

Trade Liberalization and Unemployment:

Evidence from Indian States[#]

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Abstract

A widely held view among the public is that trade liberalization increases unemployment. In this paper we use state-level data on unemployment rates and trade protection from India to examine what the data say. We find little evidence to support the view that unemployment rises with trade liberalization. On the contrary, there is evidence that unemployment, especially urban unemployment, declines with trade liberalization in states with more flexible labor markets. Urban unemployment also declines with liberalization in states with a large employment share in net exporter industries. We additionally find a positive impact of trade liberalization on urban wages. These results can be explained using a theoretical framework incorporating trade and search-generated (or alternatively efficiency wage generated) unemployment and some institutional features of the Indian economy.

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1. Introduction

There now exists a small but growing literature on the relationship between trade and unemployment.¹ Most of this literature is theoretical with some exceptions. One exception is Dutt, Mitra and Ranjan (2009).² Using cross-country data on trade policy, unemployment, and various controls, and controlling for endogeneity and measurement-error problems, they find that unemployment and trade openness are negatively related. Using panel data, they find an unemployment-increasing short-run impact of trade liberalization, followed by an unemployment-reducing effect leading to the new steady state. While that paper finds interesting empirical regularities that can be explained using plausible models of trade and search unemployment, the standard criticisms of cross-country regressions apply to that study as well. Countries differ from each other in very important ways that cannot always be controlled for by variables we use in such regressions. Therefore, we go down to the next level from cross-country analysis to an intra-country analysis based on variations in the data across the different states of India. Such interstate variations exist in a large and diverse country such as India. India is a developing country that has, in the last couple of decades, experienced major trade reforms and where a significant proportion of the population lives below the poverty line. This makes such a study potentially quite useful for policy analysis.

In this paper, using cross-state data from India, we find that overall (rural plus urban) unemployment on average does not have any relationship with average protection (weighted average with 1993 sectoral employment as weights) over time and across states. However, there are some conditional relationships between the two variables in certain specific types of states. In states with more flexible labor markets, there is evidence that on average overall unemployment is positively related to protection.

¹ The most prominent contributors to this literature are Carl Davidson and Steve Matusz. See Davidson et al. (1999) for a representative work and Davidson and Matusz (2004) for a survey. Also see Moore and Ranjan (2005) and Mitra and Ranjan (2009) for recent contributions to this literature.

² Another exception is some analysis of the correlation between job destruction and net exports across sectors in chapter 4 of the book by Davidson and Matusz (2004). They find a negative correlation between the two (equivalent to a positive correlation between net imports and job destruction), and perform some further regressions to look deeper into this correlation. See Davidson and Matusz (2005) for a more detailed empirical analysis.

In other words, trade liberalization there can reduce unemployment. In particular, we find strong evidence that reductions in protection reduce unemployment in the urban sectors of states with flexible labor markets and with large employment shares in net exporter industries. Across such states and within such states over time, the employment-weighted protection and unemployment are positively correlated. This is true across all the three measures of protection we use.

We next look at the impact of protection on urban wages. Theory suggests that the impact on wages and unemployment should be in opposite directions. As expected, we find a negative relationship between urban wage and the employment-weighted protection in states with flexible labor markets. In other words, trade liberalization in such states has been associated with an increase in wages.

We show how our empirical results are consistent with the impact of trade liberalization in a two sector model, with labor being the only factor of production and where unemployment arises due to search frictions.³ We discuss two extreme cases: (a) perfect labor mobility (the Ricardian case), where comparative advantage is exclusively productivity-driven and (b) no intersectoral labor mobility (where labor becomes sector-specific), where comparative advantage, while still dependent on productivity, is also driven by relative sectoral labor force size. Our empirical results fall in between the two extremes, depending on the flexibility of labor markets. The results get closer to the predictions of the model with perfect intersectoral labor mobility as we move from states with rigid labor laws to those with labor laws that lead to more flexible labor markets.

It must be pointed out here that our empirical results can also be related to the predictions of some other theoretical models in the trade and unemployment literature. While an unemployment reducing effect of trade liberalization, through an aggregate productivity effect based on firm selection, is obtained in the theoretical work of Felbermayr, Prat and Schmerer (2008), the opposite result is possible in Helpman and Itskhoki (2007). To the extent that trade, in the two-sector model by Helpman and Itskhoki, leads to higher aggregate productivity in their differentiated products sector subject to search frictions,

³ It is also shown that the theoretical results are robust to modeling unemployment through efficiency wages as in Shapiro and Stiglitz (1984).

this sector expands in size and the other sector, which is frictionless and has zero unemployment as a result, shrinks. A similar result is also obtained in Janiak (2007). There are other papers in the literature, such as Davidson, Martin and Matusz (1999) and Moore and Ranjan (2005) where the effect of trade on overall unemployment is ambiguous.⁴

In the next section (section 2), we present a theoretical framework to guide us in our empirical analysis. In section 3, we discuss the Indian policy framework. This is followed by our empirical strategy in section 4, the data in section 5 and the empirical results in section 6. We finally end with some concluding remarks in section 7.

2. Trade and Unemployment: Theoretical Framework

There are two main theories we are going to draw upon in our attempt to derive predictions on the effect of trade on unemployment. We first look at a theory based on search frictions, followed by one based on efficiency wages.

Search Frictions

Let θ be a measure of market tightness, which is given by the number of vacancies relative to the number of people searching for jobs in the economy. Let w be the wage rate. The cost of employing a worker is given by $w + R(\theta)$, where $R(\theta)$ is recruitment cost per worker. $R'(\theta) > 0$, which means that the cost of recruiting a worker is increasing in market tightness. The higher is the number of vacancies in the economy relative to the number of people searching for a job, the more difficult it becomes to fill a vacancy. The investment in job search per worker hired goes up. We can think of this as a larger number of vacancies that the firm will have to post for every worker it expects to hire (In a dynamic model, one can view this as a longer period for which search will have to go on from the point of view of a firm). If labor is the only input used (simplifying assumption) and we additionally assume that a units of labor are

⁴ In Davidson, Martin and Matusz the results depend on intersectoral and international differences in labor-market frictions. In Moore and Ranjan, there are two kinds of labor (skilled and unskilled) and the effects of trade on the unemployment of these two kinds of workers go in opposite directions, making the impact on overall unemployment ambiguous.

needed to produce each unit of output, then the per unit cost of producing a unit of output is given by $c = a[w + R(\theta)]$. If p is the price of output, then free entry leads to the following zero profit condition: $p = a[w + R(\theta)]$. This is the condition for creating a marginal job and we call it the job-creation curve denoted by JC in Figure 1. Clearly, this condition, for a given p , represents a negative relationship between w and θ .

We next look at bargaining between the firm and workers. If bargaining fails for a worker, then the worker is unemployed and gets her unemployment benefit given by B . So, B becomes the worker's threat point. The surplus for the worker is $w - B$. Since a worker produces $1/a$ units of output, the surplus for the firm from hiring a worker is $p/a - w$. Therefore, the joint surplus is $p/a - w + w - B = p/a - B$. If the worker's bargaining power is β , then the worker gets a share β of the joint surplus. Thus, we have $w - B = \beta[p/a - B]$. Next, note from the zero profit condition that $p/a = w + R(\theta)$, and therefore, the expression for the bargained wage can be written as $w - B = \beta[w + R(\theta) - B]$. Rearranging the terms, we can write the bargained wage equation as $w^b = B + [\beta/(1 - \beta)] R(\theta)$, which we call the wage curve or WC in Figure 1. Unless both B and $R(\theta)$ are proportional to wage (which is unlikely except in the very long run), this represents a positive relationship between wage and market tightness. When we draw both WC and JC in the (θ, w) space, the intersection of these two curves gives us the equilibrium values of w and θ . We denote here the unemployment rate by $u = u(\theta)$ where $u'(\theta) < 0$, which is the standard Beveridge curve relationship and can easily be derived. The intuition behind it can be explained as follows: When the labor market is tight, there are a large number of vacancies relative to the number of people looking for jobs and therefore, there are very few people without jobs, which means the unemployment rate is low.

In a two sector model with only one factor, namely labor that is freely mobile across sectors and where there is a unified labor market with identical recruitment costs across the two sectors, it is clear that the same wage rate will have to be paid.⁵ Assuming the numeraire to be a Cobb-Douglas combination of

⁵ This is effectively identical to the case of sector-directed search (where each potential worker chooses first the sector she wants to search in and then searches only in that sector) with identical search frictions (identical $R(\cdot)$ functions and β 's in our analysis) across sectors. In the absence of any evidence or arguments that can be made to

the two goods, it is clear that starting from autarky, a trade reform that leads to a decline in the domestic price of the importable good leads to an increase in the domestic price of the exportable. If we make a small country assumption, the country completely specializes in the export good. Since the price of the sector that exists (which is the export sector) goes up, we get a rightward shift of the JC curve for that sector that raises both wage and market tightness. When we draw both WC and JC in the (θ, w) space, an increase in p shifts the JC curve to the right to JC' and as a result increases both w and θ . We know that $u'(\theta) < 0$. Thus, an increase in p by increasing θ lowers the unemployment rate. Thus, we get a reduction in unemployment. At this point of complete specialization, increasing the import tariff (which still keeps the economy completely specialized) reduces the domestic price of the export good and leads to an increase in unemployment.

What happens if labor cannot move from one sector to another, i.e., it is sector-specific? In that case, we have sector specific unemployment rates. The overall unemployment will be a labor-force weighted average of the two sector-specific unemployment rates. Again a trade reform leads to an increase in the price of the exportable good (measured in units of the numeraire good) and a reduction in the price of the importable good. We have incomplete specialization in this case and the unemployment rate specific to the export sector declines and that specific to the import-competing sector goes up. The reason is that the value of the marginal product of labor goes up in the former and goes down in the latter. If the size of the export sector is big in terms of labor force or employment, then we should expect to see a reduction in aggregate unemployment as a result of trade liberalization.

One of the issues to discuss here is the issue of the variation in labor market rigidity coming from the variation in labor laws across the different Indian states. The states with more pro-employee labor laws are the ones that are considered to have more rigid labor laws. On the one hand, these pro-employee laws increase bargaining power of workers, which increases wage, but that reduces labor market tightness and increases sectoral unemployment. There is an upward shift in the WC curve to WC' in Figure 1 as a

the contrary in the case of India and due to the lack of data on sector-specific frictions for Indian states, we believe it is best to make the neutral assumption of identical search frictions across sectors.

result of an increase in β , which in turn reduces θ and increases unemployment. On the other hand, more rigid labor laws put more restrictions on laying off workers, which might reduce unemployment. But then firms might anticipate these restrictions and employ fewer workers in the first place. In addition, in such cases firms' employment decisions might be less responsive to trade liberalization. These are ultimately truly empirical questions.

Efficiency Wages

In place of a model based on search frictions, if we were to use a Shapiro-Stiglitz (1984) type of an efficiency wage model, the above theoretical results would remain qualitatively unchanged. In such a model, effort that goes into work results in disutility for the worker, which can only be avoided by shirking. Shirking can be detected with an exogenous probability. If a worker shirks and that is detected by the firm, he/she is fired. For any firm, the wage offered will be inversely related to the unemployment rate. This comes from the fact that the no shirking constraint needs to bind, i.e., in equilibrium workers should just about prefer no shirking to shirking. A higher unemployment rate means a lower probability of employment for a worker if unemployed and therefore, for any given wage, lower is the incentive to shirk if one is employed. Thus, as the unemployment rate goes up, the wage needed to be offered to prevent shirking goes down. This is the quasi labor supply curve and is downward sloping in the wage-unemployment space (upward sloping in the wage-employment space). With a single factor and constant returns to scale, the marginal product is constant and is invariant to employment (or unemployment). The value of marginal product is the labor demand curve, i.e., wage should equal the value of the marginal product of labor in equilibrium. Equilibrium is represented by the intersection of the labor demand curve and quasi labor supply curve. In the two-sector Ricardian case with perfect labor mobility, there will be complete specialization under trade and using the same argument as before, we will get a reduction in unemployment as a result of trade liberalization. An increase in the price of output leads to an upward shift in the labor demand curve and we move along the quasi labor supply curve such that the wage rises and unemployment falls. In the absence of intersectoral labor mobility, unemployment in the import-

competing sector will go up while it will go down in the export sector. The quasi labor supply curve here takes the place of the WC curve in the search model and the labor demand curve takes the place of the JC curve. Thus results are robust to which of the two mechanisms considered here (search frictions or efficiency wage) drives unemployment.

We conclude this theory section by summarizing the main theoretical results that will guide our empirical analysis. Firstly, in the presence of free labor mobility across sectors, trade liberalization results in unemployment reduction (provided recruitment costs are not much higher in the export sector). Secondly, when labor is immobile across sectors, aggregate unemployment will go down upon trade liberalization in an economy with a high employment share in the export sector. The real world is neither one with perfect labor mobility nor one with no labor mobility at all. However, the results from the two polar cases are useful since as impediments to labor mobility rise (fall), we move closer to (further from) the case of no labor mobility and away from (closer) to the perfect mobility case.

3. The Indian Policy and Institutional Framework

We next provide an overview of the Indian regulatory and institutional framework, an understanding of which is important for the analysis we undertake in this paper. There are two features of the Indian policy landscape that have an important bearing on the strategy we adopt for estimating the impact of trade protection on unemployment rates. First, notwithstanding some earlier efforts, India undertook a dramatic liberalization of trade policies in 1991. Thus, for example, mean tariffs, which were 128 percent before July 1991, had fallen to roughly 35 percent by 1997-98 and the standard deviation of tariffs during this period went down from 41 percentage points to roughly 15. Significantly, the trade liberalization was unanticipated. It was the result of strong conditionality imposed by the International Monetary Fund (IMF) in return for IMF assistance for dealing with a balance of payments crisis. Given several earlier attempts to avoid IMF loans and the associated conditionalities, the liberalization came as a surprise.⁶

⁶ In addition to the reduction of tariff levels and their dispersion, trade liberalization involved the removal of most licensing and other non-tariff barriers on all imports of intermediate and capital goods, the broadening and

Given its large and unanticipated nature, the trade liberalization of 1991 presents researchers an excellent opportunity to examine the effects of trade using data on trade protection and variables whose relationship with trade we are interested in examining spanning the years prior to 1991 and later.

Second, the impact of India's trade liberalization on unemployment can be expected to vary across Indian states. One reason is that the degree to which states are exposed to trade protection is unlikely to be a constant. In particular, the composition of employment across industries will typically vary across states thereby leading states to be differentially exposed to trade liberalization. Another reason has to do with the fact that the regulatory environment varies across India's states.⁷ To the extent that the effects of trade liberalization are influenced by the nature of the regulatory environment in which economic activity takes place, the impact of trade liberalization on unemployment can be expected to vary across India's states.

An element of regulation that is especially relevant for the analysis of this paper is labor market regulation. Under the Indian constitution, both the central (federal) government as well as individual state governments have the authority to legislate on labor related issues. In fact, the latter have the authority to amend central legislations or to introduce subsidiary legislations. In addition, the enforcement of many labor regulations, even those enacted by the central government, lies with the state governments.⁸ Thus, the placement of labor issues in the Indian constitution suggests variation in labor regulations and/or their enforcement across India's states. It is important to take into account this variation in assessing the impact of trade liberalization on unemployment given the considerable debate among analysts regarding the effects of labor market regulations, especially certain elements of the Industrial Disputes Act (IDA)

simplification of export incentives, the removal of export restrictions, the elimination of the trade monopolies of the state trading agencies, and the simplification of the trade regime. Trade liberalization was also accompanied by full convertibility of the domestic currency for foreign exchange transactions. See Hasan, Mitra, and Ramaswamy (2007) and the sources cited therein for more details.

⁷ This is because India's constitution gives its states control over various areas of regulation. In these areas, states have the authority to enact their own laws and amend legislations passed by the Central (federal) government. Typically, states also have the authority to decide on the specific administrative rules and procedures for enforcing legislations passed by the center.

⁸ See Anant et al (2006) for a detailed discussion of India's labor-market regulations.

which makes it necessary for firms employing more than 100 workers to obtain the permission of state governments in order to retrench or lay off workers -- permission which some analysts argue is rarely forthcoming and thereby ends up raising the effective cost of labor usage in production.⁹

4. Empirical Strategy

In the context of the foregoing discussion, our strategy for estimating the impact of trade protection on unemployment relies on estimating variants of the following basic regression specification:

$$(1) \quad \ln y_{it}^j = \alpha + \beta_1 \text{protection}_{it-1}^j + \beta_2 \text{protection}_{it-1}^j * \text{regulation}_i + \delta_i + \mu_t + \varepsilon_{it}$$

Where y_{it}^j is the natural logarithm of the unemployment rate in state i and sector j (i.e., for the state as a whole or a state's rural sector or its urban sector), $\text{protection}_{it-1}^j$ refers to a measure of state-level trade protection lagged once per state i and sector j in order to alleviate concerns about endogeneity, and regulation_i is a time-invariant variable capturing the stance of regulations across states. δ_i represents fixed state effects, μ_t represents year dummies, and ε_{it} represents an identically and independently distributed error term.

The effect of trade liberalization on unemployment can be gauged by considering the marginal effect of protection on unemployment. This is the sum of two terms: $\beta_1 + \beta_2 \cdot \text{regulation}$. The first-term represents the direct effect of trade protection on unemployment. Ignoring the second term, a positively signed estimate of β_1 implies that reductions (increases) in protection are associated with reductions (increases) in the unemployment rate. However, the nature of regulations may influence how protection affects unemployment. The term β_2 -- the coefficient on the interaction between our measures of protection and state-level regulations -- is designed to capture this. Suppose, for example, that regulation is a dummy variable capturing whether or not labor market regulations are flexible (pro-business) or not

⁹ A similar case could be made for other types of regulation -- for example, product market regulations. We discuss this possibility in more detail later.

across Indian states. A positively signed estimate of β_2 implies that reductions (increases) in protection are associated with bigger reductions (smaller increases) in unemployment in states with flexible (inflexible) labor market regulations. Of course, the total effect of trade liberalization will depend on the sum of the two terms and vary across states.

5. Data

5.1 Unemployment

State- and sector-specific unemployment rates – i.e., unemployment rates for the state as a whole as well as its rural and urban subcomponents – were computed using data from the "employment-unemployment" surveys carried by India's National Sample Survey Organisation (NSSO). The employment-unemployment surveys are the most comprehensive source for computing unemployment rates in India; accordingly, we utilize the four most recent quinquennial rounds of the surveys covering the years 1987-88, 1993-94, 1999-2000, and 2004-05 – years which enable our analysis to span a period that starts approximately three years prior to the trade liberalization of 1991 and ends fairly recently.^{10, 11} The quinquennial round surveys are often referred to as large sample rounds of the NSSO's surveys (as distinct from smaller sample annual rounds that may or may not include the employment-unemployment survey), given that they entail surveys of well over a hundred thousand households involving a multi-stage stratified sampling strategy over a full year.

The employment-unemployment surveys collect information on demographic characteristics of all household members as well as information on their participation in economic activities based on three reference periods, 365 days prior to the survey (or "usual status"), one week prior to the survey (or "current weekly status") and each day of the 7 days prior to the survey (or "current daily status"). The

¹⁰ Survey work in each of the rounds was carried out between July and June. For example, the 1987-88 survey is based on data collected between July 1987 and June 1988. In the remainder of this paper, we refer, for simplicity, to each of the four survey years in terms of the first year of the survey. For example, we refer to 1987-88 as 1987.

¹¹ NSS released two types of datasets for Round 55: Schedule 10 (basic) and Schedule 10.1 (revisit). Our analysis uses data from Schedule 10; however, official reports from NSSO use results from combined Schedule 10/ 10.1.

information on participation in economic activities can be used to infer labor force status of an individual; i.e., whether they are in the labor force or not, and in case they are, whether they are employed or unemployed. For a subset of individuals – those engaged in wage employment in the week prior to the survey – information is also collected on wage earnings.

It is useful to briefly go over the concepts and definitions adopted by the NSSO for determining labor force status based on the employment - unemployment surveys for the two reference periods used to compute unemployment rates in this paper: 365 days and one week prior to the survey.¹² For any given reference period, an individual can be engaged in one or more of the following three activities: working; not working, but either making tangible efforts to seek work or being available for work if it is available; and neither engaged in work nor available for work. A unique labor force status for each individual can be arrived at by adopting a major *time* or *priority* criterion.

The time criterion is used for determining the labor force status of individuals based on the 365 day reference period. An individual is first assigned to be either in the labor force or out of it depending on which activity dominated in terms of the time spent. They are then assigned to be either employed or unemployed depending on which of the two accounted for more of their time over 365 days. Turning to the current week reference period, an individual's labor force status is based on the priority criterion, whereby the status of working is given primacy. Specifically, a person is considered employed if they had worked for at least one hour on at least one day during the seven days preceding the survey. If a person had not done so, but had made efforts to get work or had been available for work, they are considered unemployed. A person who had neither worked nor was available for work any time of the reference week is considered as outside of the labor force. For both the reference periods, the unemployment rate is easily arrived at by computing the ratio of the number of unemployed to the size of the labor force.

¹² For more details on the employment-unemployment surveys and the various concepts and definitions used, see NSSO (2000).

We follow the above for computing unemployment rates for 15 major states of India using both the 365 day reference period as well as the one-week reference period.^{13, 14} In addition to considering unemployment rates at the state level as a whole, we also consider unemployment rates separately for the rural and urban sectors within states. Our empirical results were qualitatively very similar across unemployment rates based on a reference period of 365 days or the week prior to the survey. We therefore limit our discussion to unemployment rates based on the seven-day reference period. A few of our unemployment numbers deviate sometimes just a little from those reported in the NSSO's official publications mainly on account of the fact that we restrict at the outset attention to individuals aged between 15 and 65. There are only very few cases of such deviations.¹⁵

5.2 Protection

We follow Hasan, Mitra, and Ural (2007) for our state-level measures of trade protection at three levels of aggregation -- i.e., the state as a whole, as well as for urban and rural sectors within states. In particular, we weight industry level tariff rates and NTB coverage rates for agricultural, mining, and manufacturing industries by state and sector specific employment shares as follows:¹⁶

¹³ We deviate from the NSSO's procedures on one account and that is to treat individuals categorized as casual wage workers who did not work during the week prior to the survey due to temporary illness as employed. (The NSSO treats such individuals as out of the labor force.) Since such individuals are very few in numbers, their treatment does not make any material difference to estimates of the unemployment rate.

¹⁴ After 2000, three new states were formed: Chattisgarh, formerly part of Madhya Pradesh; Jharkhand, formerly part of Bihar; and, Uttaranchal, formerly part of Uttar Pradesh. In order to maintain consistency across years, we do not consider these new states separately and instead consider the earlier state boundaries.

¹⁵ For the most part, deviations between our numbers and those reported in NSSO publications are trivial. The only exception is for 1999 (round 55). This is mainly due to the fact that the unemployment rates reported by the NSSO for round 55 are based on including information from revisits to some sample households. It is unclear why the NSSO followed this procedure. In any case, we did not use data from the revisits in order to maintain consistency across years (data from revisits either does not exist, or has not been provided in public use files for any other round). Personal communication with some NSSO staff indicates that omitting information from the revisits is appropriate for our purposes.

¹⁶ The information on industry level tariff rates and NTB coverage rate are from Pandey (1999) and Das (2008). Pandey reports these for various years over the period 1988 to 1998. Das (2008) updates these for various years up to 2003 using the methodology of Pandey. We use simple linear interpolation to account for the fact that there are some years between 1988 and 2003 for which we do not have information on trade protection. Additionally, as is explained below, our estimation strategy requires that we also have protection related data for 1986. We estimate these by assuming that tariff and NTB coverage rates grew at the same annual rate between 1986 and 1988 as they did between 1988 and 1989. The NTB coverage rates estimated for 1986 are bounded at 100%.

$$(2) \quad \text{Tariff}_{it}^j = \sum_k \gamma_{ik,1993}^j * \text{Ind_Tariff}_{kt}$$

$$(3) \quad \text{NTB}_{it}^j = \sum_k \gamma_{ik,1993}^j * \text{Ind_NTB}_{kt}$$

where $\gamma_{ik,1993}^j$ is the employment share of industry k in broad sector j (urban, rural or overall) of state i derived from the 1993 employment-unemployment survey.¹⁷ Ind_Tariff_{kt} and Ind_NTB_{kt} are industry specific tariff rates and non-tariff coverage rates that are measured at the 2-digit industry level for each year t . $\sum_{k_m} \gamma_{ik,1993}^j = 1$ where k represents tradable 2-digit industries (comprising agricultural, mining, and manufacturing industries). Non-tradable industries were excluded from the calculations.¹⁸

A multicollinearity problem arises when tariffs and non-tariff barriers are simultaneously used on the right-hand side of our regressions. This is due to the strong correlation between the two protection measures and it prevents the precise estimation of their individual effects. To get around this problem, a combined measure of tariffs and non-tariff barriers is calculated using principal component analysis (PCA). PCA is commonly used to reduce the dimension of a matrix of correlated variables by combining them into a smaller set of variables that contains most of the variation in the data. In our case, the first principal component contains approximately 90% of the variation in the protection data for all industry groups, and hence is used as a combined measure.

5.3 Labor-Market Flexibility

As noted in Section 3, India's states can be expected to vary in terms of the flexibility of their labor markets. We use two approaches to partition states in terms of whether they have flexible labor markets

¹⁷ 1993-94 is one of the middle years in our data and we thus treat this as the base (reference) year in the construction of our state-level openness index. Like in the case of any good index, the weights therefore are not allowed to change from one year to another.

¹⁸ Similar employment-weighted protection measures have been used in other recent study. One such example is Edmonds, Pavcnik and Topalova (2008). The idea here is that there is an interaction between the industry-level tariff vector and the employment vector in the determination of various outcomes.

or not. A first approach starts with Besley and Burgess' (2004) coding of amendments to the Industrial Disputes Act (IDA) between 1958 and 1992 as pro-employee, anti-employee, or neutral, and extends it to 2004.¹⁹ Five states are found to have had anti-employee amendments (in net year terms, as defined in Besley and Burgess, 2004): Andhra Pradesh, Karnataka, Kerala, Rajasthan, and Tamil Nadu.²⁰ Since anti-employee amendments are likely to give rise to flexible labor markets, a natural partition of states would be to treat these five states as having flexible labor markets.²¹ These states are termed *Flex* states in our empirical analysis. For these states the variable *Flex* equals 1, while it takes the value of 0 for other states.

This partition has some puzzling features, however. Maharashtra and Gujarat, two of India's most industrialized states, are categorized as having inflexible labor markets on account of having passed pro-employee amendments to the IDA. However, Indian businesses typically perceive these states to be good locations for setting up manufacturing plants. It is questionable whether Indian businesses would consider Maharashtra and Gujarat to be especially good destinations for their capital if their labor markets were very rigid. Conversely, Kerala is categorized as having a flexible labor market despite an industrial record which is patchy in comparison with that of Maharashtra and Gujarat. Moreover, few Indian businesses would consider it a prime location for setting up manufacturing activity.

An alternative partition of states arises by including Maharashtra and Gujarat in the list of states with flexible labor markets while dropping Kerala. A World Bank research project on the investment climate faced by manufacturing firms across ten Indian states lends strong support to such a switch (see

¹⁹ Besley and Burgess (2004) consider each state-level amendment to the IDA between 1958 and 1992 and code it as a 1, -1, or 0 depending on whether the amendment in question is deemed to be pro-employee, anti-employee, or neutral. The scores are then cumulated over time with any multiple amendments for a given year coded to give the general direction of change. See Besley and Burgess (2004) for details. (The Besley and Burgess coding is available at <http://econ/lse/ac.uk/staff/rburgess/#wp>.)

²⁰ With the exception of Karnataka these anti-employee amendments took place in 1980 or earlier. For Karnataka the anti-employee amendments take place in 1988.

²¹ An alternative measure of labor-market flexibility/rigidity would have been to use the cumulative scores on amendments. This is the approach of Besley and Burgess (2004). Using these scores in place of our labor-market flexibility dummy variable leaves our results qualitatively unchanged.

Dollar, Iarossi, and Mengistae (2002) and World Bank (2003)).²² First, rankings by managers of surveyed firms lead Maharashtra and Gujarat to be the two states categorized as “Best Investment Climate” states; Kerala was one of the three “Poor Investment Climate” states. Second, the study reports that small and medium sized enterprises receive twice as many factory inspections a year in poor climate states (of which Kerala is a member) as in the two best climate states of Maharashtra and Gujarat. This suggests that even if IDA amendments have been pro-employee in the Maharashtra and Gujarat, their enforcement may be weak. Finally, a question on firms’ perceptions about “over-manning” – i.e., how the optimal level of employment would differ from current employment given the current level of output – indicate that while over-manning is present in all states, it is lowest on average in Maharashtra and Gujarat.²³ Thus, we consider a modified partition in which Maharashtra and Gujarat are treated as states with flexible labor markets while Kerala is treated as a state with inflexible labor markets. The six states with flexible labor markets as per this modification are termed *Flex2* states (i.e., Andhra Pradesh, Gujarat, Karnataka, Maharashtra, Rajasthan, and Tamil Nadu). For these states the variable *Flex2* equals 1, while it takes the value of 0 for other states.

We also consider a final alternative partition of states that has recently been used by Gupta, Hasan, and Kumar (2009). This partition is based on combining information from Besley and Burgess (2004), Bhattacharjea (2008), and OECD (2007).²⁴ Bhattacharjea focuses his attention on characterizing state level differences in Chapter VB of the IDA (which relates specifically to the requirement for firms to seek government permission for layoffs, retrenchments, and closures). However, Bhattacharjea considers not only the content of legislative amendments, but also judicial interpretations to Chapter VB in

²² Over a thousand firms were surveyed across ten states. Over nine hundred belong to the manufacturing sector.

²³ A supplement to the original World Bank survey carried out in two good investment climate states and one poor investment climate state was aimed at determining the reasons behind over-manning. The results indicated that over-manning was partially the result of labor hoarding in anticipation of higher growth in the future in the good investment climate states but hardly so in the poor investment climate state. In fact, labor regulations were noted as a major reason for over-manning in the latter. This lends indirect support to the notion that given Maharashtra and Gujarat’s ranking as best investment climate states, labor regulations have in effect been less binding on firms than the amendments to the IDA may suggest.

²⁴ See also Bhattacharjea (2006) for a critique of the Besley-Burgess coding.

assessing the stance of states vis-à-vis labor regulation. He also carries out his own assessment of legislative amendments as opposed to relying on that of Besley and Burgess. The OECD study uses a very different approach and relies on a survey of key informants to identify the areas in which states have made specific changes to the implementation and administration of labor laws (including not only the IDA but other regulations as well). The OECD study aggregates the responses on each individual item across the various regulatory and administrative areas into an index that reflects the extent to which procedural changes have reduced transaction costs vis-à-vis labor issues. Gupta et al take each of the three studies, partition states into those with flexible, neutral, or inflexible labor regulations and then finally come up with a composite labor market regulation indicator variable using a simple majority rule across the different partitions. Based on their work, we define *Flex3* which takes a value of 1 for five states deemed to have flexible labor regulations (Andhra Pradesh, Karnataka, Rajasthan, Tamil Nadu, and Uttar Pradesh) and 0 for the remaining states.²⁵

5.4 Other Variables

Employment share of net exporter industries and of net importer industries: Since trade liberalization is bound to affect net exporting/importing industries in different ways, we construct the share of employment in net exporting/importing industries for each state. First, we use information on exports and imports for 1989-90 to categorize industries as either a net exporting industry if net exports are greater than zero, or a net importing industry, if net exports are less than zero. We then compute state-specific employment shares for the urban sector for each of our years using the employment-industry information contained in the NSSO employment-unemployment survey data for that year. We limit our attention to the urban sector because at the 2-digit industry level at which we work, trade volumes can vary significantly within the 2-digit 'agricultural production' industry. For example, important

²⁵ While, as is obvious from our discussion above, we believe Gujarat and Maharashtra are most likely states with relatively flexible labor markets and labor laws, there are some ongoing debates on coding of some states including these two. We therefore use the third measure to show the robustness of our results to using all existing measures, allowing the reader to pick his or her preferred measure.

subcomponents of this industry include wheat and rice. While protection patterns for the two are very similar over the years, one is a net exporting industry while the other is a net importing industry. On aggregate, the agricultural production industry is a net importer. Since both wheat and rice account for large shares of employment in rural areas, we think it inadvisable to classify the entire industry as a net importer.

Product market regulations: We also use in our empirical analysis a time invariant measure of product market regulations across Indian states. As with labor market regulations, some aspects of India's product market regulations are determined at the state-level; moreover, it is the state which is responsible for their enforcement. Our measure of state-level product market regulations (PMR) is that created by Gupta, Hasan, and Kumar (2009) using a survey of product market regulations across Indian states carried out by OECD (2007) and results from an investment climate survey of Indian states carried out by the World Bank. The PMR variable takes the value of 1 for states which have relatively competitive product market regulations (Haryana, Karnataka, Maharashtra, Punjab, and Tamil Nadu). PMR for the remaining states takes a value of zero.

Wages: Although our focus in this paper is on examining the impact of trade liberalization on unemployment, we also investigate its impact on wages. As noted earlier, information on earnings over the week prior to the survey is available from the NSSO's employment-unemployment surveys. We use the earnings data along with information on the number of days worked in order to compute a daily wage rate for each wage employee.²⁶ The nominal daily wage rate is then adjusted for both spatial price differences across India's states as well as inflation. The former relies on the implied price indexes derived from official state-specific poverty lines for 2004 while the effects of inflation are captured through urban state specific CPIs. We restrict the analysis of wages to the urban sector only. This is on account of the importance of self-employment in rural areas (for which earnings information is absent).

²⁶ The NSSO breaks each of the seven days into two half-day segments of four hours each. A worker who is employed for even one hour in a given half-day segment is recorded as being employed for that segment.

Finally, to alleviate concerns regarding outliers and heterogeneity across workers, we work with median wages as opposed to average wages.

Table 1 provides summary statistics for unemployment rates, wages, and protection for the 15 states and years our empirical analysis is based on. As can be seen quite clearly, India experienced a fairly remarkable reduction in tariffs and non-tariff barriers over the period covered in our paper. There has been some increase in tariffs between 1998 and 2003, however, driven largely by industries prevalent in rural employment (i.e., agricultural products). As for the reported real wages, it may be noted that after increasing steadily between 1987 and 1999, the average of the median urban wages across the 15 major states of India declined between 1999 and 2004. Two well-documented features of the Indian economy in the first half of the 2000s presumably drive this: relatively high urban inflation and increasing wage inequality in urban India (ADB 2007). Table 2 provides more details on our trade protection variables by state and subsector (i.e., overall, rural, and urban) for the initial and final years of our data. It also describes how states are coded in terms of the labor market and product market regulation variables.

6. Results

6.1 Results with unemployment as the left-hand side variable

In Table 3, we present results using the overall unemployment rate as the dependent variable. In all our regressions present in this table and all subsequent ones, we use state-level fixed effects and year dummies. The state-level protection measures used are tariffs and NTB weighted by employment across the different tradable sectors, as well as a principal-components combination of the two. There is no evidence of any effect of protection on unemployment. The protection measure is mostly positive but insignificant. This is true across all measures of protection, when there are no controls. When an additional variable, namely an interaction of these protection measures with the state-level labor-market flexibility measure (either *Flex1* or *Flex2* or *Flex3*) or product market regulation (*PMR*), is introduced, we find that this variable (especially in the case of tariffs) is positive but in most cases only mildly statistically insignificant. The protection variable, by itself, still remains positive and insignificant.

However, taking into account the overall effects of protection on unemployment -- i.e., incorporating not only the own protection terms but also the interactions terms -- we find that in states with more flexible labor markets as measured through either *Flex2* or *Flex3*, unemployment is positively and significantly related to protection. In other words, we find evidence that trade liberalization can reduce unemployment in states with flexible labor markets. Consider the estimates reported in column 3 of Table 3. In states with flexible labor markets, a one percentage point increase in the employment-weighted tariff rate leads to a 0.75 percent increase in the unemployment rate ($0.00388+0.00361$).²⁷ A Wald test reveals this effect to be statistically significant at the 10% level. Since tariff rates declined by an average of 21% in states with flexible labor markets between 1987 and 1993, this reduction in protection translates into a decline in the unemployment rate of approximately 16%. The average unemployment rate in states with flexible labor markets was 4.75% in 1987. A 16% decline would mean an unemployment rate of 3.99% by 1993. Given that the actual unemployment rate in 1993 was 2.94% in these states our estimates suggest that trade liberalization had an economically significant impact on reducing unemployment rates in these states. Qualitatively similar results are obtained for the estimates reported in column 4 and columns 13 and 14, the latter two based on the principal-components combination of the employment-weighted tariffs and NTBs.

In Table 4 for rural unemployment, we find results somewhat similar to what we found for overall unemployment in Table 3. However, the significance of the interaction terms involving protection and the *Flex* variables is particularly weak. This suggests that a positive relationship between protection and unemployment may be stronger in urban areas. This is indeed what we find in Table 5. Here, the various estimates provide strong evidence across all protection and labor market flexibility measures that in the states with flexible labor markets, protection and unemployment are positively related. In particular, there is strong evidence from columns 2, 3, 4, 7, 8, 9, 12, 13 and 14 of Table 7 that trade liberalization reduces urban unemployment in states with flexible labor markets. For example, in states

²⁷ Note here that the dependent variable is the logarithm of unemployment rate and employment-weighted protection is obtained by computing the employment-weighted average of protection measured in percentage points.

with flexible labor markets the estimates reported in column 2 indicate that a one percentage point increase in the employment-weighted tariff rate leads to a 1.1 percent increase in the unemployment rate ($0.00788+0.00321$). Since average employment-weighted tariff rates in the urban sectors of states with flexible labor markets declined from 131% to 93.6% (i.e., a decline of approximately 37 percentage points) between 1987 and 1993, the estimates of column 2 suggest a 41.5% decline in the urban unemployment rate in such states. With an average urban unemployment rate of 6.62% in the states in 1987, the tariff reductions would imply unemployment rates to fall to 3.87% in 1993. (The actual average unemployment rate in 1993 was 4.72%.)

In Table 6, we consider two more controls: the employment share of net exporter industries denoted by ENX (or of the net importer industries denoted by ENM) interacted with protection, and the triple interaction of ENX or ENM, protection and labor market flexibility.²⁸ This is done to capture restricted labor mobility across sectors. There is fairly strong evidence from columns 1, 5 and 9 that in states with a high employment share of net exporter industries, urban unemployment is positively related to employment-weighted protection and trade liberalization in such states reduces unemployment. There is no evidence that such effects conditional on the employment share of net exporter industries additionally vary between rigid and flexible labor market states. The results in Tables 5 and 6 lead us to believe that ENX and ENM for urban areas are highly correlated with labor market flexibility. In fact looking at the data, we do find that ENX on average is about 18 percent higher for the more flexible labor market states (as measured by our *Flex2* variable) than the remaining states. While ENM is also higher for the flexible states, the differential is much smaller (only 8 percent). Therefore, once we control for the ENX or ENM interactions, there is nothing remaining to be explained by labor market flexibility.

²⁸ Our discussion is based on the *Flex2* measure of labor market flexibility. Using *Flex3* does not change our key results.

6.2 Results with wage as the left-hand side variable

We next move to the impact of protection on wages. It is important to empirically investigate this effect as theory suggests that it should be in a direction opposite to the effect of protection on unemployment. Here it is only possible to compute urban wage rates with any reasonable accuracy. Rural wage rates are difficult to compute as individual incomes in rural areas are a mix of different types of factor incomes. In the case of urban wage rates, we consider the median wage (among individuals in each of the urban areas of each state) as in practice labor is quite heterogeneous and the mean can be affected by compositional change as well as differential changes in the various wage rates.

From Table 7, we see that there is a negative relationship between this (median) wage and the employment-weighted protection in states with flexible labor markets. In other words, trade liberalization in such states has been associated with an increase in wages. This result is seen from columns 2, 3, 4, 9, 16, 17 and 18 of Table 7, which means it shows up across all measures of labor market flexibility and is especially strong for tariffs and the first principal component aggregate of tariffs and NTBs. In and across other states (the ones with relatively rigid labor markets), wages have no relationship with protection. Since the dependent variable is the logarithm of real wage and employment-weighted protection is obtained by computing the employment-weighted average of protection measured in percentage points, a one percentage point reduction in the employment-weighted tariff results in a 0.2% increase in the wage rate in states with flexible labor markets. Thus, for the period 1987-2004 we are looking at, there is a 14 percent increase in wage that may be attributed to trade liberalization. Finally, Table 8 clearly shows us that in states with relatively high share of India's net exporter industries, wages and protection are negatively related. Introduction of triple interaction effects did not give us any meaningful results. Thus, the wage results are more or less consistent with the unemployment results, as the former and latter should go in opposite directions with respect to trade liberalization.

7. Concluding Remarks

In this paper, we have empirically examined the relationship between trade protection and unemployment using data from Indian states. We find that trade liberalization has an unemployment reducing effect in states with flexible labor markets, and in states with a high employment share in the net export sectors. These results can be explained using a theoretical framework incorporating trade and search-generated (or alternatively efficiency wage generated) unemployment and institutional features of the Indian economy such as limited or no intersectoral mobility and labor-market rigidities. In doing our analysis, we follow some of the recent literature on cross-regional analysis of the impact of trade liberalization on poverty, child labor, human capital etc to construct state-level protection measures as the employment weighted-averages of industry-level protection measures such as tariffs or alternatively NTBs.²⁹ These measures of state-level protection are inverse measures of the degree to which a state is exposed to globalization. It could also be viewed as the interaction between a state's vector of sectoral employment shares and the vector of industry-level protection. In other words, there is an implicit assumption in using this measure that the state-level responses to reductions in the various industry-level tariffs will depend on how employment is distributed across sectors. This assumption seems to be reasonable, especially in our context.

We also find that trade liberalization has a positive effect on urban wages. This effect is consistent with the unemployment reducing effect of trade liberalization in urban areas in states with flexible labor markets.

In conclusion, the empirical results in this paper provide support for trade liberalization along with complementary reforms in domestic policy, i.e., the full benefits of trade reforms cannot be reaped without domestic labor market reforms. We also see that states with a bigger share of the urban population in net-export sectors are ones where trade reforms are more effective in reducing urban unemployment. While this is certainly a function of comparative advantage, certain export-promotion

²⁹ See for instance Edmonds, Pavcnik and Topalova (2008).

strategies also might be useful. Exporting also has to do with search for and matching with buyers abroad.

This is an area where the government may have a role to play.³⁰

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³⁰ See for instance Freund and Pierola (2009) where, using data on the Peruvian "non-traditional" agricultural sector, they find considerable evidence for the role of risk taking, search and creativity on the part of what they call "export entrepreneurs" in finding export markets and the right products for those markets. One can argue here that government assistance will be useful especially in sectors where firms are small.

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TABLE 1. Summary Statistics

<i>Variables</i>	<i>Average*</i>			
	<i>1987</i>	<i>1993</i>	<i>1999</i>	<i>2004</i>
Labor Measures:				
Overall Unemployment Rate (%)	5.58	4.09	4.70	5.06
Rural Unemployment Rate (%)	5.09	3.48	4.28	4.58
Urban Unemployment Rate (%)	7.49	6.41	6.43	7.04
Urban Wage Rate** (2004 Indian Rupees)	98.29	107.85	121.36	110.39
Trade Protection Measure***:				
	<i>1986</i>	<i>1992</i>	<i>1998</i>	<i>2003</i>
Overall Tariff (%)	94.69	70.63	24.38	27.19
Rural Tariff (%)	90.22	67.86	22.86	27.37
Urban Tariff (%)	131.49	93.84	36.72	25.59
Overall Non-Tariff Barriers (%)	100.00	80.80	70.48	17.43
Rural Non-Tariff Barriers (%)	100.00	81.54	72.47	18.49
Urban Non-Tariff Barriers (%)	100.00	74.25	53.33	8.31

Notes: * The average is taken over the 15 major states.

** Average is taken over the median daily wage rate of the urban areas of the 15 major states.

*** Trade protection measures are introduced in our regression equations with a one-year lag.

TABLE 2. Independent Variables: Initial Year and Final Year

<i>State</i>	<i>Andhra Pradesh</i>	<i>Assam</i>	<i>Bihar</i>	<i>Gujarat</i>	<i>Haryana</i>	<i>Karnataka</i>	<i>Kerala</i>	<i>Madhya Pradesh</i>	<i>Maharashtra</i>	<i>Orissa</i>	<i>Punjab</i>	<i>Rajasthan</i>	<i>Tamil Nadu</i>	<i>Uttar Pradesh</i>	<i>West Bengal</i>
Tariff (%)															
Initial year	88.25	104.56	79.93	95.08	91.56	92.92	149.55	81.55	89.09	84.54	91.26	89.19	99.55	85.81	97.49
Final year	26.63	31.93	25.62	25.18	25.34	27.36	39.10	25.72	25.69	25.46	25.12	25.38	26.53	25.74	27.03
Tariff (Rural) (%)															
Initial year	85.26	104.09	78.27	87.29	82.90	88.22	149.82	78.61	81.59	82.35	83.18	86.24	91.98	82.17	91.30
Final year	26.49	32.17	25.63	25.63	25.44	27.31	40.02	25.72	25.98	25.48	25.44	25.43	26.44	25.71	27.59
Tariff (Urban) (%)															
Initial year	120.04	124.15	122.63	144.04	138.37	127.29	148.35	119.61	134.72	130.75	136.58	124.61	135.41	126.67	139.18
Final year	28.12	21.91	25.15	22.35	24.83	27.68	34.73	25.77	23.98	24.92	23.31	24.76	26.98	26.09	23.27
Non-tariff Barriers (%)															
Initial year	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Final year	17.92	18.47	20.31	17.76	17.22	17.47	10.73	19.95	18.26	18.96	17.38	16.66	15.61	18.83	15.87
Non-tariff Barriers (Rural) (%)															
Initial year	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Final year	18.65	18.78	20.78	19.32	19.17	18.58	11.34	20.67	19.92	19.37	19.13	17.23	17.37	19.67	17.42
Non-tariff Barriers (Urban) (%)															
Initial year	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Final year	10.15	5.90	8.20	7.94	6.66	9.36	7.81	10.67	8.18	10.08	7.56	9.91	7.28	9.41	5.48
ENX (Urban) (%)															
Initial year	18.39	7.10	12.62	24.81	21.38	20.71	24.60	15.25	18.50	13.06	21.69	16.20	25.29	17.27	20.52
Final year	9.06	5.37	8.63	17.73	15.63	12.84	14.86	11.85	12.32	7.16	14.57	15.35	16.49	15.10	15.21
ENM (Urban) (%)															
Initial year	18.35	6.57	29.21	14.88	17.59	24.26	12.47	21.56	18.43	16.43	13.35	20.15	17.63	17.67	17.10
Final year	14.15	7.74	21.79	16.13	16.48	13.04	10.45	16.11	13.84	18.93	11.28	14.85	14.37	13.50	10.33
FLEX1	1	0	0	0	0	1	1	0	0	0	0	1	1	0	0
FLEX2	1	0	0	1	0	1	0	0	1	0	0	1	1	0	0
FLEX3	1	0	0	0	0	1	0	0	0	0	0	1	1	1	0
PMR	0	0	0	0	1	1	0	0	1	0	1	0	1	0	0

Note: FLEX variables and PMR are time-invariant: They take the same values throughout the years.

TABLE 3. Unemployment rates: Overall

Variables	Tariff					NTB					First principal component				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Constant	1.28762 [3.66]***	1.60203 [3.24]***	1.09159 [3.30]***	1.07125 [3.08]***	1.18648 [3.30]***	0.62925 [0.30]	1.46479 [0.65]	0.50774 [0.27]	0.60421 [0.32]	0.58564 [0.29]	1.34562 [5.25]***	1.54875 [4.55]***	1.27282 [5.99]***	1.24272 [5.60]***	1.3235 [5.37]***
L. Protection	0.00322 [0.94]	-0.00106 [0.18]	0.00388 [1.28]	0.00431 [1.36]	0.00346 [1.07]	0.00963 [0.47]	0.00057 [0.02]	0.0096 [0.51]	0.00875 [0.47]	0.0097 [0.48]	0.13897 [1.08]	0.00659 [0.03]	0.1527 [1.49]	0.17258 [1.60]	0.13987 [1.19]
L. Protection*FLEX1		0.00263 [1.02]					0.00214 [0.81]					0.04841 [0.87]			
L. Protection*FLEX2			0.00361 [1.60]					0.00312 [1.35]					0.07022 [1.54]		
L. Protection*FLEX3				0.00373 [1.57]					0.00339 [1.45]					0.0764 [1.61]	
L. Protection*PMR					0.00254 [1.10]					0.00111 [0.46]					0.03548 [0.74]
Observations	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Number of states	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
R-squared	0.22	0.24	0.27	0.26	0.24	0.22	0.23	0.26	0.26	0.22	0.22	0.24	0.27	0.27	0.23

Notes: State fixed-effects regressions. Absolute value of robust t statistics in brackets. Also included among the dependent variables but not reported are the year dummy variables (1987 is the reference year)

* significant at 10%; ** significant at 5%; *** significant at 1%

TABLE 4. Unemployment rates: Rural

Variables	Tariff					NTB					First principal component				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Constant	1.27722 [3.52]***	1.58085 [3.17]***	1.08146 [2.73]***	1.06153 [2.59]**	1.14687 [2.92]***	1.08508 [0.53]	2.06773 [0.93]	0.87766 [0.45]	1.04705 [0.56]	1.04009 [0.50]	1.32797 [5.09]***	1.53476 [4.53]***	1.2334 [4.73]***	1.23202 [4.67]***	1.28808 [4.74]***
L. Protection	0.00204 [0.58]	-0.00235 [0.38]	0.00294 [0.83]	0.00305 [0.86]	0.00276 [0.78]	0.00376 [0.19]	-0.00686 [0.30]	0.00462 [0.24]	0.00284 [0.15]	0.00408 [0.20]	0.07635 [0.62]	-0.06209 [0.32]	0.10517 [0.88]	0.10413 [0.90]	0.09148 [0.74]
L. Protection*FLEX1		0.00276 [0.85]					0.00238 [0.73]					0.0526 [0.78]			
L. Protection*FLEX2			0.00331 [1.05]					0.00305 [1.00]					0.0666 [1.08]		
L. Protection*FLEX3				0.00432 [1.38]					0.00391 [1.34]					0.08566 [1.42]	
L. Protection*PMR					0.00231 [0.70]					0.00038 [0.12]					0.02476 [0.38]
Observations	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Number of states	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
R-squared	0.21	0.23	0.23	0.25	0.22	0.21	0.22	0.23	0.25	0.21	0.21	0.23	0.24	0.25	0.22

Notes: State fixed –effects regressions. Absolute value of robust t statistics in brackets. Also included among the dependent variables but not reported are the year dummy variables (1987 is the reference year)

* significant at 10%; ** significant at 5%; *** significant at 1%

TABLE 5. Unemployment rates: Urban

Variables	Tariff					NTB					First principal component				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Constant	0.89871 [1.15]	0.47973 [0.65]	0.7302 [1.00]	-0.00729 [0.01]	1.00703 [1.27]	2.78717 [2.50]**	2.80177 [2.43]**	2.55172 [2.48]**	2.56494 [2.31]**	2.81688 [2.51]**	1.72778 [2.94]***	1.40804 [2.42]**	1.60861 [3.18]***	1.22054 [2.01]*	1.82063 [3.01]***
L. Protection	0.00788 [1.36]	0.01001 [1.82]*	0.00788 [1.43]	0.01375 [2.54]**	0.00665 [1.15]	-0.00852 [0.77]	-0.00974 [0.85]	-0.00776 [0.77]	-0.00728 [0.66]	-0.00936 [0.84]	0.10751 [0.36]	0.24606 [0.84]	0.13344 [0.52]	0.34523 [1.13]	0.0471 [0.15]
L. Protection*FLEX1		0.00317 [2.68]**					0.00321 [2.06]**					0.08256 [2.18]**			
L. Protection*FLEX2			0.00321 [3.00]***					0.00398 [2.76]***						0.09021 [2.94]***	
L. Protection*FLEX3				0.00318 [2.29]**					0.00292 [1.78]*						0.07999 [1.98]*
L. Protection*PMR					0.0012 [1.01]					0.00162 [0.96]					0.03573 [1.02]
Observations	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Number of states	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
R-squared	0.17	0.29	0.31	0.27	0.19	0.15	0.23	0.28	0.22	0.17	0.14	0.25	0.29	0.23	0.16

Notes: State fixed –effects regressions. Absolute value of robust t statistics in brackets. Also included among the dependent variables but not reported are the year dummy variables (1987 is the reference year)

* significant at 10%; ** significant at 5%; *** significant at 1%

TABLE 6. Unemployment rates: Urban (ENX/ENM variables)

Variables	Tariff				NTB				First principal component			
	1	2	3	4	5	6	7	8	9	10	11	12
Constant	1.56859 [1.80]*	0.38341 [0.46]	1.21599 [1.51]	0.2666 [0.32]	3.28084 [2.93]***	2.75259 [2.39]**	2.99752 [2.94]***	2.37558 [2.33]**	2.10542 [3.18]***	1.7528 [2.53]**	1.86895 [3.05]***	1.60519 [2.80]***
L. Protection	-0.0011 [0.14]	0.00953 [1.70]*	0.00263 [0.38]	0.01156 [1.89]*	-0.01891 [1.70]*	-0.00855 [0.75]	-0.01482 [1.42]	-0.00408 [0.39]	-0.25664 [0.68]	0.10236 [0.33]	-0.10201 [0.29]	0.17492 [0.66]
L. Protection*ENX	0.00021 [2.14]**		0.0001 [1.06]		0.00029 [2.61]**		0.00016 [1.30]		0.00897 [2.00]*		0.0057 [1.15]	
L. Protection*ENM		0.00013 [0.89]		0 [0.02]		0.00002 [0.13]		-0.00011 [0.83]		-0.00045 [0.08]		-0.00342 [0.76]
L. Protection*FLEX2*ENX			0.00013 [0.57]				0.0002 [1.17]				-0.00005 [0.01]	
L. Protection*FLEX2*ENM				0.00039 [1.49]				0.00039 [1.35]				0.0194 [1.43]
L. Protection*FLEX2			-0.00024 [0.04]	-0.00445 [0.83]			-0.00097 [0.22]	-0.00332 [0.56]			0.07492 [0.61]	-0.2243 [0.98]
Observations	60	60	60	60	60	60	60	60	60	60	60	60
Number of states	15	15	15	15	15	15	15	15	15	15	15	15
R-squared	0.25	0.19	0.34	0.36	0.26	0.15	0.35	0.31	0.23	0.14	0.32	0.32

Notes: State fixed –effects regressions. Absolute value of robust t statistics in brackets. Also included among the dependent variables but not reported are the year dummy variables

(1987 is the reference year)

* significant at 10%; ** significant at 5%; *** significant at 1%

TABLE 7. State-median Real Wage: Urban (FLEX interaction variables)

Variables	Tariff				NTB				First principal component			
	1	2	3	4	8	9	10	11	15	16	17	18
Constant	4.69128 [8.80]***	5.01246 [8.91]***	4.77744 [8.99]***	5.21684 [8.34]***	6.09455 [10.50]***	6.0818 [12.99]***	6.20314 [9.78]***	6.22755 [9.82]***	5.12757 [14.96]***	5.42635 [19.71]***	5.18533 [15.74]***	5.50934 [16.92]***
L. Protection	-0.00108 [0.27]	-0.00272 [0.65]	-0.00109 [0.27]	-0.00449 [1.00]	-0.01546 [2.65]**	-0.01439 [3.02]***	-0.01581 [2.49]**	-0.0162 [2.59]**	-0.3005 [1.70]*	-0.42997 [3.06]***	-0.31306 [1.81]*	-0.47942 [2.92]***
L. Protection*FLEX1		-0.00243 [2.85]***				-0.00281 [2.63]**				-0.07715 [3.36]***		
L. Protection*FLEX2			-0.00164 [2.05]**				-0.00183 [1.68]					-0.04372 [1.83]*
L. Protection*FLEX3				-0.00185 [1.85]*				-0.00175 [1.46]				-0.06021 [2.25]**
Observations	60	60	60	60	60	60	60	60	60	60	60	60
Number of states	15	15	15	15	15	15	15	15	15	15	15	15
R-squared	0.29	0.43	0.36	0.36	0.36	0.47	0.41	0.4	0.33	0.5	0.39	0.42

Notes: State fixed –effects regressions. Absolute value of robust t statistics in brackets. Also included among the dependent variables but not reported are the year dummy variables (1987 is the reference year)

* significant at 10%; ** significant at 5%; *** significant at 1%

TABLE 8. State-median Real Wage: Urban (Other interaction variables)

Variables	Tariff			NTB			First principal component		
	5	6	7	12	13	14	19	20	21
Constant	4.50031 [8.14]***	4.1662 [6.72]***	4.71471 [7.46]***	6.04742 [9.68]***	5.80904 [11.07]***	6.14859 [10.23]***	4.98571 [15.18]***	5.01122 [13.82]***	4.92694 [15.42]***
L. Protection	0.00109 [0.26]	0.00595 [1.09]	-0.00116 [0.28]	-0.01413 [2.25]**	-0.00945 [1.49]	-0.01541 [2.54]**	-0.2082 [1.23]	-0.18831 [0.87]	-0.25921 [1.57]
L. Protection*PMR	-0.00212 [2.76]***			-0.00257 [2.60]**			-0.05459 [2.35]**		
L. Protection*ENX		-0.00016 [1.98]*			-0.00017 [1.74]*			-0.00276 [0.85]	
L. Protection*ENM			-0.00001 [0.07]			-0.00003 [0.36]			0.00358 [1.46]
Observations	60	60	60	60	60	60	60	60	60
Number of states	15	15	15	15	15	15	15	15	15
R-squared	0.4	0.39	0.29	0.46	0.43	0.36	0.42	0.35	0.35

Notes: State fixed-effects regressions. Absolute value of robust t statistics in brackets. Also included among the dependent variables but not reported are the y year dummy variables (1987 is the reference year)

* significant at 10%; ** significant at 5%; *** significant at 1%