

Trade Liberalization in India: Impact on Occupational Sex Segregation

Shilpi Kapur¹

This version: March, 2008

Incomplete and Preliminary

Abstract

Segregation of men and women into different occupations is an extensively researched topic in the area of labor market discrimination. Most of these studies simply look at the demand and supply side factors causing the observed occupational sex segregation. This paper examines the impact of trade liberalization on occupational sex segregation in India. To our knowledge, there has been no empirical evidence linking trade reforms to occupational sex segregation which has been identified as one of the major causes of gender wage inequality²– the only exception being the study by Meyer L.B (2003). We focus on the possible channels through which trade reforms could affect occupational sex segregation. We examine the sub-state level changes in occupational sex segregation indices over time and also look into the impact on individual level changes in probability of working in a non-traditional occupation. The empirical estimation exploits the detailed repeated cross sectional data of India's National Sample Survey Organization (NSSO) combined with Census of India data and trade data by UNCTAD. Results indicate that there was relatively more reduction in occupational sex segregation in those areas in urban India which saw greater trade liberalization. However in rural areas, trade liberalization does not seem to affect occupational sex segregation. The results at the individual level show a relative fall in sex differential in a working woman's probability of being employed in a male occupation relative to a man's probability in industries witnessing greater tariff falls thereby suggesting falling segregation due to trade liberalization. These results hold even after we control for other factors affecting gender based occupational segregation and account for comprehensive district/region, industry and time fixed effects. The results suggest that the current period of trade liberalization and other forms of economic liberalization directly and indirectly affects cross regional trends in gender segregation.

Keywords: Trade Liberalization, Competition, Occupational Sex Segregation, India
JEL Classifications : F14, F16, J16, O12

¹ Department of Economics, Washington University in St Louis, email: skapur@artsci.wustl.edu
I am grateful to Dr Sukkoo Kim, Dr Charles Moul, Dr Bruce Petersen, Dr Andrea Beller, Dr. Sunita Parikh for all their guidance and support. I would also like to thank Marilyn Jacob, Gurnain Kaur Pasricha and Tanika Chakraborty for all their help and suggestions. All errors are mine.

² Previous studies in the area of occupational segregation have shown that, in many cases, occupational sex segregation accounts explains about 32-60% of observed gender wage differentials.

1. Introduction

In the last two decades, many developing countries including India have undergone the process of economic liberalization and increasing globalization. Trade liberalization has formed a significant part of this economic liberalization process. In India, tariff rates have decreased from very high levels of 117% in 1990-91 to 60% in 1992 and to a much lower level of 39% in 1999-2000. Besides reducing average tariff levels, trade liberalization has also changed the structure of protection across industries with most of the manufacturing sector witnessing increasing import penetration and high export growth.

The trade liberalization process in India coincided with high growth characterized by increasing exports and foreign investment. GDP grew by 6.7% per year during this phase of rapid trade liberalization. Exports grew at the rate of 14% per year and imports at an average rate of 15% per year during 1992-97. Previous studies have examined the effect of trade reforms on different aspects of the Indian economy: wage inequality between skilled and unskilled workers (Banga, 2005); poverty (Topalova, 2005); schooling and child labor (Edmonds et al, 2005), gender wage inequality (Jacob, 2007), firm productivity (?) and industry wage premiums (Kumar and Mishra, 2006). These existing studies provide mixed evidence on the effect of trade reforms.

This paper demonstrates that trade liberalization has also had an additional impact through its effect on occupational sex segregation in the labor market. Here by occupational sex segregation, we refer to unbalanced distribution of males and females across occupations in a manner inconsistent with their overall shares of employment. There is concentration of a large number of women into a narrow range of female occupations and within the same occupation or profession, men occupying the higher and women the lower ranks of a given occupational hierarchy. The empirical results in this paper show occupational segregation to have declined relatively more in urban areas which witnessed greater fall in net tariffs, though there was no significant effect in rural areas after we control for socio and demographic variables. At the individual level, the results show that the sex differential in the probability of working in a male dominated occupation saw a greater fall in those industries which witnessed a relatively larger fall in their respective tariff levels. The findings match predictions from Becker's model for gender groups whereby increasing competition leads to fall in discrimination.

I further attempt to investigate the various channels through which trade liberalization could affect occupational sex segregation at a regional level/sub-state level and at the individual level, using the detailed available micro-data³. Trade can impact occupational sex segregation by changing the regional and industrial market structure through increased domestic competition which creates pressures on domestic and foreign employers in the economy to hire and employ different factors of production (here , specifically men and women) efficiently. The need to compete effectively in this increasingly competitive environment begins to override any sex based preference, making the employers amenable to employing cheaper labor and particularly women. Trade also changes the occupational structure by creating new jobs and also changing the size of existing occupations. Export oriented sector with high intensity of female labor become significant. There also comes about an expansion of the informal sector which is also more amenable to employing women in various occupations thus affecting gender segregation.

We exploit the detailed person and household level survey data by National Sample Survey in India and link it to region/district and industrial level tariff changes and trade exposure. More specifically, the empirical methodology used in this paper exploits the geographic and industrial variation in exposure to trade reforms. At the sub-state level we explore the causal link between trade liberalization and occupational sex segregation by relating regional/district sex segregation index to regional/district inter-temporal heterogeneity in exposure to tariff rates. Our analysis at the individual level specifically tries to examine whether trade liberalization through reduction in industrial tariffs

³ There are theories both on the demand side (Taste based discrimination by Becker, Statistical discrimination by Phelps & Arrow) and supply side (Neoclassical/Human Capital by Polachek, Mincer) in the literature which explain occupational sex segregation. Supply side theories have been extensively used to explain the observed segregation but it fails to explain all the observed occupational sex segregation like those of women who are well educated and who do not plan work interruptions. For example the individual-level variables indicated by the neoclassical theory are clearly pertinent to the issue of women's *participation* in the labor force, but their ability to explain sexual segregation within the labor force is minimal. Jacobs (1986) concludes: "*In 1981, assigning to women the age, hours, and educational distributions of men would reduce the degree of segregation by just over 2 percent*". Also in a 1982 paper, England P shows that human capital theory cannot explain bulk of the occupational sex segregation. The two main predictions of the human capital theory are refuted in the data set used by her in the paper. She finds that the earnings of women in predominantly female occupations do not show higher rates of appreciation or depreciation than in male dominated occupations and women who have spent most time of their post school years out of the labor force are no more apt to be in predominantly female occupations than the women who have been continuously employed.

facilitates the entry of women in male dominated occupations leading to a fall in sex differential in probability of working in a male dominated occupation.

In a way this study also explores the interrelation of trade and gender and is part of the broad study area trying to understand the adjustment of labor market in developing countries to trade reforms. To our knowledge, there has been no empirical evidence linking trade reforms to occupational sex segregation – the only exception being the study by Meyer L.B (2003) where she analyzes 56 countries for the period 1970-90 and shows that global forces reduce occupational sex segregation and inequality. This paper attempts to fill this gap in the literature. In addition, to my knowledge, this would be the first study exploring the area of occupational sex segregation per se in India.

The tariff reduction in India was unanticipated and part of the IMF conditioned program. The policy makers had little room to cater to political interests; from an individual region/district and industry's perspective, the final tariff rates can be considered exogenously determined. Thus the usual problem of the endogeneity of trade policy is not a big issue here. Also by focusing on variations within one country, we do not face the problem of inter country related data comparability issues.

However there are several limitations to our study which should be considered. Firstly we restrict the analysis to the tariff measures only and do not take into account the reduction in non-tariff barriers (NTBs) which were also a significant part of the trade liberalization policy. This is due to the non-availability of non tariff barrier data on an annual basis for all industries. However this is not an issue of major concern since the limited data available on NTBs suggest that tariffs and NTBs were positively correlated during the period under consideration. Thus the tariff changes are likely to account accurately for the overall measures of trade policy changes⁴, though they may overstate the pure tariff effect. Secondly we do not account here for the tariff reductions by other countries which would lead to an increase in exports, altering the employment and segregation patterns in the domestic labor market. But here again we assume the effects to be generated through the similar mechanisms as our own tariff reductions. Thirdly we refrain from analyzing the economy wide effects of tariff changes on occupational sex

⁴ Some studies have alternatively used effective rates of protection as a measure of trade policy. See (). However in case of India, these are available only for few years.

segregation in the more general equilibrium set up as we cannot separate the trade induced effects from other economy wide changes without imposing strong identification assumptions.

The results from this paper contribute towards the empirical literature on economics of discrimination. To the extent that occupational sex segregation result from taste based discrimination or statistical discrimination practiced by employers, it is inefficient because it prevents maximization of productive capacity; the fall in sex segregation associated with trade liberalization represents an efficiency gain in the economy. When women are kept out of certain occupations based solely on sex, the best worker is not matched with the most appropriate job and elimination of occupational segregation can increase GDP between 2% and 9 % points. (Esteve-Volart 2000, 2004; Tzannatos 1999). Due to data limitations in this paper, we were unable to calculate increase in output associated with this fall in segregation, but previous study by Besley, Burgess and Esteve-Volart (2004) in the context of India finds that a 10% increase in female to male ratio of managers raises nonagricultural output by 2%.⁵

In addition, this paper goes one step forward compared to previous studies that have looked on gender and trade liberalization. It analyzes the effect of trade liberalization on occupational sex segregation, which has been identified as a major mechanism through which women are denied access to higher paying and better jobs thereby resulting in significant gender wage inequality⁶. In terms of policy relevance, the empirical results suggest that greater trade openness has led to a fall in occupational sex

⁵ Occupational sex segregation also assumes importance in the sphere of public policy as the observed segregation is an indicator of inter sector and intra sector factor immobility in the economy. It is observed that women are excluded from the 'male-dominated' occupations and males are not preferred in the 'female-dominated' occupations. Also women are concentrated in a narrow range of occupations than men and this further lessens the occupational mobility for them. It results in labor market inefficiency (human resources are wasted as many of the best qualified persons for an occupation may be excluded because of their sex, resulting in a sub-optimal labor market outcome). Many predominantly-male occupations often have higher earning potentials (McLaughlin 1978), allow for increased occupational mobility (Wolf and Rosenfeld 1978), and provide greater promotional opportunities (Glass 1990; Hultin 2003). Besides this, segregation also affects education of women, training of future generations (Anker 1998), labor force participation rates, social rewards like class standing and prestige, fertility rates and inequality in the society as a whole. Thus segregation is an important labor market characteristic which cannot be underestimated in today's society.

⁶ International studies have shown that occupational sex segregation is an extremely important factor explaining the wage gap, ranging from 12% (Blau et al. 1998) to 90% (Petersen and Morgan 1995; Tomaskovic-Devey 1993) of earning differences. Also see Treiman and Hartmann, 1981; Reskin and Hartmann, 1986; Groshen, 1990; Macpherson and Hirsh, 1995; Miller, 1997.

segregation which might then translate into long term consequences for gender wage inequality and contribute towards the argument favoring trade liberalization in India.

In a section in this paper, we also specifically try to see if there is an impact of tariff cuts on gender employment segregation in the informal sector which then could also be one of the causes explaining occupational sex segregation. The rest of the paper is organized in the following way. Section 2 describes the Indian trade liberalization experience; section 3 discusses the various mechanisms through which trade liberalization could impact occupational sex segregation. The fourth and fifth section looks at the data, variables and the empirical methodology respectively used in the analysis. The results of the empirical estimation are then presented in the Section 6 of the paper. The seventh section discusses the findings of the paper. Section 8 presents the conclusions of the paper based on the results till date.

¹⁵ Rodrik and Subramanian (2004) distinguish the reforms of the eighties and nineties by describing the former as 'pro-business' and the latter as 'pro-market'. They argue that there came about a structural break in early eighties because there was an attitudinal shift in the attitude of the government and the reforms focused on increasing profitability of existing firms by easing capacity restrictions and reducing corporate taxes, among other things. The reforms of the 90s allowed more competition and paved a way for entry of new domestic firms and MNCs in Indian industries

2. Trade Liberalization in India

2.1 Trade Liberalization Phase

Since Independence, India had a very restrictive trade regime. Average tariff rates were as high as 117% in 1991. Besides high tariff rates, there were also very high non-tariff barriers like restriction of imports and exports to certain sectors, complex import licensing system that covered almost all product categories in intermediate, capital and consumer goods sectors. In the 1980s there was some conscious effort to dismantle the import licensing regime via reductions in the number of products listed under banned/restricted category and a start to reduction and rationalization of tariff structure. But it was only in early 1990s that any significant changes in the tariff structure came about. The 1991 reforms were much broader both in scope and scale and also initiated a departure from the long existing stringent regime of controls and represented a significant move to a market oriented regime¹⁵.

A series of domestic and foreign sector crisis triggered this significant trade liberalization process in India in 1991. Whereas the domestic sector was characterized by a significant rise in the fiscal deficit, assassination of the then prime minister of India, Rajiv Gandhi (that created lot of political uncertainty) and shaking investor confidence, the foreign sector was suffering from hike in oil prices, reduction in repatriation from expatriate workers (due to the Gulf war) in the Middle east which then lead to severe balance of payment crisis. To deal with these problems, government of India introduced unanticipated reform measures under an IMF adjustment program in August 1991 which was conditional on introducing macroeconomic stabilization and structural reforms in the industrial and import licensing sector¹⁶, financial sector, tax and trade policies.

Tariffs and non-tariff barriers across all sectors were drastically reduced and brought to a more uniform level. Variation in tariff levels was also reduced significantly. The average tariff in manufacturing declined from a high of 117% in 1990-91 to 60% in 1992 and to a much lower level of 39% in 1999-2000. All 26 import licensing lists were

¹⁶ A New Industrial Policy was announced in July 1991. This policy abolished licensing for all but 18 industries; industries restricted for public sector investments were cut from 17 to 8; and allowed small scale enterprises to offer up to 24% of shareholding to large enterprises.

eliminated and a negative list was established¹⁷. See Figure 1 and Figure 2 in Appendix A2 for changes in the protection levels across time. Not only was there increased openness brought about in the manufacturing sector, but also the agricultural sector witnessed a more open and liberal trade policy. Tariff rates were reduced for all agricultural products with the exception of cereals and oil seeds. Non tariff barriers were also subsequently lifted in the late 1990s. There also came about the liberalization of foreign exchange controls and foreign direct investment. Liberalization of foreign investment increased competition through the entry of foreign firms into domestic markets. The gain in momentum in the pace of reforms over the period 1991-96, later slowed down after 1997.

2.2 Review of Literature on Impact of Trade Liberalization

There have been many studies that have tried to study the social impacts of trade liberalization in India. Topalova (2005) uses a difference in difference methodology and shows that the districts that were more exposed to trade liberalization faced lower incidence and depth of poverty decrease as compared to other districts that had fewer industries exposed to trade liberalization. Edmonds et al. (2005) looks at the effect on children and find that though during the period, India experienced significant declines in child labor and increases in schooling attendance, districts more exposed to tariff cuts observed smaller declines in child labor and smaller increases in school attendance. They suggest that the adjustment costs associated with trade liberalization were responsible for these observed trends.

As regards changes in male and female employment due to trade liberalization, Bhaumik (2003) notes that the growth in the workforce share classified as casual accelerated after 1993 as a result of the liberalization policies, with larger increases for female workers compared to their male counterparts in both rural and urban areas. A series of studies have also looked at the impact on inter sector wage inequality and more specifically gender wage inequality. Jacob. M (2006) finds find that industries that were exposed more to trade liberalization by experiencing larger reductions in trade barriers saw higher reductions in the wage differential between men and women. Also looking at

¹⁷ Goods from this negative list could be freely imported along with all other goods, subject to import tariffs.

the wage differential between low and high caste workers, it doesn't seem to be affected significantly by trade liberalization. Mishra and Kumar (2005) argue in their paper that higher wage premiums occurred in sectors that disproportionately employed unskilled workers which then led to an increase in their relative incomes and a decline in overall wage inequality in the economy.

2.3 Endogeneity of Trade Policy

Trade liberalization could be endogenous with occupational sex segregation thereby creating bias in our analysis. Particularly, if increase in competition brought about through trade liberalization (more specifically tariff reduction here) was systematically different in regions and industries facing higher segregation levels as compared to those facing lower segregation, then our estimates would be biased. Furthermore Topolova P (2005)¹⁸ discusses that since the trade reforms were brought about as a part of the IMF conditioned program, the external obligations to be met were exogenous and did not permit any political opposition to this policy implementation. Policy makers did not have much room for catering to the special lobby interests from the industrial groups. Also looking at the tariff changes across time post 1991, it can be seen that the movements in tariffs were uniform until 1997(which also corresponds to the first five year plan¹⁹ incorporating the reforms). Most of the tariff changes across products showed similar behavior. Post 1997, the tariff changes appear to loose this uniformity and reflects policy maker's selectivity in setting product tariffs. In addition, Topolova P (2005) further supports her arguments by looking at the correlation between future tariffs and current productivity in 1989-96 and post 1997 period. She finds the correlation to be "indistinguishable from zero for the period 1989-96 and negative post 1997. In our analysis, I consider the trade policy variation in the 1989-97 period and thus for the

¹⁸ Topalova P (2005) studied the effect of the Indian trade reforms and found an adverse impact on poverty in states with inflexible labor regulations, while there was no overall effect on inequality in India as a whole. Also the effect was significant in rural areas whereas there was no statistically significant relationship in the urban area.

¹⁹ Five year plans were initiated in India after independence in 1947. Through these plans, India broadly adopted a socialist strategy of development that envisaged the role of the state as a regulator, provider of infrastructure and producer of goods and services. The first five year plan started in 1951 and ended in 1956. Through these 5 year plans, the government of India made explicit its commitment to regional development.

calculation of the 1999-00 trade variable, I use the 1997 product tariffs to avoid the problem of endogeneity of trade protection²⁰.

Thus the change in the protection levels in the economy can be considered as exogenous and therefore OLS should generate consistent estimates. Tariff and non-tariff barriers were reduced across the board for all industries and our analysis captures the variation in the extent of the net²¹ decline in protection in a district/region and across industries. In addition, the trade liberalization phase lasted over several years and thereby provides variation over time in the trade protection levels for the purpose of identifying the trade policy effects.

3. Conceptual Framework

In this section I would summarize the possible mechanisms through which trade liberalization can effect occupational sex segregation.

3.1 *Increases in Market Competition*

Becker's model of taste²² based discrimination emphasizes the factors which limit the amount of competition in the labor market or in the product market thereby enabling employers to practice discrimination. A discriminating employer must act if he were willing to forfeit income to avoid certain transactions (with a certain section of the labor force (Becker 1953). Employers who practice employment discrimination (over and above what can be accounted for by productivity differentials between men and women) have a disutility attached to employing women workers in some occupations which denotes their taste preference for men in some occupations and women in other occupations. Hence women workers may have to 'compensate' employers by being more productive at a given wage in a given occupation or, equivalently, by getting employed only in specific occupations which in most cases are also low paid occupations as compared to men's occupations. The employers are also in turn harmed by this

²⁰ For further details, refer to pages 14-18 of Topolova P (2005).

²¹ By net, here we imply aggregated effect of protection by combining all industries in a district/region for the analysis at the sub-state level and the respective industry tariff level for the individual level analysis.

²² There is no explanation given in the literature for the existing prejudice that some workers, employers or customers do not want to work with or come into contact with members of other racial groups or with women, rather it is simply assumed that there is a 'taste' or preference against people from disadvantaged groups and that this taste can be treated in exactly the same way that economists would analyze individual preferences between goods and services. In this paper, we adopt a similar approach.

discrimination, as they have to give up some profits to be able to practice discrimination. However they will continue to discriminate as long as the disutility they save from hiring women workers is greater than lost utility of this sacrifice in profits that they have to make. Industries with higher levels of market power have more latitude in which to engage in such costly practices like discrimination (see Shepherd 1979, Shepherd and Levin 1973). With increasing competition, need to realize profit by competing within the market arena forces employers to hire the cheapest workers available, and thus any potential employer preference based on sex would be overridden by this need to compete effectively. It is generally believed that increasing international competition in a previously protected economy will bring about increasing competition in the domestic industry also. This has been termed as *imports-as-market-discipline hypothesis* by Levinsohn (1993).

Also if in a competitive labor market, one or even many employers refused to hire women for certain occupations or systematically underestimated their productive potential, then other employers would make higher profits from stepping in and hiring the women workers who had earlier been shunned from some occupations by the discriminating employers. Thus in a perfectly competitive market, non-discriminatory employers gain a cost advantage and ultimately drive discriminating employers out of business. Consequently, in transition, as an economy becomes more competitive, we would expect employer discrimination to decline as the economic rents derived earlier from the discriminatory behavior are reduced. Exposure to international competition may drive inefficient firms from the market and reduce the social costs of production by promoting production based on comparative advantage. Access to export markets may induce increased capacity utilization as well as scale economies which may also increase demand for both male and female labor.

In addition, many a times the behavior of an employer is discriminatory not because he is prejudiced against the women workers but because he is ignorant of their true efficiency/productivity (Becker, 1957). Competition brought about through trade liberalization also brings about spread of knowledge that increases monitoring of efficiency and gives employers less opportunity to forgo profits for discrimination as their disutility from hiring women decreases.

3.2 Changes in Occupational Structure

Increased global economic production resulting from trade liberalization affects the distribution and status of women in the occupational structure. There comes about creation of new jobs (in many cases, low-end jobs) in the manufacturing and service sectors. Many old occupations decline in their relative shares and new occupations emerge. As domestic firms enter export markets after the trade reforms, they may absorb new technologies through their contact with international markets and those firms which face relatively more intense import competition may have to innovate in order to remain efficient and viable producers (Porter 1990). There also comes about an improvement in the quality of human capital due to improvement in technical skills and thereby productive efficiency of firms. The improvement in technology of production leads to a rise in the share of professional and technical workers particularly scientists and engineers owing to the emphasis of science and technology. Also import of large scale machinery and equipment from abroad and trade related work requires financial procedures to be done which then increases particularly the demand for tasks of clerical jobs.

A dominant feature of increased export production is also the high intensity²⁵ of female labor in sectors especially agriculture and allied activities, textiles and garments manufacturing and a wide range of other manufacturing activities ranging from micro activities like handicrafts, toys and food processing to assembly line activities like pharmaceuticals, communications and hardware.²⁶ This increases the relative demand for women specific occupations and encourages domestic employers²⁷ to use all of the best

²⁵ Women are often seen as both physically and mentally better suited to perform tedious repetitive tasks and are also considered more docile than men. Specifically, most positions on the low end hierarchy of the occupational structure come under the category of female dominated occupations.

²⁶ The services sector too has seen increasing participation of women in different occupations.

²⁷ Falling trade barriers also encourages multinational corporations to set of operations in the domestic economy. These multinational corporations are increasingly characterized by horizontal networks that enable women to work efficiently. Adler and Izraeli (1994:9) discuss how “the international business enterprise is often centered on relationship-building and is based on a structure that is less hierarchical and more circular or team structured.” This kind of an organizational structure strengthens the position of the women in the occupational distribution and they are able to function more effectively than men.

human resources available for any particular jobs/occupation, and thus they become more amenable to employing women²⁸.

3.3 Informal Sector

Also in India, as in many developing countries, there is a very significant presence of the labor force in the informal sector²⁹ and more specifically women constitute a considerably high proportion: 65% of the women are employed in the informal sector and they constitute 23% of the share of total informal sector employment. The contribution of the informal sector to the employment in India is as high as 84 % currently in the non-agricultural employment and 93% in the total employment. Informal sector may grow or shrink due to trade liberalization. It could shrink simply because individuals in the informal sector may switch to seek new employment opportunities in the formal export led sector such as food processing, garment manufacturing. There could also result closing down of small informal units³⁰ because of increasing competition from imported goods. Also production from the households may be shifted towards specialized firms (in the formal sector) in order to obtain gains from specialization due to larger scales of production to meet the growing international demands (Goodfriend and McDermott, 1995).

However there is also a possibility of growth of the informal sector. To reduce the fixed cost of labor, employers may increasingly resort to substituting regular full time wage and salary earners with fixed wages, and fringe benefits by various types of non-regular workers, temporary or part-time workers, piece rate workers, seasonal workers, or home-based production workers in subcontracting or putting out systems³¹. Standing

²⁸ See Adler and Izraeli 1994; Gothaskar 1995; Mears 1995; Sim and Yong 1995. Also see Fontana (2003) for a more detailed review of gender effects of trade liberalization.

²⁹ The informal sector comprises informal employment (without secure contracts, worker benefits, or social protection) of two kinds: *Self-employment in informal enterprises* (small unregistered or unincorporated enterprises) including: employers, own account operators, and unpaid family workers in informal enterprises; *Paid employment in informal jobs* (for informal enterprises, formal enterprises, households, or no fixed employer), including: casual or day laborers, industrial outworkers, unregistered or undeclared workers, contract workers, and unprotected temporary and part-time workers. Thus the informal sector is often identified as having worse working conditions and lower job “quality”, and a reallocation of employment from the formal to informal sector is considered undesirable.

³⁰ For example, most small-scale oil processing businesses in India have closed down following a change in trade policy that allows imported soya oil from the United States of America (Shiva 2001).

³¹ Also workers in the formal sector may be laid off due to intensified competition and they may then move to the informal sector. This can come about when the lowering of product prices due to intensified import competition increases the chance that the firm will need to fire formal workers in response to demand

(1989) argues that because of increased global competition employers have put a greater premium on worker's prepared to take low-wage jobs. For women these informal sector jobs can be attractive, as the "informal" arrangement may allow them to combine paid work with household or child-raising duties³². But this benefit could detract from wages and benefits, as enterprises can potentially more easily operate outside labor laws and below legislated minimum wages. Women may also experience more job turnover than men and they are subject to more frequent hiring, firing, and relocation from one job to another. A study from Chile covering a period of rapid adjustment including that due to trade liberalization shows that firms tend to lay off a slightly higher proportion of female workers when business declines and hire more women when business recovers (Levinsohn 1999 cited in World Bank 2001). So reallocation of production and employment between the formal and informal sector has a differential effect by gender, which then effects the occupational sex segregation. Women take over men's jobs in the process of being informalized and this is also commonly termed in the literature as 'Feminization of Labor Force' (ILO, 2004), irrespective of the fact which kinds of jobs are being captured by women in the process.³³ Any change in gender differential in the probability of working in the informal sector related to the trade liberalization in the industry is considered suggestive of generating an effect on the occupational sex segregation in the industry.

Thus from the above discussion, we can conclude that there is a theoretical basis for expecting changes in occupational sex segregation with trade liberalization. Through this paper we demonstrate this relation for India.

4 Empirical Methodology

fluctuations. As a result, the formal workers then attach less value to their current jobs on the fear of being fired and thus require higher wages as an incentive to work in the formal sector (See Goldberg and Pavcnik, 2003).

³²Informal labor market in such scenario gives an additional source of flexibility that enables enterprises to vary the volume of employment and it's content to match the fluctuations in export demand. A large share of workforce in key export industries like garment, textiles footwear, electronics and food processing industry in India have seen this phenomenon very significantly. Using NSSO data, it is observed that the share of female employment has increased from 31 per cent of total unorganized manufacturing sector employment during 1994-95 to 34 per cent during 2000-01.

³³ Women constitute a "cheaper" source of labor, where, "*cheap*" labor is deconstructed beyond wage levels to include employee protection, employer's contribution to social wage, taxation, investment and working conditions in combination with non militancy, docility and manual dexterity and conscientious application to often monotonous production process... (Pearson, 1998, p. 5).

4.1 Sub-State Level (Districts and Regions)

The empirical methodology used in this paper attempts to exploit the variation in the industrial composition of employment across districts/regions in India. Since the trade liberalization experience in India can be considered as exogenous based on the discussion in section 2, the period before the reform and after the reform can be taken as a natural experiment. The identification strategy used here is similar to Topolova, P (2005) where differences in levels of liberalization across geographic areas is exploited to study the impact on poverty levels across districts in India. Here, I correlate the changes in a district/region's exposure to international trade based on the composition of district/region's industrial employment before liberalization (more specifically, in 1991) with changes in our main variable of interest: *occupational sex segregation index*³⁴. The variation in industrial employment levels is used to construct the levels of district/region exposure to trade. Thus though the tariff and non-tariff barriers were reduced uniformly across all districts/regions, but the net effect of these reductions on aggregate district/region trade levels were dependent on the industrial composition in the district/region prior to the reduction. The baseline econometric specification is of the form:

$$Y_{dt} = a_0 + a_1 * Trade_Measured_t + a_2 * Trade_Measure_{jt} * PostLibdummy + a_3 * SocioEconomic\&Demographic_Aggregated_{dt} + a_4 * Other\ Controls + \gamma_t + \delta_d + \epsilon_{dt} \quad (2)$$

where Y_{dt} is the district/ region level measure of occupational sex segregation such as Duncan's Dissimilarity Index, Ratio Index and $Trade_Measured_t$ is district/region exposure to international trade at time t . The main coefficient of interest a_1 captures the average effect of trade protection/trade openness on our district/region level sex segregation measure. $SocioEconomic \& Demographic_Aggregated_{dt}$ is a vector of district level aggregated socio demographic and socio economic characteristics. The vector of coefficients a_3 measures the impact of these on our dependent variable. Other controls include the industrial composition of a district. The inclusion of district/region

³⁴ To make sure that my results are not driven by particular choice of sex segregation index, I conduct the empirical estimation using different indices of segregation.

fixed effects³⁵ δ_d will account for the district-specific heterogeneity in determinants of sex segregation and time fixed effect γ_t will capture the macroeconomic shocks like business cycle fluctuations and changes in labor markets that could also affect occupational sex segregation. To examine any heterogeneity in the effect of trade policy (overall effects of lowered protection after trade liberalization) on occupational sex segregation over time, the trade policy variable is interacted with a post-liberalization dummy, *Postlibdummy*, which takes the value one in the post-reform period (i.e., post-1991) and zero otherwise. We do the analysis separately for the rural and urban India³⁶.

4.2 Individual Level

As a further step in this paper, I also analyzed occupational sex segregation changes at individual level. Since we do not have an explicit measure of occupational sex segregation at the individual level, I make use of a linear probability model similar to Beller (1983) to conduct the analysis at the individual level. In this model, I consider the dependent variable as a binary variable indicating whether an individual i of sex s is employed in a male dominated occupation (for example, the probability of a female being employed in a male dominated occupation or the probability of a male being employed in a male dominated occupation). Thus the probability of a working female (male) employed in a male occupation in industry j in district d is estimated as a function of tariff measure in the industry, socio-demographic controls, industry and district fixed effects. The fall in sex differential in probability of being employed in a male dominated occupation over time is suggestive of falling occupational sex segregation. The baseline specification here takes the following form:

For sex=male and female,

³⁵ This would imply a different intercept for each district/ region in the estimation.

³⁶ Since industries are located differently in geographic and social space with the workers in the rural areas being drawn from the social groups with more traditional values as compared to urban areas, we would expect that the urban industrial strata might have much greater changes in levels of occupational segregation than rural industrial strata. Also the relatively little rural-urban migration³⁶ in India surrounding trade liberalization episode (Topalova 2004b), makes it possible to consider the urban and rural labor markets as segmented and thus experiencing different responses to tariff changes (especially in the initial phase of the trade reforms). Rural sector was predominantly agricultural whereas urban areas had manufacturing as the predominant activity. Thus I would expect trade liberalization to have implication both for the rural and urban labor markets as tariff liberalization occurred not only in manufacturing and mining sector, but also in agricultural products.

$$\text{Probsex}_{ijdt} = b_1 + b_2 * \text{Trade_Measure}_{jt} + a_2 * \text{SocialDemographic_Personal}_{it} + a_3 * \text{Other Controls} + \delta_s + \gamma_j + \varepsilon_{idt}$$

where Probsex_{ijdt} is the probability that an individual i in industry j in district d of a particular sex is employed in a male dominated occupation, $\text{Trade_Measure}_{jt}$ measures the level of tariff level in individual i 's respective industry of employment j at time t and hence captures the exposure of individual's industry of employment to international trade at time t . Also we restrict the analysis to the manufacturing sector here. It is assumed that lower tariff rates imply higher competition within an industry. $\text{SocioDemographic_Personal}_{it}$ is a vector of personal demographic characteristics consisting of the individual characteristics like age, education dummies for each level of education completed, marital status (equals one if married and zero otherwise), social group, sex of household head dummy (equals one if head of household is a male, zero otherwise)³⁷. Industry fixed effects (γ_j) and state fixed effects (δ_s) are included in all specifications to control for variation in economic activity across industries and states respectively, resulting from differences in industry specific policies, state-level institutions, and other potentially unobserved industry and state level characteristics.

Estimating the above equation separately for the male and female and two time periods: pre and post liberalization and comparing the b_2 coefficients for the two set of cross sections over time, would give an estimate of the effect of the trade liberalization measure on the sex differential in the probability of a working woman and man employed in a male occupation³⁸. We use Zellner's seemingly unrelated regression (SUR) technique³⁹ (Zellner, 1962) to measure the changes in the sex differential.

³⁷ All individual level regressions are weighted using sample weights provided in the NSSO data for each of the relevant years in our data sample and these weights correct for the fact that the proportion of individuals and households in each sample differs from the proportion in the true population. Thus using these weights makes the coefficients nationally representative.

³⁸ Changes in occupational structure that comes about due to trade liberalization will be captured by the coefficient from the estimation using the male data as most men are employed in male dominated occupations. (Beller 1983)

³⁹ This accounts for the possible existence of interdependence between male and female probability of working in a male dominated occupation at a particular time and across time periods, as the same unobservable factors which affect men's probability may also be affecting women's probability. This technique is also attractive since appropriate F statistics for testing the significance of difference (which here is the sex differential in probability of working in a male occupation as discussed previously) in the response of each dependent variable to the independent variables across equations is available as a by-product of the analysis. Ordinary least squares (OLS) will give unbiased estimates but will be compromising on efficiency. Inefficiency of the OLS estimates results due to its failure to take account of

We also estimated the above equation using the method of pooled cross sections and got similar results. In the pooled cross sectional method, I combine the different cross sectional data for the pre and post liberalization years and include female dummy, post liberalization dummy and interaction terms of these with tariff rates. The female dummy variable is included to support our assumption of there being gender differences in the probability of being employed in a male dominated occupation. The interaction terms account for the difference in the impact of trade liberalization across the two gender groups. The empirical specification takes the following form:

$$\text{Probsex}_{ijt} = b_1 + b_2 * \text{FemaleDummy}_{ijt} + b_3 * \text{Trade_Measure}_{ijt} + b_4 * \text{Trade_Measure}_{ijt} * \text{FemaleDummy}_{ijt} + b_5 * \text{Trade_Measure}_{ijt} * \text{FemaleDummy}_{ijt} * \text{PostLiberalization}_{ijt} + a_2 * \text{SocialDemographic_Personal}_{ijt} + a_3 * \text{Other Controls}_{ijt} + \delta_s + \gamma_j + \eta_t + \epsilon_{ijt}$$

The main variable of interest in the pooled cross sectional analysis is the interaction of the female dummy with the tariff level and the interaction of the female dummy with tariff level and post liberalization dummy as these indicate the impact of a change in the degree of protection on the relative probability of employment of females in male dominated occupations across different industries. Increased competition brought about due to falling tariff levels and thus more openness in industries will force employers to be less discriminatory in their hiring decisions and therefore females will experience an increase in their relative probability of working in a male dominated occupation to males. As mentioned earlier, we include the industry fixed effects to account for the within-industry comparisons since there has been different magnitude of tariff changes across industries over time due to the trade liberalization reforms.

4.3 Trade Liberalization and Informal Sector

We use both a one step and two step procedures here to identify whether the gender differential in probability of working in the informal sector has changed due to trade liberalization. In the one step procedure, we follow an empirical strategy similar to the one discussed above in the individual level analysis section. The only change we make is that we look at the probability of an individual working in the informal sector in

the possible correlation between the error terms among the equations. The seemingly unrelated regression technique is statistically the soundest since it provides efficient estimates by taking into account possible error correlation.

an industry and see its relationship with the trade openness levels in the industry and how it differs across gender.

$$\text{Prob}_{ijst} = c_1 + c_2 * \text{FemaleDummy} + c_3 * \text{TariffMeasure} + c_4 * \text{FemaleDummy} * \text{TariffMeasure} + c_5 * \text{FemaleDummy} * \text{TariffMeasure} * \text{Postlibdummy} + c_6 * \text{SocialDemographic_Personal}_{it} + c_7 * \text{Other Controls} + \mu_t + \gamma_j + \delta_s + \varepsilon_{ist}$$

In the two step procedure, we use an empirical strategy similar to the one used in the labor literature on wage premium. Here in the first step, we use a linear probability model to estimate the probability of working in the informal sector for males and females separately as a function of their social, demographic characteristics and control for industry affiliation and state fixed effects. We then calculate the residual probabilities by sex for each industry. To do this we use the mean of the residuals within each sex industry group for each period. The difference between the average male and female residual probabilities in each industry in the sample is calculated for each time period (here we have one pre trade liberalization period and 2 post trade liberalization time period). These industry wise residuals so calculated are then used as the dependent variable in the second stage OLS equation that has the difference in average male-female residuals over time as the dependent variable and controls for industry characteristics and exposure to trade openness (measured here by tariff levels) through the independent variables. Here again we restrict our analysis to the manufacturing sector. In the empirical estimation, we do the following:

Step 1

Male Equation:

$$\text{Prob}_{ijst} = b_1 + b_2 * \text{SocialDemographic_Personal}_{it} + b_3 * \text{Other Controls} + \gamma_j + \delta_s + \varepsilon_{ist}$$

Where Prob_{ijst} is an indicator variable for whether a male i employed in industry j in state s at time t works in the informal sector, $\text{SocialDemographic_Personal}_{it}$ is a vector of the individual's demographic and social characteristics like age, age squared, marital status, education, religion. γ_j is the industry fixed effects and thus indicates the individual's industry affiliation. δ_s are the state fixed effects and accounts for the state level differences in labor regulation policies. Call residuals from this equation as Residual_{mt} . Calculate the average value of these residuals by the 3 digit industry codes. Denote them by Residual_{mjt} . Estimate a similar equation for using the Male Sample from the Post liberalization period. Call residuals from that equation as Residual_{mt+1} . Calculate

the average value of these residuals by the 3 digit industry codes. Denote them by **Residual_{mjt+1}**

Female Equation:

$$\text{Prob } ijst = b1_f + b2_f * \text{SocialDemographic_Personal } it + b3_f * \text{Other Controls} + \gamma_j + \delta_s + \varepsilon_{ist}$$

Call residuals from this equation as Residual_{ft} . Calculate the average value of these residuals by the 3 digit industry codes. Denote them by **Residual_{fjt}**. Estimate a similar equation for using the Female Sample from the Post liberalization period. Call residuals from that equation as Residual_{ft+1} . Calculate the average value of these residuals by the 3 digit industry codes. Denote them by **Residual_{fjt+1}**

Calculate the dependent variable for the second step as:

$$(\text{Residual}_{mjt+1} - \text{Residual}_{fjt+1}) - (\text{Residual}_{mjt} - \text{Residual}_{fjt}) = R_j$$

Step 2

Regress the above created dependent variable on Changes in Industry tariff levels, Measure of industry concentration and other characteristics.

$$R_j = a1 + a2 * \text{deltaTariff}_j + a3 * \text{Industry ConcentrationLevel}_j + e_j$$

Where deltaTariff_j measures the change in tariff level from year t to year t+1.

The coefficient a2 then gives us an estimate of the relationship between changes in industry tariff levels and its effect on sex differential in probability of working in the informal sector. A significant change in this sex differential in probability is then indicative of differential impact on male and female participation in informal sector due to trade liberalization. This differential would then effect the occupational sex segregation as discussed in an earlier sub section. Results of this procedure not reported here.

In this paper due to the reliance of the empirical strategy on tariff rates, I am restricted to only the tradable sectors (agricultural and manufacturing) in the analysis of occupational sex segregation and have to exclude the non-tradable sectors (services)⁴⁰. The unobserved characteristics of men and women in our estimation equation or their decision to work or not are certain factors which could also explain the changes in sex differential in probability of working in a male dominated occupation. The educational

⁴⁰ Tariff levels are zero for services sector.

attainment of the individuals in the economy has risen in the time period we consider, but the differences by gender are minimal. Labor force participation rates have declined marginally for women and could be attributed to their increasing educational attainment over time, but this cannot account for their increasing share in certain occupations. So the neoclassical/human capital factors do not seem to be playing an important role in explaining the changes in sex segregation. We also make the plausible assumption here that there are no systematic differences in the changes in these factors across industries based on the openness of these sectors and thus it will not affect the main results of our paper.

5. Data and Variables

5.1 Data

I use data from several sources in this paper. The individual level data⁴¹ comes from the NSS's Employment and Unemployment Survey (Schedule 10) of the NSSO (National Sample Survey Organization) conducted by the government of India. These are quinquennial surveys and are divided into four sub-rounds and covers both urban⁴² and rural areas. The survey includes information on household characteristics like, household size, principal industry-occupation, social group, monthly per capita expenditure etc., detailed demographic particulars including age, sex, marital status, location, educational level, school attendance, principal and subsidiary status, industry and occupation of the employed etc., and daily time disposition. The survey adopts a stratified two-stage design with four sub-rounds in each survey year⁴³. Data is available for the years 1983 (38th round), 1987-88 (43rd round), 1993-94 (50th round) and 1999-2000 (55th round)⁴⁴. Thus it covers periods both pre and post trade liberalization experience in India. The data are

⁴¹ For the sub-state level of analysis, the individual and household level data is appropriately aggregated to arrive at measures of factors that influence segregation indices.

⁴² An urban area is defined as a town if it met the following conditions: (1) a density of not less than 1000 per square mile, (2) population of at least 5000, (3) three-fourths of the occupations of the working population should be outside of agriculture, and (4) at the discretion of the Superintendent of the State, the place should have a few pronounced urban characteristics and amenities such as newly founded industrial areas, large housing settlements, or places of tourist importance, and other civic amenities. See Bose (1973). Our data set assigns a sector value to all observations

⁴³ The first-stage units in the sub rounds are census villages in the rural sector and the NSSO urban frame survey (UFS) blocks in the urban sector. In 1993-94 (Round 50 of NSS), the survey covered more than 69000 rural and 46000 urban households.

⁴⁴ The latest round of NSS that is now available for corresponds to 2004-05 (61st round). I recently acquired access to the same and plan to incorporate that into my future analysis in the paper.

repeated cross-sections. I restrict the analysis to individuals in the age group 15 to 65 years and from 16 states and 2 union territories⁴⁵ of the 26 states and 2 union territories⁴⁶ that form the Union of India. These are the states typically covered in studies on India. The omitted states are in north-east India, where frequent insurgency problems may have affected data collection.

The hierarchy structure of government in India has the Central government at the top, which is then followed by the State government and then the District⁴⁷ administration. I accounted for the changes in the district boundaries⁴⁸ by constructing consistent district identifiers using the Maps of India website and Census Atlases. Since district identifiers are not available for 2 of the 4 NSS rounds data that are available for use, I have done the sub-state analysis at the level of two different geographical units: region⁴⁹ and district level. For our district level analysis in the urban sector, I can use only two rounds of the data available as opposed to being able to use 3 rounds⁵⁰ of data for region level analysis.

As regards the data on the informal sector, a relatively strict way of classifying workers into the formal or informal sector would be to distinguish those workers who are permanent in an organized sector establishments (covered by ASI) from those who work as contract workers or work for the unorganized sector establishments or those who are self employed. Prior to the NSS 55 Employment and Unemployment Survey in India (1999-00), there was no detailed information on the type of establishment a person was employed in. The only categorization was that by principal activity status into the category of self employed (unpaid household and own account workers), casual workers

⁴⁵ The 2 included union territories are Delhi and Chandigarh. Delhi is included because it is the capital of India and also one of the four major metropolitans of India (the other 3 major metropolitans: Chennai, Kolkata and Mumbai are included in the respective districts considered in our study). Chandigarh is included on the grounds that it serves as the capital to the two North Indian states of Punjab and Haryana

⁴⁶ For the list of included and excluded states and union territories, see Appendix A4. Delhi, now falls under the category of a State and not a Union territory.

⁴⁷ Districts in India are the counterparts of US counties. For the period of analysis being considered in this paper, my sample consists of 326 out of the 450 districts in India during that time. The excluded districts either belong to the excluded states and union territories or had missing observations as regards some variables and thus had to be excluded.

⁴⁸ Most of the district boundary changes post 1991 was creation of many new districts out of old ones.

⁴⁹ A region is a grouping of districts in any given state. In my sample, there are 59 regions in 16 states and 2 union territories to which I have restricted the analysis.

⁵⁰ NSS 1983 data usage is limited due to no availability of industry wise trade data for this year. We use this year data to basically study the trends in segregation levels and categorize our occupations into male and female dominated.

and regular salaried workers. So in the absence of more detailed data on organized and unorganized workers over time (more specifically the pre trade liberalization) we will resort to using regular salaried workers as a proxy for formal organized sector employment and self employed and casual workers as informal workers.

5.2. Trade Variable

Following Topolova. P (2005), the key independent variable of interest for the sub-state level is calculated as an **employment weighted sum of industry specific tariff** = $\sum_i \text{emplyid} * \text{tariffit}$ where *i* denotes an industry, *d* denotes a district or region and *t* denotes time. This trade measure does not change with changes in industrial composition associated with the reforms which would be endogenous to changes in factors influencing occupational sex segregation. Here I restrict employment to only the traded goods industry and do not include the non-traded industries⁵¹. For this, I used the UNCTAD's WITS database and 1991 Census of India data. The WITS database gave me the annual tariff rates for 5000 product lines at the 6 digit level of the Indian Trade Classification Harmonized System (HS) Code. I matched these 5000 product lines to the 3 digit NIC codes using the concordance of Debroy and Santhanam (1993). The average industry level tariffs at the 3 digit NIC code were calculated by taking a simple average of tariffs of all the products belonging to a particular industry. The 1991 Census of India gives the industrial employment levels at the 3 digit NIC code for the districts which can then also be used to construct the same for regions. This pre liberalization industrial employment levels (corresponding to 1991 census estimates) acts as weights in the construction of the trade variable⁵². Table 1.1 summarizes the tariff levels at the district and region level.

For the individual level of analyses, I use the industry tariff corresponding to the 3-digit NIC code of the individual's industry of employment. The tariff rates differ significantly across the pre and post liberalization period. Concordance tables were used to convert all the industry codes into their NIC-87 and NIC-98 equivalents. As a

⁵¹ Topolova (2004) also constructs a trade measure with taking the non-traded sector also into account by assigning zero tariff rates to industries in this sector. This results in average tariff levels in all industries when both traded and non-traded sector is taken into account that are much lower than those when just the traded goods sector is taken into account. The variation in tariff levels when only the traded goods industries are taken into account is not influenced by the size of the non-traded goods sector

⁵² States in India and thus districts and regions vary in terms of their levels of industrialization and the kinds of industries that they have. However the changes in trade protection were at the industrial level and applied uniformly across all states.

robustness check, we will also use other measures of trade openness (such as import penetration ratios, effective rates of protection⁵³), used commonly in the literature of trade reforms.

5.3 Controls

The state in India has played an active role in the regulation of employment, wages and conditions of work in the manufacturing sector (more specifically the organized manufacturing). India experienced a series of labor market reforms initiated by these state governments during the 1980s and 1990s (period partly coinciding with the trade liberalization phase). This partial overlap of trade liberalization phase and labor market reforms may make it difficult for us to separate out or find any effects of trade liberalization on occupational sex segregation. To deal with this issue, we include the state level labor market deregulation indices calculated by Besley and Burgess (?). Also the cross sectional and industry wise variation in our tariff measure helps us identify this impact more clearly. Thus though the effect of trade liberalization varied across industries, it is presumed that neither the effect of labor market reforms vary in any systematic way across industries, nor were these effects related systematically to tariff cuts in each industry.

We also account for supply side variables like socio and demographic controls in our analysis based on the neoclassical/human capital explanations of occupational sex segregation. For details, see Appendix ?.

⁵³ However these are available for a very limited number of industries.

⁵⁸ It is also important to distinguish between the horizontal and vertical aspects of occupational sex segregation. Considerations based on productivity lead to horizontal segregation (men and women employed in different occupations) whereas, vertical segregation (which occurs when men and women may be in the same occupational group but women may be in grades with less pay, lower status or promotion opportunities) results from non-economic motivations representing preferences for men over women in occupations . Anker (1998) suggests that low levels of segregation being observed may actually be due to the inadequate pick up of the “vertical” segregation in horizontal segregation. Vertical segregation can be analyzed by comparing some typical female and male occupations. But with the kind of data set that is available to us, it makes it difficult to examine and study vertical segregation separately.

5.4 Occupational Sex Segregation Measure

The dependent variables of interest used in this paper are indices of occupational sex segregation for the sub-state level and probability of working in a male occupation for the individual level. At the sub-state level, segregation has been measured using various indexes of dissimilarity (*Duncan's index*, D is most common and widely used in this context), Marginal matching and KM index. Each index measures the disparity in the gender shares of employment across occupations⁵⁸. For details, see Appendix A1. In this paper, we report the results based on the Duncan's dissimilarity index and the ratio index R to construct our measure⁵⁹ of segregation. For the individual level regressions, we do not have an explicit measure of occupational sex segregation. Instead we construct a sex differential in probability of working in a male dominated occupation and changes in this sex differential measure are suggestive of changes in occupational sex segregation. This measure is similar to Beller A (1983) where the author studies the impact of Equal Employment Opportunity programs on changes in sex segregation. For details, see Appendix ?.

Occupational sex segregation is widely observed in the Indian labor markets with men and women not only found in different occupations, but also within occupations they are found at different grades. Employment distribution by seven major occupation groups (*professional and technical; administrative and managerial; clerical; sales; services; agriculture; and production*), shows wide gender variations in Indian labor market. Women tend to be concentrated in three of the seven major groups: 7.1% of the employed women were in clerical, 16.1% in services and 14.9% as professional and technical workers in 1993-94.

Figure 6 shows the distribution of the working population in major occupational groups in 1987-88 and 1999-00. The occupational structure (the percentage share of different occupations in total employment) doesn't seem to have changed for the rural sector. For urban India, there seems to be some change in the occupation structure. The expansion of managerial, professional and technical occupations and the contraction of blue-collar occupations are most remarkable. To some extent it can be seen that India has

⁵⁹ See Appendix A1 for details about the formula and construction of these indices..

undergone a process of ‘occupational upgrading’, which is characterized by an increased share of higher-status administrative, professional and semi-professional occupations in the labor market. Changes in female representation across different occupations in the pre and post liberalization period are reported in Table 2 in the Appendix A2. The female representation in different occupational groups relative to their participation in total employment increased both in the professional technical and related workers and in the clerical and related workers over the period. There was also an increase seen in sales and service workers which may be due to the fact that these are low-skill, labor-intensive jobs that require little job training or previous experience, and consequently they are the most vulnerable to fluctuations in demand for labor. Although women are reasonably over represented in professional jobs in the post liberalization phase given their overall labor force share, they continue to be under-represented in administrative, clerical and sales jobs in both the pre and post trade liberalization period. It has also been found that, although professional work is basically male dominated, in India and many other Asian countries the proportion of women in this occupation category is normally higher than female participation in all non-agricultural jobs, suggesting an over-representation of women in the professional category. In India, as noted previously, females have also been over represented in the agriculture sector where they work as “unpaid” family workers.

6. Results

6.1 *Sub-State Level*

Based on the discussion in the section on theoretical motivation, it is clear that I do not have strong priors as regards the mechanism dominating the effect of trade liberalization on occupational sex segregation. Thus I resort to following an inferential approach in our analysis of the results of the empirical estimation.

⁶⁶ When we estimated equation 2 for each of the individual cross section years separately, it was found that the trade protection measure differed in its relationship with our main dependent variable of interest across time. The interaction term *Tariffmeasure x PostLibdummy* in the panel data estimation accounts for the heterogeneity in the overall effects of lowered protection post liberalization.

When we consider both agricultural and manufacturing sector together, we find that in rural regions, there is no statistically significant relationship between trade exposure and occupational sex segregation for either of our indices. The point estimates are negative, but very small and insignificant. However when I perform the analysis at the district level, I do see a statistically positively significant relationship between trade protection changes and occupational sex segregation for Duncan's D index of segregation. For R index, the relationship continues to be insignificant. In case of urban regions, there is a statistically significant relationship between declines in tariffs and occupational sex segregation. The decline in tariffs resulting from the trade liberalization appears to have led to a relative decrease in occupational sex segregation in urban regions more exposed to liberalization. The coefficients imply that a 10% fall in protection level across the region leads to a decline of 3.7% in the region sex segregation index. At the urban district level of analysis, the coefficient estimates are higher for the R index of sex segregation though still positively significant for both D and R index implying a positive relationship between tariff reductions and fall in occupational sex segregation⁶⁶.

When I perform the empirical analysis specifically just for the manufacturing sector across regions/districts, I again find some evidence of relatively more decline in occupational sex segregation in regions/districts more exposed to trade liberalization in urban regions/districts. In case of rural regions, there appears to be no statistically significant affect, but when I do the analysis at the rural district level manufacturing, some indication of a statistically positive relationship between tariff reduction and fall in occupational sex segregation emerges. The results are presented in the Appendix A3. Also the results are somewhat larger in magnitude when I consider just the manufacturing sector as opposed to when I take the entire tradable good sector together (which then includes agriculture also). I report our estimation results by both excluding and including appropriate controls (discussed earlier) for other variables affecting occupational sex segregation. The coefficients of the control variables are significant and match their expected signs.

6.2 Individual Level

The results of the SURE estimation are presented in Table 8. This table gives the coefficient estimates for the trade protection variable for the male and female cross sections over time after accounting for the cross equation correlation between the error terms. We can see that protection levels across industries negatively influence the probability of an individual working in a male dominated occupation. There exists a sex differential in probability of a male and a female working in a male dominated occupation. Also comparing the coefficients over time and running the test for difference in this gender sex probability shows a fall in the gender sex differential with trade liberalization.

Table 9 gives the estimates from a pooled cross sectional analysis of the relation between trade protection variable and relative gender probability of an individual working in a male dominated occupation. The main variables of interest in this specification are the trade protection variable interacted with female dummy variable. The combined effect of lower protection levels (lower tariff rates here) on female probability of working in a male dominated occupation, relative to the male probability is given by the sum of Trade Protection*FemaleDummy variable and PostLibDummy*Female Dummy* Trade Protection variable. This implies that a fall in protection levels leads to an increase in relative probability of a women working in a male dominated occupation.

As regards the control variables accounted for in my analysis, they match the expected signs. The probability that a woman is employed in a male dominated occupation (a nontraditional occupation) is negatively related to variables indicating a weaker attachment to the labor force over the life cycle. The coefficients on the marital variable, number of children are both negative and significant.

6.3 Informal Sector

Table 10 and 11 present the results of gendered impact of trade liberalization on informal sector participation when we use the one step method of estimation (pooled cross sectional for males and females combined). Table 10 shows the estimation results for the

rural sector and Table 11 shows the same for the urban sector. Looking at the coefficients, we see that females have a higher probability of working in the informal sector compared to the males. The coefficients of interest here are again the interaction terms between trade protection measure and female dummy and that between trade protection measure, female dummy and post liberalization dummy. These coefficients are negative thereby implying that higher is the trade liberalization in an industry (so lower is the trade protection measure) , higher is the relative probability of a female working in that industry to be employed in the informal sector. Also in the post liberalization period, a relative fall in the tariff level increases the relative probability of females working in the informal sector of the industry (as indicated by the coefficient on the three-way interaction term). The positive coefficient on the post liberalization dummy indicates an increase in probability of individuals working in the informal sector in the post trade liberalization phase. These together imply that trade liberalization has not only led to an increase in probability of individuals working in the informal sector, but also the increase has been relatively higher for females as compared to males in the rural sector.

Looking at the results of the urban sector, we see similar results, though the significance drops out in many some specifications. We do find a higher probability of females working in the informal sector as compared to males. Also looking at column 2 in Table 11, the coefficient on the two way interaction term of female dummy and trade protection measure implies that a fall in tariff leads to a relative increase in the relative probability of females working in the informal sector. The other coefficients match the expected signs but are not significant. This could be due to a high degree of correlation between the various two way and three way interaction terms that is causing the significance to drop in few cases.

7. Discussion

Manufacturing sector and urban areas in India were most commonly affected by trade liberalization and as a result most of the studies in the literature have focused on these two segments⁶⁹. Therefore it is not surprising that the effects of trade on our sex segregation index are more pronounced in manufacturing sector and urban India. As per

⁶⁹ See Goldberg and Pavnick 2004

estimates, the manufacturing sector appears to have responded significantly to the reforms and the consequent competitive pressures in the domestic and international market. The annual growth rate of manufacturing which had declined to -3.7% in 1991-92, recovered to 4.2% in 1992-93. During the next four years the manufacturing sector output grew at an appreciably high rate of around 10.4% per annum. Additionally the manufacturing sector typically accounts for only 6% of the rural workforce. So even if there is a reduction in occupational sex segregation in the small rural manufacturing sector, the affect may not get reflected in all-industries combined estimation for the rural sector in our sub-state level analysis.

Also theories about trends in occupational segregation applies mostly specifically to competition in manufacturing sector and may not apply with equal force to the agricultural sector. To explain this, it can be argued that the degree to which competitive forces drive employers to find the lowest-wage worker for a given job applies more to the manufacturing economy because the contribution of family members to farm work is often outside the cash nexus of a broad economy⁷⁰.

In India, the size of the unorganized manufacturing sector employment (a major part of the informal sector employment that we talked about in this paper) has grown in the phase of liberalization due to stagnation in the organized sector employment. The share of unorganized manufacturing in total manufacturing employment increased from 80% in 1993-94 to 82.3% in 2001-02. One major characteristic of this sector is the high and increasing share of female workers. Looking at the share of female workers in total unorganized manufacturing sector, I find an increase from 31% in 1993-94 to 34% in 2001-02. This could also be contributing to the observed changes in occupational sex segregation in areas more exposed to liberalization being observed.

8. Conclusion

The paper demonstrates the effect of trade liberalization in India on occupational sex segregation. Similar to other rapidly growing economies, in India too women act as a direct source of cheap labor, especially in export manufacturing industries. In fact,

⁷⁰ However by this we are not denying that the competitive forces work in agriculture also. But in agriculture, the force of tradition is stronger.

women's labor is central to factories that produce or assemble commodities for the global market. This also leads to economic growth and increased opportunities in paid employment for women, and this new growth in turn increases women's labor force participation rate thereby also reducing gender segregation. Higher levels of international trade and investment resulting from the trade liberalization decrease gender segregation by drawing more women into traditionally male-dominated manufacturing and service sectors. This motivates companies to reduce discrimination toward women as competition increases among businesses worldwide. Employers become more amenable to employing women, in order to use all the human resources available.

I find that trade liberalization in India in the 1990s impacted the significantly prevailing occupational sex segregation. Through my analysis that is conducted at both a sub-state level (regions and districts) and at individual level, I show that occupational sex segregation is negatively correlated with trade liberalization measure. Increased competition in the sectors that experience more openness (as measured by greater fall in tariff levels witnessed by the industry, district or region) causes employers to be less discriminatory and therefore witness a relatively greater fall in segregation levels and an increase in the relative probability of a women working in a non-traditional occupation (male dominated occupation) as compared to men. Lower protection in terms of lower tariff levels brings about a relative fall in occupational sex segregation index and the sex differential in male and female probability of working in a male dominated occupation. These results are consistent with Becker's theory of discrimination.

Despite the observed decrease in occupational sex segregation, one needs to be careful here as though the relative female employment in different occupations may be increasing, the quality of female employment i.e. types of jobs, earnings and benefits etc. and how the jobs with some positive qualities are distributed among men and women may not be improving. Thus there could be an increase in the quantity but decrease in the quality of jobs due to increased competition which could disproportionately affect women, given their labor market disadvantage. The need for increased competitiveness brought about by trade liberalization may result in the employer offering women more flexible forms of employment such as seasonal employment and day-contracting or

piece-based remuneration, which may generate negative impacts on female labor market impact for women.

Appendix

A.1 Measuring Occupational Sex Segregation

In the standard literature, the Classification of Occupations (NCO) categorizes occupations into 10 basic divisions (at one digit level, which are further categorized into groups and families at 2 digit and 3 digit levels respectively) based on the fundamental criterion of the type of work performed. Workers engaged in the same type of work are grouped together irrespective of the industrial classification of the establishments they are engaged in. The National Classification of Occupations (1968) in India classifies occupations into the following **10 basic divisions**:

Division 0-1: Professional, Technical and Related Workers

Division 2: Administrative, Executive and Managerial Workers

Division 3: Clerical and Related Workers

Division 4: Sales Workers

Division 5: Service Workers

Division 6: Farmers, Fishermen, Hunters, Loggers and Related Workers

Division 7-8-9: Production and Related Workers, Transport Equipment Operators and Laborers

Division X: Workers not classified by occupations

We for our analysis have looked at both the one digit and two digit level of classification. More disaggregated the level of classification of occupations used; higher are the calculated segregation indexes.

I calculate the segregation indices using both the 1-digit and 2-digit level of occupational classification⁷¹. At first glance, there does not seem to be change in occupational sex segregation during the period at the all India level (see Figure 3). However this comparison masks away the sub-state level variation in levels and changes in occupational segregation. Figures 4 and 5 depict there is considerable variation in the degree and trends in segregation across different states of India. These regional differences in segregation may reflect differences in industrial structure, rather than, or in addition to, cultural differences.

The three most widely used occupational sex segregation indexes in the literature are:

(1) **Index of dissimilarity, D (Duncan and Duncan, 1955)** defined as follows:

⁷¹ One of the important methodological results of the occupation based studies in the literature has been that as the level of job or occupational classification increases so does the measured segregation level. Use of broad occupational groups underestimates the segregation levels because it masks segregation at a more disaggregated level (Presser and Kishor, 1991). This has led to a consensus in the field that more detailed occupational classification in describing the employment context is generally preferable to less. We thus also look at 2 digit-level of classification of occupations. See Bielby and Baron (1986)

$$D = \sum_{j=1}^i \left| \left(\frac{F_j}{\sum_{j=1}^j F_j} \right) - \left(\frac{M_j}{\sum_{j=1}^j M_j} \right) \right| \cdot \frac{1}{2}$$

where F_j and M_j are the respective frequency of women and men in an occupational category j . The index measures the proportion of either men or women who would have to change occupational categories in order for the two gender groups to have an equal occupational distribution.

(2) **Size standardized index of dissimilarity, DS** (e.g. Gibbs, 1965; Jacobs and Lim, 1995) is defined as follows:

$$DS = \sum_{j=1}^i \left| \left[\frac{(F_j/T_j)}{\sum_{j=1}^j (F_j/T_j)} \right] - \left[\frac{(M_j/T_j)}{\sum_{j=1}^j (M_j/T_j)} \right] \right| \cdot \frac{1}{2}$$

where, F_j and M_j are the respective frequency of women and men in an occupational category j and $T = M + F$. Although the DS resolves problems associated with variations in occupational structure across places, it treats each category as if it is of the same size. Thus, it inflates the impact of small occupational categories and devalues the impact of large occupational categories. Charles and Grusky (1995) also discuss how the DS is also dependent on the female labor force participation rate. So its value will change when this rate changes, but all else remains the same.

(3) **Ratio index, R** defined as follows:

$$R = 1/J \sum_{j=1}^j \left| \ln(F_j/M_j) - \left[1/J \sum_{j=1}^j \ln(F_j/M_j) \right] \right|$$

where M , F and j are the same as in the previous equations. The values of the ratio index (R) represent the sum of occupational-specific deviations from proportional representation of the two sexes. In other words, the value represents the factor by which women in a specific country are disproportionately represented in an average occupational category. In a fully integrated market $R = 0$ (exp $R = 1$). Despite its apparent advantage, the R index, like the DS, gives each category of occupations equal weight.

I also did my analysis using the Size Standardized Index of Dissimilarity to account for the cross regional differences in relative size of occupational categories as it standardizes each occupation to the same size and thus helps in preventing the bias in our estimates of effect of increasing competition brought about through trade liberalization on occupational sex segregation, The size standardized index is sensitive to changes in female labor force participation rates. However this may not be source of concern for us as we can see from Table (?) in the appendix that female labor force participation rates have not changed during our period of study. I am currently doing the analysis by calculating the KM index of segregation. Preliminary results are similar. There have been many indices of sex segregation used in the literature over time. There also have been subsequent improvements to the accuracy of measurement through the innovation of margin free indices (like the Ratio index R by Charles and Grusky (1992) discussed later in this section). All these indexes were calculated using the household survey data and give an idea of the level of integration and segregation across occupations in different regions/districts. Distribution of employment existing in a region is said to be integrated when the female (male) share of employment in each occupation is equal to the overall female (male) share of employment. However there are also many problems and lack of consensus associated with these different measures of occupational sex segregation.

Individual Level Sex Segregation Measure:

To construct this, we first classified all the 2-digit occupation codes into male and female dominated occupations using a baseline definition (based on 1983 division of men and women into different occupations and in the labor force). If men and women were equal in all respects relevant to the labor market, the expected fraction of women in any given occupation would be approximately equal to the fraction in the labor force. Using the proportion of the labor force which was male in 1983 as the reference point (88%), a male occupation is defined as one in which men's share of employment in the occupation exceeds their share in the labor force by 5 percentage points (allowing 5 percentage points for random deviations)⁷². If the male share of the employment in a particular

⁷² The empirical specification was re-estimated allowing 10-20 percentage points for random deviations. We also estimated the model defining the occupations as male or female dominated based on 1987-88 male

occupation is between 5 percentage points higher or 5 percentage points lower than their share in the labor force, then it is called an integrated occupation. We then construct our binary dependant variable for the empirical estimation (discussed in the next section) using this definition and combining it with an individual's occupational classification code for our different cross sections across different years. The comparison of coefficient on the trade reform measure in the sex specific individual level regression then gives us the sex differential measure, which is used to infer changes in occupational sex segregation resulting from trade liberalization.

Other Controls

A measure of family structure is constructed that aims to tap childbearing duties more directly than crude birth rates or the total fertility rates (Pampel and Tanaka (1986), Semyonov (1980) and Ward (1983)). This measure is calculated as the ratio of number of children in the age group 0-9 divided by the number of women ages 25-44 in the region/district. This measure also captures the current size of the population needing care and controls for variation in infant and child mortality. Because child birth and the presence of young children in the household leads women to exit the labor market periodically and often leads to perceptions about their degree of commitment to employment, high child/woman ratios are expected to increase the occupational sex segregation. Education also increases a women's ability to gain the skills and credentials required and qualify them to enter into a broader range of jobs and more specifically into high-paying, high status occupations (traditionally dominated by men) requiring university degree and professional training. Table ?? in the Appendix shows that men have more years of education compared to women. Since being hired for a job/occupation may be highly correlated with education, we need to control for these differences. Thus a measure accounting for the relative differences in education and human capital between men and women is constructed to account for these differences that could influence the sex segregation levels. I construct this measure as the ratio of proportion of women with secondary and higher schooling and proportion of men with secondary and higher

and female division into different occupations relative to their respective participation in the labor force. Essentially the results obtained were the same.

schooling. Female labor force participation⁷³ is also expected to influence the observed segregation, though the impact can be in either direction. Since there is possibility of reverse causality between female labor force participation rates and occupational sex segregation, I use ratio of females to males in total population as an instrument for the female labor force participation rates. Share of service sector and manufacturing sector in total employment, women's share in employment within sectors are some other factors that may affect occupational sex segregation levels and are accounted for appropriately in my analysis⁷⁴. However women's share of employment within sectors may themselves respond to the structure of the trade regime and thus may not be exogenous.

At the individual level, we also control for marital status, age and sex of the head of the household, number of children, job experience, and social group⁷⁵. Education is accounted for by using dummy variables⁷⁶ for different levels of education. Even after controlling for these factors, there is significant relationship between occupational segregation and trade liberalization that is observed.

⁷³ Interestingly, despite all the structural and economic changes, the labor force participation rates of women have not changed much during the entire period under study. See Table in Appendix A2. This would then lend support to our results not being driven by a significant increase in the number of women entering the labor force.

⁷⁴ There is rough consensus in this literature that segregation levels are lower in the social service sector, while personal services and wholesale trade are more moderately segregated than other sectors. As regards other sectors, occupational sex segregation is highest in the construction and mining and lowest in retail trade. Transportation, communication, and utilities as well as durable manufacturing and wholesale trade are also highly sex segregated whereas non-durable manufacturing and producer service are show moderate levels of segregation. The changes over time have maintained these differences in segregation levels across the sectors.

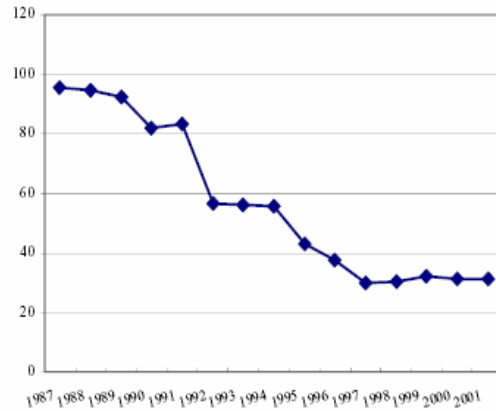
⁷⁵ *Marital status* is a dummy that equals one for those currently married and is zero otherwise. Sex of the *Household head* equals one if there is a male heading the household and zero otherwise. Information on social group identifies whether the individual belongs to a scheduled caste.

⁷⁶ There are 8 education categories: those not literate (*notliterate*); literate but with no formal education (*noformal*); those with below primary education (*belowprimary*); completed primary schooling (*primary*); completed middle school (*middle*); completed secondary school (*secondary*); *graduate* (with agricultural degree, engineering graduate or medicine graduate); graduate in other subjects (*othergrad*). The omitted category is *notliterate*.

A.2 Tables & Figures

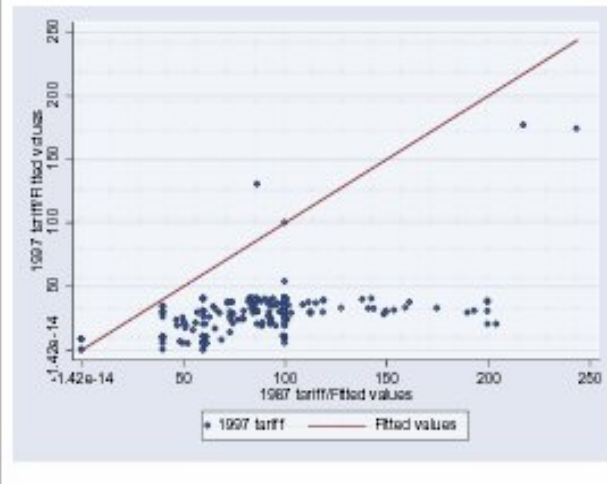
Figure 1: Trends in Average Nominal Tariffs and Correlation of Tariffs across time

Figure 1: Average Nominal Tariffs



From Topalova (2005)

Figure 2: Correlation of Industry Tariffs In 1997 and 1987



From Topalova (2005)

Table 1.1: Some Summary Statistics on Tariff Measures

| | Rural | | Urban | |
|---|---------|---------|---------|---------|
| | 1987-88 | 1999-00 | 1987-88 | 1999-00 |
| District Level | | | | |
| Average Tariff (Including Traded & Non-traded goods) | 0.086 | 0.023 | 0.209 | 0.073 |
| Average Tariff (Only traded goods) | 0.881 | 0.303 | 0.899 | 0.312 |
| Region Level | | | | |
| Average Tariff (Including Traded & Non-traded goods) | 0.083 | 0.024 | 0.213 | 0.076 |
| Average Tariff (Only traded goods) | 0.878 | 0.301 | 0.909 | 0.315 |

Note: Tariff is the employment weighted average nominal ad-valorem tariff at time t in a district/region (where employment weights are the pre-liberalization (1991) employment shares in different industries in a district/region). Workers in non-traded industries (service, trade, transportation, construction, workers in growing of cereals & oilseeds) are assigned zero tariffs in all years in this measure. Average tariff on traded goods is employment- weighted tariff over the set of traded industries (i.e. it abstracts from individuals working in non-traded industries in a given district/region). All means are weighted. The tariff measure for 1987/88 round is based on tariff information for 1987. Tariff measure for 1999/00 round is based on tariff information for 1997.

Table 1.2: Some Summary Statistics on Other Trade measures

| | Phase 1 (1980-85) | Phase 2 (1986-90) | Phase 3 (1991-95) | Phase 4 (1996-00) |
|---|----------------------|----------------------|----------------------|----------------------|
| Average Effective Rate Of Protection | 115.1 | 125.9 | 80.2 | 40.4 |
| Average Import Coverage Ratio | 97.6 | 91.6 | 37.9 | 24.8 |
| Average Import Penetration Ratio | 0.10 | 0.11 | 0.12 | 0.16 |

Source: Das (2003)

Table 2A: Female Representation ratios (RRSs)

| Female Representation Ratios (RRs) | NSS 43rd (1987-88) | | NSS 55th (1999) | |
|--|-----------------------|-------------|--------------------|-------------|
| | Rural | Urban | Rural | Urban |
| Professional, Technical & Related Workers | 0.64 | 1.67 | 0.79 | 1.79 |
| Administrative, Executive & Managerial Workers | 0.66 | 0.52 | 0.58 | 0.66 |
| Clerical & Related Workers | 0.18 | 0.59 | 0.27 | 0.85 |
| Sales Workers | 0.57 | 0.54 | 0.45 | 0.53 |
| Service Workers | 1.06 | 1.74 | 1.06 | 1.86 |
| Farmers, Fishermen, Hunters & Related Workers | 1.09 | 2.01 | 1.13 | 1.87 |
| Production & Related Workers, Transport Equipment Operators & Labourers | 0.73 | 0.77 | 0.61 | 0.73 |

Note: The representation ratio of women in an occupation describes the extent to which women are underrepresented (ratio < 1) or overrepresented (ratio > 1) relative to women's share in total employment and is calculated as the percentage of women in an occupation divided by the percentage of women in total employment. In the occupational segregation literature, an occupation is said to be female dominated if the representation ratio of women is equal to or greater than 1.5. If the representation ratio of women is equal to or less than 0.5, the occupation is labeled as male dominated and the occupation is considered gender integrated if the representation ratio of women is between 0.5 and 1.5

Table 2B: Changes in the Sex Labels of 2-digit Detailed Occupations

| All India | | | | |
|-------------------------|------|---------|---------|---------|
| Sex Label | 1983 | 1987-88 | 1993-94 | 1999-00 |
| Male Dominated | 78 | 63 | 62 | 67 |
| Integrated | 09 | 20 | 20 | 09 |
| Female Dominated | 13 | 17 | 18 | 24 |
| Total | 100 | 100 | 100 | 100 |

These numbers represent the number of occupations in each category over time based on the 2-digit level of occupational classification.

Table 3: Labor Force Participation Rates for Males and Females in Urban India

| Year | Activity Status | Male | Female |
|---------|------------------|------|--------|
| 1983 | Principal status | 500 | 120 |
| 1987-88 | Principal status | 496 | 118 |
| 1993-94 | Principal status | 513 | 121 |
| 1999-00 | Principal status | 513 | 117 |

Source: Sarvekshana, 87th Volume, GOI.

Numbers denote the Number of persons employed per 1000 persons according to the usual status for all of India, where "Usual status" includes persons who had, for a relatively longer period of the year, either worked or were looking for work and also those from among the remaining population who had worked at least for some time with some regularity.

Table 4: Labor Force Participation Rates for Males and Females in Rural India

| Year | Activity Status | Male | Female |
|---------|------------------|------|--------|
| 1983 | Principal status | 528 | 248 |
| 1987-88 | Principal status | 517 | 245 |
| 1993-94 | Principal status | 538 | 234 |
| 1999-00 | Principal status | 535 | 242 |

Source: Sarvekshana, 87th Volume, GOI.

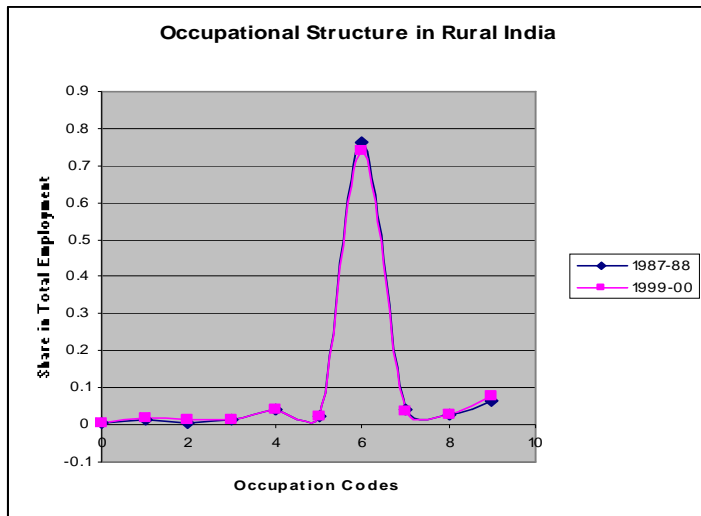
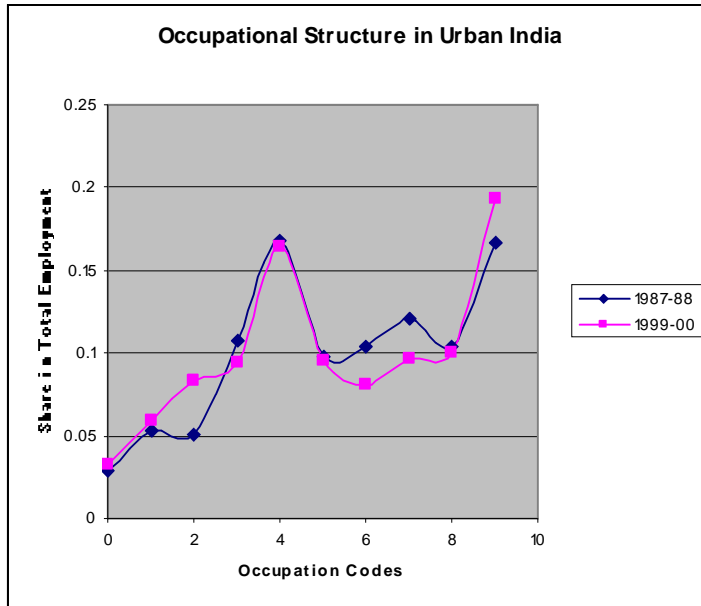
Numbers denote the Number of persons employed per 1000 persons according to the usual status for all of India, where "Usual status" includes persons who had, for a relatively longer period of the year, either worked or were looking for work and also those from among the remaining population who had worked at least for some time with some regularity.

Table 6: Some Summary statistics on Education variables by Gender

| Proportion (%) | Year 1983 | | Year 1999-00 | |
|---------------------|-----------|--------|--------------|--------|
| | Male | Female | Male | Female |
| No formal education | 2.7 | 2.2 | 0.8 | 0.9 |
| Below Primary | 12.4 | 9.6 | 10.2 | 10.7 |
| Primary | 20.3 | 17.8 | 13.8 | 17.8 |
| Middle | 19.4 | 11.8 | 19.6 | 17.2 |
| Secondary | 20.1 | 9.7 | 30.0 | 15.2 |

Source: National Sample Survey (NSS) rounds 43rd and 55th.

Figure 6: Occupational Structure in Urban and Rural India



A.3 ESTIMATION RESULTS: Sub-State Level

Table 7.1: Effect of Trade Liberalization on Occupational Sex Segregation at the Rural Region Level (Panel Data Estimation)

| | All Industries[#] | | | |
|--|-----------------------------------|-------------------|-------------------------------|-------------------|
| | D index of Dissimilarity | | R index of Segregation | |
| | (1) | (2) | (3) | (4) |
| Trade Protection | -0.029 (-0.26) | -0.02 (-0.21) | -0.41 (-0.26) | -0.059 (-0.03) |
| Trade Protection *Time indicator | -0.148 (-1.15) | -0.137 (-0.90) | 2.555 (0.72) | 2.742 (0.73) |
| Other Controls ⁺ | No | Yes | No | Yes |
| Region Fixed Effects | Yes | Yes | Yes | Yes |
| Time Fixed Effects | Yes | Yes | Yes | Yes |
| Regions | 59 | 59 | 59 | 59 |
| Observations | 177 | 177 | 177 | 177 |
| Adjusted R-squared | 0.9274 | 0.9335 | 0.6774 | 0.6835 |
| P-values: | | | | |
| Joint Significance of District dummies | 0.000 | 0.000 | 0.000 | 0.000 |

| | Manufacturing Industries | | | |
|--|---------------------------------|--------------------|-------------------------------|-------------------|
| | D index of Dissimilarity | | R index of Segregation | |
| | (1) | (2) | (3) | (4) |
| Trade Protection | -0.838 (-1.47) | -0.903* (-1.83) | 3.815 (1.41) | 3.846 (1.51) |
| Trade Protection *Time indicator | -0.442 (-0.87) | 0.038 (0.08) | -0.928 (-0.18) | -0.324 (-0.07) |
| Other Controls ⁺ | No | Yes | No | Yes |
| Region Fixed Effects | Yes | Yes | Yes | Yes |
| Time Fixed Effects | Yes | Yes | Yes | Yes |
| Regions | 59 | 59 | 59 | 59 |
| Observations | 175 | 175 | 175 | 175 |
| Adjusted R-squared | 0.5854 | 0.6526 | 0.6450 | 0.6682 |
| P-values: | | | | |
| Joint Significance of District dummies | 0.00 | 0.00 | 0.00 | 0.02 |

t-statistics are reported in parenthesis.

[#] By All Industries here, I mean all tradable industries in the agricultural and manufacturing sector. As mentioned earlier in the paper, I exclude the non-tradable sector which includes the services sector.

⁺ Here Other controls include measure of Region level family structure, share of female in the labor force, relative education/human capital levels of men and women, share of agricultural sector, manufacturing sector, services sector.

Robust and clustered (at the state level) standard errors are reported. ***, **, * represent significance at 1%, 5%, and 10% respectively.

Time fixed affects are included to capture any pattern that the districts/regions may exhibit as a group over the years, e.g., macroeconomic shocks and time trends.

Table 7.3: Effect of Trade Liberalization on Occupational Sex Segregation at the Urban Region Level (Panel Data Estimation)

| | All Industries[#] | | | |
|--|-----------------------------------|------------|-------------------------------|------------|
| | D index of Dissimilarity | | R index of Segregation | |
| | (1) | (2) | (3) | (4) |
| Trade Protection | 0.373* | 0.37* | 6.308* | 5.913* |
| | (1.91) | (1.95) | (1.86) | (1.85) |
| Trade Protection*Time indicator | 0.538 | 0.591* | 4.917 | 5.465 |
| | (1.62) | (1.57) | (1.17) | (1.44) |
| Other Controls ⁺ | No | Yes | No | Yes |
| Region Fixed Effects | Yes | Yes | Yes | Yes |
| Time Fixed Effects | Yes | Yes | Yes | Yes |
| Regions | 57 | 57 | 59 | 59 |
| Observations | 171 | 171 | 177 | 177 |
| Adjusted R-squared | 0.6948 | 0.6951 | 0.7010 | 0.6951 |
| P-values: | 0.000 | 0.000 | 0.000 | 0.000 |
| Joint Significance of Region dummies | | | | |
| | Manufacturing Industries | | | |
| | D index of Dissimilarity | | R index of Segregation | |
| | (1) | (2) | (3) | (4) |
| Trade Protection | 0.461 | 0.752 | 6.932** | 8.157** |
| | (0.65) | (1.46) | (2.34) | (2.63) |
| Trade Protection *Time indicator | 0.342 | -.291 | 9.734 | 9.701 |
| | (0.46) | (-0.30) | (1.48) | (1.38) |
| Other Controls ⁺ | No | Yes | No | Yes |
| Region Fixed Effects | Yes | Yes | Yes | Yes |
| Time Fixed Effects | Yes | Yes | Yes | Yes |
| Regions | 57 | 57 | 58 | 58 |
| Observations | 171 | 171 | 174 | 174 |
| Adjusted R-squared | 0.4111 | 0.4369 | 0.7625 | 0.7647 |
| P-values: | 0.000 | 0.000 | 0.000 | 0.000 |
| Joint Significance of District dummies | | | | |

t-statistics are reported in parenthesis.

[#] By All Industries here, I mean all tradable industries in the agricultural and manufacturing sector. As mentioned earlier in the paper, I exclude the non-tradable sector which includes the services sector. Robust and clustered (at the state level) standard errors are reported. ***, **, * represent significance at 1%, 5%, and 10% respectively

⁺ Here Other controls include measure of Region level family structure, share of female in the labor force, relative education/human capital levels of men and women, share of agricultural sector, manufacturing sector, services sector.

Robust and clustered (at the state level) standard errors are reported. ***, **, * represent significance at 1%, 5%, and 10% respectively.

Table 7.5: Effect of Trade Liberalization on Occupational Sex Segregation at the Rural District Level (Panel Data Estimation)

| | All Industries[#] | | | |
|--|-----------------------------------|------------|-------------------------------|------------|
| | D index of Dissimilarity | | R index of Segregation | |
| | (1) | (2) | (3) | (4) |
| Trade Protection | 0.165* | 0.145* | 0.758 | 0.682 |
| | (2.62) | (2.21) | (0.80) | (0.72) |
| Trade Protection *Time indicator | 0.661* | 0.758* | -0.111 | -0.072 |
| | (10.35) | (9.92) | (-0.11) | (-0.08) |
| Other Controls ⁺ | No | Yes | No | Yes |
| District Fixed Effects | Yes | Yes | Yes | Yes |
| Time Fixed Effects | Yes | Yes | Yes | Yes |
| Districts | 319 | 317 | 319 | 317 |
| Observations | 957 | 951 | 957 | 951 |
| Adjusted R-squared | 0.7679 | 0.7886 | 0.6913 | 0.6988 |
| P-values: | | | | |
| Joint Significance of District dummies | 0.000 | 0.009 | 0.000 | 0.000 |

| | Manufacturing Industries | | | |
|--|---------------------------------|------------|-------------------------------|------------|
| | D index of Dissimilarity | | R index of Segregation | |
| | (1) | (2) | (3) | (4) |
| Trade Protection | 0.305** | 0.279* | 2.4775*** | 2.3469*** |
| | (1.96) | (1.82) | (2.63) | (3.09) |
| Trade Protection*Time indicator | 0.5367** | 0.4760 | -1.3741 | -1.9037 |
| | (2.02) | (1.50) | (-0.46) | (-0.69) |
| Other Controls ⁺ | No | Yes | No | Yes |
| District Fixed Effects | Yes | Yes | Yes | Yes |
| Time Fixed Effects | Yes | Yes | Yes | Yes |
| Districts | 319 | 317 | 319 | 317 |
| Observations | 957 | 951 | 957 | 951 |
| R-squared | 0.7751 | 0.7783 | 0.6754 | 0.6836 |
| P-values: | | | | |
| Joint Significance of District dummies | 0.000 | 0.009 | 0.000 | 0.000 |

t-statistics are reported in parenthesis.

+ Here Other controls include measure of District level family structure, share of female in the labor force, relative education/human capital levels of men and women, share of agricultural sector, manufacturing sector, services sector.

By All Industries here, I mean all tradable industries in the agricultural and manufacturing sector. As mentioned earlier in the paper, I exclude the non-tradable sector which includes the services sector.

Robust and clustered (at the state level) standard errors are reported. ***, **, * represent significance at 1%, 5%, and 10% respectively.

Table 7.7: Effect of Trade Liberalization on Occupational Sex Segregation at the Urban District Level (Panel Data Estimation)

| | All Industries[#] | | | |
|--|-----------------------------------|-------------------|-------------------------------|---------------------|
| | D index of Dissimilarity | | R index of Segregation | |
| | (1) | (2) | (3) | (4) |
| Trade Protection | 0.1278** (2.98) | 0.21*** (3.26) | 2.1550** (2.62) | 2.5768*** (2.87) |
| Trade Protection*Time indicator | 0.187* (2.02) | 0.198* (1.95) | 1.34* (1.98) | 1.1730* (1.93) |
| Other Controls ⁺ | No | Yes | No | Yes |
| District Fixed Effects | Yes | Yes | Yes | Yes |
| Time Fixed Effects | Yes | Yes | Yes | Yes |
| Districts | 318 | 312 | 318 | 312 |
| Observations | 636 | 624 | 636 | 624 |
| R-squared | 0.5399 | 0.7206 | 0.5924 | 0.7345 |
| P-values: | | | | |
| Joint Significance of District dummies | 0.000 | 0.000 | 0.000 | 0.000 |

| | Manufacturing Industries | | | |
|--|---------------------------------|------------------|-------------------------------|-------------------|
| | D index of Dissimilarity | | R index of Segregation | |
| | (1) | (2) | (3) | (4) |
| Trade Protection | 0.489* (1.84) | 0.473* (1.77) | 0.606 (0.64) | 0.026 (0.03) |
| Trade Protection *Time indicator | 0.714 (1.46) | 0.807 (1.58) | - 1.483 (-0.91) | -2.413 (-1.54) |
| Other Controls ⁺ | No | Yes | No | Yes |
| District Fixed Effects | Yes | Yes | Yes | Yes |
| Time Fixed Effects | Yes | Yes | Yes | Yes |
| Districts | 318 | 312 | 318 | 312 |
| Observations | 636 | 624 | 636 | 624 |
| Adjusted R-squared | 0.6626 | 0.6129 | 0.7827 | 0.7881 |
| P-values: | | | | |
| Joint Significance of District dummies | 0.00 | 0.00 | 0.00 | 0.00 |

t-statistics are reported in parenthesis.

[#] By All Industries here, I mean all tradable industries in the agricultural and manufacturing sector. As mentioned earlier in the paper, I exclude the non-tradable sector which includes the services sector.

⁺ Here Other controls include measure of District level family structure, share of female in the labor force, relative education/human capital levels of men and women, share of agricultural sector, manufacturing sector, services sector.

Robust and clustered (at the state level) standard errors are reported. ***, **, * represent significance at 1%, 5%, and 10% respectively.

ESTIMATION RESULTS: Individual Level

Table 8: Seemingly Unrelated Regression (SURE) Regression estimates at the Individual Level

| | Male Pre-Liberalization | Female | Male Post Liberalization | Female |
|-------------------------|------------------------------------|------------------------|-------------------------------------|----------------------|
| Trade Protection | -0.02488** (-1.98) | -0.24862*** (-5.53) | -0.00047 (-0.40) | -0.1655** (-1.89) |

Note: The SURE controlled for demographic and socio economic controls, industry fixed effects, state fixed effects. Clustering of standard errors was done at the industry level. Since the system of equations was unbalanced due to unequal number of observations, the data was reshaped and rescaled using Stata's xtgee command to fit the model and obtain estimates utilizing all the available data and thus preventing potential loss in efficiency.

Table 9: Pooled Cross Sectional Regression estimates at the Individual Level

Dependant Variable:

**Probability of Working
In Male Dominated Occupation**

| | (1) | (2) | (3) | (4) |
|--|------------------------|-----------------------|----------------------|-----------------------|
| Female Dummy | - 0.1531*** (-5.13) | -0.2535*** (-3.75) | -0.1662** (-2.47) | -0.1666** (-2.22) |
| Trade Protection | | -.09462* (-1.74) | -0.2104** (-2.02) | -0.2103** (2.03) |
| Trade Protection *Female Dummy | | -0.13203** (-1.98) | .000617 (1.00) | -.06216** (-1.89) |
| PostLib Dummy | | | 0.4392*** (3.34) | 0.4376*** (3.04) |
| PostLib Dummy *Female Dummy | | | -0.1346** (-1.98) | -0.133** (-1.84) |
| PostLib Dummy *Female Dummy *Trade Protection | | | | -0.2726*** (-2.68) |
| Industry Fixed Effects | Yes | Yes | Yes | Yes |
| State Fixed Effects | Yes | Yes | Yes | Yes |
| Year Fixed Effects | Yes | Yes | Yes | Yes |
| Demographic & Socio -Economic Controls | Yes | Yes | Yes | Yes |
| Other Controls | Yes | Yes | Yes | Yes |
| R squared | 0.3594 | 0.4741 | 0.5022 | 0.5553 |
| Observations | 54247 | 52658 | 52658 | 52658 |

Note: Dependent variable is the binary variable defined as the probability of an individual i working in a male dominated occupation. In all the regressions, standard errors were clustered by industry.

***, **, * represent significance at 1%, 5%, and 10% respectively.

Table 10: Pooled Cross Sectional Regression estimates for Informal Sector (1-Stage Estimation)

| Dependant Variable: | | | | |
|--|---------------------|-----------------------|-----------------------|-----------------------|
| Probability of working Informal Sector | | | Rural | |
| | (1) | (2) | (3) | (4) |
| Female Dummy | 0.0931*** (3.50) | 0.2244*** (4.93) | -0.2721 (-1.17) | -0.16703 (-0.73) |
| Trade Protection | | -0.2536 (-0.80) | -0.3316 (-0.94) | -0.3068 (-0.87) |
| Female Dummy*Trade Protection | | -0.3056*** (-3.43) | 0.2950 (1.13) | 0.2771 (1.07) |
| Postlib Dummy*Female Dummy | | | 0.4999** (2.17) | 0.3961* (1.76) |
| Female Dummy*Trade Protection*Postlib Dummy | | | - 0.6097** (-2.34) | -0.59515** (-2.31) |
| Postlib Dummy | | | | 0.0968* (1.76) |
| Industry Fixed Effects | Yes | Yes | Yes | Yes |
| State Fixed Effects | Yes | Yes | Yes | Yes |
| Year Fixed Effects | Yes | Yes | Yes | Yes |
| Demographic & Socio-Economic Controls | Yes | Yes | Yes | Yes |
| Other Controls | Yes | Yes | Yes | Yes |
| R squared | 0.2787 | 0.3301 | 0.3302 | 0.3303 |
| Observations | 28849 | 24477 | 24477 | 24477 |

Table 11: Pooled Cross Sectional Regression estimates for Informal Sector (1-Stage Estimation)

| Dependant Variable: | | | | |
|--|----------------------|---------------------|--------------------|--------------------|
| Probability of working Informal Sector | (1) | (2) | Urban (3) | (4) |
| Female Dummy | 0.1625 *** (4.87) | 0.2332*** (4.48) | 0.3134* (1.68) | 0.5006** (2.26) |
| Trade Protection | | 0.4451 (1.24) | 0.4559 (1.24) | 0.5214 (1.38) |
| Female Dummy*Trade Protection | | -0.1130* (-1.84) | -0.2788 (-1.22) | -0.3155 (-1.34) |
| Postlib Dummy*Female Dummy | | | -0.0807 (-0.44) | -0.2675 (-1.21) |
| Female Dummy*Trade Protection*Postlib Dummy | | | 0.1672 (0.73) | 0.2024 (0.86) |
| Postlib Dummy | | | | 0.1687** (2.41) |
| Industry Fixed Effects | Yes | Yes | Yes | Yes |
| State Fixed Effects | Yes | Yes | Yes | Yes |
| Year Fixed Effects | Yes | Yes | Yes | Yes |
| Demographic & Socio-Economic Controls | Yes | Yes | Yes | Yes |
| Other Controls | Yes | Yes | Yes | Yes |
| R squared | 0.2419 | 0.2663 | 0.2664 | 0.2665 |
| Observations | 45002 | 39083 | 39083 | 39083 |

Bibliography

- Albelda, Randy. 1986. Occupational Segregation by Race and Gender, 1958-1981. *Industrial and Labor Relations Review* 39: 401-11.
- Arrow, Kenneth. 1973. "The Theory of Discrimination." In *Discrimination in Labor Markets*, edited by Orley Ashenfelter and Albert Rees. Princeton: Princeton University Press.
- Banga, Rashmi, "Liberalization and Wage Inequality in India", ICRIER Working Paper No.156, March 2005.
- Barbezat, Debra (1993). Occupational segmentation by sex in the world. Working paper prepared for the Interdepartmental Project on Equality for Women in Employment. Geneva: International Labour Organization.
- Bardhan, Pranab (1989). Poverty and employment characteristics of urban households in West Bengal, India: an analysis of the results of the National Sample Survey, 1977-1978. In *Urban Poverty and the Labour Market*, Gerry Rogers, ed. Geneva: International Labour Organization.
- Baron, James and William T. Bielby. 1980. "Bringing the Firm Back In: Stratification, Segmentation, and the Organization of Work." *American Sociological Review*. 45:737-65.
- _____. 1984. "The Organization of Work in a Segmented Economy." *American Sociological Review*. 49: 454-473.
- _____. 1986. "The Proliferation of Job Titles in Organizations." *Administrative Science Quarterly*. 31: 561-586.
- Becker, Gary S. 1957/1971. *The Economics of Discrimination*. 2nd edition. Chicago: University of Chicago Press.
- Becker, Gary S. 1965. A Theory of the Allocation of Time. *The Economic Journal* 75: 493-517.
- Becker, Gary S. "Human Capital Effort and Sexual Division of Labor", *Journal of Labor Economics*, 3. 33-58
- Beller, Andrea H. 1982. "Occupational Segregation By Sex: Determinants and Changes." *The Journal of Human Resources* 17(3): 371-392.
- Bergmann, Barbara R. 1974. "Occupational Segregation, Wages and Profits When Employers Discriminate by Race or Sex." *Eastern Economic Journal* 1(1 and 2): 103-10.
- Bergmann, Barbara R. (1986) *The Economic Emergence of Women*, New York, Basic Books.
- Bhatt, Ela (1985). "Home-based women workers". *Asian Labour*, No. 33 (212)
- Bhaumik, S.K. 2003. "Casualisation of the Workforce in India, 1983-2002," *Indian Journal of Labour Economics* 46 (4): 907-926.
- Bianchi, Suzanne M. and Daphne Spain. "Labor Force Participation and Occupational Composition." Pp. 139-166 in Bianchi and Spain, *American Women in Transition*, New York: Russell Sage Foundation, 1986.
- Bianchi, Suzanne. "Changing Economic Roles of Women and Men." Pp. 107-154 in Reynolds Farley (ed.) *State of the Union, America in the 1990s. Volume One: Economic Trends*. New York: Russell Sage Foundation, 1995.
- Bilson, Beth and Wallace E. Hendricks. 1978. Occupational Segregation by Sex: Trends and Prospects. *The Journal of Human Resources* 14(2): 196-210.
- Black, Sandra, and Elizabeth Brainerd. 2004. "Importing Equality? The Impact of Globalization on Gender Discrimination," *Industrial and Labor Relations Review* 57 (4): 540-59.
- Blau, Francine, Patricia Simpson, and Deborah Anderson. 1998. "Continuing Progress? Trends in Occupational Segregation in the United States over the 1970s." *Feminist Economics* 4: 29-71.
- Blau, Francine D., and Lawrence M. Kahn. 2000. "Gender Differences in Pay." *Journal of Economic Perspectives* 14(4): 75-99.
- Blinder, Alan S. and Yoram Weiss. 1976. Human Capital and Labor Supply: A Synthesis *Journal of Political Economy* 84(3): 449-472.
- Bloomquist, Leonard E. 1990. Local Labor Market Characteristics and the Occupational Concentration of Different Sociodemographic Groups. *Rural Sociology* 55(2): 199-213.
- Carlson, Susan M. 1992. Trends in Race/Sex Occupational Inequality: Conceptual and Measurement Issues. *Social Problems* 39(3): 268-290.
- Central Statistical Organization. 1970. *National Industrial Classification 1970*. New Delhi, India: Department of Statistics, Ministry of Planning.

Central Statistical Organization ,1998. National Industrial Classification (All Economic Activities) 1998. New Delhi, India: Department of Statistics, Ministry of Planning and Programme Implementation.

Charles, M. (1992) 'Cross-National Variation in Occupational Sex Segregation', *American Sociological Review*, 57: 483–502

Charles M and David B. Grusky Occupational Ghettos: The Worldwide Segregation of Women and Men Stanford University Press, 2004.

Das, Deb Kusum, "Quantifying Trade Barriers: Has Protection Declined Substantially in Indian Manufacturing?", ICRIER Working Paper No. 105, July 2003.

Eric Edmonds, N. Pavcnik and P. Topalova "Trade Adjustment and Human Capital Investments: Evidence from Indian Tariff Reform", February 2007, also available as National Bureau of Economic Research Working Paper #12884

Fontana, Marzia, "The Gender Effects of Trade Liberalization in Developing Countries: A Review of the Literature", University of Sussex at Brighton, Discussion Papers in Economics, 2003.

Fortin, Nicole M. 2002. Occupational Gender Segregation and Women's Wages in Canada: An Historical Perspective. *Canadian Public Policy* 28(supplement): S11-S39.

Fox, Bonnie J. and John Fox. 1987. *Occupational Gender Segregation of the Canadian Labor Force 1931 - 1981*. Toronto: University of Toronto Press.

Fuchs, Victor R. 1989. Women's Quest for Economic Equality. *Journal of Economic Perspectives* 3: 25-41.

Gersen, Jacob E. "Markets and Discrimination: A Theoretical and Empirical Analysis", 2004.

Goldberg, Pinelopi K., and Nina Pavcnik, "Trade, Inequality and Poverty: What Do We Know? Evidence from Recent Trade Liberalization Episodes in Developing Countries", 2004a.

Goldberg, Pinelopi K., and Nina Pavcnik, "The Effects of the Colombian Trade Liberalization on Urban Poverty", NBER, 2004b

Goldin, Claudia. 1990. *Understanding the Gender Gap: An Economic History of American Women*. New York: Oxford University Press.

Gross, Edward. 1968. Plus Ca Change...? The Sexual Structure of Occupations over Time. *Social Problems* 16: 198-208.

Hutchens, Robert. 2004. One Measure of Segregation. *International Economic Review* 45: 555-78.

Joekes, Susan. 1995. "Trade-Related Employment for Women in Industry and Services in Developing Countries," United Nations Research Institute for Social Development Occasional Paper. Available at <http://www.unrisd.org>

Joekes, Susan "A Gender Analytical Perspective on Trade and Sustainable Development" in Trade, Sustainable development and Gender, UNCTAD, Papers prepared in support of the themes discussed at the Pre-UNCTAD X Expert Workshop on Trade, Sustainable Development and Gender, UN New York and Geneva, July 1999, 33-59.

King, Mary.1992. Occupational Segregation by Race and Gender, 1940-1988. *Monthly Labor Review* 115: 30-36.

Macpherson, David A., and Barry T. Hirsch. 1995. "Wages and Gender Composition: Why Do Women's Jobs Pay Less?" *Journal of Labor Economics* 13(3): 426–71.

McDowell Allen. 2004 "From the help desk:Seemingly unrelated regression with unbalanced equations" *The Stata Journal* ,Number 4, 442-448

Meng, Xin and Paul Miller. 1995. Occupational Segregation and its Impact on Gender Wage Discrimination in China's Rural Industrial Sector. *Oxford Economic Papers* 47: 136-55.

Menon, Nidhiya, and Yana Rodgers. 2006. "The Impact of Trade Liberalization on Gender Wage Differentials in India's Manufacturing Sector," Social Science Research Network Working Paper .

Meyer ,Lisa B. 2003 "Economic Globalization and Women's Status in the Labor Market: A Cross-National Investigation of Occupational Sex Segregation and Inequality ", *The Sociological Quarterly*, Volume44/3.

Mincer, Jacob. 1962. Labor Force Participation of Married Women: A Study of Labor Supply.*Journal of Labor Economics*: 63-105.

Mincer, Jacob and Stanley Polachek. 1974. Family Investments in Human Capital: Earnings of Women. *Journal of Political Economy* 82: S76-S108.

Mishra, Prachi, and Utsav Kumar, "Trade Liberalization and Wage Inequality: Evidence from India", IMF Working Paper, January 2005.

Pampel, Fred C. and Kazuko Tanaka. 1986. "Economic Development and Female Labor Force Participation: A Reconsideration". *Social Forces*. 64:3:599-619

- Petersen, Trond and Laurie Morgan. 1995. "Separate and Unequal: Occupation-Establishment Sex Segregation and the Gender Wage Gap." *American Journal of Sociology* 101: 329-365.
- Phelps, Edmund, "The Statistical Theory of Racism and Sexism," *American Economic Review*, September 1972, 62, 659-61.
- Polachek, S.W., 1979. Occupational segregation among women: Theory, evidence, and a prognosis. In: Lloyd, C.B. (Ed.), *Women in the Labor Market*. Columbia University Press, New York, pp. 137– 157.
- Polachek, Solomon W. 1981. "Occupational Self-Selection: A Human Capital Approach to Sex Differences in Occupational Structure." *Review of Economics and Statistics* 63(1): 60–69.
- Preston, Jo Anne. 2000. Occupational gender segregation Trends and explanations. *The Quarterly Review of Economics and Finance* 39: 611-24.
- Porter, Michael. 1990. *The Competitive Advantage of Nations*. New York: Basic Books.
- Rawlston, Valerie and William E. Spriggs. 2002. A Logit Decomposition Analysis of Occupational Segregation: An Update for the 1990s of Spriggs and Williams. *Review of Black Political Economy* 29(4): 91-96.24.
- Reilly, Barry and Puja Vasudeva Dutta, "The Gender Pay Gap and Trade Liberalization: Evidence for India", PRUS Working Paper No. 32, July 2005.
- Revenge, Ana, "Employment and Wage Effects of Trade Liberalization: The Case of Mexican Manufacturing", *Journal of Labor Economics*, Vol.15, No.3, Part 2: Labor Market Flexibility in Developing Countries, S20-S43, 1997
- Roos, Patricia A. and Barbara A. Reskin. "Occupational Desegregation in the 1970s: Integration and Economic Equity." *Sociological Perspectives* 35:69-91, 1992.
- Sarvekshana, 87th Volume, Government of India publication, March 2002.
- Semyonov, M. 1980. "The Social Context of Women's Labor Force Participation: A Comparative Analysis." *American Journal of Sociology* 86:534-50.
- Spriggs, William E. and Rhonda M. Williams. 1996. A Logit Decomposition Analysis of Occupational Segregation: Results for the 1970s and 1980s. *The Review of Economics and Statistics* 78: 348-354.
- Tomaskovic-Devey, Donald and Sheryl Skaggs. 2002. "Sex Segregation, Labor Process Organization, and Gender Earnings Inequality." *American Journal of Sociology* 108: 102-128.
- Topalova, Petia, "Factor Immobility and Regional Impacts of Trade Liberalization: Evidence on Poverty and Inequality from India", NBER Working Paper, 2005
- Ward, Kathryn. 1984. *Women in the World-System: Its Impact on Status and Fertility*. New York: Praeger.
- Ward, Kathryn. 1993. "Reconceptualizing World-System Theory to Include Women" in *Theory on Gender/Feminism on Theory*, edited by Paula England. New York: Aldine de Gruyter.
- Ward, Kathryn. (ed.) 1990. *Women Workers and Global Restructuring*. Ithaca, NY: ILR Press.