurs. In particular, restrictive retrenchment laws may elicit an asymmetric response in that the adjustment may occur mainly through the channel of job creation rather than job destruction. Further, there is no reason to believe that the adjustment costs associated with labour market dynamics will be borne proportionately by men and women, particularly when the process of labour retrenchment is difficult and litigious. If women provide relatively 'cheap and flexible' labour than men (Cagatay and Ozler, 1995; Elson, 1999; Standing, 1999), the former may bear disproportionately higher adjustment costs compared to the latter. In general, greater labour market flexibility provides producers with more freedom to internalize negative shocks by adjusting labour force irrespective of their gender identity. However, it is highly possible that the burden of adjustment will fall disproportionately on the shoulders of women when retrenchment laws are rigid.

India provides an ideal setting to examine the above issues for two reasons. First, as part of a major economic reform programme aimed at improving external competitiveness, India's trade and exchange rate policies were liberalised and restructured since the early 1990s. The trade liberalization policies were primarily targeted at the manufacturing sector. The consequent increase in international exposure of Indian industries, in terms of higher export orientation and import competition under a market determined exchange rate regime, implies that firms are forced to make adjustments in response to changes in international competitiveness brought about by exchange rate fluctuations. Our econometric strategy exploits plausibly exogenous inter-temporal variation in industry level exchange rates to analyse the causal effect of export competitiveness shocks on job dynamics[iii]. Second, we exploit the variation across Indian states with respect to the relative stringency of labour regulations. While Indian labour laws are one of the most rigid in the world, particularly with respect to collective dismissal in formal manufacturing enterprises, the extent of the rigidity does vary significantly across states (Dougherty, 2009). The genesis of this variation lies in India's Constitution, with labour being in the Concurrent List, making it possible for both Central and State governments to frame and amend labour laws.

Our results show that even as net job creation rate is quite low, the labour market has experienced significant job turnover rates (simultaneous job creation and destruction) for both gender groups. Econometric analysis provides evidence for an asymmetric impact of exchange rate in that while depreciation (appreciation) is found to increase (reduce) gross job creation rates, exchange rate changes do not exert any effect on gross job destruction rates. Exchange rate depreciation increases job creation rates as well as reallocation rates, more so for females than males. The impact of export competitiveness on job dynamics vary across states grouped on the basis of differences in labour market flexibility. Improvement in export competitiveness positively influences job creation for both genders with the magnitude of this effect being greater in states with flexible labour market followed by neutral states and with no effect in states with rigid labour markets. However, export competitiveness changes do not affect job destruction rates, irrespective of state level differences in labour rigidity. Improvement in export competitiveness positively influences net job creation rates for both gender, but only in states with flexible labour market. The results indicate that in the presence of labour market rigidities, female workers face greater job turnover rates compared to their male counterparts. Our results remain unchanged even when we control for the use of contractual workers, which is expected to provide some *de facto* labour market flexibility to producers.

The rest of the paper is organized as follows. Set against a brief background discussion on policy changes and labour market institutions, Section 2 gives an overview of broad trends in employment outcomes in India's manufacturing sector. Section 3 provides a brief review of related literature on labour market dynamics. Section 4 outlines the data and descriptive statistics pertaining to the measures of job dynamics for male and female workers in India's manufacturing sector. Section 5 discusses the empirical strategy, specification, and estimation issues. The results from the econometric exercise along with robustness checks are provided in section 6. Finally, section 7 provides the concluding remarks.

2. Policy Background and General Trends in Employment Outcomes

Liberalization of trade and exchange rate controls has been central to the structural adjustment programmes implemented by India since the early 1990s. The quantitative restrictions (QRs) on capital and intermediates goods imports were mostly dismantled in 1992 while the ban on importing consumer goods continued until the late 1990s. Customs duties in the manufacturing industries were gradually reduced from about 128% before 1991 to 33% in 1998 and 9.8 in 2008 (Figure 1). Following the tariff reductions introduced in the March 2007 budget, India has emerged as one of the world's low protection and open industrial economies (Pursell et al 2007). In order to reduce the anti-export bias of the past protectionist policies, the government introduced a major downward adjustment in the rupee exchange rate against the major international currencies in July 1991. In February 1992, a dual exchange rate system was introduced, which allowed exporters to sell 60% of their foreign exchange earnings at the free market rate and 40% to the government at the official lower rate. In April 1993, a further move towards the deregulation of the external sector took place when the government adopted full convertibility on the trade account by unifying the official exchange rate with the market one. These steps culminated in India adopting full current account convertibility in August 1994.

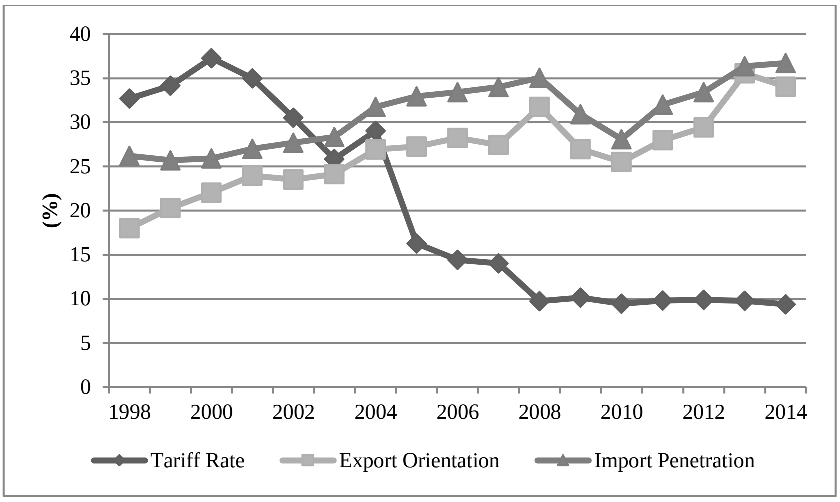


Figure 1: Tariff Rates and Trade Openness in India

Note: Export orientation is defined as ratio of manufactured exports to total output of the manufacturing sector; Import Penetration is measured as the ratio of gross imports of manufactured products to apparent consumption for this sector.

(Source: Authors' calculations using data from WITS-COMTRADE and UNIDO)

It was expected that the reforms would increase the international exposure of firms across industries. The manufacturing sector, as a whole, indeed witnessed a steady increase in trade openness (See Figure 1) even as both the level and growth of export orientation and import penetration vary widely across industries[iv].

Although the country has made major strides in the area of product market liberalization during the last two decades, India's factor markets (labour and land) are still plagued by severe distortions and policy induced rigidities. In particular, rigid labour laws have created severe exit barriers, discouraged large firms from entering into labour-intensive manufacturing, made it difficult for firms to adjust their employment in response to changes in demand, limited the flexibility of firms in moving workers across tasks and encouraged firms to remain small and informal (Besley and Burgess, 2004; Kochhar et al, 2006, Panagariya 2007). A provision in the Industrial Disputes Act (IDA) 1947 stipulates that factories employing 100 or more regular workers must seek prior consent of the state Government before any retrenchment or closure[v]. Some studies, however, have argued that industries circumvent these laws by increasing the use of temporary or contract workers, for whom these regulations do not apply (Ramaswamy, 2003; Saha et al, 2013).

Against this policy background, we now turn to examine the general trends in employment within the manufacturing sector. While the absolute size of employment in the formal manufacturing sector remains significantly less than that in the informal sector, the share of the former in total employment increased steadily from 19.3% in 2004-05 to 26.9% in 2011-12[vi]. For the formal manufacturing sector,

Figure 2 depicts employment trends three categories of workers - blue-collar (production) workers, white-collar (non-production) workers and contractual workers. Among these categories, the gender break-up is available only for blue- collar workers. Between 1998 and 2014, while blue-collar employment for males increased from 4.1 million to 5.3 million, the same for females increased rather slowly, from 1.1 million to 1.4 million. Female employment intensity (FEI), defined as the share of female employment in total employment, remained below 20% for most of the years. That FEI remained constant in India, during a period that witnessed major trade liberalization, contrasts with the experience of several other developing countries that were in similar situation (Fontana, 2009)[vii]. The number of workers employed on contract basis, however, increased rapidly from slightly above 1 million during the early 2000s to 3.7 million in 2014 (Figure 2), which is consistent with the view that, with increased international exposure, firms seek flexibility in labour adjustment by means of employing more contract workers.

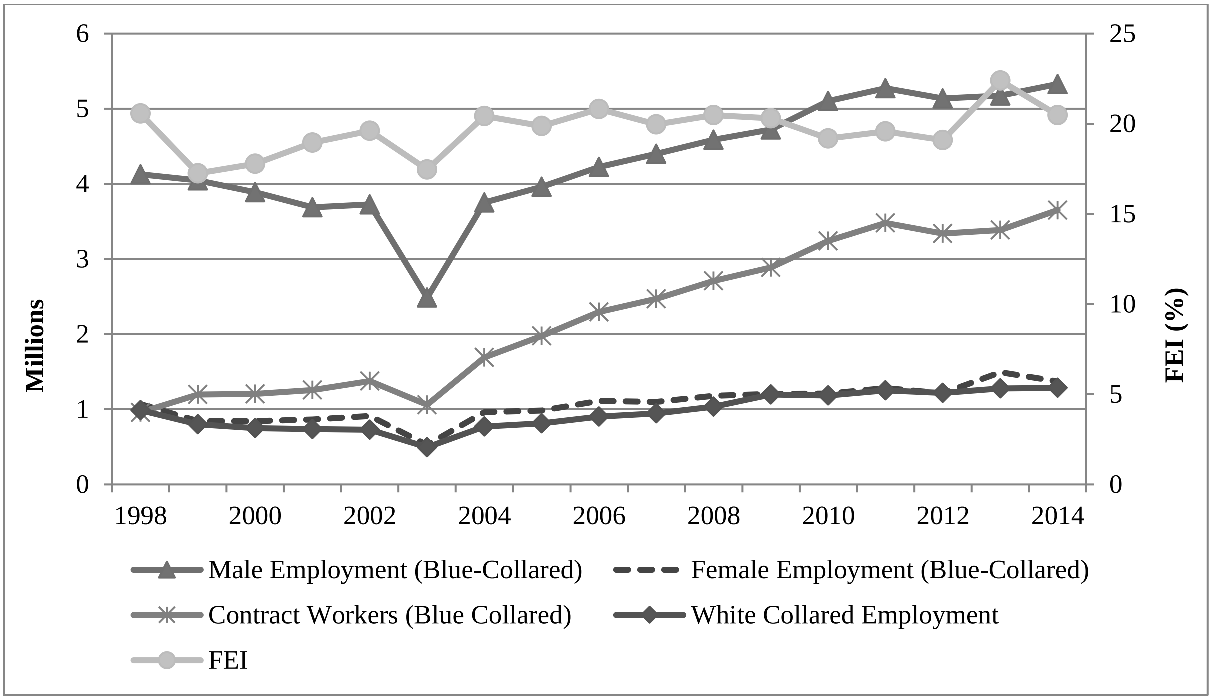
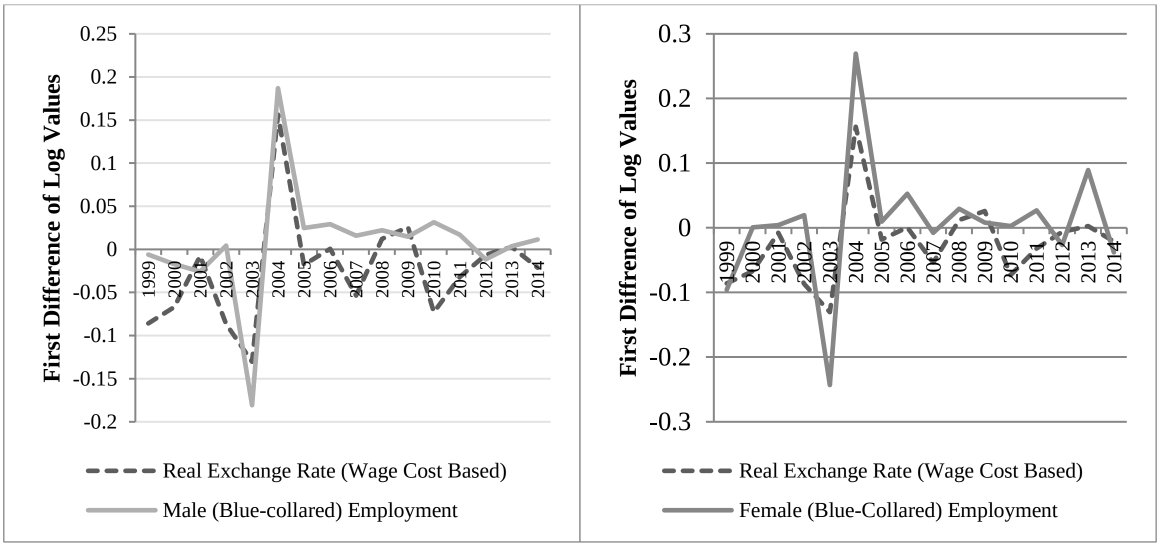


Figure 2: Employment in Manufacturing Sector in India (1998-2014)

Notes: Blue and White-collar employment represents employment on regular (as opposed to contract) basis. Gender break-up is not available for White collar and contract workers. FEI in right axis represents female employment intensity (share of female employment in total employment)

Source: Authors' Calculations based on data from Annual Survey of Industries (ASI)

As noted above, greater exposure to international markets implies that firms are forced to make labour adjustments in response to short term competitiveness shocks resulting from exchange rate changes. As a first-cut evidence, Figure 3 depicts a high degree of co-movement between exchange rate changes and net employment for both males and females at the aggregate level. In Section 5, we probe this relationship further is by examining the causal effect of fluctuations in industry-level changes in export competitiveness on different measures of job dynamics across states and industries.



Panel 1 **Panel 2**

Figure 3: Annual Changes in Employment and Exchange Rate

Note: Wage Cost based real exchange rate is measured as $WREER_{it} = \frac{\sum_{j=1}^{K}\left(T_{ijt}/\sum_{j=1}^{K} T_{ijt}\right) ULC_{ijt}}{ULC_{i,India,t}}$ *where* ULC_{ijt} *measures the unit labour costs (annual wage rate) in industry i in country j in year t. Similarly,* $ULC_{i,India,t}$ *measures the wage rate in industry i in India in year t.* T_{ijt} *is the total trade (i.e sum of exports and imports) between India and country j in industry i in year t. Thus,* $WREER_{it}$ *is the ratio of trade share weighted wage costs in other countries to wage costs in India, in industry i year t.*

(Source: Author's calculations using UNIDO and ASI data)

3. Job Dynamics and Exchange Rates: A Brief Review of Related Literature

Several studies have examined the role of trade openness on employment. Most of these studies have focused on the role of standard trade openness variables, such as export orientation and import penetration, in determining 'net' employment outcomes (Wood, 1995; Feenstra, 1998). As noted earlier, the net employment changes are the final outcome of the underlying labour market dynamics in the form of job creation, destruction, and reallocation. Davis et al (1998), one of the earliest studies to analyse the impact of standard trade openness measures on job dynamics, however, do not find any systematic relationship between gross job flows and international exposure. They point out that this result is not surprising as standard trade openness variables, being representatives of the underlying long-run industry characteristics – such as comparative advantage, geography and technology – may not be instrumental in driving short term labour market adjustments. On the other hand, exchange rate fluctuations are a significant source of internationally generated short run shocks that could potentially affect labour market dynamics. In what follows in this section, we provide a brief review of related literature dealing with the question of job dynamics.

Movements in real exchange rates represent a change in relative prices, which, in turn, may induce resource reallocation from industries that have become relatively less competitive to industries that have gained competitiveness.. Traditional models, based on the assumption of homogeneity among producers, predict that there can either be job creation or job destruction within a given industry but not both at the same time. A number of empirical studies, however, documented simultaneous occurrence of job creation and destruction even within narrowly defined industries. Subsequently, theoretical models have been formulated, incorporating firm level heterogeneity, to explain the occurrence of simultaneous job creation and destruction within industries[viii] (Gourinchas, 1999; Klein et al, 2003).

Klein et al (2003) considers heterogeneity and plant level idiosyncratic shocks, giving rise to simultaneous job creation and destruction in response to industry level exchange rate shocks. While the overall effect of exchange rate depreciation (appreciation) on industry level job creation is positive (negative), plant level response could be heterogeneous. It is quite possible that, in response to a given change in industry level exchange rate, employment may expand in some plants while it may shrink in others, leading to simultaneous job creation and destruction[ix].

Empirical studies measure industry level job creation and destruction as weighted sums of employment changes at the growing and shrinking firms respectively (Davis and Haltiwgner, 1990). Using such measures, a number of studies provided documentary evidence on job dynamics across countries, industries and time[x]. To the best of our knowledge, Ozler (2007), dealing with Turkish manufacturing sector, is the only study that provides estimates of job dynamics by gender. This study finds that, compared to men, women face higher job reallocation rates in all sectors but higher net job creation rates only in exporting sectors.
In the context of India, to the best of our knowledge, there is only one study that examines the issue of job dynamics (Dougherty, 2009). This study reports significant job reallocation rates in India’s organized manufacturing sector during the period 1985-2004. Underlying the deleterious effect of labour laws on regular employment in large plants, the study notes low net job creation and reallocation rates in larger plants (with more than 100 workers) as compared to smaller plants (with less than 100 workers) and for regular workers as compared to contractual workers. This study, however, does not examine gender differences and industry level variation in job dynamics.

None of the above studies examine the causal effect of changes in export competitiveness on job dynamics across industries and time. Gourinchas (1998) was one of the earliest papers to empirically examine the link between exchange rate fluctuation and gross job flows. Using data on a sample of industries from USA's manufacturing sector for the period 1972- 1988 they find that an appreciation of the cyclical component of industry level real exchange rates led to an increase of both job creation and destruction rates but a decline of net job creation rates (Gourinchas, 1998). For a sample of French firms, Gourinchas (1999) finds that traded-sector industries are more responsive to real exchange rate movements than non-trade sector industries. He also notes that, in general, job destruction rates are less responsive to real exchange rate fluctuations than job creation rates.

Klein et al (2003) find that exchange rate appreciation is associated with a decline in net job creation through the channel of increased job destruction while there is no effect on job creation rates[xi]. The asymmetric effect of exchange rate fluctuations on job creation and destruction are explored further in Moser et al (2010). This paper studies the impact of international competitiveness on job flows in a panel of German firms between 1993 and 2005. They find that while real exchange rate depreciation leads to a small increase in gross and net job creation rates, it exerts no effect on job destruction rates. They attribute this strikingly different result for Germany from that for US to more rigid labour laws in the former, which makes adjustment through the channel of job destruction a difficult process.

In the context of developing countries, there are few studies on the relationship between job flows and exchange rate changes. Ribiero et al (2004) finds that a real exchange rate depreciation of Brazilian manufacturing industries increases gross job creation rates but has no impact on gross job destruction rates (). In contrast, another study on the manufacturing sector in six Latin American countries finds that exchange rate depreciation decreases the pace of net job creation and gross job reallocation rates (Haltiwagner, 2004)[xii]. The author argues that this result could be driven by the possibility that currency depreciation might have increased the price of imported intermediate inputs thereby reducing the profitability of domestic firms.

4. Job Dynamics in the Indian Manufacturing Sector

In order to estimate simultaneous job creation and destruction within an industry (or sector) we follow the methodology proposed by Davis and Haltiwanger (1990) which involves aggregating the growth rates of employment at growing and shrinking plants within a sector to yield industry level measures of job creation and destruction.

Gender-specific employment growth at plant *p* belonging to sector *i* for gender group *f* in period *t* is given by g^f_{pit}

$$g^f_{pit} = \frac{x^f_{pit} - x^f_{pi(t-1)}}{a^f_{pit}} \qquad (1)$$

where a^f_{ipt} is average employment of gender group *f* defined as

$$a_{pit}^{f} = \frac{x_{pit}^{f} + x_{pi(t-1)}^{f}}{2} \quad (2)$$

Note that g^f_{pit} is symmetric around zero and lies in the interval [-2, 2]. A value of $g^f_{pit} = 2$ implies that a plant has started employing workers belong to group *f* for the first time in year *t* while a value of -2 corresponds to a situation where the plant has retrenched all its workers belonging to group *f*. Usually, g^f_{pit} lies within these extreme values with positive values of g^f_{pit} implying an increase in employment and vice versa with negative values.

We shall now define the gross job creation and destruction rates. *Gross job creation rate,* denoted as C^f_{it}, is measured as a weighted sum of g^f_{pit} across all those plants within a given sector *i* where employment has recorded a positive growth rate.

$$C_{it}{}^{f} = \sum_{p \in M_i^{f+}} \left(\frac{a_{pit}}{A_{it}}\right) g_{pit}^{f} \quad (3)$$

The ratio $\frac{a_{pit}}{A_{it}}$ acts as the weight (that is, total employment shares of plants in sector *i*)[xiii], where A_{it} is the average employment for sector *i* defined analogously to a_{pit} for plants and M_i^{f+} represents the set of plants within sector *i* where employment of group *f* is expanding (i.e., $g^f_{pit} > 0$).

Similarly, *gross job destruction rate* is a weighted sum of employment losses at shrinking and dying plants within a sector.

$$D_{it}{}^{f} = \sum_{p \in M_i^{f-}} \left(\frac{a_{pit}}{A_{it}}\right) g_{pit}^{f} \quad (4)$$

where M_i^{f-} is the set of plants within sector *i* where employment is shrinking (i.e., $g^f_{pit} < 0$).

Net job creation rates (N^f_{it}) are given by the difference between the gross job creation rate and the gross job destruction rate (i.e., $N^f_{it} = C^f_{iit} – D^f_{iit}$). The *gross job reallocation rate,* denoted as R^f_{ijt}, for the sector is given by the sum of C^f_{iit} and D^f_{iit} (i.e., $R^f_{iit} = C^f_{iit} + D^f_{iit}$)[xiv].

It may also be noted that sectors (denoted by *i* in the above discussion) could be defined, at the aggregate or disaggregate level, depending upon the purpose in hand.

In order to analyse these labour market dynamics, we use plant level panel data from the Annual Survey of Industries (ASI) published by the Central Statistical Organization (CSO) of India. ASI, the principal source of industrial statistics in India, provides panel data at the plant level starting from 1998-99. For production (blue collared) workers, this database provides employment figures separately for females and males at the plant level. However, information on the gender composition of workforce is not available for non-production (white collared) workers. Measurement of job dynamics requires that a given plant be observed in year *t* as well as *t-1*. Thus, all those plants which have not been included in the survey for any two consecutive years have to be dropped from our analysis. We note in this context that Dougherty, 2009 does not use this plant level panel data in order to calculate job dynamics. Instead he uses a pseudo-panel data constructed using repeated cross section for the time period he is analysing.

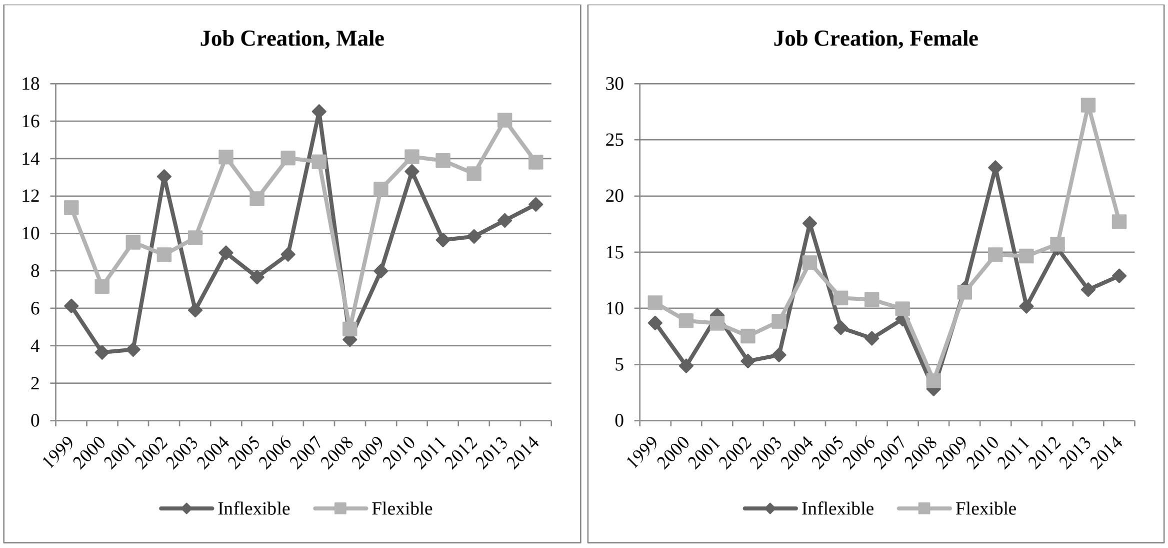
In Table 1 the job dynamics for the aggregate manufacturing sector is presented for male and female workers, as well as for total blue-collared permanent workers. We find that, while the net job creation rates in most years have been quite low and even negative in some years, there has been considerable reallocation experienced by both male and female workers in the manufacturing sector[xv]. High gross job creation along with high job destruction indicates some firms within the manufacturing sector are growing while others are shrinking. Mean t-test was conducted for each of the job dynamics and we fail to reject the null of equal means for male and female workers in the case of job creation (p-value=0.2628), job destruction (p-value=0.3818), and net job creation (0.9395). There are no statistically significant differences between male and female job creation, job destruction and net job creation rates at the aggregate level. However, we find that average job reallocation rates for male workers are lesser than that for female workers over the time period 1999 to 2014. The p-value for the one tailed test is 0.0842.

Table 1: Job Dynamics for Male, Female and All Blue-Collared Workers in the Manufacturing Sector

Year	**Job Creation**			**Job Destruction**			**Net Job Creation**			**Job Reallocation**		
	Male	***Female***	***Total***	***Male***	***Female***	***Total***	***Male***	***Female***	***Total***	***Male***	***Female***	***Total***
1999	8.97	8.74	6.46	11.36	21.37	18.59	-2.39	-12.63	-12.12	20.33	30.12	25.05
2000	6.22	8.00	5.66	9.82	13.74	9.26	-3.60	-5.75	-3.61	16.04	21.74	14.92
2001	7.54	10.21	7.66	11.62	12.37	10.42	-4.08	-2.16	-2.76	19.16	22.59	18.07
2002	11.31	7.47	7.44	10.35	10.50	9.46	0.96	-3.03	-2.03	21.66	17.96	16.90
2003	9.00	9.18	8.06	11.38	9.87	10.68	-2.38	-0.69	-2.62	20.38	19.05	18.74
2004	10.51	11.02	9.20	10.09	8.29	8.41	0.42	2.73	0.80	20.61	19.30	17.61
2005	9.96	9.70	9.43	9.79	8.74	8.55	0.17	0.96	0.89	19.75	18.45	17.98
2006	12.71	11.30	11.14	8.53	8.57	8.13	4.18	2.73	3.01	21.24	19.87	19.28
2007	13.19	10.75	12.09	9.26	9.78	7.98	3.93	0.98	4.10	22.45	20.53	20.07
2008	4.15	2.83	4.09	3.89	2.71	3.99	0.26	0.12	0.10	8.05	5.54	8.07
2009	10.12	11.12	9.10	11.14	10.24	10.17	-1.02	0.88	-1.08	21.25	21.35	19.27
2010	13.42	14.29	12.52	10.40	10.27	9.25	3.02	4.02	3.27	23.82	24.57	21.77
2011	12.68	14.31	12.15	11.17	11.64	10.45	1.51	2.67	1.71	23.85	25.95	22.60
2012	12.50	14.92	11.45	13.36	11.95	12.15	-0.86	2.97	-0.70	25.85	26.87	23.59
2013	13.41	20.85	16.27	12.41	11.58	10.98	1.00	9.26	5.29	25.82	32.43	27.26
2014	12.18	15.23	10.88	12.29	16.05	14.46	-0.10	-0.82	-3.59	24.47	31.27	25.34
Mean	**10.49**	**11.25**	**9.60**	**10.43**	**11.10**	**10.18**	**0.06**	**0.14**	**-0.58**	**20.92**	**22.35**	**19.78**

These aggregate numbers on job dynamics could vary substantially across states in India, given the variations in labour market conditions. A number of studies have exploited the state level variation in labour laws to analyse its impact on industrial performance and employment outcomes in India. Using this state level variation in labour laws Besley and Burgess (2004) categorize states as pro-worker, neutral, or pro-employer based on the amendments made to the IDA. They find that industrial performance is weaker in states with pro-worker labour laws. Aghion et al (2008) using a similar coding finds that states with pro-worker labour laws have received lesser benefits from delicensing reforms. Bhattacharjea (2006) argues that the coding of state-level amendments to the IDA in Besley and Burgess (2006) is flawed. Gupta et al (2009) correct for these anomalies in the coding and they too find that states with inflexible labour regulations have experienced slower growth of labour intensive industries and slower employment growth. We follow the paper by Gupta et al, 2009 in categorizing 15 major states in India into three categories with regard to the nature of their labour laws: flexible, neutral, and inflexible. This paper makes corrections to the classifications in Besley and Burgess (2004)[xvi] and this revised classification is what we shall be following in the current paper.

In Figure 2 below the job creation rates for male and female workers across states with flexible and inflexible labour laws have been presented. We find that job creation for male workers is higher, in nearly all the years, in states with more flexible labour markets. However, for female workers the pattern is less clear, though average annual job creation for them too is higher in states with flexible labour markets. Figure 3 presents job destruction rates for male and female workers across states with flexible and inflexible labour laws. We find that states with inflexible labour laws have lower job destruction rates for men, which is to be expected since the inflexibility of labour laws pertain to reducing firing of workers. However, these labour laws do not significantly lower job destruction rates for women as evidenced by similar job destruction rates in states with flexible and inflexible labour laws. The average annual job dynamics rates are presented in Table A1 in the Appendix. We note that in states with flexible labour laws the net job creation rates and job reallocation rates of male and female workers are not significantly different. However, in states with inflexible labour laws we find average net job creation rates for women (-1.07%) to be lower than that for men (-0.94%). However, in these rigid labour markets women (21.95%) face greater job reallocation compared to men (19.06%). It appears that when faced with legislative rigidities in labour markets, firm tend to adjust the workforce by hiring and firing female workers rather than male.



Panel 1 Panel 2

Figure 2: Job Creation for Male and Female Workers in States with Flexible and Inflexible Labour Laws

Source: Author's calculations using ASI data. Flexible and Inflexible states are classified following Gupta et al (2009)

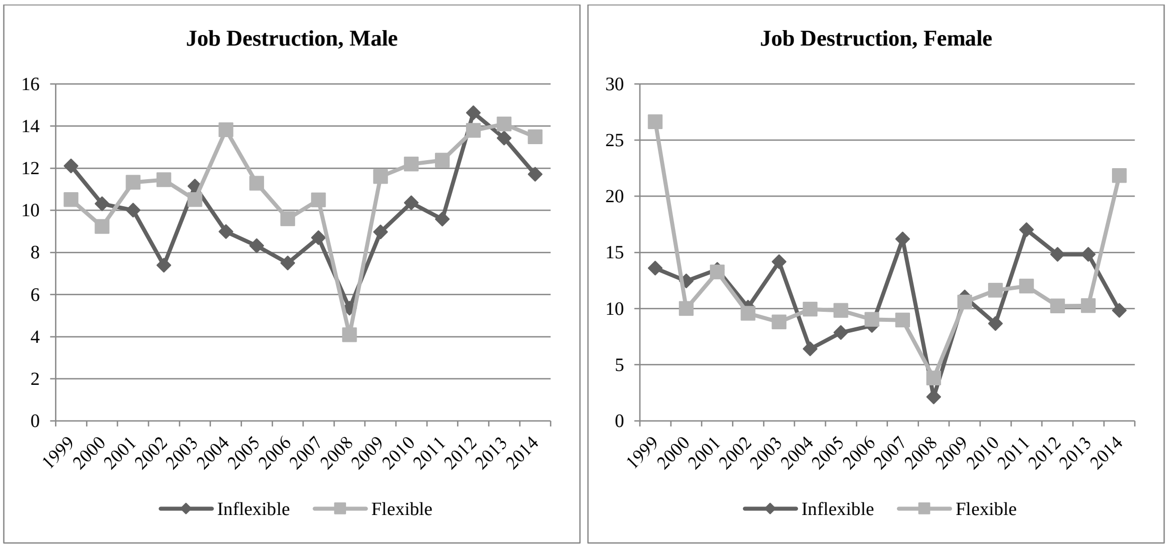


Figure 3: Job Destruction for Male and Female Workers in States with Flexible and Inflexible Labour Laws

Source: Author's calculations using ASI data. Flexible and Inflexible states are classified following Gupta et al (2009)

We have observed from above that there is some temporal as well as state wise variation in job dynamics for both male and female workers. However, it is interesting to note that affiliation to state, industry (measured at the 3-digit level) and year explain only a small of the variation in job dynamics. Using job dynamics for male and female workers across 58 industries and 32 states for the period 1998-99 to 2014-15 we find that gender, state, industry and year affiliations explain only 6.9 per cent[xvii] of the variation in job creation. For job destruction, net job creation and job reallocation these dummy variables explain 6.5%, 4.4%, and 7.1% of the variation respectively. This clearly indicates that a large part of the variation in job flow dynamics remains unexplained by gender, state, industry and year fixed effects. Thus, much of the variation in job flows could be explained by time varying characteristics at the industry level. In this context, whether inter-temporal movements in export competitiveness of an industry influence job dynamics, the main question addressed in this paper, assumes significance.

5. Empirical Strategy and Variables

5.1 Empirical Strategy

Our baseline estimation equation is a modified reduced form following the model of Klein et al. (2003)

$$JobDynamics_{ist} = \beta_1 JobCreation_{is(t-1)} + \beta_2 Jobdestruction_{is(t-1)} + \beta_3 EXCOMP_{it} + \beta_4 RWAGE_{ist} + \beta_5 RMP_{it} + \gamma_{is} + \gamma_t + \epsilon_{ist} \quad (5)$$

where i denotes the industry index (at the NIC 3 digit level)[xviii], s denotes the state index, and t denotes the year. Job dynamics refer to gross job creation, gross job destruction, net job creation, and job reallocation. $EXCOMP_{it}$ is the industry specific real exchange rate interacted with export orientation. *RWAGE* measures the real average wage rate in an industry i in state s in year t. *RMP* measures the real price of materials used in the industry, and Υ_{is} is the i.i.d state-industry specific random effect and Υ_t represents year-specific dummy variables. These regressions are estimated separately for each gender group.

The model takes the form of a dynamic panel regression model since the lagged values of the dependent (or part of it) is used as a covariate. The predetermined (endogenous) variables (like C_{it} D_{it}), are defined as random variables that may depend on past values of the dependent variable but not on its future values. Trognon (1978) has shown that the OLS estimator in this case is inconsistent because the lagged dependent variable is correlated with the random effect. Nickell (1981) shows that even the fixed-effects (FE) estimator in the case of a small time dimension is biased. This is because of the correlation of the group mean of the error term with the lagged-dependent variable. The co-efficient on the lagged dependent variable is underestimated with the fixed-effects model and overestimated with the OLS model.

In order to obtain efficient estimates in these types of regressions Arellano-Bond suggest a one-step generalized method of moments (GMM) methodology which exploits all the information within the data set (Arellano and Bond, 1991). A key assumption in this case is that all the necessary instruments are ‘internal’ to the model i.e. lagged values of the predetermined (endogenous) variables being used in the model. These lagged values are valid instruments only if the second and higher order lagged values of the dependent variable are not correlated with the first differenced error term. Blundell & Bond (1998) point out a potential weak instrument problem with the Arellano-Bond specification and suggest additional moment conditions (lagged levels as well as lagged differences)[xix] in the estimation (see Roodman, 2003 for a detailed discussion on the estimation technique). Autocorrelation tests are performed as the validity of instruments is ensured only if the error term is not auto-correlated of second order. In addition, a Hansen test of over identifying restrictions is done to check whether the instruments are correlated with the error term. The results from these tests are reported alongside the regression results. In all specifications, AR (2) test shows that the errors are not auto-correlated of order 2. The p-values for the Hansen test in all specifications reject the null hypothesis of over identified restrictions. There is a concern with the system GMM technique that the proliferation of instruments may weaken the Hansen test (Roodman, 2009). In order to address this concern, we adopt the method of collapsing the instrument matrix which reduces the problem of a weakened Hansen test in data sets with larger time periods. In specifications where the AR(2) test fails we specify the instrument from the third lag onwards and check for the statistical significance of the AR(3) test.

In all specifications we include state fixed effects that may account for any time-invariant state specific factors that affect international competitiveness as well as job dynamics. We also include year fixed effects in order to control for any macroeconomic changes that affect all industries in all states similarly.

5.2 Variables and Hypothesis

The methodology for measuring job dynamics has been outlined in Section 4. We calculate job dynamics for male and female workers for each year between 1998-99 and 2014-15 are at the state-industry level where industries are defined at the NIC 3-digit level.

We calculate industry wise real exchange rates based using relative wage costs as follows.

$$WREER_{it} = \frac{\sum_{j=1}^{K}\left(T_{ijt}\Big/\sum_{j=1}^{K} T_{ijt}\right)ULC_{ijt}}{ULC_{i,India,t}} \qquad (6)$$

where ULC_{ijt} measures the unit labour costs (annual wage rate) in industry *i* in country *j*’s in year *t*. Similarly, $ULC_{i,India,t}$ measures the wage rate in industry *i* in India in year *t*. T_{ijt} is the total trade (i.e sum of exports and imports) between India and country *j* in industry *i* in year *t.* Thus, $WREER_{it}$ is the ratio of trade share weighted wage costs in other countries to wage costs in India, in industry *i* year *t*. This wage cost based real exchange rate measures industry wise differences in competitiveness between India and its trading partners. An industry that is more open to exports would face greater changes in their export competitiveness as a result of such exchange rate shocks. In order to capture this, we interact the measure of exchange rate, $WREER_t$, with a measure export orientation (EO_{it}) of the industry *i* in year *t*

$$EO_{it} = \frac{1}{2}\sum_{s=1}^{2}\left(\frac{X_{i(t-s)}}{Y_{i(t-s)}}\right) \qquad (7)$$

where X_{it} and Y_{it} are the gross exports and total output of industry *i* in year *t* in India. The interaction term between the lagged values of $WREER_t$ and EO_{it} gives us a measure of international competitiveness, *EXCOMP*, at the industry level.

$$EXCOMP_{it} = WREER_t * EO_{it} \qquad (8)$$

Note that we have used average of lagged export orientation values for our measure of openness (EO_{it}) in order to address concerns that international trade itself could be endogenous to job dynamics. In addition by instrumenting the predetermined variables using the system GMM estimation we may conclude that the coefficient on EXCOMP identifies the effect of exchange rate driven changes in international competitiveness in export oriented industries on job dynamics. Data on output and unit labour costs were taken from the UNIDO's industrial database, INDSTAT 4. Industry wise export data was taken from UN-COMTRADE database accessed using World Integrated Trade Solution (WITS) software from the World Bank. We expect an increase in EXCOMP, i.e. depreciation in more export oriented industries to have a positive effect on job creation and a negative effect on job destruction.

RWAGE is measured as nominal average wage rate for a gender group (male or female workers) in a particular state-industry divided by the Wholesale Price Index (WPI) of that industry. We expect that a rise in real wage would lower job creation and increase job destruction. Wages are calculated for each state-industry category in each year using the ASI plant level data. Materials price in an industry is measured as the weighted sum of the WPI of all inputs used in that industry where the weights are calculated using the Input-Output tables. This weighted price is then divided by the industry's own WPI to obtain real materials price, RMP_{it}. A rise in prices of inputs other than labour would be associated with lesser job creation and greater job destruction of manufacturing workers. Details regarding variable construction and data sources are presented in Table A2 in the Appendix.

Following Gupta et al (2009) we have each state is categorized as having flexible, neutral, or inflexible labour laws[xx]. These regressions are estimated separately for each of these categories as well in order to examine if labour regulations mediate the relationship between changes in international competitiveness and job dynamics.

6. Results

6.1 Baseline Results

Tables 2 and 3 report the regression results for the entire sample i.e. all state industry pairs in all years in the period 1998-99 to 2014-15. It is apparent from Table 2 that exchange rate driven changes in international competitiveness have an asymmetric effect on job creation and job destruction in Indian manufacturing. An increase in EXCOMP, i.e. depreciation in more export-oriented industries, increases the gross job creation for both male as well as female workers (columns 1 and 2, Table 2). As firms gain international competitiveness they hire more workers, both male and female. We note that the point estimates are higher for female workers implying that a short term positive shock results in greater hiring of female workers in these export-oriented industries. Given export orientation, a 10% depreciation would result in 3.0% gross job creation for males and 5.4% gross job creation for females. However, it can be seen that changes in EXCOMP do not have a statistically significant impact on job destruction in the manufacturing workforce (columns 3 and 4, Table 2). This asymmetric result indicates that employers in India do not adjust the workforce through the channel of firing of workers pointing to some labour market rigidities in this regard. It can be seen, as expected, an increase in real wages reduces job creation and increases job destruction.

From Table 3 we note that changes in EXCOMP does not have any significant impact on net job creation (column 1 and 2, Table 3) but does result in higher job reallocation (columns 3 and 4, Table 3 and 4). This is interesting as we note that while workers do experience labour market turnover in the aftermath of an exchange rate shock, this is not associated with any net benefits in terms of employment growth. It is also striking that the effect on women's job reallocation is higher than that on men's indicating that women workers bear a greater burden of the adjustment costs in response to an international shock. This provides some evidence in support of the idea that women workers are perceived to be more 'flexible'.

Table 2: Regression results: Job Creation and Job Destruction

	Creation		Destruction	
VARIABLES	***Male***	***Female***	***Male***	***Female***
	(1)	(2)	(3)	(4)
C_{ist-1}	-0.1630**	-0.4410***	-0.0146	-0.1940
	(0.0772)	(0.1120)	(0.2410)	(0.2420)
D_{ist-1}	0.0930**	0.136***	0.102	0.0846
	(0.0405)	(0.0510)	(0.150)	(0.1620)
INCOMP	**0.3090*** **	**0.5440*** **	**0.2230**	**0.2860**
	(0.0801)	(0.1520)	(0.1600)	(0.1760)
RMP	-0.2590	-2.194*	0.701	-0.0042
	(0.5180)	(1.1270)	(1.0120)	(1.3830)
RWAGE	-0.0006*	-0.0005	0.0010**	0.0007***
	(0.0003)	(0.0004)	(0.0005)	(0.0002)
Constant	10.9366**	8.2383**	36.8504***	6.7570
State Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	11,388	6,486	10,169	4,938
Hansen (p-value)	0.361	0.468	0.358	0.125
AR(1) (p-value)	0.000	0.091	0.029	0.011
AR(2) (p-value)	0.130	0.002	0.530	0.743
AR(3) (p-value)	0.53	0.653	0.44	0.689

Standard errors clustered at the state*industry level reported in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 3: Regression results: Net Job Creation and Job Destruction				
	Net Job Creation		**Job Reallocation**	
VARIABLES	***Male***	***Female***	***Male***	***Female***
	(1)	(2)	(3)	(4)
C_{ist-1}	-0.5000*	-0.0128	-0.3360	-0.3800
	(0.3040)	(0.4170)	(0.2320)	(0.3120)
D_{ist-1}	-0.1610	-0.1790	0.0604	0.139
	(0.2130)	(0.2420)	(0.170)	(0.231)
EXCOMP	**0.2520**	**0.3060**	**0.6100*** **	**0.8020*** **
	(0.1840)	(0.2210)	(0.1610)	(0.2580)
RMP	-1.2750	-1.2320	0.2800	0.4080
	(1.1260)	(1.8690)	(1.2590)	(2.0500)
RWAGE	-0.0014**	-0.0013***	-0.0001	-0.0002
	(0.0006)	(0.0002)	(0.0004)	(0.0002)
Constant	-20.1770	8.0536	45.099***	13.0553
State Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	9,937	4,910	9,937	4,910
Hansen (p-value)	0.00980	0.00421	0.00459	0.000369
AR(1) (p-value)	0.0231	0.0516	0.0484	0.00832
AR(2) (p-value)	0.797	0.865	0.729	0.804
AR(3) (p-value)	0.523	0.675	0.128	0.856

Standard errors clustered at the state*industry level reported in parentheses; *** p<0.01, ** p<0.05, * p<0.1

6.2 Labour Market Rigidity

From the previous section we may note that Indian producers do not adjust the workforce by firing workers in the aftermath of an adverse exchange rate shock. We also note that in the aggregate women workers experience greater job reallocation compared to male. In order to examine if these results are related to the labour market institutions that are specific to India we estimate similar regressions as above for the three categories of states outlined in Gupta et al (2009) separately.

We note that exchange rate depreciation leads to higher gross jobs (Table 4) for male and female workers in states with flexible or neutral labour laws (columns 1, 3, 4 and 6, Table 4). A positive international shock does not result in job growth in states with inflexible labour laws (columns 2 and 5, Table 4). When faced with a short term shock to export competitiveness, in states where labour laws are not flexible, producers do not increase the workforce since they are aware that firing these new recruits in the event of an adverse shock would be difficult. Job destruction still remains largely unresponsive to exchange rate changes in all types of states (Table 5).

Turning to net job creation, we find that it increases for both male and female workers when there is an improvement in export competitiveness; only in states with flexible labour laws (columns 1 and 4, Table 6). Job reallocation in the aftermath of the exchange rate shock is higher for men in states with flexible and neutral labour laws (columns 1 and 3, Table 7). However, women experience greater reallocation after an exchange rate shock in states with inflexible labour laws (column 5, Table 6). It appears that in states where producers face rigidities in the labour market, they choose to carry out short adjustments to the workforce using female labour rather than male. Thus, labour laws that are purported to protect the workforce have resulted in a situation where women are bearing a disproportionate burden of the adjustment costs associated with resource reallocation.

Table 4: Regressions Results - Job Creation and Labour Market Rigidity

VARIABLES		***Male***			***Female***	
	Flexible	***Inflexible***	***Neutral***	***Flexible***	***Inflexible***	***Neutral***
	(1)	(2)	(3)	(4)	(5)	(6)
C_{ist-1}	-0.2760***	-0.1790**	-0.2670***	-0.4540***	0.05420	-0.2080***
	(0.0905)	(0.0737)	(0.0797)	(0.0945)	(0.0889)	(0.0766)
D_{ist-1}	-0.0019	0.0253**	0.1310**	0.1610**	0.1850**	0.2250**
	(0.0185)	(0.0127)	(0.0640)	(0.0698)	(0.0742)	(0.1080)
EXCOMP	**0.7090*** **	**0.0187**	**0.4160*** *	**0.5560*** *	**0.4500**	**0.4850***
	(0.1920)	(0.1900)	(0.1660)	(0.2540)	(0.4890)	(0.2710)
RMP	-1.1590	-1.7870	0.1920	-1.3400	-1.6020	-1.4830
	(1.1750)	(1.2750)	(1.1240)	(2.1480)	(2.1580)	(2.5900)
RWAGE	-0.0003**	-0.0008	-0.0022***	0.0027**	-0.0003	-0.0006*
	(0.0001)	(0.0007)	(0.0007)	(0.0012)	(0.0016)	(0.0003)
Constant	8.9270***	7.2701***	7.4131***	5.5639*	2.2610	13.9310***
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,135	1,654	3,245	2,149	985	1,760
Hansen (p-value)	0.00919	0.259	0.0511	0.000590	1.000	0.0324
AR(1) (p-value)	0.00211	0.00552	0.00148	0.0270	0.00396	0.00506
AR(2) (p-value)	0.132	0.0933	0.0254	0.00731	0.400	0.188

AR(3) (p-value)	0.520	0.391	0.288	0.828	0.478	0.195
Standard errors clustered at the state*industry level reported in parentheses; *** p<0.01, ** p<0.05, * p<0.1						

Table 5: Regressions Results - Job Destruction and Labour Market Rigidity

		Male			*Female*	
VARIABLES	***Flexible***	***Inflexible***	***Neutral***	***Flexible***	***Inflexible***	***Neutral***
	(1)	(2)	(3)	(4)	(5)	(6)
C_{ist-1}	0.1500	0.4090	0.2190**	0.6360	-0.0630	-0.1220
	(0.2240)	(5.1480)	(0.1090)	(0.3900)	(0.1180)	(0.0855)
D_{ist-1}	0.3300	-0.2770	-0.1420***	-0.1220	-0.4190	-0.2490**
	(0.2090)	(1.6450)	(0.0425)	(0.2480)	(0.3210)	(0.1000)
EXCOMP	**0.1860**	**0.5180**	**0.0892**	**-0.1100**	**0.4960**	**0.8000***
	(0.2770)	(28.6600)	(0.1540)	(0.2990)	(0.5520)	(0.4190)
RMP	-0.3280	15.1500	1.7190	2.0170	-5.3260*	3.9460
	(1.2080)	(114.9000)	(1.3830)	(2.3690)	(3.1130)	(2.5890)
RWAGE	0.0009*	-0.0007	0.0009	0.0004	0.0016**	0.0007***
	(0.0005)	(0.0839)	(0.0009)	(0.0012)	(0.0008)	(5.26e-05)
Constant	6.9405*	-0.7163	9.5630***	5.6443	18.2715***	20.4685***
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,902	1,526	2,919	1,777	779	1,315
Hansen (p-value)	0.468	0.964	0.431	0.54	0.245	0.903
AR(1) (p-value)	0.0034	0.131	1.55E-05	0.0461	0.494	0.127
AR(2) (p-value)	0.552	0.207	0.516	0.314	0.232	0.0311
AR(3) (p-value)	0.827	0.919	0.468	0.435	0.928	0.324
Standard errors clustered at the state*industry level reported in parentheses; *** p<0.01, ** p<0.05, * p<0.1						

Table 6: Regressions Results - Net Job Creation and Labour Market Rigidity

	Male			*Female*		
VARIABLES	***Flexible***	***Inflexible***	***Neutral***	***Flexible***	***Inflexible***	***Neutral***
	(1)	(2)	(3)	(4)	(5)	(6)
C_{ist-1}	-0.3290**	-0.6110	-0.3720***	-0.6370**	-0.0707	-0.1650*
	(0.1450)	(0.4270)	(0.1130)	(0.2870)	(0.1110)	(0.0981)
D_{ist-1}	0.2810***	0.2080**	0.2170***	0.2490***	0.3090**	0.1940
	(0.1040)	(0.0839)	(0.0737)	(0.0868)	(0.1430)	(0.1220)
EXCOMP	**0.6130****	**-0.5870**	**0.2380**	**0.6580***	**0.3370**	**-0.1670**
	(0.2520)	(0.4690)	(0.2540)	(0.3370)	(0.5260)	(0.3540)
RMP	0.2320	-17.3400	-1.4950	-2.5090	0.7960	-5.3950*
	(1.558)	(11.200)	(1.7220)	(3.0930)	(2.7440)	(3.2090)
RWAGE	-0.0008	-0.0006	-0.0034***	0.0018	-0.0016	-0.0012***
	(0.0008)	(0.0022)	(0.0010)	(0.0018)	(0.0015)	(0.0001)
Constant	-5.4147	14.8007	0.8348	-17.0924***	-9.8366**	-2.2265
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,874	1,514	2,870	1,776	779	1,308
Hansen (p-value)	0.00651	0.997	0.0236	0.00782	1	0.553
AR(1) (p-value)	0.00128	0.0732	5.63e-05	0.0198	0.0194	0.00131
AR(2) (p-value)	0.0402	0.123	0.144	0.0582	0.0102	0.0753
AR(3) (p-value)	0.748	0.412	0.562	0.437	0.217	0.203

Standard errors clustered at the state*industry level reported in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 7: Regressions Results - Job Reallocation and Labour Market Rigidity

	Male			*Female*		
VARIABLES	***Flexible***	***Inflexible***	***Neutral***	***Flexible***	***Inflexible***	***Neutral***
	(1)	(2)	(3)	(4)	(5)	(6)
C_{ist-1}	-0.0390	0.415	-0.0861	0.102	0.0378	-0.185**
	(0.123)	(0.472)	(0.126)	(0.136)	(0.111)	(0.0858)
D_{ist-1}	0.0173	-0.164*	-0.00737	-0.123	0.0882	0.0751
	(0.0842)	(0.0858)	(0.0741)	(0.0862)	(0.112)	(0.137)
EXCOMP	**0.791*****	**0.575**	**0.584****	**0.519**	**0.902***	**0.861****
	(0.246)	(0.401)	(0.247)	(0.394)	(0.461)	(0.439)
RMP	-2.470	11.54	1.139	-1.173	-5.593	1.402

	(1.817)	(10.43)	(1.777)	(3.221)	(3.433)	(3.457)
RWAGE	0.000115	-0.00102	-0.00199*	0.00282**	0.00171**	-0.000154
	(0.000412)	(0.00163)	(0.00106)	(0.00130)	(0.000764)	(0.000118)
Constant	25.3366***	4.9852	13.8091***	21.9660***	15.4255***	14.1494**
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,874	1,514	2,870	1,776	779	1,308
Hansen (p-value)	0.266	1	0.234	0.831	1	0.915
AR(1) (p-value)	0.000103	0.0685	5.88e-06	8.75e-06	0.00167	0.00932
AR(2) (p-value)	0.583	0.262	0.894	0.764	0.428	0.826
AR(3) (p-value)	0.315	0.568	0.344	0.750	0.375	0.895

Standard errors clustered at the state*industry level reported in parentheses; *** p<0.01, ** p<0.05, * p<0.1

6.3 Controlling for Contract Worker Share

We find from our results that labour market rigidities based on labour laws do play a role in mediating the relationship between changes in international competitiveness and job dynamics. However, some scholars have argued that while these labour laws do exist on paper, firms are easily able to circumvent them by hiring contractual workers. In our analysis below, we control for this *de facto* liberalization and then comment on the relationship between exchange rates and job dynamics. In the regressions that follow we include a variable, CWS_{ist}, that measures the share of contract workers in total blue collared workforce in state *s* in industry *i* in year *t.* Controlling for contract worker share reinforces our previous results and provides some further insights.

We note that the positive effect of EXCOMP on job creation still holds for both male and female workers in states with flexible labour laws (columns 1, 3, 4, and 6, Table 8), while it has no impact in states with inflexible labour laws (columns 2 and 5, Table 8). It is interesting to note that industries in states with a high share of contract workers have lower job creation for male workers in states with flexible labour laws. However, in states with inflexible labour laws higher CWS is associated with lower job creation for female workers. In states where firms face greater rigidities in terms of labour laws they substitute permanent female workers with contract workers i.e. they increase their *de facto* flexibility by giving up female workers but not male. Unfortunately, the current data does not provide the gender composition of contract workers employed. Therefore, we are unable to comment on whether female permanent workers are being replaced by male or female contract workers. We find, even after controlling for CWS, EXCOMP has no effect on job destruction of manufacturing workers (Table 9) We note that higher CWS is associated with higher job destruction of only male workers in states with flexible labour laws.

It can be seen from Table 10 that a rise in EXCOMP results in higher net job creation for both male and female workers in states with flexible labour laws (columns 1 and 4, Table 10). As before, it has no impact on net job creation in the states with rigid labour laws (columns 2 and 5, Table 10). Consistent with previous findings we also note that higher CWS results in lower net job creation for male workers only in states with flexible labour laws. It is also noted that higher EXCOMP results in higher job reallocation for female workers in states with inflexible labour laws (column 5, Table 11) but for male workers this occurs in states with flexible labour laws (column 1, Table 11).

It is true that Indian producers have attempted to create flexibility in labour markets by increasingly using more contract workers in place of permanent workers in the manufacturing workforce. However despite this we find that labour market rigidities do play a role in how firms change their labour demand in response to an international shock. In particular we note that these labour market rigidities affect female workers adversely compared to their male counterparts.

Table 8: Regressions Results - Job Creation and Labour Market Rigidity Controlling for Contract Worker Use

	Male			***Female***		
VARIABLES	***Flexible***	***Inflexible***	***Neutral***	***Flexible***	***Inflexible***	***Neutral***
	(1)	(2)	(3)	(4)	(5)	(6)
C_{ist-1}	-0.2980***	-0.2020***	-0.2290***	-0.4300***	-0.0160	-0.223***
	(0.0845)	(0.0640)	(0.0886)	(0.0975)	(0.103)	(0.0745)
D_{ist-1}	0.0128	-0.0007	0.0849	0.1540**	0.0947	0.1630
	(0.0284)	(0.0078)	(0.0755)	(0.0687)	(0.4050)	(0.1020)
EXCOMP	**0.6220*** **	**0.0714**	**0.3140** **	**0.6580** **	**0.7880**	**0.7850** **
	(0.2050)	(0.1990)	(0.1550)	(0.2560)	(0.5500)	(0.3550)
CWS	**-5.5630*** **	**-2.949**	**-1.7040**	**-4.1360**	**-10.4600**	**-1.8500**
	(1.9360)	(2.000)	(1.3070)	(3.1300)	(24.3600)	(3.3240)
RMP	-1.0580	-2.1940**	0.6410	-1.5480	-2.0370	0.2370
	(1.1890)	(1.0450)	(1.0780)	(2.3170)	(10.7100)	(2.3740)
RWAGE	-0.0005*	-0.0008	-0.0026***	0.0023**	-0.0004	-0.0006***
	(0.0003)	(0.0007)	(0.0005)	(0.0011)	(0.0012)	(0.0002)
Constant	26.1788***	12.6604***	5.4555	0.5525	26.6636**	-0.5777

State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,962	1,568	2,890	2,052	961	1,623
Hansen (p-value)	0.937	1.000	0.548	0.973	1.000	0.990
AR(1) (p-value)	0.00214	0.00532	0.00350	0.0421	0.0160	0.00149
AR(2) (p-value)	0.111	0.0859	0.134	0.0164	0.256	0.00323
AR(3) (p-value)	0.413	0.662	0.165	0.981	0.752	0.237

Standard errors clustered at the state*industry level reported in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 9: Regressions Results - Job Destruction and Labour Market Rigidity Controlling for Contract Worker Use

	Male			***Female***		
VARIABLES	***Flexible***	***Inflexible***	***Neutral***	***Flexible***	***Inflexible***	***Neutral***
	(1)	(2)	(3)	(4)	(5)	(6)
C_{ist-1}	0.1300	0.3790	0.0550	0.2610	0.0671	-0.0517
	(0.1050)	(0.2640)	(0.0773)	(0.1940)	(0.0874)	(0.0923)
D_{ist-1}	-0.1080	-0.4510***	-0.2010***	-0.1270	-0.1610**	-0.3290***
	(0.0969)	(0.0788)	(0.0615)	(0.0774)	(0.0696)	(0.0884)
EXCOMP	**0.1120**	**0.3110**	**0.2200**	**-0.0701**	**0.3660**	**0.4710**
	(0.2020)	**(0.3550)**	**(0.1820)**	**(0.3040)**	**(0.3890)**	**(0.3810)**
CWS	**5.5390****	**19.2000**	**6.3090*****	**-1.0160**	**3.4060**	**-2.8690**
	(2.7130)	(18.1900)	(2.3470)	(5.3190)	(8.4220)	(3.7270)
RMP	-1.7500	16.1600	0.8700	-0.0700	-5.021*	-0.2490
	(1.3060)	(12.5600)	(1.5720)	(2.140)	(2.842)	(2.3290)
RWAGE	0.0003	-0.0003	0.0009	0.0012	0.0019**	0.0007***
	(0.0004)	(0.0022)	(0.0009)	(0.0011)	(0.0008)	(9.70e-05)
Constant	0.9819	-11.2194	7.4452	5.1617	18.1522	15.5008***
Observations	2,768	1,458	2,644	1,721	766	1,230
Hansen (p-value)	0.762	1.000	0.479	1.000	1.000	0.999

AR(1) (p-value)	0.000853	0.136	0.000895	0.000482	0.000372	0.0334
AR(2) (p-value)	0.225	0.152	0.571	0.0969	0.149	0.0301
AR(3) (p-value)	0.790	0.377	0.421	0.291	0.910	0.583
Standard errors clustered at the state*industry level reported in parentheses; *** p<0.01, ** p<0.05, * p<0.1						

Table 10: Regressions Results - Net Job Creation and Labour Market Rigidity Controlling for Contract Worker Use

	Male			***Female***		
VARIABLES	***Flexible***	***Inflexible***	***Neutral***	***Flexible***	***Inflexible***	***Neutral***
	(1)	(2)	(3)	(4)	(5)	(6)
C_{ist-1}	-0.3090**	-0.5640**	-0.3240**	-0.5700**	-0.0928	-0.1100
	(0.14200)	(0.277)0	(0.1470)	(0.2900)	(0.1070)	(0.1250)
D_{ist-1}	0.2780***	0.4600***	0.2660***	0.2640***	0.3670***	0.6900***
	(0.1070)	(0.0792)	(0.0881)	(0.0794)	(0.116)	(0.159)
EXCOMP	**0.5620****	**-0.1500**	**0.0992**	**0.6840****	**0.6340**	**-0.0692**
	(0.2360)	**(0.3780)**	**(0.2520)**	**(0.3300)**	**(0.5950)**	**(0.3310)**
CWS	**-12.7900*****	**-19.3900**	**-6.46400****	**-5.6110**	**-19.4900****	**4.7610**
	(2.9950)	(17.2200)	(2.7840)	(5.9420)	(9.1690)	(5.2770)
RMP	0.0246	-18.3700	-1.9440	-2.1350	0.5350	-1.1350
	(1.5920)	(12.5300)	(1.7110)	(3.0060)	(2.9740)	(3.5070)
RWAGE	-0.0008	-0.0008	-0.0035***	0.0012	-0.0015	-0.0014***
	(0.0006)	(0.0031)	(0.0010)	(0.0015)	(0.0012)	(0.0003)
Constant	12.9567**	16.857	6.2704	-3.9702	14.8169	-11.6483
Observations	2,758	1,453	2,617	1,721	766	1,226
Hansen (p-value)	0.377	1.000	0.373	1.000	1.000	1.000
AR(1) (p-value)	0.000432	0.119	0.00123	0.0133	0.0204	0.0145
AR(2) (p-value)	0.0514	0.101	0.175	0.113	0.00649	0.0185
AR(3) (p-value)	0.365	0.642	0.755	0.392	0.248	0.0504
Standard errors clustered at the state*industry level reported in parentheses; *** p<0.01, ** p<0.05, * p<0.1						

Table 11: Regressions Results - Job Reallocation and Labour Market Rigidity Controlling for Contract Worker Use						
	Male			***Female***		
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	***Flexible***	***Inflexible***	***Neutral***	***Flexible***	***Inflexible***	***Neutral***
	(1)	(2)	(3)	(4)	(5)	(6)
$\mathbf{C_{ist-1}}$	-0.0512	0.196	-0.271***	-0.0257	0.0464	-0.213**
	(0.128)	(0.292)	(0.0951)	(0.134)	(0.121)	(0.0991)
$\mathbf{D_{ist-1}}$	0.0957	-0.461***	-0.0525	-0.00401	0.0539	0.0115
	(0.163)	(0.0898)	(0.102)	(0.141)	(0.106)	(0.193)
EXCOMP	0.759***	0.304	0.466**	0.509	1.269***	0.968*
	(0.260)	(0.420)	(0.221)	(0.434)	(0.492)	(0.552)
CWS	-1.214	19.47	4.369**	-4.669	-7.008	-3.420
	(3.179)	(17.20)	(2.211)	(6.154)	(11.18)	(4.378)
RMP	-1.762	12.53	-0.124	-2.020	-8.116**	0.0192
	(1.685)	(12.80)	(1.772)	(3.058)	(3.602)	(3.706)
RWAGE	-1.20e-05	-0.000904	-0.00196*	0.00298**	0.00175**	-2.29e-06
	(0.000289)	(0.00201)	(0.00102)	(0.00135)	(0.000874)	(0.000203)
Constant	13.7338**	-11.2717	16.6787***	10.8383	30.9433**	4.5675
Observations	2,758	1,453	2,617	1,721	766	1,226
Hansen (p-value)	1.000	1.000	0.998	1.000	1.000	1.000
AR(1) (p-value)	0.000	0.068	0.000	0.000	0.002	0.000
AR(2) (p-value)	0.878	0.207	0.574	0.238	0.394	0.399
AR(3) (p-value)	0.310	0.436	0.064	0.551	0.307	0.816
Standard errors clustered at the state*industry level reported in parentheses; *** p<0.01, ** p<0.05, * p<0.1						

7. Conclusion

While a lot of attention has been paid to the fact that India has experienced 'jobless growth' in the years since liberalization was initiated in the early 1990s, most of these studies have focussed on growth rates of net employment. We find, in this paper, that underlying this lacklustre growth in employment is a manufacturing labour market that has significant job dynamics. There exists simultaneous job creation and job destruction, both for male and female manufacturing workers. These job dynamics vary across time, industries, as well as states. However, a large part of the variation in job dynamics remains unexplained by these affiliations.

In this paper we seek to explain the variation in job dynamics for male and female workers in response to an important source of time varying short-term shocks – changes in export competitiveness driven by exchange rate fluctuations. We find that exchange rate changes in export-oriented industries have an asymmetric impact on job creation and destruction. Exchange rate depreciation increases job creation for both male and female workers; more so for the latter. However, it does not have any impact on job destruction rates. Women also face greater job reallocation with exchange rate depreciation. Greater impact on females is expected as women provide 'cheap and flexible' labour compared to men (Cagatay and Ozler, 1995; Elson, 1999; Standing, 1999). This flexibility attribute of female workers is important in an otherwise rigid labour market.

Our analysis suggests that the impact of exchange rate changes on job dynamics does depend on the nature of labour market rigidities that exist in the state. Improvement in international competitiveness positively influence job creation for both gender in states with flexible labour market followed by neutral states but not in states with rigid labour markets. Exchange rate changes do not affect job destruction rates across the board, irrespective of state level differences in labour rigidity. Improvement in international competitiveness positively influence net job creation rates for both gender, but only in states with flexible labour market. Exchange rate depreciation leads to higher reallocation for men in flexible states and higher reallocation for women in rigid states. This indicates that when faced legislative rigidities in the labour market firms seek to adjust the female workforce when faced with short term shocks. We find that labour market rigidity matters even after taking into account the impact of the use of contract workers which provide some *de facto* flexibility to the firms. Accounting for contract worker intensity reinforces our previous results. Once contract worker intensity is controlled for, women enjoy greater job creation in all states. Use of contract workers reduces job creation for males in flexible states whereas it reduces job creation for females in rigid states.

This paper finds evidence for the fact that changes in export competitiveness do affect the job dynamics of Indian workers. Although we may not have observed substantial employment growth in the years under trade liberalization, Indian job markets do respond to changes in firms' international competitiveness. In studying these job dynamics across Indian states as well as industries we are able to establish the fact that labour market rigidities with regard to firing of workers affects job destruction rates in the Indian manufacturing sector. However, we find that these rigidities have created an economic environment where women bear a disproportionate burden of the adjustment costs relating to resource reallocation in an open economy. Using of women workers to increase 'flexibility' points to a serious need to rethink the labour laws in this country. It can be seen that laws intended to protect workers are creating an adverse labour market for an already disadvantaged segment of the workforce. In an economic environment where Indian firms are increasingly exposed to changes in international competitiveness, a flexible labour market, with appropriate social safety nets, is a crucial necessary condition for the growth of formal manufacturing sector employment for female workers in India.

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Appendix

Table A1: Average Annual Job Dynamics for Male, Female and All Blue-Collared Workers across states with Flexible and Inflexible labour market regulations

Labour Laws	Job Creation			Job Destruction			Net Job Creation			Job Reallocation		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Inflexible	8.35	9.62	7.72	10.00	11.51	9.37	-0.94	-1.07	-0.99	19.06	21.95	17.75
Neutral	8.16	10.89	7.67	9.63	11.19	9.16	-0.74	0.68	-0.80	18.53	23.05	17.51
Flexible	11.11	11.54	10.43	11.24	11.65	11.51	0.56	0.61	-0.43	23.04	23.91	22.60

Table A2: Variable Names and Data Sources

Variable Name	Definition	Data Source
JD	Job Dynamics	ASI plant level panel data
WREER	Wage Cost Based Exchange Rate	Exports Data from WITS-COMTRADE/UNIDO Unit Labour Costs from UNIDO
EO	Export Orientation	WITS-COMTRADE/UNIDO
IP	Import Penetration	WITS-COMTRADE/UNIDO
GPS	Global Production Sharing	World Input Output Database (WIOD)
RWAGE	Real Wage	ASI plant level panel data WPI from Reserve Bank of India's Database on Indian Economy
RMP	Real Materials Price	DBIE, RBI & WIOD
INF	Contract worker share	ASI

[i] Female labour force participation in India was only 24% in 2018 (one of the lowest in the World) compared to 61% in China (see https://data.worldbank.org/indicator/SL.TLF.CACT.FE.ZS).

() The labour force participation rate of females in 2018 was 64% in low income countries and 45% in middle income countries Women constituted % and % of the manufacturing workforce in low income and middle income countries of the world in 2018. In contrast women constituted only % of the manufacturing workforce in India (ILO Statistics) (give the latest statistics from ILO for this).

[ii] The analysis does not cover informal (unorganized) manufacturing industries primarily because plant level panel data, required for measuring job dynamics, is not available for the informal sector. At the same time, it is important to emphasize that formal (organized) sector jobs are usually more sought after compared to poorly paid work in informal industries. Formal sector jobs provide higher wages, higher job security, better working conditions and greater opportunities for upward mobility. By contrast, a job in the informal sector, more often than not, is a fall back option when formal sector jobs are not available. In India, the poor quality of employment is a much bigger concern than availability of jobs per se. Viewed thus, our focus on formal sector is justified as formal sector jobs are usually considered better in terms of quality. Though India's formal manufacturing sector accounts for only 10.5% of total manufacturing employment, as much as 65% of total manufacturing value added is attributed to the formal sector in 2009-10 (Kapoor, 2015) (do we have a more recent estimate for this?).

[iii] While exchange rate changes might affect firms through the channel of imports as well, our focus on the export channelis motivated by the fact that women's employment in India is concentrated mostly in export oriented industries. In 2011, women constituted 15.7% of the total workforce engaged in India's exporting sectors compared to only 4.05% in import competing sectors (Banerjee and Veeramani, 2017).

[iv] For the year 2014, for example, the measure of export orientation was the highest for industries such as "Manufacture of Television and Radio Transmitters and Apparatus for Line Telephony and Line Telegraphy" (95.6%), "Manufacture of other fabricated metal products; metal working service activities" (84.2%), and "Manufacture of other electrical equipment n.e.c" (75.3%). In contrast, industries such as "Manufacture of Coke Oven Products" (1.3%), "Manufacture of dairy product" (3.7%) and "Printing and service activities related to printing" (4.3%) record the lowest values. Similar variation can also be observed with respect to import penetration with the highest values being recorded for "Manufacture of Television and Radio Transmitters and Apparatus for Line Telephony and Line Telegraphy" (99.5%), "Manufacture of basic precious and non-ferrous metals" (89.9%) and " Manufacture of office, accounting and computing machinery"(84.2%) and the lowest values for " Manufacture of dairy product" (0.99%), " Manufacture of tobacco products" (1.0%) and "Printing and service activities related to printing" (1.8%).

[v] The original post-independence legislation allowed employers to retrench workers as market conditions required, subject to minimum levels of protection through stipulated notice periods, severance payments etc. The legislation was tightened in 1976 for firms employing over 300 workers by making it mandatory for firms to obtain government permission to retrench workers. In 1982, this restriction was extended to all firms employing 100 or more workers. Recently, some of the states (Rajasthan, Haryana, Madhya Pradesh and Maharashtra) have made certain amendments to labor regulations, including an increase in the threshold for retrenchment of workmen, without Government approval, from 100 to 300.

[vi] These shares are calculated using the data on employment for the total manufacturing sector from the NSSO (Employment and Unemployment Surveys)and for the formal manufacturing sector from the ASI. The difference between these two is the estimated informal sector employment in the manufacturing sector. We also note that the manufacturing sector's share in total employment increased slightly from 10.7% in 2000 to 11.8% in 2014 (calculated using the ILO's statistics on employment).

[vii] Employment of white collared workforce also grew slowly during the study period, at the rate of 4.1% per annum. The share of white collared workers in the total workforce (including both regular and contractual workers) declined slightly from about 13.8% in 1998-99 to 11.0% in 2014-15.

[viii] A number of empirical studies have established that, even within a narrowly defined industry, firms could differ substantially in terms of productivity, technology and exposure to international competition (Wagner, 2007; Keller & Yeaple, 2009).

[ix] Using a model with heterogeneous plants and search frictions in labor market, Gourinchas (1999) show that each firm optimally decides its entry/exit or the timing of technology upgrading. An anticipated appreciation of exchange rate would lead to simultaneously higher job creation and destruction within an industry. In contrast, a sudden appreciation of exchange rate would trigger opposite movements in job flows.

[x] See, for example, Davis and Haltiwgner (1990, 1992) for the US manufacturing sector, Baldwin et al (1998) for a comparison of US and Canadian manufacturing sectors, Boeri (1994) for 10 major industrial countries, and Roberts and Tybout (1996) for a comparative analysis for Chile, Colombia, Morocco, Canada, and USA. Jackson et al (1997) provides evidence on job dynamics in Poland. See Caves (1998) for a review of the related literature.

[xi] For the US manufacturing sector, Klein et al (2003) find results that are different from Gourinchas (1998). The econometric specification in Klein et al (2003) control for several industry characteristics avoiding potential endogeneity concerns. They also explicitly account for the fact that the effect of exchange rates on job dynamics is dependent on the degree of trade openness by interacting the exchange rate measure with trade orientation of the industry.

[xii] The countries included in this study are: Argentina, Brazil, Chile, Colombia, Mexico, and Uruguay.

[xiii] Note that we use total employment shares and not gender specific employment shares while aggregating the growth rates. This is done in order to maintain comparability of male and female job dynamics in sector *i* and time *t*. If we used gender specific employment shares then it would not be possible to delineate if the differences job dynamics between male and female workers is arising because of the differences in job growth or simply due to the gender specific shares of a plant in an industry. In this context it important to note that in India, a large number of plants do not employ any female workers at all. Thus the job dynamics measure would surely be affected by the propensity of hiring female workers, which would then be reflective of a different set of plant/industry characteristics.

[xiv]It should be noted that R_{it} is an upper bound on the gross job reallocation rate. This is so because some workers could be moving from the shrinking plants to the expanding ones within the same sector. To get a lower bound we could compute $L_{it} = \max \{C_{it}, D_{it}\}$. In reality, the actual reallocation rate could lie between L_{it} and R_{it}.

[xv] The average job dynamics numbers in our study are broadly comparable with those estimated by Dougherty (2009). We find, as in his work, that although average net job creation rates have been negative for permanent workers, there are large underlying job creation, destruction, and reallocation rates. Though the job dynamics measured in Dougherty (2009) for blue collared workers is greater than our estimates, it could be attributed to the fact that he uses a pseudo-panel data set for his analysis and also categorizes plants into 5 digit NIC categories. In addition, his paper studies a smaller time period, 1999-2004. In contrast we use a panel dataset for a longer time period.

[xvi] States with flexible labour laws: Andhra Pradesh, Karnataka, Rajasthan, Tamil Nadu, Uttar Pradesh. States with neutral labour laws: Assam, Bihar, Gujarat, Haryana, Kerala, Madhya Pradesh, Punjab. States with inflexible labour laws: Maharashtra, Orissa, West Bengal.

[xvii] This result is based on the adjusted R^2 values of regressions that include state, industry, year, gender dummy variables along with the interaction effect of the gender dummy with state, year, and industry dummy variables.

[xviii] We calculate these measures at this level of aggregation because for the calculation it is imperative the plant in question remains in the same industry in two subsequent years. Using a more disaggregated industrial classification increases the attrition rate in the sample i.e. the industrial classification of many plants are seen to be different at higher levels of disaggregation. Note also that ASI reports data over this time period under the industry classification NIC 98 till 2003-04 and NIC 2004 subsequently. At the NIC 3 digit level, the industry classification over these two versions of NIC remains consistent. These two versions of NIC are also similar to the ISIC industrial classification which has been used for obtaining trade related variables

[xix] Note that using the GMM technique for estimating the model allows us to take care of the unobserved heterogeneity across state-industry groups by estimating a first differences model

[xx] In order to keep the states comparable over the entire time period we clubbed Jharkhand with Bihar, Uttaranchal with Uttar Pradesh, Chhattisgarh with Madhya Pradesh, and Telangana with Andhra Pradesh.