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ABSTRACT

Facing the same labor demand shock through imports from China, we show that men and women make different labor market and family adjustments that result in significant long-run gender inequality. The gender gap is driven by the female biological clock. Using population registers and matched employer-employee data from Denmark, we document that especially women in their late 30s, towards the end of their biological clock, decide to have a baby as the shock causes displacement. High-earning women in leadership positions and women who need to acquire new human capital are central because their new employment would require particularly high investments that are incompatible with having a newborn in the short time remaining on the biological clock. While children penalize women in the labor market, we show that due to the biological clock an otherwise gender-neutral shock leads to a gender gap in the labor market.

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1 Introduction

The factors driving differences in the labor market behavior of men and women are not fully understood. This paper makes progress by examining the balance between labor market and family activities in response to a trade shock. Worker skill and the conditions of the local labor market are important determinants in worker adjustment to negative labor demand shocks.[1] We focus on gender differences in the market versus family choice in determining adjustment costs.[2] Studying workers exposed to rising import competition from China in the 2000s, we show that as the trade shock leads to displacement, gender and age play central roles in determining how workers respond to the shock as they re-balance market and family activities.

Employing population register and labor market information on workers matched to their firms, we provide a longitudinal picture of individual-level family *and* labor market adjustments to rising import competition in Denmark from 1999-2009. We document a strong gender difference in long-run labor market outcomes and a shift towards family due to reduced labor market opportunities. Workers exposed to increased import competition are disproportionately more likely to have newborn children and to take parental leave; they are also more likely to form new marital unions, as well as to avoid breaking up existing ones. Women, not men, are driving this shift.

We study two 1999 cohorts of workers: Denmark's entire private-sector labor force and a subset, the textile and clothing workers. The latter are specifically affected by the removal of the Multi-fibre Arrangement (MFA) quotas on Chinese exports following the country's entry into the World Trade Organization (2002). This trade liberalization leads to an increase in childbirths and marriage among single women, while exposed married women respond with a reduced likelihood of divorce. These family responses go hand in hand with long-run labor earnings losses for women, while men do not significantly lose earnings over an eight-year period (2002 - 2009). The findings from this trade policy change are broadly confirmed for Denmark's labor force as a whole using an instrumental-variables approach.

Gender differentials along the labor market-family margin are a source of inequality on which little is known. We find that women and men are facing an adverse labor demand shock of the same size. Respective earnings losses at the firm of employment at the time of the shock, and the likelihood of displacement from it, are similar across gender. However, a substantial gender gap in labor market outcomes favoring men over women emerges after displacement, and there is a

[1] Jacobson, Lalonde, and Sullivan (1993), Artuç, Chaudhuri, and McLaren (2010), Autor, Dorn, Hanson, and Song (2014), Dix-Carneiro (2014), Utar (2018), and Traiberman (2019).

[2] Synonymous to family in our paper is the term household. An early contribution is Becker (1973).

corresponding gender gap in fertility and marriage rates, with women's rates higher than men's.

Our explanation for these gender differences is the biological clock of a woman. Because women are unlikely to conceive beyond their early forties, fertile-age women have a higher reservation value to stay in the labor market than men. Consequently, a given negative labor demand shock will raise a woman's incentive of moving towards family more than it does for a man. Furthermore, because having and caring for a young child is female-intensive, making investments to succeed in a new career before the biological clock runs out may be impossible and lead women to focus on family. Confirming this prediction, we show that particularly women in their late 30s, towards the end of their biological clock, decide to have a baby as import competition from China causes displacement.

College educated women in leadership positions contribute strongly to the fertility effect. These women disproportionately feel the pressure of the biological clock because they would be expected to show the highest commitment should they move to a new career, leaving little time to raise a baby.[3] In addition, women in manufacturing-specific occupations who would have to switch to the services industry are important for the fertility gender gap. Such women would have to acquire new human capital, which might be incompatible with the short time remaining on the biological clock. Other explanations, such as that women's employment is disproportionately concentrated in highly exposed firms or occupations, play a limited role.

Much progress has been made in understanding adjustment costs to workers' re-establishing promising career paths after a trade shock, with a growing literature studying heterogeneity in adjustment experiences. On the one hand, young workers tend to perform better than older workers (Artuç, Chaudhuri, and McLaren 2010, Dix-Carneiro 2014), in part because they lose comparatively little industry- or occupation-specific human capital (Utar 2018). On the other, young workers may face higher adjustment costs because of weak attachment to the labor market (Autor, Dorn, Hanson, and Song 2014). By showing that women and men subject to the same-sized shock respond differently in both their labor and non-labor market choices, our analysis shifts the focus to gender, with child bearing and rearing playing a key role. In a non-trade context, Becker's (1960, 1965) model of fertility lays out two effects in response to lower market earnings. It could decrease fertility through an income effect, or increase fertility through a substitution effect because the opportunity costs of time have fallen. Recent research has highlighted dynamic effects that provide incentives for women to postpone fertility, such as the adverse impact of early-stage career interruptions, and

[3]College educated women may also feel their biological clock particularly because investing into a career before family planning has taken time and they are simply older; we evaluate this below.

that a young child negatively affects the probability of finding a new job (Del Bono, Weber, and Winter-Ebmer 2012, 2015, Huttunen and Kellokumpu 2016). We study how these effects interact with a woman's biological clock. Women in manufacturing occupations adversely affected by import competition, such as machine operators, need to learn new skills, while women in high-level professional occupations need to show special commitment early in their new jobs. This is incompatible with having a newborn the closer a woman is to the end of her fertile period. Therefore, the trade shock-induced fertility response of these women is particularly strong.

The unprecedented growth of imports from China has generated a large literature that documents a significant decline in manufacturing employment in many advanced countries.[4] Among the smaller set of analyses of non-labor outcomes, Autor, Dorn, and Hanson (2019) find that import competition lowers marriage rates, while we find that import competition increases marriage rates. This highlights how the empirical approach and the structure of welfare policies can lead to different results. First, we focus on gender differences in worker adjustment, showing that the market-family margin is a major factor leading to gender inequality. This is difficult to study without individual-level measures of exposure and outcomes, as in Autor, Dorn Hanson (2019), and their region-level cross-sectional analysis is better suited to measuring aggregate effects including spillovers. Furthermore, the institutional setting matters. Our results suggest that effective insurance and transfer payments as in Denmark can dampen the import competition's negative income effect and thus shape the responses of workers.

We also contribute to uncovering the reasons behind gender differences (Bertrand 2010, Blau and Kahn 2017, Juhn and McCue 2017). A key finding is that in the labor market, women experience 'penalties' for having children (e.g., Kleven, Landais, and Sogaard 2019). In contrast, we show that because of the woman's biological clock, gender-neutral labor shocks can increase childbirth. The focus on a plausibly exogenous shock that leads to childbirth allows us to identify gender earnings differentials that are free from selection issues. Furthermore, by placing child-bearing and child-rearing at the center of the argument, our biological clock explanation relates to the temporal flexibility argument (Goldin 2014, Goldin and Katz 2016). One difference is that to the extent that the gender gap is driven in part by biology, greater family friendliness and social policies cannot fully eliminate the gender gap. Moreover, we study the career choices of manufacturing workers subject to a sudden, plausibly exogenous shock with data that allows us to rule out potentially important composition effects.

[4] See Autor, Dorn, and Hanson (2013), Bloom, Draca, and van Reenen (2016), Ebenstein, Harrison, McMillan, and Phillips (2014), Keller and Utar (2016), Pierce and Schott (2016), Traiberman (2019), Utar and Torres-Ruiz (2013), and Utar (2014, 2018). None of these studies focus on gender.

The remainder of the paper is as follows. The next section reviews the recent evolution of imports in Denmark and discusses identification of the impact of rising import competition using employee-employer matched data. We also introduce the most important recent developments regarding family formation and fertility. Section 3 lays out the econometric framework for studying the textile trade liberalization. Section 4 shows that increased import competition causes gender earnings inequality by generating higher earnings losses for women than for men, even though the short-run labor market impact of Chinese import competition was the same for men and women. The competition shock also leads to higher childbirths and marriage rates for women, the flip side of reduced female labor market activity. Section 5 shows that our findings on textile workers generalize to Denmark's entire private-sector labor force. Section 6 discusses the main mechanism for our finding, a woman's biological clock, and how it interacts with the costs of re-establishing a career. Section 7 contains a concluding discussion. The Appendix presents supplemental results and analysis.

2 Import Competition in Denmark

2.1 Rising Import Competition for Denmark's Workers

Since the late 1990s, Denmark, like many other advanced countries, has experienced increased import competition from lower-wage countries which has reshaped its manufacturing landscape. To estimate gender differences in trade adjustment, we first employ a quasi-natural experiment that uses a concrete policy change, the lifting of the Multi-Fibre Arrangement (MFA) quotas on China's exports to the European Union following China's entry into the WTO (December 2001). Due to its compelling nature, this policy change has been extensively employed in the literature to address various questions (Bloom, Draca, and van Reenen 2016, Harrigan and Barrows 2009, Khandelwal, Wei, and Schott 2013, and Utar 2014). We also generalize the analysis to the entire private-sector labor force by employing an instrumental variables approach that exploits changes in import penetration due to a sudden expansion of production capabilities in China around the time of its WTO accession. The following summarizes our two approaches, with additional information given in the Appendix.

2.1.1 Textile and Clothing Liberalization

The MFA was established in 1974 as the cornerstone of a system of quantitative trade restrictions on developing countries' textile and clothing exports with the intention to protect this relatively

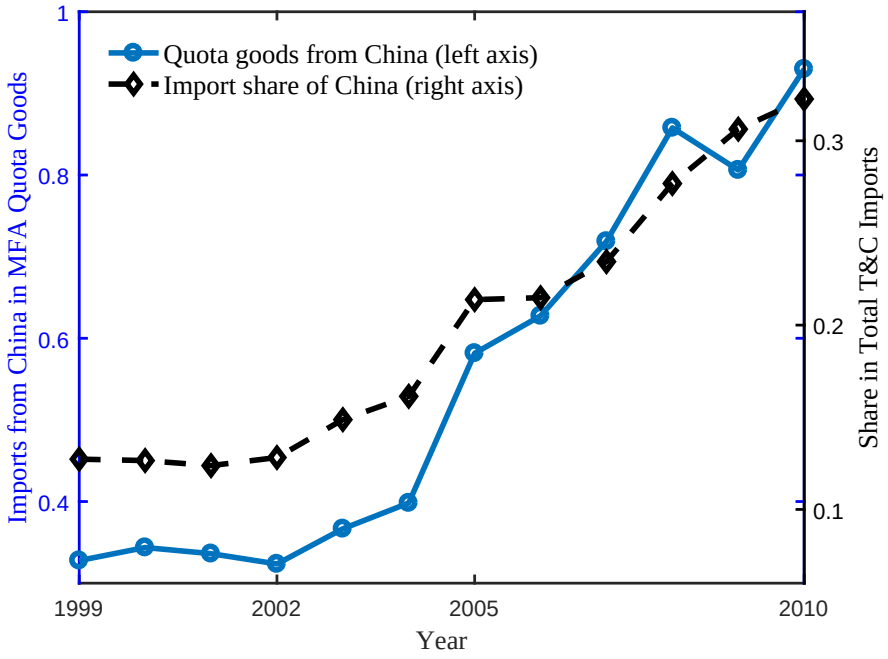


Figure 1: **Evolution of Chinese Imports in Response to Quota Removal**

Notes: Solid line shows imports from China of MFA quota goods in Denmark, measured in the total value added in the textile and clothing industry. Dashed line shows China's share in all imports of textiles and clothing (T&C) goods in Denmark.

labor-intensive sector in advanced countries. With the conclusion of multilateral trade negotiations in 1994, it was agreed to bring textiles and clothing in line with the rules of other world trade at the time, and thus import quotas were to be removed. Accordingly, MFA quotas would be abolished in four phases, Phases I to IV, in the years 1995, 1998, 2002, and 2005.

One advantage of focusing on this policy change is that neither Denmark nor China was directly involved in negotiating the creation or removal of the textile quotas (as well as which goods would be covered in which phase). This is because negotiations took place at the level of the European Union, where Denmark's influence as a relatively small country is limited. Also, China did not influence the process because it was not a member of the WTO at the time. Similarly, because it was not a member of the WTO, China did not benefit from the first two phases of 1995 and 1998. At the same time, China stood out in comparison to other countries subject to MFA quotas in terms of the number of binding quotas. While there was considerable uncertainty about the if, when, and how of China's entry into the WTO, China did become a member of the WTO in December 2001. Only once that had happened, China benefited from Phases I to III, and subsequently from Phase IV in 2005. See Appendix B.1 for additional information on the quota liberalizations and how it is employed in this analysis.

The lifting of quotas led to a surge of Chinese textile imports starting in the year 2002, as Figure 1 shows. Between 2002 and 2010, imports of quota goods from China measured in the 1999 domestic value added of the Danish textile and clothing industries (about 1.3 billion Euros) tripled. Figure B1 shows that the growth in Chinese imports of quota-free products was, in contrast, limited. This trade liberalization generates a worker-level measure of exposure to import competition. Employing a domestic production database that reports product-level information for manufacturing establishments, we identify quota good-producing firms, and the employee-employer matched data allows us to identify workers employed in those firms. A worker is defined to be exposed if, as of 1999, her or his firm has domestic production in any 8-digit Common Nomenclature (CN) good for which China sees her quota lifted due to her WTO entry. Workers employed in 1999 in textile and clothing manufacturing firms that produce none of the affected 8-digit CN products constitute our control group of workers. We also define an alternative exposure variable using the firms' revenue share in quota products in 1999, finding similar results (see Appendix A.5.1).

2.1.2 Import Competition and the Economy-wide Labor Force

In order to generalize our results we study the impact of changes in import penetration from China, defined as imports from China over domestic absorption, across six-digit industries in the entire private sector economy. The change in import penetration varies widely even between six-digit industries that belong to the same two-digit industry (see Figure A5). To eliminate the influence of broader shocks such as technology, we rely on variation within two-digit industries. We address possible correlation between domestic industry demand shocks and changes in import penetration with an instrumental variables approach based on geography-based transportation costs and imports of other advanced countries as instruments. Additional information on this approach is given in section 5 and in the Appendix, section A.6.

2.2 Workers and their Firms

We employ the Integrated Database for Labor Market Research of Statistics Denmark, which contains administrative records on virtually all individuals and firms in Denmark.[5] To construct the sample, we apply the following sample criteria. First, to ensure that workers would typically not retire during the sample period, we focus on workers who were between 18 and 56 years old in 1999. Second, we concentrate on employees who worked as a full-time employee in 1999 so that

[5]The database provides information on all persons of age 15 to 70 residing in Denmark with a social security number, on all establishments with at least one employee in the last week of November of each year, and on all jobs that are active in that same week. See Bunzel (2008) for a description of this data.

both female and male workers have comparably strong labor market attachment.[6] This yields a 1999 cohort of about 1.6 million workers, essentially Denmark's entire private-sector labor force. Of these workers, about 10,000 were employed in the textile and clothing industry. We will refer to the latter as the quota experiment sample for short.

We follow the 1999 cohort for a decade as they change jobs, switch firms, industries, or occupations, and as they move out of the labor force to become a parent or unemployed. In this way the analysis yields a worker-level picture of labor market and family adjustments throughout the entire economy. Table 1 shows a number of key sample characteristics for the quota experiment sample.

Table 1: **Textile Worker Characteristics by Exposure**

	Exposed N = 4,743 **Average**	**Control** N = 5,255 **Average**	**Diff.**	**t-stat**
Age	39.206	39.228	-0.022	-0.111
Labor Market Experience	14.912	14.491	0.421	3.694
Log Annual Earnings	12.165	12.154	0.011	0.843
Married	0.604	0.576	0.028	2.802
No. of Children	1.448	1.480	-0.032	-1.387
Birth Event	0.040	0.045	-0.004	-1.100
Parental Leave Take	0.052	0.049	0.003	0.686
College Educated	0.138	0.116	0.021	3.188
Vocational Educated	0.361	0.358	0.003	0.355
Machine Operator	0.353	0.359	-0.007	-0.685
Manager	0.059	0.052	0.008	1.680

Notes: Shown are averages of the 1999 characteristics of textile workers by exposure to rising import competition due to the quota removals for China. Exposed workers are those whose firm domestically manufactured a product protected by a quota in 1999 that would be removed with China's entry into the WTO; correspondingly, Control workers are workers in other textile manufacturing firms. Labor market experience measured in years. Married, Birth Event, Parental Leave Take, College, Vocational, Machine Operator, and Manager are indicator variables. Log earnings is measured in 2000 Danish Kroner; the mean is about 40,000 current US Dollar.

We see that roughly half of the workers were employed at firms that manufactured products subject to quota removals for China (exposed in Table 1). The average age of both exposed and control workers is the same at 39.2, which is important because adjustment costs vary between older and younger workers. We also see that both sets of workers have between 14 and 15 years of labor

[6] Nevertheless, results that include part-time workers are similar (available upon request).

market experience. Average annual earnings are quite similar in 1999 for exposed and control workers. Also notice that around 60 percent of exposed workers are married, compared to about 58 percent for the control group. The average number of children as of 1999 in our sample is 1.46, with no significant difference between the sets of exposed and control workers. About one in 20 workers has a newborn child or takes parental leave in 1999, which is similar for exposed and control workers. Table 1 also shows summary statistics for education and occupation.[7] Overall, differences between the set of exposed and control workers are limited. This holds as well for the year 1995, see Table A2.

We also examine the balance of the sample by gender and by family status (married versus unmarried); see Table A1. There are some differences; for example, women overall account for a larger share of textile workers than men (about 5,600 versus 4,400 workers, respectively). Textile and clothing production tends to be female intensive; however, women perform a wide range of occupations in the textile industry (Figure A1 shows the distribution across occupations by exposure to import competition). The majority of women, exposed or control, work in production as machine operators, similar to men, as this is a typical manufacturing industry. We also observe the position of a worker in the job hierarchy of the firm, which will be employed in section 6 below.

There is essentially no age difference between exposed and control workers, whether among married women, unmarried women or married men (Table A1). Married workers are generally older than unmarried workers, by about seven years for women and nine years for men. In line with this age difference, hourly wages are relatively high for married workers. It is worth noting that the gender wage difference is larger for married than for unmarried workers. This could be an indication that family activities require more time away from the labor market for women in comparison to men. Hourly wages are quite similar across different demographic samples by exposure to import competition, indicating exposed and control workers have similar qualifications even within demographic groups.

Our economy-wide sample has N = 1,651,774 individuals, about 45 percent of which are women (Table 2). These workers are employed in wide range of industries including mining, manufacturing, wholesale and retail trade, hotels and restaurants, transport, storage and communication, as well as real estate and business services. The employer-employee link allows us to control for a number of firm-level variables that may be important for the workers' labor market and family choices, such as firm size (measured by employment) and firm quality (proxied by the average firm

[7] We employ the Danish version of the International Standard Classification of Occupation (D-ISCO) at the four-digit level; it has about 400 different job types. See https://www.dst.dk/en/Statistik/dokumentation/nomenklaturer/.

wage). Specific industry, firm, and job characteristics are important for assessing the importance of selection at different margins for our results. Furthermore, for those workers who are not single, our analysis accounts for partner (married spouse as well as cohabitant) characteristics, including earnings, income, and the degree to which the partner is exposed to rising import competition. Summary statistics on our economy-wide sample are shown in Table 2. In 1999 these workers are 38 years old on average and 28 percent of them have college education. Furthermore, workers in Denmark's private-sector overall have similar rates of fertility as textile workers (between four and five percent).

Table 2: **Worker Characteristics in an Economy-Wide Sample**

			Most Exposed		**Not Exposed**	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**
	N = 1,651,774		**N = 83,335**		**N = 82,000**	
Age	38.194	9.868	37.801	9.719	38.350	9.894
Labor Market Experience	14.44	5.807	14.528	5.718	14.452	5.818
Married	0.543	0.498	0.543	0.498	0.546	0.498
Number of Children	1.337	1.152	1.352	1.163	1.340	1.149
Log Earnings	12.255	0.669	12.253	0.600	12.243	0.678
College	0.280	0.449	0.155	0.362	0.304	0.460
Vocational Educated	0.411	0.492	0.442	0.497	0.406	0.491
Birth Event	0.046	0.208	0.048	0.215	0.044	0.206
Divorce Event	0.008	0.088	0.007	0.084	0.008	0.088
Marriage Event	0.026	0.159	0.026	0.160	0.026	0.159
Machine Operators	0.056	0.23	0.215	0.411	0.016	0.127
Managers	0.037	0.188	0.037	0.188	0.036	0.186

Notes: First two columns: all full-time, private sector workers as of the year 1999 (N = 1,651,774). SD stands for standard deviation. Most Exposed workers are those with change in import penetration in the top 5 percent, 'Not Exposed' is a random 5 percent sample of workers with change in import penetration of zero. Labor market experience in years. Manager is a one-digit ISCO classification, Machine Operators is ISCO code 82. Birth, Divorce, and Marriage variables are indicators on whether a worker fathers or mothers a newborn baby, divorces, or marries in a given year, respectively. Log Earnings measured in 2000 Danish Kroner.

On the right side in Table 2 we present summary statistics for workers who are highly exposed to an increase in Chinese import penetration ("Most Exposed") versus workers who are not ("Not Exposed").[8] Table 2 shows that while the sets of workers subject to different levels of Chinese

[8]In the present case there is no comparable indicator of treatment to that of the textile liberalization case. The Most

competition are similar in many respects, there are some differences. For example, only about 16 percent of the most exposed workers are college-educated, compared to 30 percent among not-exposed workers. The most exposed workers in this dimension are similar to textile workers, of whom about 12 percent are college educated. Also, about 22 percent of the most exposed workers are machine operators, in contrast to the not-exposed set of workers of which only about 2 percent have this occupation. Machine operator is a typical manufacturing occupation less common in the overall economy. We will address broad differences in the sample by including industry, firm, and worker characteristics, as well as industry and occupation fixed effects. This information is complemented by summary statistics by gender, see Table A15.

2.3 Family Trends in Denmark

This section provides an overview of family trends in Denmark. The age at first marriage has increased for both men and women in Denmark since the 1960s, as it did in many other countries. Education goals and increased life expectancy are contributing factors. An important aspect of family life is co-habitation (living together without being married), which for many couples is the stage of life before marrying. In 2003, 22 percent of all couples in Denmark were cohabiting. In our sample, the figure is the same. Divorce rates for Danes have fallen from the mid-1980s to the mid-2000s. Marriage and divorce information for all residents comes from Denmark's Central Population Register. We match this data to worker data with a unique person identifier.

One goal of household formation is to raise children. While since the year 1990 the total fertility rate in Denmark has been broadly stable, during the period 2002 to 2008 Denmark's total fertility rate increased by almost 10%.[9] Childbirth information is from Statistics Denmark's Fertility Database, which provides parental information with personal IDs on every child born in Denmark. Our results below indicate that import competition contributed to the decline in divorce at the same time when it increased fertility.

Another indicator of family activities is parental leave, where parents reduce time spent in the labor market to care for children. This can be newborn or older children. Although there have been some fluctuations in parental leave provision over time, by international standards parental

Exposed sample are workers in the top 5 percent of change in Chinese import penetration, while the Not Exposed sample is a 5 percent random sample of workers facing a change of Chinese import penetration of zero.

[9]The total fertility rate is defined as the number of children that would be born alive per 1,000 women during the reproductive period of their lives (ages 15 through 49), if all 1,000 women lived to be 50 years old, and if at each age they experienced the given year's age-specific fertility rate. The rate for Denmark is estimated at around 1,871 in 2010, compared to 1,925 for the United States. Human Fertility Database, Max Planck Institute for Demographic Research and Vienna Institute of Demography. Available at www.humanfertility.org.

childcare leave is generous in Denmark. From the year 2002 on, the state guarantees paid leave for 52 weeks, compensated at the unemployment benefit level, including 18 weeks of maternity leave, 2 weeks of paternity leave and 32 weeks of parental leave to be shared between the parents.

3 Estimation Approach

This section describes our quasi-experimental design based on the textile trade liberalization and how we address identification challenges. Our generalized difference-in-differences framework with two-sided fixed effects exploits the drastic change in import competition as China benefited from the removal of textile quotas by entering the WTO. Consider the following estimating equation:

$$X_{it} = \alpha_0 + \sum_{h=1995}^{2009} \alpha_h \overbrace{1[t=h] \times Exposure_{i,99}}^{\text{ImpComp}_h} + \delta_i + \zeta_t + \varphi_{it}, \tag{1}$$

where X_{it} is a labor- or family outcome of worker i in period t, including his or her labor earnings, hours worked, the number of childbirths, and marriage; $Exposure_{i,99}$ is an indicator for exposure to rising import competition that is one if the worker was employed in 1999 in a firm domestically producing a quota-protected good from China, ζ_t denotes fixed effects for each year t that capture the influence of aggregate trends affecting all workers, and δ_i is a fixed effect for each worker i. We interact the worker-level exposure variable with an indicator variable for each year to document the annual impact of the shock. Rather than starting our estimation from the year 1999, we follow worker outcomes also backward in time and present an integrated pre-trend analysis by estimating equation (1) over the period 1994-2009. The error term φ_{it} is assumed to be mean zero, and we allow for correlation within groups of workers by clustering standard errors at the level of the firm of employment in 1999.

Equation (1) will be estimated both for the full sample of men and women as well as separately by gender. Another way to detect possible differentials by gender is to form a triple difference-in-differences estimation equation; it is given by:

$$X_{it} = \alpha_0 + \sum_{h=1995}^{2009} \alpha_h 1[t=h] \times Exposure_{i,99} + \sum_{h=1995}^{2009} \beta_h \overbrace{1[t=h] \times Exposure_{i,99} \times Female_i}^{\text{W} \times \text{ImpComp}_h} + \delta_i + \zeta_t + \kappa_{it} + \varphi_{it}, \tag{2}$$

where $Female_i$ is equal to one if worker i is a woman, and κ_{it} denotes Female $\times$ Year fixed effects that capture the common shocks on female textile workers. In this specification, β_h measures the differential effect of rising import competition on women in year t. Results from specifications (1) and (2) will be shown in graphical form in several key figures in the text.

We also present results for versions of equations (1) and (2) where we interact the worker-level exposure with the indicator $Post_t$ to estimate the average annual impact of the trade shock to conserve space. In the case of equation (2), it is given by

$$X_{it} = \beta_0 + \beta_1 \underbrace{Post_t \times Exposure_{i,99}}_{\text{ImpComp}} + \beta_2 \text{ ImpComp}_{it} \times Female_i + \delta_i + \zeta_t + \kappa_{it} + \varphi_{it}, \tag{3}$$

where $Post_t$ = 0 if t = 1995,..., 2001 and $Post_t$ = 1 if t = 2002,...,2009. The reason for presenting results based on equation (3), instead of on equations (1) and (2), is to conserve space. In particular, we employ equation (3) for results presented in the tables of the text. As indicated in equations (1), (2), and (3), we use ImpComp as shorthand for $Year \times Exposure$ or $Post \times Exposure$.

Identification The inclusion of worker fixed effects implies that the coefficients α_h and β_h are estimated from within-worker variation over time. This has the advantage that the influence of any observed or unobserved worker characteristic as of year 1999 that may be correlated with workers' future exposure to competition, such as occupation, education, unobserved abilities, or technological differences across firms, is eliminated.

The coefficients α_h in equation (1) are the well-known difference-in-differences estimates, which give the treatment effects under the standard identification assumption that in the absence of treatment the workers would have followed parallel trends. This assumption would not hold, if, for example, removal of quotas for other developing countries in 1995 and 1998 (Phases I and II, respectively) had led to increased competition and differential trends between exposed and control workers. Furthermore, the second half of the 1990s is also a period of increased trade integration

with Eastern European countries. To address these issues we follow our workers back over time to estimate equations (1), (2), and (3) starting from 1994 to present evidence on possible pre-trends.[10] We do not find evidence that the samples of treated and control workers follow different trends in the pre-treatment period.

What about other threats to identification? Broad differences between men and women, for example the lower propensity of women to work as a manager, are captured by worker fixed effects. We also control for aggregate shocks that are specific to female workers (the term κ_{it} (= Year $\times$ Female) in equation (2)). Finally, the trade shock might be correlated with other shocks during this time period, in particular other aspects of globalization, such as technical change. To address such concerns, we will augment our specification with differential time trends for workers' detailed occupations as of 1999, see section 6 below.

4 Import Competition, Gender, and the Family

This section shows that the labor market consequences of import competition are far from gender-neutral, with women experiencing larger labor market adjustment costs than men. Are the greater labor market losses of women the flip side of the shift towards more family activities? We continue this section by showing that women, not men, respond to rising import competition by increasing family activities. This is in part a substitution effect from market work to family activities driven by the worker's lower opportunity costs.

4.1 Gender Gaps in the Labor Market in Response to Import Competition

4.1.1 Import Competition Triggers Long-run Gender Inequality

We begin by establishing that increased import competition with China via the removal of import quotas is felt as a major labor market shock, especially to female workers. Figure 2 shows results from estimating equation (1) separately for male and female workers over 1994-2009. The dependent variable is workers' annual earnings (in log).

First, note that the coefficients for years before 2002 are not significant and generally close to zero (Figure 2). This shows the absence of major differences between the groups of exposed and control workers, such as through previous quota liberalization phases or the trade integration with the Eastern European Countries in the late 1990s.[11]

[10] Inclusion of worker fixed effects means that the impact in 1994 is not estimated.

[11] One explanation for the coefficients in 2000 and 2001 turning negative is anticipation effects, namely that by

Focusing on the impact of the shock, Figure 2 shows that while men's coefficients are scattered around zero, the impact on women is negative throughout 2002-2009, and significantly so over 2002-2007. Exposure to trade decreases women's annual earnings by 6-10 % during these years.

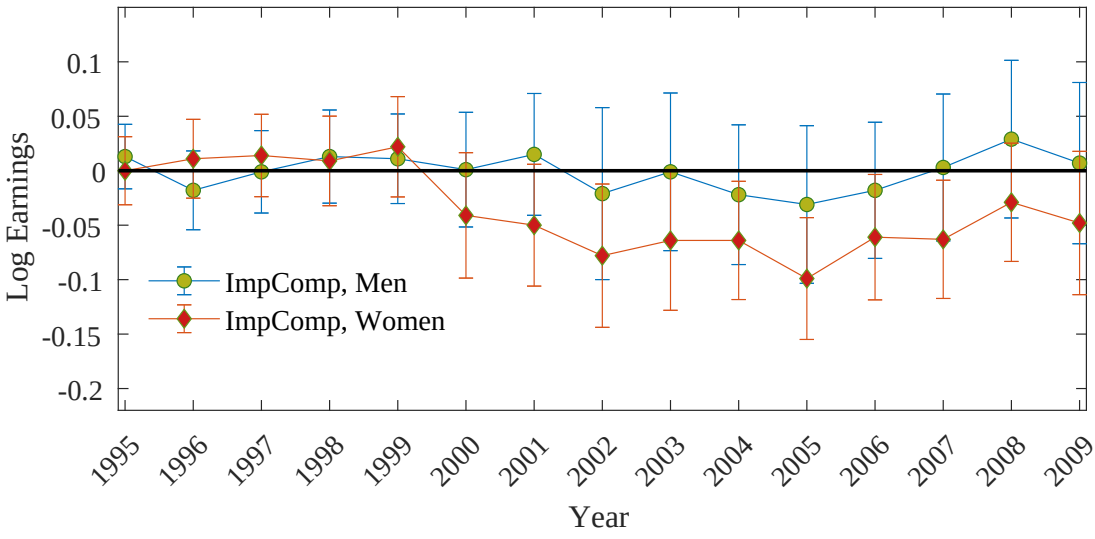


Figure 2: Gender Differences in Labor Adjustment to Import Competition

Notes: Figure shows impact of import competition on annual earnings (in logs). Estimation of equation (1) separately by gender. Point estimates for ImpComp (= Year × Exposure) with 90% confidence intervals shown. Coefficient estimates and standard errors provided in Table A3.

If the import competition shock causes displacement because the exposed firms shed labor or go out of business, adjustment margins for displaced workers include switching firms, occupations, and industries or facing a period of unemployment. To capture some of these margins, Table 3 examines the average impact of the shock in the long run by estimating equation (3) for several labor market outcomes, namely annual earnings, employment, annual hours worked, unemployed time, and annual income. The effectiveness of Denmark's person-oriented transfer policy is assessed by studying the impact on workers' personal income after transfers and benefits. To take into account the workers' likelihood of being unemployed or stay out of the labor market and to be able to distinguish the short-run impact at the exposed firm from the adjustment after separation, instead of expressing them in logarithms, we express the earnings, income, and hours measures in worker's own annual pre-shock earnings, income, and hours respectively. The employment measure is a binary variable indicating whether an individual is employed in a given year.

2000 it may have been clear to some that once China had entered the WTO in 2002, competition would toughen. This motivates our choice to define treatment in 1999, several years before China's entry into the WTO.

Table 3: **Labor Market and Income Impacts of Import Competition**

	(1) Earnings	(2) Employment	(3) Hours	(4) Unemployment	(5) Personal Income
Panel A.	**Average Annual Impact on all Workers**				
ImpComp	-0.041	-0.024**	-0.050***	2.474***	0.023
	(0.032)	(0.010)	(0.016)	(0.526)	(0.021)
Panel B.	**Impact by Gender**				
ImpComp	0.019	-0.010	-0.027	1.501**	0.027
	(0.051)	(0.015)	(0.025)	(0.600)	(0.033)
ImpComp × Female	-0.103**	-0.015	-0.030	2.001***	-0.007
	(0.051)	(0.015)	(0.025)	(0.719)	(0.029)
N	153,137	155,137	148,694	153,137	153,137
Panel C.	**Short-run Impact at the Firm of Employment in 1999**				
ImpComp	-0.149***	-0.133***	-0.143***	0.426	-0.147***
	(0.052)	(0.045)	(0.049)	(0.317)	(0.051)
ImpComp × Female	0.009	0.016	0.019	-0.513	0.018
	(0.040)	(0.034)	(0.038)	(0.369)	(0.038)
N	138,497	138,497	138,208	138,497	138,497

Notes: Dependent variables, given on top of columns: Earnings is annual labor earnings from the worker's primary job expressed in the worker's average 1996-99 annual earnings; Employment is an indicator variable if worker i is employed in a primary job in year t; Hours is annual hours worked in the worker's primary job, expressed in the worker's average 1996-99 annual hours worked. Unemployment is an index number indicating time in unemployment within a year. Personal Income is earnings plus insurance benefits, cash and non-cash transfers, also expressed in the worker's average 1996-99 annual income. ImpComp is short for Post × Exposure. Panel A: Estimation of equation (3) without Female term. Panels B and C: Estimation of equation (3). Panel C: Short-run Impact, with dependent variables defined at the firm of employment in 1999. Unemployment in Panel C is unemployment spells that immediately follow employment at the 1999 firm. Coefficients give average annual impacts. Robust standard errors clustered at the level of firm of employment in 1999. ***, ** and * indicate significance at the 1%, 5% and 10% levels respectively.

Panel A of Table 3 shows the average impact of trade liberalization among all workers, while Panel B distinguishes results by gender. Workers experience an average reduction in annual earnings amounting to 4.1% of pre-shock annual earnings across the years over the sample period (column

1, of Panel A). While the average earnings effect is not estimated precisely, implying an underlying heterogeneity, both employment and hours estimates are negative and significant (columns 2 and 3, respectively). The results in Panel B show that the average earnings impact of Chinese import competition on women is significantly worse than for men (column (1)). This confirms gender differences in log earnings as shown in Figure 2 and shows that trade-induced gender difference in earnings persists even after taking into account earnings losses due to possible long-term non-employment spells. Providing evidence on the mechanisms for the long-run gender earnings gap, we see that female workers face disproportionately more time in unemployment (column (4)), and also shorter hours and fewer years of employment contribute to the gender earnings gap (columns (3) and (2), respectively). Moreover, the Female interaction coefficient in the earnings equation is large (in absolute value) compared to those in the employment and hours equations, implying that part of the gender inequality comes from women taking jobs with relatively low pay.

We also see that the trade shock has no negative long-run impact on the personal income –labor earnings net of insurance payments, as well as cash and non-cash benefits and transfers–, whether the worker is male or female (column (5)). As Denmark is a country with active labor market policies, the long-run earnings losses that are born especially by women are compensated via insurance payments and transfers.[12] We also show that import competition causes a significant increase in transfers, more so for women, which is in line with larger earnings losses we document for them (see Table A5).

Overall, these results show that increased import competition from China due to the removal of import quotas causes gender inequality in the labor market. The increase in the earnings gap between men and women is due both to women having lower-paid jobs and experiencing reductions in work time.

4.1.2 Gender Gaps Caused by a Gender-Neutral Shock

To understand whether trade-induced gender inequality arises due to differences in workers' adjustment to the shock or because female workers are for one reason or another exposed to a stronger shock than male workers, or perhaps face different treatment at the exposed firm, we decompose the labor market outcomes into outcomes associated with the workers' firm as of 1999 and outcomes resulting from subsequent labor market spells. The latter reflect worker reallocation to other

[12]Personal income differs from disposable income. In addition to unemployment insurance and -benefits, personal income includes, for example, subsidies for housing and utilities provided by local or state governments for unemployed or lower-income residents.

firms, industries and sectors (hence the adjustment), while the former provides information on the size of the initial impact of the shock. Annual earnings at the firm of employment in 1999, the dependent variable in Panel C, column (1), takes the value of zero in year t for a worker who does not work for the firm of employment of 1999 in year t.[13]

For the typical worker, import competition causes a 15% reduction in annual earnings at the 1999 firm of employment compared to earnings before the shock. Importantly, the earnings loss at the 1999 firm of employment is the same for both men and women (the Female interaction coefficient is close to zero in column (1), Panel C). It is mostly driven by displacement–shorter spells at the 1999 firm of employment–, rather than due to lower wages or lower hours worked at the exposed firm (columns (2) and (3), Panel C).[14] To sum up, we find no evidence that women's labor market outcomes at the exposed firm are significantly worse than men's.

In column (4) of Panel C, the dependent variable is the unemployment spells that follow the employment spell at the 1999 firm. We find no evidence that women have greater difficulty in finding a new job after initial displacement compared to men (column (4), Panel C), and consequently, the disproportionate long-run impact on female unemployment seen in Panel B is due to differences in employment paths between men and women as they adjust to import competition from China.

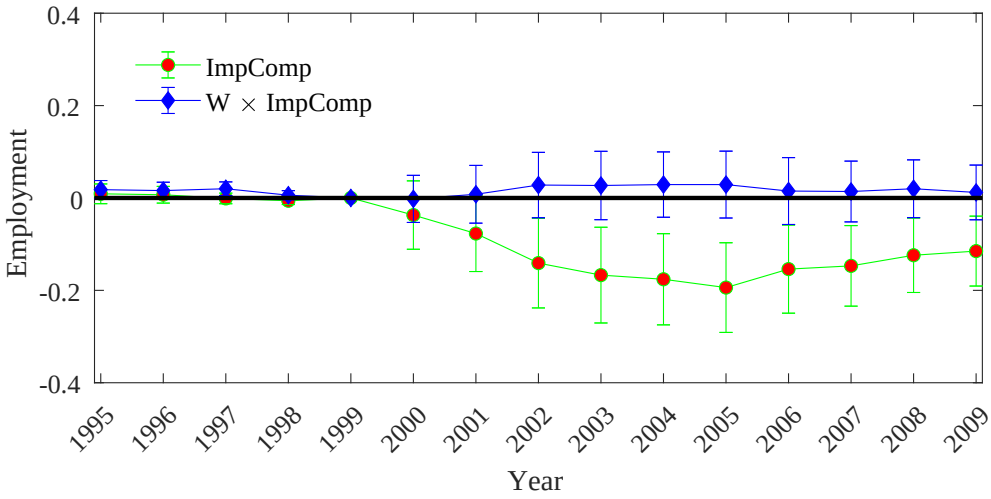
The year-by-year impact of import competition on employment and earnings at the 1999 firm of employment is shown in Figure 3. Key for our purpose is whether women are more likely to be displaced from the exposed firms and whether the size of the earnings loss is comparably large for male and female workers. Figure 3a shows that for both genders a significant decline in employment starts in 2002, with the negative effect being largest in 2005. The differential impact on women is close to zero, and if anything, positive throughout 2002-2009 (blue diamonds). Moreover, the size of earnings losses for male and female workers at the 1999 firm of employment is similar as well (Figure 3b). Figure 3 also shows that there is no major difference between exposed and control workers at the 1999 firm of employment during the years before 1999.

These results show that import competition due to the removal of import quotas on China causes a significant gender earnings gap in the long-run, yet the resulting gender differential is not driven by women being hit by a stronger adverse shock than men. Are the greater labor market losses of women the flip side of the shift towards more family activities? This is addressed in the next

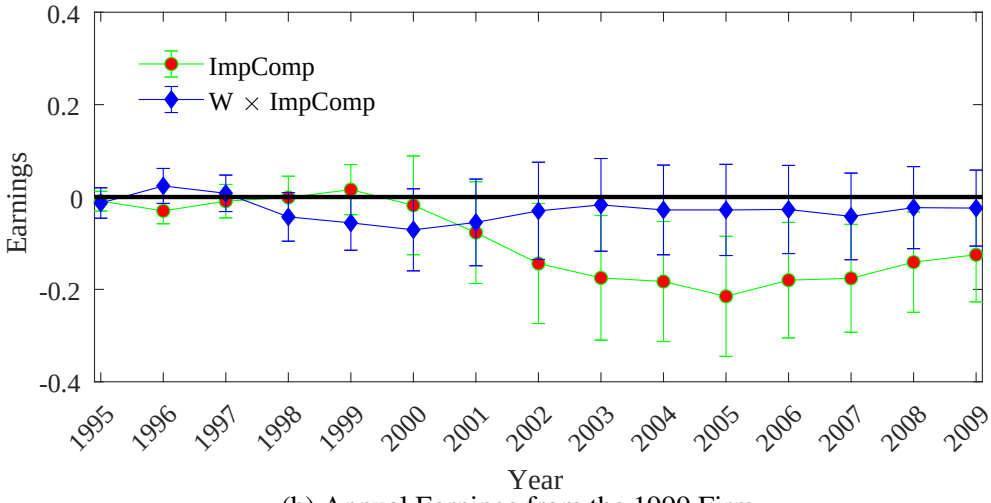
[13] In the data, a worker's annual labor market position is recorded in the end of November of each year.

[14] The specifications in Panel C of Table 3 have a lower number of observations than the respective specifications above because not all workers are employed at the 1999 firm throughout 1994-1998. When workers are not employed at the 1999 firm of employment in the pre-1999 years, the dependent variables in Panel C are not defined.

section.



(a) Employment at the 1999 Firm



(b) Annual Earnings from the 1999 Firm

Figure 3: Short-run Impact by Gender

Notes: Figure shows impact of import competition on the probability of employment (top) and annual earnings (bottom) at the worker's firm of employment as of 1999. Estimation of equation (2). Coefficients for ImpComp (= Year × Exposure) and W × ImpComp with 90% confidence intervals shown. Coefficient estimates and standard errors provided in Table A4.

4.2 Import Competition Induces Childbirth

This section examines workers' fertility responses to the textile trade liberalization. Fertility information draws on the population registers and shows whether a worker (woman or man) has become

the biological parent to a newborn. Focusing on the set of fertile-age workers, defined to be between 18 and 39 years old as of 1999, we estimate equation (3) with the cumulative number of childbirths as the dependent variable. We find no evidence that import competition leads to lower fertility. On the contrary, the key finding is that import competition increases newborn children for women but not for men. The gender gap in fertility is strongest for workers who, as of 1999. are single. Figure 4 plots results from estimation equation (2) for these workers, with regression coefficients and standard errors shown in Table A6.

First, note that coefficients before the year 2002 are close to zero, indicating that the set of exposed and control workers face similar fertility trends before the shock (Figure 4a). The impact of import competition on childbirth responses of male workers is captured by the ImpComp series (ImpComp is short for Year $\times$ Exposure). Trade exposure tends to decrease the number of newborns that male workers have; all coefficients over the post-removal years are negative, but imprecisely estimated.

Furthermore, import competition disproportionately increases the rate at which female workers have a newborn child (the W $\times$ ImpComp series in Figure 4). We estimate positive coefficients for every year from 2002, when the Chinese quotas were lifted, to the year 2009, and the coefficient is significant in 2004. Table A8 also shows a significant average annual impact of the shock among single workers and results for all fertile-age workers.

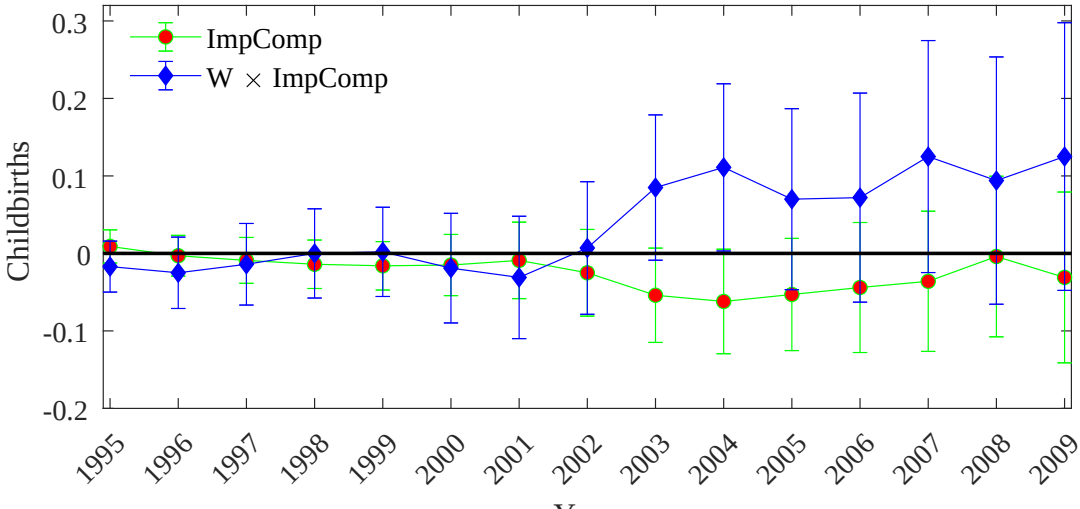
Figure 4b plots the regression results among the same group with the dependent variable is the cumulative number of days in parental leave spells. We confirm that women spend less time in the labor market as a result of childbirths by finding that women spend more time in parental leave. The timing of parental leave effect suggests that parental leave is mostly associated with childbirth.

These results demonstrate not only that import competition has a significant impact on fertility but also that the earnings impact of the shock is likely to manifest itself over a long period. Single workers are almost by definition at an early stage of their lives, implying that their fertility choice will affect a large part of their life.

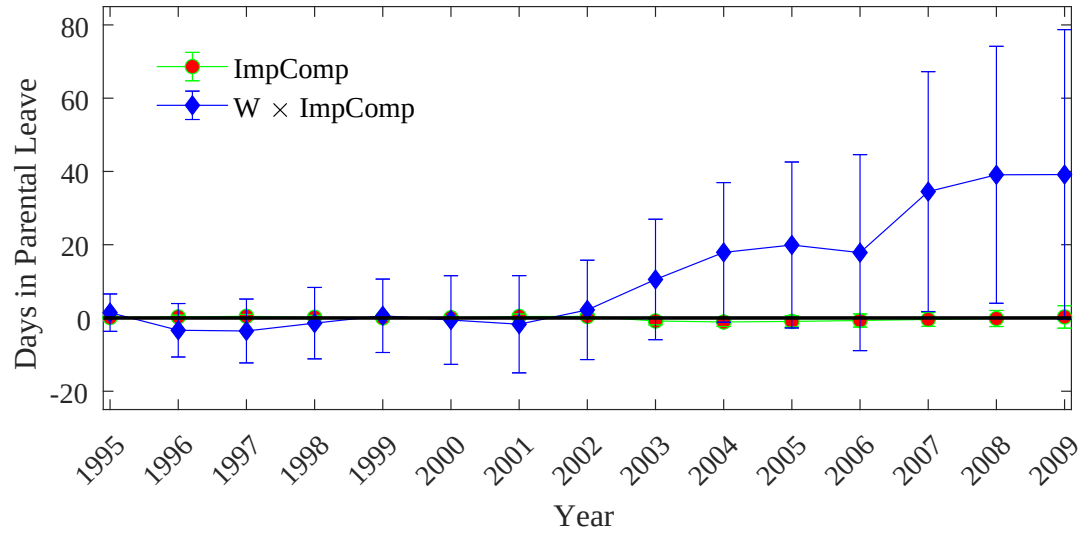
4.3 Marriage Responses to Import Competition

We estimate the impact of import competition on marriage probabilities by estimating equation (2) among workers who were not married as of 1999. The dependent variable takes the value of 1 on and after year t if worker i gets married in year t, and zero otherwise. Figure 5 shows these results.

The yearly evolution of the impact of import competition on the likelihood of marriage for male



(a) Childbirths



(b) Days in Parental Leave

Figure 4: Import Competition, Fertility, and Parental Leave

Notes: Dependent variables are cumulative number of childbirths (top) and cumulative number of days in parental leave (bottom). Estimation of equation (2). Sample is all single textile workers of fertile age as of 1999 (N = 24,797). Shown are ImpComp (= Year × Exposure) and W × ImpComp (= Year × Exposure × Female) point estimates with 90% confidence intervals. Coefficients and s.e. are provided in Table A6.

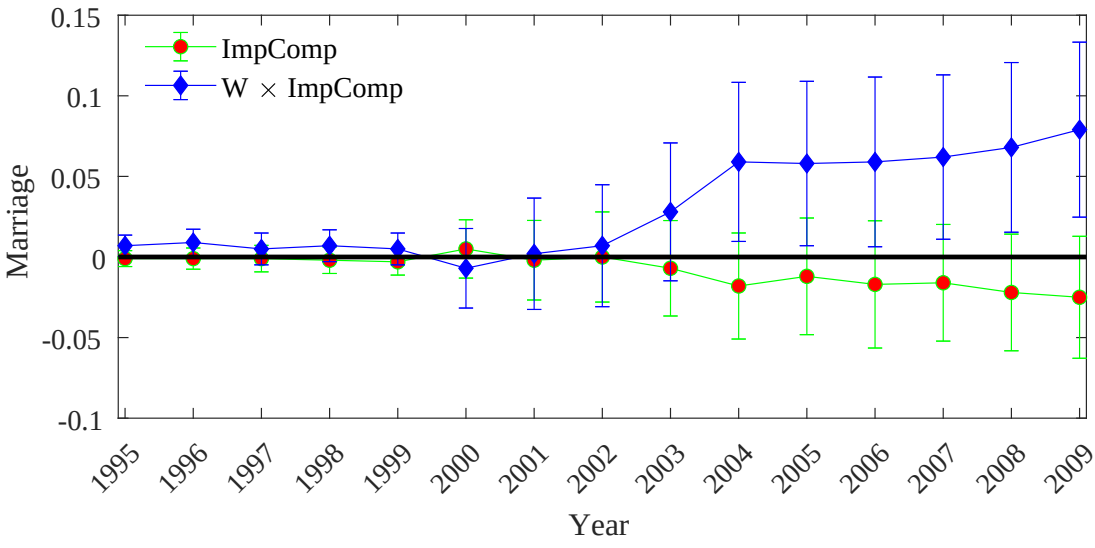


Figure 5: Import Competition and Marriage

Notes: Figure shows impact of import competition shock on cumulative probability of getting married. Estimation of equation (2). ImpComp (= Year × Exposure) and W × ImpComp (= Year × Exposure × Female) coefficients with 90% confidence intervals shown. Sample is textile workers who were not married as of 1999 (N = 64,768). Coefficients and standard errors in Table A7, column (1).

textile workers is given by the series ImpComp, and we see that import competition tends to reduce male marriage probabilities. In sharp contrast, import competition causes a significant increase in the marriage probabilities of female workers, as evidenced by the series W × ImpComp, especially over the years 2004-2009 (Figure 5).

Of course, marriage and fertility decisions might be related. We find that the positive marriage impact of import competition is relatively large for fertile-age workers (Table A7). In addition, there is an even larger marriage impact for fertile-age women who are single, not cohabiting in 1999 (see Table A7). This means that the marriage impact of the shock is not likely to be driven by insurance motivations. Exploring the impact of import competition on the joint decision of marriage and childbirth, we estimate a positive coefficient for women, and our results also indicate that the childbirth effect of import competition tend to precede the marriage impact (results are available upon request).

Furthermore, import competition leads to a greater reduction in women's likelihood of divorce more than it does for men, and this gender gap is stronger for workers of fertile age (see Figure A3). This is consistent with women's stronger focus on family planning extending from fertility

and marriage to whether a person will stay in an existing marital union or not.[15]

Overall, our results show that women's re-optimization after a trade-induced displacement shock is likely to have consequences for long-run careers, family structure, and gender inequality.

5 Extending the Results to all Private-Sector Workers

Do these findings on textile workers generalize for the entire economy? Here we address this point by examining labor market and family trajectories of Denmark's entire 1999 private-sector cohort, about 1.6 million workers, over the years 2000-2009.

Our estimation exploits the change of import penetration in Denmark between 1999-2009 across six-digit industries. In the case of earnings, the estimation equation is:

$$Earnings_i^{2000-09} = \beta_0 + \beta_1 \Delta IMP_{j(i)} + \beta_2 \Delta IMP_{j(i)} \times Female_i + Z_i^W + Z_i^F + Z_i^P + \varepsilon_i. \quad (4)$$

The dependent variable $Earnings_i^{2000-09}$ is cumulative annual earnings of worker i over the period from 2000 to 2009. On the right-hand side, the variable $\Delta IMP_{j(i)}$ is the change in import penetration from China over 1999-2009 in worker i's six-digit industry of employment as of 1999:

$$\Delta IMP_{j(i)} = \frac{M_{j,2009}^{CH} - M_{j,1999}^{CH}}{C_{j,1999}}. \quad (5)$$

Here, $M_{j,t}^{CH}$ denotes imports from China in worker i's six-digit industry j and year $t = \{1999, 2009\}$, and $C_{j,1999}$ is consumption in year $t = 1999$, equal to production minus exports plus imports in the six-digit industry j. We include an extensive set of worker (Z_i^W), firm and six-digit industry (Z_i^F), and partner (Z_i^P) characteristics as of year 1999 to ensure that we compare observationally similar workers.[16] Importantly, Z_i^W includes occupation fixed effects to address potentially confounding technological factors. Further, instead of comparing workers across rather different industries such

[15] We also find the reduction in women's divorce likelihood does not depend on spouse's income, indicating insurance motives are not important in women's move toward family (results are available upon request).

[16] We include worker characteristics that potentially affect an employee's labor market-family choice. The term Z_i^W includes gender, age, the interaction between gender and age, immigration status, marital status (married indicator, widow indicator, an indicator whether an individual has ever been in any form of homosexual union), the number of children, the squared number of children, education (college dummy, vocational education dummy, at most high-school diploma dummy), the logarithm of the hourly wage, occupation (two-digit ISCO fixed effects), the history of unemployment spells, an indicator whether the individual is a union member, and the worker's labor market experience, measured by the number of years in the labor market.

as chemicals versus electronics, we include two-digit industry fixed effects to focus on variation within electronics or chemicals.[17] The term ε_i is a mean zero residual. We allow for arbitrary correlation patterns by clustering at the six-digit industry level.

In order to address the potential endogeneity of the change of Chinese import penetration in Denmark, we instrument Chinese imports in Denmark with Chinese imports in other advanced countries (as in Autor, Dorn, and Hanson 2013). Our first instrumental variable is given by:

$$\Delta HIP_j^{CH} = \frac{OM_{j,2009}^{CH} - OM_{j,1999}^{CH}}{C_{j,1996}}, \tag{6}$$

where $OM_{j,t}^{CH}$ is the total value of imports in the corresponding six-digit industry j in eight high-income countries at year t.[18] To address possible sorting in anticipation of import changes, our instrumental variables approach utilizes consumption levels from the year 1996. An important identification condition of this approach, for which there is ample support, is that China's exports are primarily driven by China's economic reforms as well as the global decline in trade costs.

We strengthen this approach by adding a second instrumental variable based on six-digit industry variation in transportation costs. It exploits the fact that a given supply shock in China leads to disproportionately large exports to Denmark in industries in which transport costs are relatively low. The instrumental variable, $Open_j^{Dist}$, is given by the log of the weighted sum of bilateral distances to the import source countries, where the weights are the import source-country's shares of industry imports in 1996:

$$Open_j^{Dist} = log \sum_c \{\omega_c^j \times d_{DNK,c}\}, \tag{7}$$

where $d_{DNK,c}$ is the distance between Denmark and country c and ω_c^j is industry j's import share from import source country c in 1996. Consider two industries, j and k, that import from the same set of countries (and hence same bilateral distances). If industry j has relatively high-transport cost, $Open_j^{Dist}$ will be relatively low because import shares are skewed towards sources that are relatively near by (low distances). Conversely, high values of $Open_j^{Dist}$ indicate that import shares are less skewed towards low distances, thereby indicating low transport costs. When transport

[17] The terms Z_i^F also include firm and six-digit industry pre-trends, and Z_i^P includes demographic and labor market characteristics of a worker's partner. We describe the full set of controls in Z_i^F, and Z_i^P in section A.6.

[18] They are Australia, Finland, Germany, Japan, the Netherlands, New Zealand, Switzerland, and the United States.

costs are low, a given supply shock in China will tend to increase Danish imports by a lot, and hence we expect a positive relationship between ΔIMP_i and $Open_j^{Dist}$. This is plausibly exogenous because transportation costs are geography-based and because lagged import shares are employed. First-stage regression results confirm that our instrumental variables are strongly correlated with the change in Chinese import penetration and have the expected signs (see Appendix, Table A16).

Table 4 presents the second-stage results. Panel A shows results for the impact of Chinese import competition on workers' cumulative labor market outcomes over the period of 2000-2009, reflecting the long-run adjustment of these workers. The linear coefficient capturing the impact on men in column (1) is positive but statistically not distinguishable from zero, while the female interaction coefficient is negative and significant. Thus, Chinese import competition has caused long-run gender earnings inequality among all private-sector workers. In columns (2)-(4), we focus on workers' employment, and the dependent variables are respectively the cumulative number of years with primary employment, the cumulative number of hours worked, and the cumulative unemployment spells (measured in months). We see that Chinese import competition disproportionately decreases female employment and hours worked, at the same time it raises female unemployment more strongly than male unemployment (Panel A, columns (2), (3), and (4), respectively). Table 4 also reveals that Chinese import competition did not lower workers' personal income, earnings adjusted for insurance and transfer payments, neither for male nor for female workers (column (5), Part A). These results are in line with our quota removal experiment findings above. Additional evidence on the validity of our instrumental variables comes in the form of overidentification tests, which show that virtually always the p-value of the text is above 10 percent (see Table 4).

To separate the adjustment to the shock from the initial impact of the trade shock, we define analogous dependent variables as before that are associated to the workers' six-digit NACE industry of employment as of 1999. We capture the short-run impact by focusing on outcomes while the worker is still employed in her or his initial six-digit industry. Once a worker is displaced from the initial industry of employment, earnings, income and hours do not contribute anymore to the worker's cumulative variables in Panel B.[19] To capture the short-run impact in unemployment, we focus on the unemployment spells that immediately follow the 1999 job as in Section 4.

We see that import competition leads to significant short-run earnings reductions for both men and women. This contrasts with the long-run findings, where it is exclusively women who do not recover from their short-run earnings losses (column (1), Panels B and A, respectively). Workers

[19]Here we focus on workers' movement from their initial six-digit industry of employment instead of from the initial firm of employment as of 1999 because the level of exposure is defined at the six-digit industry level.

exposed to Chinese import competition may adjust along a number of dimensions in the labor market as well as the labor market-family margin. Panel A of Table 4 documents a substantial gender gap in the labor market after this adjustment period.

Table 4: **Gender Gaps in Labor Market Adjustment – All Private Sector Workers**

	(1) Earnings	(2) Employment	(3) Hours	(4) Unemployment	(5) Personal Income
Panel A. Long-run Impact					
ΔIMP_i	1.961	-0.436	0.350	11.186*	-1.513
	(2.697)	(0.857)	(1.661)	(6.261)	(8.289)
Female $\times$ ΔIMP_i	-13.393**	-2.626**	-8.252**	18.917**	13.802
	(6.267)	(1.225)	(3.667)	(9.330)	(18.270)
Hansen J OverID stat	0.316	0.062	0.062	0.359	0.068
Hansen J P-value	0.574	0.804	0.804	0.549	0.794
Panel B. Short-run Impact					
ΔIMP_i	-12.703*	-9.560*	-10.186*	3.697	-11.316*
	(6.699)	(4.941)	(5.548)	(2.256)	(6.073)
Female $\times$ ΔIMP_i	0.179	1.612	-0.088	1.226	2.202
	(2.447)	(1.905)	(1.891)	(1.866)	(2.365)
Hansen J OverID stat	1.446	1.177	1.494	3.010	1.157
Hansen J P-value	0.229	0.278	0.222	0.083	0.282
For both panels					
S-W F-stat (ΔIMP_i)	19.739	19.739	19.727	19.739	19.739
S-W F-stat (Female $\times$ ΔIMP_i)	16.007	16.007	16.022	16.007	16.007
N	1,651,774	1,651,774	1,642,413	1,651,774	1,651,757

Notes: All dependent variables, given on top of column, are defined over period 2000 to 2009. Earnings, hours and income variables are measured in units of worker i's 1999-1996 average earnings, hours worked and income, respectively. Unemployment is an index number indicating total time spent in unemployment spells over 2000-2009. Dependent variables in Panel A are cumulative outcomes in any job during 2000-2009; dependent variables in Panel B are cumulative outcomes while workers employed in their initial six-digit industry. Unemployment in Panel B is defined as the cumulative spells following the initial job spell of worker i. Estimation by 2SLS; second-stage coefficients shown. First-stage coefficients in Table A16. All specifications include two-digit industry and occupation fixed effects, as well as worker, firm, and partner characteristics. S-W stands for Sanderson-Windmeijer. Robust standard errors clustered at the six-digit industry level (701) in parentheses. *, ** and *** indicate significance at the 10 %, 5% and 1% levels respectively.

Furthermore, while import competition leads to a reduced number of years of employment and hours in the exposed industry, there is no significant difference in the short-run effects for men and women (see Panel B, columns (2), (3), and (4)). Moreover, there is no gender differential in how workers' personal incomes are affected in the short run (column (5), Part B). These results show that import competition causes a gender gap in the entire labor market, despite the initially gender-neutral impact of the shock.

Next, we focus on the family decisions. Results for the impact of import competition on childbirth are shown in column (1) of Table 5 for more than 900,000 workers who are between 18 and 39 years old as of 1999. With a positive and significant female interaction coefficient of about 0.9 and a coefficient for men that is relatively small, there is evidence for a gender differential in trade-induced fertility decisions. We also document a significant gender differential in the likelihood of taking parental leave in favor of women, indicating that family activities require women's time out of the labor market (Panel A of Table A17). These findings are in line with what we have found in the case of the quota removal experiment above.

Turning to the impact of import competition on marriage, there is no evidence that import competition from China strongly affects the marriage likelihood of men (Table 5, column (2)). In contrast, the marriage likelihood of female workers increases with exposure to rising import competition (the interaction coefficient is significant at the one percent level and about six times larger than that of men). This shows that our fertility and marriage results from the sample of textile workers carry over to the Danish economy as a whole.[20]

It is useful to contrast our result with the finding that the overall marriage rate in the U.S. has fallen due to import competition from China (Autor, Dorn, and Hanson 2019). In contrast, we find evidence for higher marriage rates due to substitution from labor market to family activities, in part because negative income effects are not as dominant as they are in the United States. The level of government transfers and insurance payments to workers who lose their jobs is greater in Denmark than in the United States. As shown in Tables 3 and 4, while labor earnings are down, there is no significant negative effect of import exposure on the (transfer-inclusive) personal income of Danish workers. Our result is of interest from a policy perspective because it indicates that the institutional framework may be important in shaping aggregate responses to import competition.

[20]We also find broadly similar gender gaps on divorce behavior as for the textile trade liberalization. Results are available upon request.

Table 5: **Birth and Marriage Responses - All Private-Sector Workers**

	(1) Childbirth	(2) Marriage
ΔIMP_i	-0.346	0.054
	(0.271)	(0.126)
ΔIMP_i x Female	0.917***	0.445***
	(0.218)	(0.105)
N	903,629	757,302
Sample	Age 18-39	Unmarried
S-W F-stat (ΔIMP_i)	18.874	19.007
S-W F-stat (ΔIMP_i x Female)	16.121	15.727
Hansen J OverID stat	2.047	1.439
Hansen J P-value	0.153	0.230
No. of Clusters	756	757

Notes: Dependent variable, at top of column, is the number of childbirths over 2000-2009 and an indicator for marriage of worker *i* over 2000-2009, and zero otherwise (columns (1) and (2), respectively). Estimation by 2SLS; second-stage coefficients shown. First-stage coefficients in Table A16. All specifications include two-digit industry and occupation fixed effects as well as worker-, firm-, and partner characteristics as discussed in the Appendix. S-W stands for Sanderson-Windmeijer. Robust standard errors clustered at the six-digit industry level in parentheses. *, ** and *** indicate significance at the 10 %, 5% and 1% levels respectively.

Overall, these results provide evidence that the size of the import-induced labor shock for men and women is similar. The gender gap in labor market outcomes is primarily the result of differences in the long-run adjustment of men and women. Furthermore, results on fertility and marriage in Table 5 show that women disproportionately respond to Chinese import competition by moving towards family activities. We conclude that the import quota experiment generalizes to the economy as a whole.

6 Explaining Gender Gaps in the Market vs. Family Margin

This section lays out our biological clock hypothesis for gender gaps in workers' responses. We turn to our quasi-natural experiment to show that child-bearing and child-rearing is key for the gender gap because the gap vanishes for workers who are past their fertile period. Furthermore, women who are about to run out of their biological clock contribute most strongly to the fertility response. We then employ our economy-wide sample to provide additional evidence on the

heterogeneity in female responses in demographic, education and occupation dimensions.

6.1 The Biological Clock Explanation

We argue that our findings are related to child-bearing and child-rearing, in which women are more involved than men. As shown above, women respond more strongly to the import shock by moving towards family activities than men, especially relatively young workers. Now we demonstrate that these younger women do this at the expense of successful trade adjustment and better careers in the labor market. Table 6 presents the results.

Table 6: **Earnings Gaps by Age and Family Activity**

	(1) Fertile Age	(2) Not Fertile Age	(3) Family Activity 2002-9
Panel A. Long-run Impact			
ImpComp	0.103*	-0.084**	0.130**
	(0.062)	(0.041)	(0.060)
ImpComp × Female	-0.156**	-0.042	-0.178**
	(0.066)	(0.042)	(0.079)
N	78,567	74,570	36,158
Panel B. Short-run Impact			
ImpComp	-0.126**	-0.174***	-0.104*
	(0.052)	(0.058)	(0.055)
ImpComp × Female	-0.013	0.033	-0.020
	(0.041)	(0.049)	(0.054)
N	69,263	69,234	31,583

Notes: Panel A gives Long-Run Impact; dependent variable is worker *i*'s annual earnings in any job. Panel B gives Short-Run Impact; dependent variable is worker *i*'s annual earnings obtained from the 1999 firm of employment. Annual earnings expressed in worker *i*'s average annual earnings over 1996-1999. Sample is given at top of column as a subset of all workers with firm of employment in 1999 in textiles or clothing. Family activity is defined as birth, marriage or parental leave. Workers in any of these activities over 2002-2009 are in the sample in column (3). ImpComp stands for Post × Exposure. Fertile Age is defined as ages 18 to 39 in year 1999. Estimation of equation (3) by least squares. Robust standard errors clustered at the level of workers' firm of employment in 1999 in parentheses. *, ** and *** indicate significance at the 10 %, 5% and 1% levels respectively.

The dependent variable in Panel A is annual earnings from any job, so that the results capture both the effect of the import shock on impact, or, initial effect, and the effect as workers adjust to the shock. In contrast, Panel B of Table 6 shows only the initial effect of the import shock, as measured by earnings from the firm of employment as of 1999. Results in column (1) are for fertile age workers, whereas findings for workers outside of their fertile age are shown in column (2). We see that despite experiencing a reduction in annual earnings at the exposed firm amounting to 12.6 % of pre-shock earnings (Panel B, column (1)), fertile-age men are able to fully compensate for the earnings loss induced by displacement in the long run, while this is not the case for older male workers (see coefficient on ImpComp, Panel A, columns (1) and (2), respectively). The relatively good adjustment of younger workers is consistent with human capital theory and other evidence (Dix-Carneiro 2014, Utar 2018). In sharp contrast, however, fertile-age women are not able to make up for the initial earnings reduction, resulting in a significant earnings gender gap in the long run (coefficient of -0.156, Panel A, column (1)).

Workers in their fertile age are relatively young, and for these workers, questions of child-bearing matter more compared to workers who are not in their fertile age anymore. The results in column (2) show that exposure to import competition does not lead to a gender gap for workers outside their fertile age. Because import competition induces significant earnings differences in the long-run only for younger workers, this is evidence that child-bearing and -rearing is at the center of this gender inequality. Figure A4 shows the annual evolution of the earnings gap induced by trade, specific to fertile age workers. The gap amounts to 20% of pre-shock annual earnings and is stable over 2002-2009. The earnings difference between fertile-age men and women arises because young women shift disproportionately towards family activities, as we have seen above.[21]

In the final specification of Table 6 we restrict the sample to those workers who have at least one family activity over 2002-2009, as defined by getting married, having a child, or taking parental leave. We see that the gender earnings differential is stronger for this group than for the other groups of workers presented in Table 6. It is indeed women's family activity that leads exposed female workers to have a relatively weak earnings performance. In terms of timing, we find evidence that a woman's move towards family typically occurs *after* a non-employment spell following

[21] According to Table 6, young men do not suffer at all from the trade-induced job displacement shock, in the long run, so one might ask whether the trade-induced displacement shock for them is actually a good thing. First, that labor earnings (more than) fully recover over time does not mean that welfare increases through the import shock, because often workers have to incur substantial costs of retraining for their new careers, which we do not capture. Also, we find evidence that young workers have certain skill sets that allow them to benefit from occupation-specific shocks (see Panel B of Table A14).

displacement from the firm she was employed in 1999 (see Table A10).[22]

In sum, the biological clock eliminates the advantage of being young for women in the presence of a negative labor market shock, but not for men. Birth is female-time-intensive by nature, and women, in contrast to men, tend to have difficulties conceiving beyond their early forties. As a consequence, a younger woman's reservation value to stay in the labor market is higher than a man's reservation value at the same age. For any given negative labor shock, a woman will have stronger incentives to take up family activities than a man, versus committing to a new career path with the associated investment in training. This explains both the gender difference in family responses and that women's labor earnings fall behind those of men as a consequence of this shift to family. The argument applies as long as the woman's age is low enough so that child-bearing and child-rearing are still playing a role (see Table 6, columns (1), (2)).

Before we evaluate the biological clock hypothesis further, it is important to consider other factors, such as the sample composition of men and women. For example, women are disproportionately working as clerks while men account for more of the managers. Our quasi-natural experimental design includes worker fixed effects, which means only within-worker variation is exploited. Because this amounts to comparing female clerks with male clerks, female managers with male managers, and so on, such sample differences are addressed by these fixed effects.[23]

However, there could still be labor market shocks other than import competition that interact with gender due to the differential distribution of men and women across occupations. In particular, technological shocks related to computer and information communication technology or automation were common in the 2000s, and if they affect more negatively jobs in which women are disproportionately working that might explain part of our earnings results. To address this, we have extended the specification to include differential annual time trends across detailed occupations by interacting each four-digit ISCO occupation of workers (as of 1999) with year fixed effects. This implicitly attributes all cross-occupation variation to factors other than import competition (including technology). We find that even controlling for occupation-time trends, women experience disproportionately large earnings losses due to import competition at the same time when they respond more strongly in terms of family than men. Moreover, we confirm that this holds only when they are in fertile age (see Table A14). Thus, our results do not mask technology or any

[22] Consistent with the more strongly negative effect of exposure on women's earnings, Hakobyan and McLaren (2018) estimate that female wage growth in the U.S. was disproportionately reduced by the NAFTA liberalizations, which they explain by higher-paid female workers disproportionately dropping out of the labor force.

[23] Note that we generalize these results with the economy-wide sample by controlling for occupation fixed effects in addition to other detailed worker characteristics, addressing differences in sample compositions.

other shocks that have a differential impact by gender via workers' occupations.

6.2 Mechanisms of Adjustment towards Family

Because the fertile-age window differs across gender, and heavy investments to learn new skills for the new job, industry, or occupation might be incompatible with caring for a young child in which women are disproportionately involved, female workers respond differently to a negative labor market shock than male workers. In particular, the biological clock matters more for women who are closer to the end of their fertile period than for women who are far away from (or past) it. Thus, while generally fertility declines with age, if indeed the fixed fertile-age time window causes a gender difference in worker responses, one should expect that a labor shock generates a larger gender differential the closer women get to the end of their fertile period.

To better understand the age pattern of women's responses, we study gender gaps in fertility responses to import competition depending on workers' age as of 1999. Our quadruple difference-in-differences equation featuring worker age, k, is given by:

$$Birth_{it} = \beta_k \{Post_t \times Exposure_{i,99} \times Female_i \times \sum_k 1[Age_i = k]\} + \mathbf{Z} + \varphi_{it}, \tag{8}$$

where β_k measures women's differential fertility response to import competition depending on her age as of 1999. Equation (8) expands on equation (3) by including Age indicators as fourth differences. The vector $\mathbf{Z}$ includes all lower-order difference-in-differences terms as well as *Worker*, *Year*, $Female \times Year$, $Age \times Year$, and $Female \times Age \times Year$ fixed effects.

Figure 6 presents the interaction coefficient β_k for ages 33 to 39 (see Table A11 for other ages). The horizontal axis shows worker age as of 1999, three years before the 2002 import quota lifting. After that quota lifting, there is a monotonically increasing fertility gender gap with age for workers who are between 36 and 40 years old at the start of the shock. This is natural in the context of the biological clock hypothesis because with every year of age in this range it tends to become more difficult to accommodate the demands of investing into a new career *and* childbearing and -rearing before the biological clock runs out.

Based on point estimates, the largest fertility gender gap is present for workers who are 37 years old in 1999, or equivalently, 40 years at the start of the quota lifting period.[24] For men, the age of

[24]The limited amount of variation left for age to explain differences in fertility responses after all fixed effects and lower-order terms are included in our quadruple-differences specification is one reason why only two coefficients in

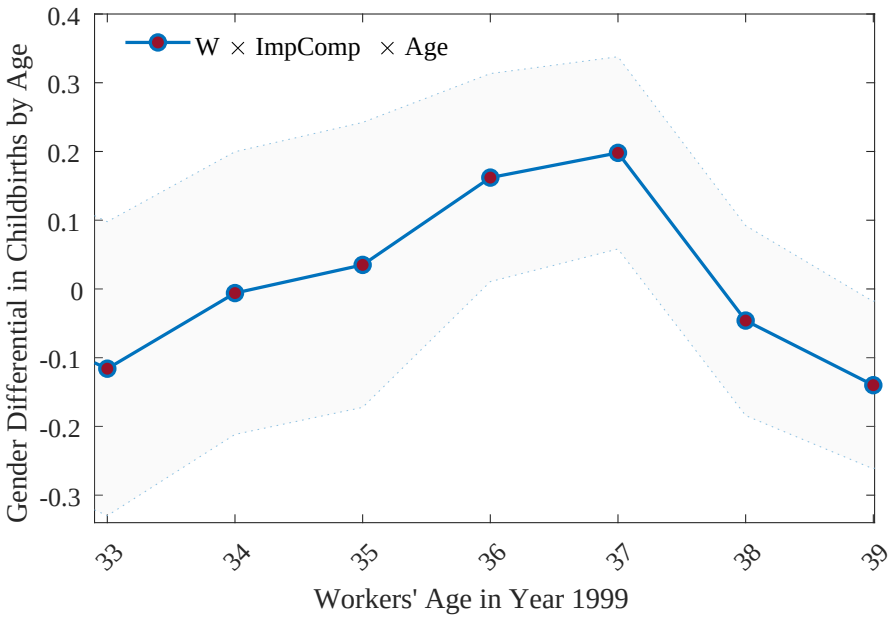


Figure 6: Women's Fertility Response and the Biological Clock

Notes: Figure shows coefficients β_k of equation (8) where the dependent variable is childbirth; N = 158,137; 90% confidence intervals shaded. Corresponding results are in column (1) of Table A11.

40 does not imply a strong and imminent change in their ability to conceive. In contrast, a 40 year old female worker exposed to an adverse labor market shock knows that by the time her firm has weathered the increase in import competition or she has lost her job and successfully retrained, her ability to conceive will be very low. At the same time, being 40 years old, there are typically about two years left on the biological clock. It is virtually impossible to have both a newborn child and invest into a new career during this short period, and given the bleak labor market situation, the woman decides to focus on her fertility goals.

Once women are 41 or 42 years old as import competition increases, the fertility gender gap shrinks again as the biological clock has run out (ages of 38 and 39 as of 1999, see Figure 6). Because 42-year old women typically do not conceive, the goals of having a newborn and necessary investments into a new career are not, in effect, in conflict with each other. As a consequence, the fertility gender gap is relatively low.

While the biological clock is common to all women versus men, in making their fertility decisions,

Figure 6 are positive at standard levels of significance (ages 36 and 37, see Table A11). The average annual gender gap in birth response is positive, and significantly so among single workers, see Table A8.

female workers decide between a shift towards family activities and embarking on a new career– and the latter differs across workers. To shed more light on the underlying mechanism, we examine how women's fertility decisions vary by demographic, education, and occupation factors. To do this, we employ the economy-wide sample with the 2SLS analysis since compared to the quota liberalization sample, the economy-wide sample yields more variation in potentially important dimensions. Table 7 reports results for the sample of all female fertile-age private-sector workers.[25]

We see, first, that among fertile-age women, the fertility response is increasing with age (column (1)). This is consistent with Figure 6 and provides additional support for our biological clock argument with the economy-wide data. Moreover, the fertility response is particularly large if a woman already has one or more children as of the year 1999 (column (2)). A stronger fertility response for women with children is plausible because to the extent that there are scale economies in child-rearing, the increase in costs of the first child is higher than for subsequent children. In addition, if a young child lowers a worker's ability to signal high commitment for investing into training and skill acquisition to future employers, it will be easier for women who already have a child to add another one than for a woman to have her first child.[26] We also examine whether the fertility response varies with the worker's stage of life, measured by whether the women has a partner (either married or cohabiting), finding no significant influence (column (3)).

The remaining specifications in Table 7 consider the roles of worker education as well as hierarchical position and occupation at the worker's initial firm as sources of heterogeneity. We find that exposure to import competition causes a disproportionately positive fertility impact for college educated women (column (4)).[27] Furthermore, Chinese import competition leads to a strong positive fertility response especially for women holding top-level positions in the initial firm (column (5), Table 7).[28]

A female worker who has to consider switching into a new position at the age of 39 knows that

[25] We interact the exposure to import competition with a worker characteristic as of 1999 and control for the same characteristic's linear effect. Also included are all worker-, firm-, industry-, and partner variables, occupation and industry fixed effects that we employed before.

[26] Del Bono, Weber, and Winter-Ebmer (2012) refer to this as the impact of previous children on employability. In line with our results, they find that having children is associated with a higher fertility response.

[27] Exploring the age pattern of the fertility response as in Figure 6 for different groups of workers, we document a particularly strong fertility response for college-educated women close to the end of their fertile age period, see Table A11.

[28] The finding of a positive fertility response to adverse labor shocks for highly-skilled, highly-paid women is the opposite found in some recent work (Del Bono, Weber, and Winter-Ebmer 2012, Huttunen and Kellokumpu 2016). These studies explain their finding by difficulties of re-establishing career paths when having a young child, in particular, that a woman with a young child might not be able to keep up with the intensive training that occurs in the first few years on a new job. Our analysis shows how this interacts with a woman's biological clock.

succeeding in a new position will require considerable investments. The worker also knows that more is expected from a professional, for example, than from an office clerk. If she has not yet fulfilled her fertility goals, the worker might come to the conclusion that she cannot achieve both career and fertility goals in the remaining time of her fecundity. In addition, because high-powered women would have to invest most heavily to succeed in their new jobs, it is these women who will contribute most strongly to the positive fertility response after a trade-induced displacement shock. Yet another possibility is that college-educated, professional workers feel the biological clock more strongly because they are older after postponing child-bearing to invest into their careers. Exploring this further, it turns out that among professionals the fertility response of childless single women (as of 1999) is comparable to that of women who already have a child and relationship; this suggests that even though they pursued higher education and careers, these women had already started to think about family planning (results not shown).

To be sure, there are other factors pushing towards a lower fertility response of educated women, such as that highly-educated workers tend to have more transferable human capital and a better ability to re-accumulate skills. In this respect our result of a positive fertility response indicates that the time window drawn by a woman's biological clock can lead to quantitatively important incentives. The trade-off between committing to be successful in a new top-level career and devoting time to child-rearing and child-bearing before the end of their biological clock induces these women to give birth in response to an adverse labor market shock.

To further pin down the role of time commitments to learn new skills for a new career in the face of the biological clock, we consider a range of specific occupations. In line with our college and top hierarchy results (columns (4) and (5)), we find that women in professional occupations such as industrial engineers, or finance professionals have a positive fertility response to the adverse trade shock (column (6)). Interestingly, the same is not the case for women in less demanding occupations, such as office clerks (column (7)). The fertility impact of the adverse trade shock on women in service occupations is even negative (column (8)). Focusing on machine operators, a typical occupation in manufacturing industries, we find a positive fertility response (column (9)). Workers who had manufacturing-specific jobs are often in need of building new human capital as increased competition with lower-wage countries leads to displacement from manufacturing (Utar 2018). Indeed, we document a strong movement of female workers to the service sector due to Chinese import competition, and it is especially fertile-age women who switch to lower paying occupations in the new sector (see Table A17). Our findings are consistent with significant investments that these workers would have to make when making broad sector switches.

Table 7: **Heterogeneous Fertility Effects among Women**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Demography			Education	Within Firm Job Ranking	Occupations			
ΔIMP_i	-1.458**	-0.230	0.108	-0.005	0.018	0.015	0.081	0.079	-0.051
	(0.648)	(0.238)	(0.175)	(0.162)	(0.162)	(0.163)	(0.167)	(0.163)	(0.189)
$\Delta IMP_i \times$ Age	0.050**								
	(0.020)								
$\Delta IMP_i \times$ Have a child		0.517*							
		(0.297)							
$\Delta IMP_i \times$ Have a partner			-0.131						
			(0.147)						
$\Delta IMP_i \times$ College				0.357***					
				(0.129)					
$\Delta IMP_i \times$ Top Ranked Positions					0.776**				
					(0.309)				
$\Delta IMP_i \times$ Professionals						0.904*			
						(0.464)			
$\Delta IMP_i \times$ Office Clerks							-0.063		
							(0.115)		
$\Delta IMP_i \times$ Service Occupations								-0.832**	
								(0.365)	
$\Delta IMP_i \times$ Machine Operator									0.466*
									(0.246)
N	398,530	398,530	398,530	398,530	398,530	398,530	398,530	398,530	398,530
Hansen J OverID statistic	0.576	0.873	1.073	0.593	0.664	0.644	0.645	0.783	0.555
Hansen J Pval	0.448	0.350	0.300	0.441	0.415	0.422	0.422	0.376	0.456

Notes: Dependent variable, Birth, is an indicator for childbirth of worker *i* over 2000-2009, and zero otherwise. Sample is female workers 18 to 39 years old as of 1999. Estimation by two-stage least squares; second-stage coefficients shown. All regressions include the set of worker, firm and spouse characteristics employed in section 5, as well as two-digit occupation and industry fixed effects. Linear terms of each interaction variable are included in the respective regression if not already among the set of controls. Robust standard errors clustered at the industry level (744) in parentheses. *, ** and *** indicate significance at the 10 %, 5% and 1% levels respectively.

Overall, these results show that the biological clock-induced birth effect is strongest for women who face a costly adjustment to re-establish their careers, either in form of investments in their new skill sets or by having to demonstrate particularly strong commitment to their new jobs.

7 Concluding Remarks

Using population register data on all childbirths and marriages together with employer-employee matched data covering all labor market spells of workers in Denmark, we show that a labor market shock in the form of Chinese import competition has a significant impact on gender inequality through its effect on the family-market work balance. Generally, single workers exposed to import competition have a higher likelihood of getting married, having children, and taking parental leave, while married workers do not divorce their spouses as often as similar non-exposed workers do. Strikingly, even though the negative short-run earnings and employment impact of the shock is similar across both genders, the shift to family is largely accounted for by women, not men. Correspondingly, the negative long-run earnings impact of import competition on women is much higher than for men. These results carry over to the Danish economy at large.

We show that the gender differential in the workers' family-market work adjustment is neither because women are employed in jobs at particular firms, industries, or occupations, nor because women suffer more strongly from concurrent shocks such as technology. Instead, the strong family response, along with the corresponding gender earnings inequality, is due to a woman's biological clock. Because women, not men, can bear children and are unlikely to conceive beyond their early forties, fertile-age women have a higher reservation value to stay in the labor market than men, and a negative labor demand shock induces a woman to move towards family more than it induces a man. Combined with the fact that having and caring for a young child is female-intensive, making investments to succeed in a new career before the biological clock runs out is difficult, and may induce women to focus on family instead of 'having it all'. Support for this comes from finding that there is no gender differential for workers past their fertile age, and that the move towards family is particularly strong among women who are closest to the end of their fertile periods and who would have to make the highest investments into new careers.

Our paper shows how otherwise gender-neutral labor market shocks can generate strongly gender-specific results by interacting with a woman's biological clock. This demonstrates that the gender-gap in the labor market can arise even when education, occupation, or preference differences between men and women, as well as discriminatory practices and policies in labor markets, are limited. Chinese import competition is but one labor market shock where the woman's biological

clock may have important implications for gender inequality, household specialization, and family structure.

This paper also indicates that globalization can have a strong impact on earnings inequality because women and men do not substitute family work for market work in the same way due to a different reservation value to stay in the labor market determined by their biology. In the absence of effective insurance and government transfer systems, the negative effect on earnings may outweigh any substitution from labor market to family, while in a setting with substantial family-oriented support systems as in Denmark, the shift of women towards family activities–with the corresponding implications for gender inequality– is stronger. There is clearly a need for more economic research on the importance of the market-family margin.

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Appendix:

"Globalization, Gender and the Family"

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September 22, 2021

Contents (Appendix)

A Main Appendix

A.1 Textile Trade Liberalization: Descriptive Results

A.1.1 Characteristics By Gender, Family, and Treatment Status

Complementing Table 1 in the text, we show summary statistics by gender as well as family and treatment status in Table A1. The figures show that for the most part differences in the exposed and control samples are relatively small.

Table A1: **Characteristics By Gender, Family, and Treatment Status**

	Exposed Mean	Control Mean	Diff	t-stat
Panel A. Women	N = 3,069	N = 2,524		
Age	39.28	39.21	0.07	0.26
Hourly Wage	134.86	134.28	0.58	0.49
Panel B. Married Women	N = 1,889	N = 1,534		
Age	42.18	41.90	0.28	0.93
Hourly Wage	136.02	135.14	0.88	0.57
Partner's Log Income	12.50	12.47	0.04	2.25
Panel C. Unmarried Women	N = 1,180	N = 990		
Age	34.64	35.05	-0.41	-0.94
Hourly Wage	133.02	132.95	0.06	0.03
Partner's Log Income	12.41	12.39	0.01	0.41
Panel D. Men	N = 1,674	N = 2,731		
Age	39.07	39.24	-0.18	-0.57
Hourly Wage	189.64	181.71	7.93	2.50
Panel E. Married Men	N = 974	N = 1,493		
Age	43.01	43.16	-0.15	-0.43
Hourly Wage	206.98	193.68	13.31	3.01
Partner's Log Income	12.14	12.15	-0.01	-0.41
Panel F. Unmarried Men	N = 700	N = 1,238		
Age	33.58	34.52	-0.94	-2.09
Hourly Wage	165.51	167.28	-1.77	-0.50
Partner's Log Income	12.06	12.12	-0.06	-2.01

Notes: Shown are averages of worker characteristics in year 1999. See the text for definition of treatment. Partner characteristics in the case of unmarried workers are for co-habitant individuals.

A.1.2 Sample Balance in Year 1995

Table A2 shows summary statistics on textile worker characteristics by exposure for the year 1995.

Table A2: **1995 Worker Characteristics by Exposure to Import Competition**

	Treated N = 4,667 Average	Control N = 5,163 Average	Difference	t-stat
Age	35.37	35.43	-0.06	-0.29
Labor Market Experience	11.35	10.96	0.39	3.71
Log Annual Earnings	11.99	12.01	-0.03	-1.45
Married	0.54	0.53	0.01	0.86
Marriage Event	0.02	0.03	0.00	-1.00
Divorce Event	0.01	0.01	0.00	0.56
Birth Event	0.05	0.05	0.00	-0.87

Notes: Shown are averages of the 1995 characteristics of workers treated and not treated (control) to rising import competition from China. Treated workers are those whose firm in 1999 manufactured in Denmark a product protected by a quota that would be removed with China's entry into the WTO, control otherwise. Log earnings is measured in 2000 Danish Kroner.

A.1.3 Sample Balance and Structural Change in the Textile Sector

Figure A1 shows the occupational distribution of female workers whose firm of employment in 1999 was a textile or apparel firm by exposure to Chinese import competition. We see that the largest group of workers are machine operators, and also clerks as well as professionals and technicians are important. Differences in the share of occupations by treatment status are limited.

Figure A2 turns to the sectoral movement of workers. It shows that 38 percent of workers not exposed to Chinese import competition whose firm of employment in 1999 was in textile manufacturing are still in manufacturing by 2009, whereas 31 percent have moved to the services sector. This shift from manufacturing to services is a general trend during the sample period. Factors that may explain this shift towards services include the relocation of manufacturing jobs to other countries and labor-saving technological change in manufacturing (e.g., Keller and Utar 2016).

Figure A2 also shows that of the set of exposed workers, by 2009 44 percent are employed in the service sector, while only 26 percent have still a manufacturing jobs. This difference between exposed and control workers suggests that rising import competition has sped up structural change

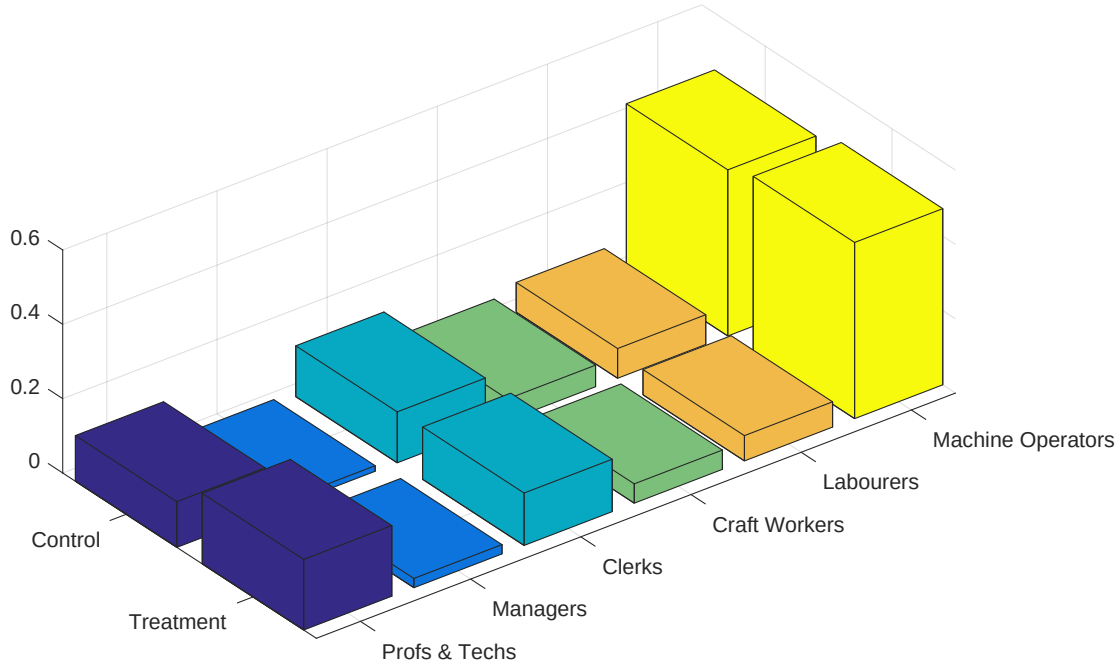

Figure A1: **Occupational Distribution of Female Textile Workers in 1999**

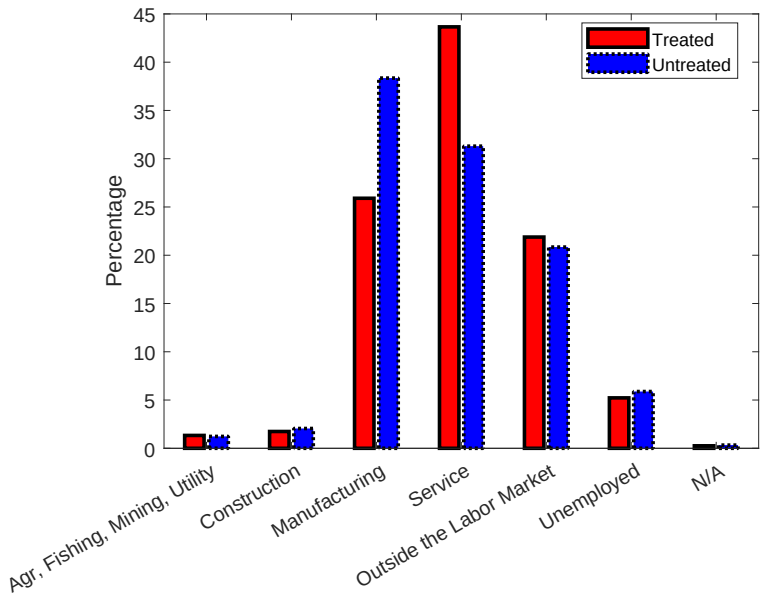

Figure A2: **Sectoral Distribution and Labor Market Status of Workers in 2009**

for exposed workers (see also Utar 2018). If manufacturing firms exposed to import competition have shut down, displacing their workers, or they have scaled down their production, the rate at which exposed workers seek to find jobs in services will be relatively high. In line with this, note that the disproportional shift of exposed workers into services is virtually the same size as their lower tendency of staying in manufacturing (12, versus 13 percentage points, respectively). While Figure A2 shows that exposed workers are somewhat more likely to be out of the labor force than control workers, overall the most important consequence of trade exposure is the shift from manufacturing to services.

A.2 Textile Trade Liberalization and Gender Gaps in the Labor Market

A.2.1 Supporting Material for Figures in the Text

Table A3 reports the coefficients and standard errors shown in Figure 2.

Table A3: **Earnings Impact of Import Competition by Gender**

	Women	**Men**
1995	0.000	0.013
	(0.019)	(0.018)
1996	0.011	-0.018
	(0.022)	(0.022)
1997	0.014	-0.001
	(0.023)	(0.023)
1998	0.009	0.013
	(0.025)	(0.026)
1999	0.022	0.011
	(0.028)	(0.025)
2000	-0.041	0.001
	(0.035)	(0.032)
2001	-0.050	0.015
	(0.034)	(0.034)
2002	-0.078*	-0.021
	(0.040)	(0.048)
2003	-0.064*	-0.001
	(0.039)	(0.044)
2004	-0.064*	-0.022
	(0.033)	(0.039)
2005	-0.099***	-0.031
	(0.034)	(0.044)
2006	-0.061*	-0.018
	(0.035)	(0.038)
2007	-0.063*	0.003
	(0.033)	(0.041)
2008	-0.029	0.029
	(0.033)	(0.044)
2009	-0.048	0.007
	(0.040)	(0.045)
Worker FE	✓	✓
Year FE	✓	✓
N	72,020	60,947

Notes: Dependent variable is the logarithm of annual earnings. Estimation of equation (1) separately by gender. Shown are coefficients on ImpComp (Year × Exposure). FE stands for fixed effects. Robust standard errors are clustered by worker's firm of employment in year 1999. *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively.

Table A4 presents the coefficient estimates and standard errors for Figure 3.

Table A4: **Gender Differentials in the Effect of Import Competition on Impact**

	(1) Annual Earnings at the 1999 Firm		(2) Employment at the 1999 Firm	
	ImpComp	**WxImpComp**	**ImpComp**	**WxImpComp**
1995	-0.009	-0.013	0.009	0.018
	(0.013)	(0.020)	(0.013)	(0.012)
1996	-0.030*	0.024	0.007	0.016
	(0.017)	(0.023)	(0.011)	(0.011)
1997	-0.009	0.008	-0.001	0.020**
	(0.022)	(0.024)	(0.007)	(0.009)
1998	-0.001	-0.043	-0.006	0.006
	(0.028)	(0.032)	(0.005)	(0.006)
1999	0.016	-0.056	0.000	0.000
	(0.033)	(0.036)	(0.000)	(0.000)
2000	-0.018	-0.071	-0.037	-0.002
	(0.065)	(0.054)	(0.045)	(0.031)
2001	-0.077	-0.055	-0.077	0.008
	(0.067)	(0.057)	(0.050)	(0.038)
2002	-0.144*	-0.030	-0.141**	0.028
	(0.079)	(0.064)	(0.059)	(0.043)
2003	-0.175**	-0.017	-0.167***	0.027
	(0.082)	(0.061)	(0.063)	(0.045)
2004	-0.183**	-0.028	-0.176***	0.029
	(0.079)	(0.059)	(0.060)	(0.043)
2005	-0.215***	-0.028	-0.194***	0.029
	(0.079)	(0.060)	(0.059)	(0.044)
2006	-0.180**	-0.027	-0.154***	0.015
	(0.076)	(0.058)	(0.058)	(0.044)
2007	-0.176**	-0.042	-0.147***	0.014
	(0.071)	(0.057)	(0.053)	(0.040)
2008	-0.141**	-0.023	-0.124**	0.020
	(0.066)	(0.054)	(0.049)	(0.038)
2009	-0.125**	-0.024	-0.115**	0.012
	(0.062)	(0.050)	(0.046)	(0.036)
Worker FE	✓		✓	
Year FE	✓		✓	
Female × Year FE	✓		✓	
N	138,497		138,497	

Notes: Estimation of Equation (2). Dependent variable in column (1) is annual earnings obtained from the 1999 firm of employment. Annual earnings are expressed in workers' own average 1996-1999 earnings. Dependent variable in column (2) is employment at the 1999 firm of employment. ImpComp is Year × Exposure, W × ImpComp is Female × Year × Exposure. As all textile workers are employed in 1999 at the 1999 firm of employment by construction, Exposure x 1999 is not estimated in column (2). FE stands for fixed effects. *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively.

A.2.2 Import Competition and Income Transfers

Table A5 shows the impact of trade exposure on income support workers receive from the Unemployment Insurance (UI) Fund. The results show that trade exposure leads to an increase in unemployment benefits amounting to a 26% of an initial pre-shock monthly earnings (column (1)). Panel B shows that the increase in unemployment benefits is significantly higher for women. In column (2) and (3) we focus on education and other benefits provided by the UI fund. Import competition significantly increases both of these transfers, especially for women.

Table A5: **Import Competition and Income Transfers**

	(1) UI Benefits	(2) Education Benefits	(3) Other UI Benefits
Average Impact			
ImpComp	0.262**	0.069**	0.059***
	(0.077)	(0.030)	(0.016)
Impact by Gender			
ImpComp	0.165**	0.041*	0.016*
	(0.077)	(0.021)	(0.008)
ImpComp × Female	0.221*	0.063	0.084***
	(0.125)	(0.048)	(0.027)
Female x Year FE	✓	✓	✓
For both panels:			
N	108,850	108,850	108,850
Worker FE	✓	✓	✓
Year FE	✓	✓	✓

Notes: Dependent variable at top of column. They are different transfers from the Unemployment Insurance (UI) Fund, expressed in pre-shock (1996-1999) monthly earnings. ImpComp stands for Post × Exposure. Sample period: 1999-2009. FE stands for fixed effects. Robust standard errors are clustered by workers' firm of employment as of 1999. *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively.

A.3 Family Adjustment in Response to Textile Trade Liberalization

A.3.1 Supporting Material for Figures in the Text

We begin with reporting point estimates and standard errors for figures shown in the text. Table A6 reports these for the fertility and parental leave Figure 4, while Table A7 shows point estimates

and standard errors for marriage responses, which is Figure 5 in the text.

Table A6: **Import Competition, Childbirth, and Parental Leave**

	(1) Birth		(2) # of Days in Parental Leave	
	ImpComp	**W × ImpComp**	**ImpComp**	**W × ImpComp**
1995	0.009	-0.017	0.122	1.451
	(0.013)	(0.020)	(0.142)	(3.102)
1996	-0.003	-0.025	0.289	-3.355
	(0.016)	(0.028)	(0.289)	(4.436)
1997	-0.009	-0.014	0.452	-3.552
	(0.018)	(0.032)	(0.306)	(5.298)
1998	-0.014	0.000	0.181	-1.415
	(0.019)	(0.035)	(0.325)	(5.926)
1999	-0.016	0.002	0.035	0.596
	(0.019)	(0.035)	(0.323)	(6.092)
2000	-0.015	-0.019	0.063	-0.562
	(0.024)	(0.043)	(0.349)	(7.359)
2001	-0.009	-0.031	0.405	-1.710
	(0.030)	(0.048)	(0.411)	(8.067)
2002	-0.025	0.007	0.420	2.202
	(0.034)	(0.052)	(0.456)	(8.244)
2003	-0.054	0.085	-0.823	10.515
	(0.037)	(0.057)	(0.637)	(9.994)
2004	-0.062	0.111*	-1.095	17.901
	(0.041)	(0.066)	(0.744)	(11.584)
2005	-0.053	0.070	-0.945	19.922
	(0.044)	(0.071)	(0.946)	(13.773)
2006	-0.044	0.072	-0.689	17.836
	(0.051)	(0.082)	(1.092)	(16.263)
2007	-0.036	0.125	-0.398	34.499*
	(0.055)	(0.091)	(1.160)	(19.905)
2008	-0.004	0.094	-0.145	39.084*
	(0.063)	(0.097)	(1.335)	(21.320)
2009	-0.031	0.125	0.284	39.148
	(0.067)	(0.105)	(1.864)	(24.054)
N	24,797		24,797	
Worker FE	✓		✓	
Year FE	✓		✓	
Female × Year FE	✓		✓	
	Single 18-39		Single 18-39	

Notes: Dependent variable is the cumulative number of childbirths in column 1 and it is the cumulative number of days in parental leave spells in column 2. ImpComp is Year × Exposure, W × ImpComp is Female × Year × Exposure. Estimation of equation (2). Sample: textile workers who are single and in fertile age (18-39) as of 1999. FE stands for fixed effects. Robust standard errors are clustered by workers' firm of employment as of 1999. *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively.

Table A7 also shows that marriage responses of fertile age women, especially if single, are particularly strong (columns (2) and (3), respectively).

Table A7: **Import Competition and Marriage Behavior**

	(1)		Fertile Age (2)		Fertile Age Single (3)	
	ImpComp	W × ImpComp	ImpComp	W × ImpComp	ImpComp	W × ImpComp
1995	-0.001	0.007*	-0.001	0.010*	0.000	0.011
	(0.003)	(0.004)	(0.004)	(0.006)	(0.004)	(0.007)
1996	-0.001	0.009	-0.002	0.013*	0.000	0.013
	(0.004)	(0.005)	(0.005)	(0.007)	(0.007)	(0.010)
1997	-0.001	0.005	-0.002	0.007	0.000	0.000
	(0.005)	(0.006)	0.005	0.008	0.007	0.011
1998	-0.002	0.007	-0.003	0.010	-0.001	0.006
	(0.005)	(0.006)	(0.005)	(0.008)	(0.007)	(0.012)
1999	-0.003	0.005	-0.005	0.008	-0.005	0.005
	(0.005)	(0.006)	(0.005)	(0.007)	(0.007)	(0.011)
2000	0.005	-0.007	0.003	-0.008	0.005	-0.009
	(0.011)	(0.015)	(0.013)	(0.020)	(0.010)	(0.017)
2001	-0.002	0.002	-0.006	-0.004	-0.012	0.003
	(0.015)	(0.021)	(0.018)	(0.026)	(0.016)	(0.024)
2002	0.000	0.007	0.000	-0.003	-0.032*	0.024
	(0.017)	(0.023)	(0.021)	(0.030)	(0.018)	(0.028)
2003	-0.007	0.028	-0.012	0.032	-0.039*	0.041
	(0.018)	(0.026)	(0.021)	(0.032)	(0.021)	(0.032)
2004	-0.018	0.059**	-0.026	0.068**	-0.059**	0.074**
	(0.020)	(0.030)	(0.023)	(0.034)	(0.023)	(0.035)
2005	-0.012	0.058*	-0.017	0.063*	-0.052**	0.080**
	(0.022)	(0.031)	(0.023)	(0.034)	(0.025)	(0.036)
2006	-0.017	0.059*	-0.021	0.068*	-0.056**	0.076*
	(0.024)	(0.032)	(0.025)	(0.035)	(0.028)	(0.041)
2007	-0.016	0.062**	-0.018	0.062*	-0.050*	0.086*
	(0.022)	(0.031)	(0.025)	(0.035)	(0.030)	(0.047)
2008	-0.022	0.068**	-0.021	0.071*	-0.055*	0.097**
	(0.022)	(0.032)	(0.025)	(0.037)	(0.030)	(0.048)
2009	-0.025	0.079*	-0.021	0.078**	-0.054*	0.117**
	(0.023)	(0.033)	(0.025)	(0.038)	(0.031)	(0.050)
N	64,768		45,584		24,797	
Worker FE	✓		✓		✓	
Year FE	✓		✓		✓	
Female × Year FE	✓		✓		✓	

Notes: Dependent variable is Marriage. Sample: textile workers who are not married as of 1999. Further sample restrictions are given in column headings. Estimation of equation (2). ImpComp is Year × Exposure, W × ImpComp is Female × Year × Exposure. FE stands for fixed effects. Robust standard errors are clustered by workers' firm of employment as of 1999. *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively.

A.3.2 Additional Results and Dissolution of Marital Unions

Table A8 shows that among textile workers of fertile age, import competition increases the number of childbirths particularly for women who are single as of 1999, see columns (1) and (2), respectively. Regarding the probability of taking parental leave, exposure to trade decreases the likelihood of taking parental leave for men and increases for women (columns (3) and (4)).

Furthermore, trade exposure increases the marriage likelihood for workers who were initially not married, see column (5). Finally, column (6) shows the gender gap in marriage likelihood for single workers of fertile age.

Table A8: **Import Competition, Childbirth, and Marriage**

	Birth		Parental Leave		Marriage	
	(1)	(2)	(3)	(4)	(5)	(6)
ImpComp	0.032	-0.031	-0.158	-0.619	-0.014	-0.055**
	(0.031)	(0.037)	(0.670)	(0.863)	(0.017)	(0.021)
Female × ImpComp	0.013	0.099**	16.727	24.036*	0.049**	0.072**
	(0.044)	(0.059)	(11.216)	(12.759)	(0.025)	(0.030)
N	82,164	24,797	82,164	24,797	64,768	24,797
Sample	18-39	18-39 S	18-39	18-39 S	Not Married	18-39 S
Worker FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Women × Year FE	✓	✓	✓	✓	✓	✓

Notes: Dependent variable at top of column. Birth is the cumulative number of childbirths. Parental Leave is the cumulative number of days in parental leave. Marriage is an indicator variable for being married. Estimation of equation (3). ImpComp stands for Post × Exposure. Sample "18-39" are all workers 18 to 39 years old, and "S" are single workers, both as of 1999. FE stands for fixed effects. Robust standard errors are clustered by workers' firm of employment as of 1999. *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively.

Table A9 presents estimation results for fertility conducted separately among women and men who were textile workers in 1999. We form a difference-in-differences equation that distinguishes the disproportionate impact of import competition on workers who are single as of 1999:

$$Birth_{it} = \beta_0 + \sum_{h=1995}^{2009} \beta_h 1[t=h] \times Exposure_{i,99} \times Single_i + \delta_i + \zeta_t + \mu_{it} + \varphi_{it} \tag{A1}$$

Here, μ_{it} denotes Single x Year fixed effects, and as before δ_i and ζ_t denote worker and year fixed effects. Coefficients β_h captures the yearly impact of import competition on single workers; Table A9 presents these coefficients. We see that the positive fertility impact is higher if they are single before the start of the shock.

Table A9: **Impact of Import Competition on Childbirth**

		(1) Women	(2) Men
Single × **ImpComp** ×			
	1995	0.000	0.006
		(0.011)	(0.010)
	1996	-0.006	-0.002
		(0.014)	(0.013)
	1997	-0.003	-0.005
		(0.017)	(0.014)
	1998	0.003	-0.012
		(0.018)	(0.016)
	1999	0.002	-0.013
		(0.018)	(0.015)
	2000	-0.008	-0.006
		(0.022)	(0.020)
	2001	-0.010	-0.001
		(0.025)	(0.024)
	2002	0.007	-0.008
		(0.026)	(0.026)
	2003	0.040	-0.026
		(0.030)	(0.028)
	2004	0.056	-0.030
		(0.035)	(0.032)
	2005	0.039	-0.021
		(0.038)	(0.034)
	2006	0.051	-0.009
		(0.047)	(0.039)
	2007	0.092*	0.000
		(0.053)	(0.043)
	2008	0.097*	0.026
		(0.056)	(0.050)
	2009	0.103*	0.015
		(0.062)	(0.054)
N		88,566	69,571
Worker FE		✓	✓
Year FE		✓	✓
Single × Year FE		✓	✓

Notes: Dependent variable is the cumulative number of childbirth. Estimation of equation (A1) by gender. ImpComp is short for Year × Exposure. FE stands for fixed effects. Robust standard errors are clustered by workers' firm of employment as of 1999. *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively.

Family Responses of Single Workers across Labor Market Positions

We examine the type of labor market positions that induce exposed workers to make a shift towards family activities. We exploit the timing of family activities and the workers' labor market positions at the time of these shifts. To do that, we aggregate our sample from 1999-2009 into two periods, before any of the MFA quota removals, and after (1999-2001, and 2002-2009, respectively). We distinguish family outcomes depending on the labor market positions of workers at the time of the family events. Table A10 reports the difference-in-differences coefficient (and robust standard error) on $ImpComp(= Post \times Exposure)$, based on a least-squares regression with worker and period fixed effects. Results for Birth, Parental Leave, and Marriage are shown in three broad columns, separately for women and men who were single as of 1999.

The first row of Table A10 shows the overall family response, irrespective of the worker's labor market position; this confirms earlier results with a two-period analysis and shows that import competition causes single women to give birth, to take parental leave, and to marry, but not men. In Panel B, the dependent variables are family events while being employed at the 1999 firm of employment. In Panel C, the dependent variables are family events after the worker is displaced from the 1999 firm of employment. The key finding is that the trade shock induces women to move toward family *after* displacement. Finally, the lower panels distinguish two specific labor market positions after departing from the 1999 firm of employment, namely (1) Unemployed and (2) Outside of the labor force. The results show that women's family activities tend to occur when they are outside of the labor market.

Table A10: **Timing of Family Responses**

	(1)	(2)	(3)	(4)	(5)	(6)
	Birth		**Parental Leave**		**Marriage**	
	Women	Men	Women	Men	Women	Men
Panel A. Any Labor Market Position						
ImpComp	0.109***	-0.019	0.094**	-0.028	0.094**	-0.026
	(0.041)	(0.037)	(0.039)	(0.030)	(0.042)	(0.033)
Panel B. At the 1999 Firm of Employment						
ImpComp	0.009	-0.029	0.005	-0.028	0.020	0.040*
	(0.022)	(0.027)	(0.023)	(0.024)	(0.022)	(0.021)
Panel C. After Displacement from the 1999 Firm of Employment						
ImpComp	0.111***	0.006	0.113***	-0.004	0.073**	0.014
	(0.040)	(0.032)	(0.037)	(0.025)	(0.037)	(0.028)
Of which:						
Panel D. Unemployed						
ImpComp	0.003	-0.015*	0.019	-0.011**	-0.003	-0.003
	(0.006)	(0.008)	(0.015)	(0.005)	(0.006)	(0.005)
Panel E. Outside the Labor Market						
ImpComp	0.036	0.007	0.037*	-0.006*	0.025*	0.004
	(0.025)	(0.008)	(0.020)	(0.003)	(0.015)	(0.008)

Notes: Sample is single female textile workers (N = 1,452) in odd numbered columns, and single male workers (N = 1,708) in even numbered columns. Dependent variables are indicators for a family event (Panel A), family event while worker is employed at the 1999 firm of employment (Panel B), family event after worker is displaced from the 1999 firm of employment (Panel C), family event while worker is unemployed (Panel D), and family event while worker is outside the labor market (Panel E). Specific family events are given in column headings. Each cell shows least-squares coefficient on *ImpComp*, short for Post $\times$ Exposure. All regressions include worker and period fixed effects. Robust standard errors clustered by workers' firm of employment as of 1999 in parentheses. *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively.

Import Competition and Dissolution of Marital Unions

If import competition has a significant impact on the formation of marriages by pushing women towards family activities, it may also impact the dissolution of marriages. To understand that, we estimate equation (1) among the sample of married male and female workers as of 1999. The dependent variable takes one on and after year t if a worker, initially married, divorces at year t. Figure A3 contrasts divorce behavior in response to import competition of men and women in the top part of the figure. We see that while men's divorce rates are scattered around zero during the treatment years 2002 - 2009, exposure to import competition leads to lower divorce probabilities for women, especially after the year 2004.

Our analysis on marriage shows that women of fertile age tend to react more strongly to import competition than older workers. We have also seen that such workers respond strongly to import competition in terms of fertility and parental leave. In the lower part of Figure A3 we compare women's overall divorce response to import competition to that of fertile age women (ages 18 to 39 in the year 1999). Judging by the point estimates, we see that fertile age women reduce their divorce likelihood more strongly than older married women. This is consistent with child-bearing and -rearing playing a role for divorce responses to the negative labor shock.

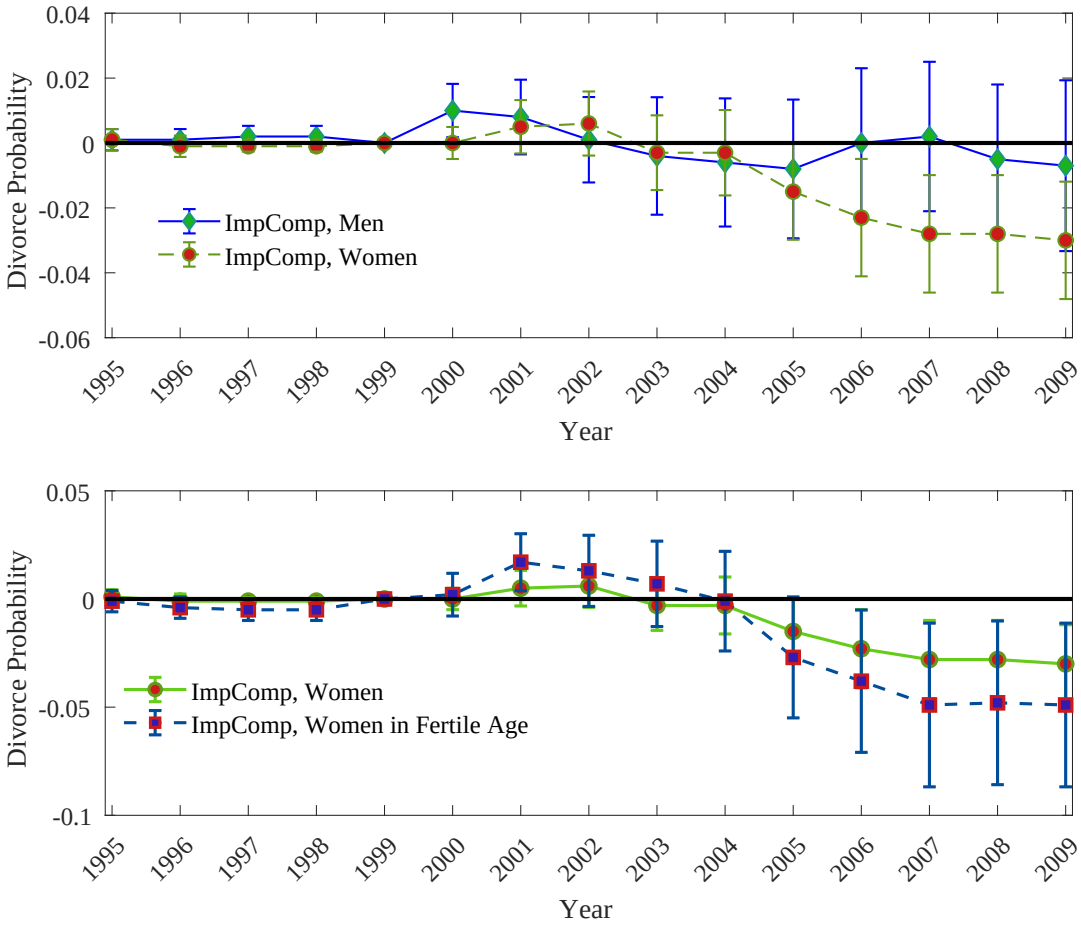

Figure A3: Exposure to Import Competition and Likelihood of Divorce

Notes: Figures show results from estimating equation (1) when the dependent variable is divorce (indicator); top panel separately by gender, bottom panel separately for two samples, (i) women married in 1999 and (ii) women married in 1999 and of fertile age (18-39 years old). Import Competition is coefficient on Year $\times$ Exposure; 90 percent confidence intervals shown.

A.4 Mechanism: The Biological Clock and Gender Gaps

Table A11 reports coefficients shown in Figure 6 in the text in column (1). Also indicated in Table A11 is that women with less than college education as of the year 1999 do not exhibit as strong a fertility response as the biological clock is running out as women with college education; see columns (3) and (2), respectively, for ages 36 and 37 in particular.

Table A11: **The Childbirth Gender Gap and the Closing of the Fertility Window**

	(1)	(2)	(3)
	All	College	No College
ImpComp	0.003	0.023	0.001
	(0.004)	(0.016)	(0.004)
W × ImpComp × Age27	0.384**	0.607	0.326
	(0.175)	(0.554)	(0.204)
W × ImpComp × Age28	-0.051	-0.063	-0.108
	(0.171)	(0.334)	(0.207)
W × ImpComp × Age29	-0.037	0.302	-0.095
	(0.168)	(0.405)	(0.184)
W × ImpComp × Age30	0.129	-0.172	0.183
	(0.166)	(0.402)	(0.184)
W × ImpComp × Age31	0.246*	0.536	0.129
	(0.138)	(0.351)	(0.153)
W × ImpComp × Age32	-0.030	0.718**	-0.203
	(0.13)	(0.34)	(0.15)
W × ImpComp × Age33	-0.116	-0.168	-0.072
	(0.130)	(0.324)	(0.152)
W × ImpComp × Age34	-0.006	0.599	-0.109
	(0.125)	(0.405)	(0.135)
W × ImpComp × Age35	0.035	-0.165	0.050
	(0.126)	(0.341)	(0.130)
W × ImpComp × Age36	0.162*	0.596*	0.063
	(0.092)	(0.338)	(0.085)
W × ImpComp × Age37	0.198**	0.482**	0.155*
	(0.085)	(0.192)	(0.091)
W × ImpComp × Age38	-0.046	0.027	-0.038
	(0.084)	(0.204)	(0.097)
W × ImpComp × Age39	-0.140*	-0.148	-0.142*
	(0.074)	(0.143)	(0.081)
N	158,137	19,806	138,298
ImpComp × Age FE	✓	✓	✓
Worker FE	✓	✓	✓
Year FE	✓	✓	✓
Female × Year FE	✓	✓	✓
Age × Year FE	✓	✓	✓
Female × Age × Year FE	✓	✓	✓

Notes: Dependent variable: cumulative number of childbirths. Estimation of equation (8). Sample in column (1) is all full-time workers with firm of employment in 1999 in the textile or clothing industry; workers with [without] college education as of 1999 in column (2) [column (3)]. ImpComp is Post × Exposure. FE stands for fixed effects. Robust standard errors are clustered by workers' firm of employment as of 1999. *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively.

Figure A4 plots the disproportionate impact of the shock due to the removal of import quotas for China on annual earnings of young women. It shows that the shock causes a significant gender gap specific to workers in fertile age. The resulting gender gap amounts to 20% of pre-shock annual earnings.

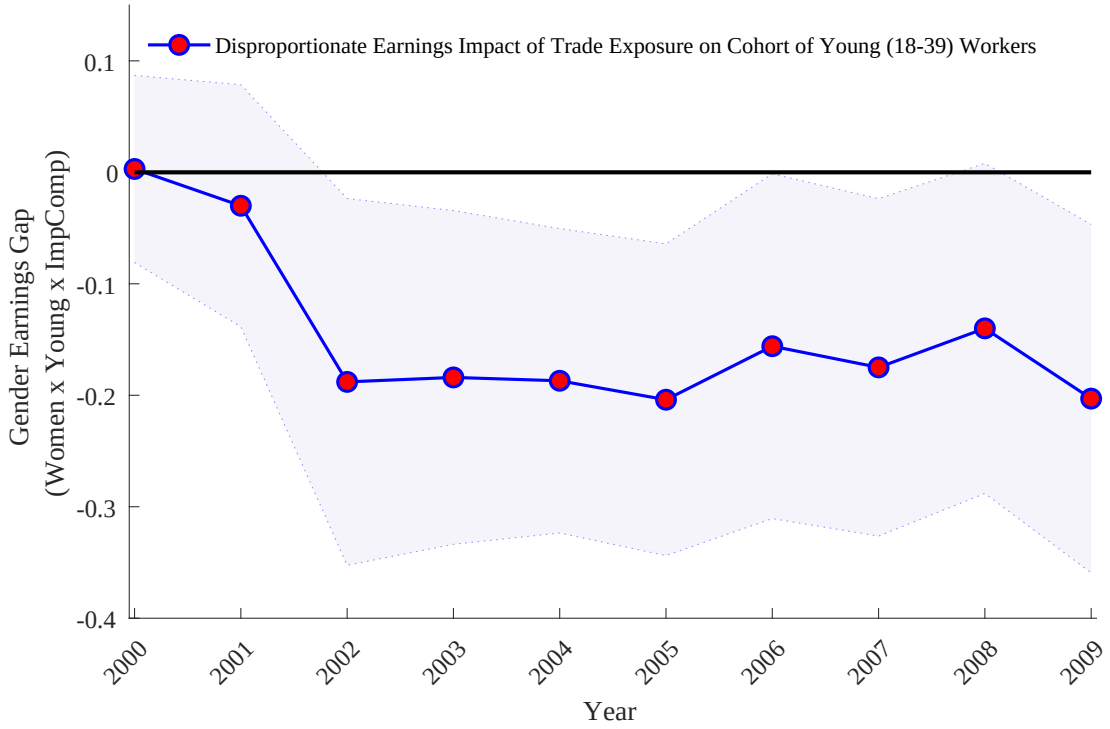

Figure A4: Missing Earnings of Young Women

Notes: Dependent variable is annual earnings in any job. Sample is all workers in the textile liberalization sample for years 1999-2009 (N = 107,342). Quadruple difference-in-differences estimation with third and fourth differences being Women and Young, respectively. Young defined as 18-39 years old as of 1999. All lower order difference-in-differences coefficients and Worker, Year, Female × Year, Young × Year, and Young × Female × Year fixed effects included. Shown are 'Year × Exposure × Female × Young' point estimates with 90% confidence intervals. Robust standard errors clustered at the level of firm of employment in 1999.

A.5 Econometric Specification: Treatment Variable and Other Shocks

A.5.1 Measuring Trade Exposure: Revenue Share of Affected Textile Products

This section presents results obtained using an alternative, continuous treatment definition. Instead of an indicator whether worker *i*'s firm of employment in 1999 manufactures any products for

which the quotas will be lifted in 2002 or 2005, we employ the revenue share of these products in 1999 (denoted RevShare). Results are shown in Tables A12 and A13.

Table A12: **Labor Adjustment Using a Continuous Exposure Variable**

Panel A. Long-run Impact	(1) Earnings	(2) Hours Worked	(3) Unemployment	(4) Personal Income
RevShare × Post	0.083	-0.108	6.116***	0.120
	(0.195)	(0.084)	(2.104)	(0.119)
W × RevShare × Post	-0.362*	-0.099	6.287***	-0.056
	(0.191)	(0.089)	(0.416)	(0.105)
N	153,137	148,694	153,137	153,137
Panel B. Short-run Impact	Earnings at the 99 Job	Hours Worked at the 99 Job	Unemployment following the 99 Job	Personal Income at the 99 Job
RevShare × Post	-0.572***	-0.552***	1.656	-0.563***
	(0.177)	(0.165)	(1.094)	(0.172)
W × RevShare × Post	0.014	0.041	-1.843	0.031
	(0.135)	(0.128)	(1.261)	(0.131)
N	138,497	138,208	138,497	138,497
For both panels:				
Worker FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
Female × Year FE	✓	✓	✓	✓

Notes: Dependent variable at top of column. Panel A. is the Long-run Impact, defined as outcomes at any job. Panel B. is the Short-run Impact, defined as outcomes at the firm of employment in 1999. Estimation of equation (3) with RevShare instead of the indicator treatment variable. Variable "W" is Female indicator. FE stands for fixed effects. Robust standard errors clustered at the level of the firm of employment in 1999 in parentheses. *, ** and *** indicate significance at the 10 %, 5% and 1% levels respectively.

Comparing the results of Tables A12 and A13 with the corresponding results obtained with the indicator treatment definition shown in the text indicates that the two sets of results are similar.

Table A13: **Family Outcomes Using a Continuous Exposure Variable**

	(1) Birth	(2) No. of Days in Parental Leave	(3) Marriage
RevShare x Post	-0.212*	-3.960	-0.244***
	(0.125)	(2.753)	(0.067)
W × RevShare x Post	0.497**	82.615*	0.276***
	(0.215)	(47.813)	(0.105)
N	24,797	24,797	24,797
Worker FE	✓	✓	✓
Year FE	✓	✓	✓
Female × Year FE	✓	✓	✓

Notes: Estimation of equation (3) with RevShare instead of the indicator treatment variable. Sample is all single textile workers of fertile age (18-39 years old as of 1999). Dependent variable at top of column. Variable "W" is Female indicator. FE stands for fixed effects. Robust standard errors clustered at the level of firm of employment in 1999 in parentheses. *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively.

A.5.2 Technology as an Alternative Shock

Table A14 reports results from estimating equation (3) augmented with Occupation by Year fixed effects where we consider each occupation that workers hold as of 1999. Technological change is a potential confounding factor. One reason for this might be that tasks performed in some occupations have a high task routine-ness, which would mean that workers are relatively likely to be substituted by automation and computers. We consider annual time trends for each occupation based on a four-digit ISCO classification. As examples of the level of detail, some of these occupations are: 1) textile pattern maker, 2) sewer, 3) fibre-spinning machine , 4) bleaching machine operator, 5) production department manager, and 6) supply and distribution department manager. The results indicate that our results are robust to including these differential time trends. These results provide evidence that the impact of import competition is separate from any effect that technological change might have.

Table A14: **Allowing for Occupation-Specific Time Trends**

Dep. Var.	(1) Birth	(2) Marriage	(3) Earnings	(4) Earnings at the 1999 Firm	(5) Earnings	(6) Earnings at the 1999 Firm
Panel A.						
			Fertile Age		Older	
ImpComp	-0.031	-0.014	0.103*	-0.126**	-0.084**	-0.174***
	(0.037)	(0.017)	(0.062)	(0.052)	(0.041)	(0.058)
W × ImpComp	0.099*	0.049**	-0.156**	-0.013	-0.042	0.033
	(0.059)	(0.025)	(0.066)	(0.041)	(0.042)	(0.049)
Occupation × Year FE	-	-	-	-	-	-
Panel B.						
ImpComp	-0.018	-0.019	0.065	-0.134***	-0.088***	-0.187***
	(0.046)	(0.017)	(0.050)	(0.046)	(0.031)	(0.051)
W × ImpComp	0.103*	0.059***	-0.114*	-0.012	-0.023	0.042
	(0.062)	(0.023)	(0.062)	(0.038)	(0.036)	(0.043)
Occupation × Year FE	✓	✓	✓	✓	✓	✓
For both panels:						
N	24,797	64,768	78,567	69,258	74,570	69,234
Worker FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Female × Year FE	✓	✓	✓	✓	✓	✓

Notes: Dependent variable given at the top of column. Estimation of equation (3) augmented with occupation (4-digit ISCO) × year fixed effects in Panel B. Birth regression is conducted among fertile age (18-39) single, and marriage regression is conducted among workers not married, both as of 1999. Earnings at 1999 Firm is annual earnings obtained from the worker's firm of employment of 1999. ImpComp is Post × Exposure, W × ImpComp is Female × Post × Exposure. Robust standard errors are clustered by workers' firm of employment as of 1999. *, ** and *** indicate significance at the 10 %, 5% and 1% levels respectively.

A.6 Analysis of the Economy-Wide Labor Force

This section provides additional information on the analysis of section 5. Our 1999 cohort covers virtually the entire private-sector economy of Denmark. It does not include workers whose firm of employment in 1999 was in public administration, education, health, and with a wide range of small personal and social service providers.[29] Our analysis follows about 1.6 million workers regardless of which sectors or labor market positions that they move to. Table A15 provide summary statistics separately for men and women.

Table A15: **Sample Characteristics by Gender**

	Men		**Women**	
	Mean	**SD**	**Mean**	**SD**
	N = 915,702		**N = 736,072**	
Age	38.039	10.051	38.387	9.632
Immigrant	0.044	0.206	0.038	0.190
Labor Market Experience	14.498	5.898	14.368	5.691
Married	0.521	0.500	0.570	0.495
Number of Children	1.264	1.179	1.428	1.112
Log Earnings	12.362	0.665	12.128	0.626
College	0.246	0.431	0.322	0.467
Vocational Educated	0.437	0.496	0.380	0.485
Birth Event	0.048	0.215	0.042	0.201
Divorce Event	0.007	0.085	0.008	0.092
Marriage Event	0.026	0.158	0.026	0.160
Managers	0.051	0.219	0.020	0.139
Professionals	0.147	0.354	0.138	0.345
Office Workers	0.059	0.235	0.216	0.412
Machine Operators	0.061	0.240	0.049	0.217

Notes: Summary statistics for all full-time, private sector workers as of the year 1999. SD stands for standard deviation. Immigrant is indicator variable for first and second generation immigrants. Occupation categories follow one-digit ISCO classification except Machine Operators (ISCO = 82). Birth, Divorce, and Marriage Event are indicators on whether a worker fathers or mothers a newborn baby, divorces, or marries in a given year, respectively. Log earnings in 2000 Danish Kroner.

Table A15 shows that the fraction of workers with college education is higher among women than men (thirty two versus twenty five percent respectively), while men are relatively more frequently

[29] In Denmark, most of these sectors are public sectors, and data availability is more limited.

vocationally trained. The sample also confirms some well-known occupational differences, for example men are more likely to be managers than women (five compared to two percent, respectively), while women are more likely to be office workers than men (twenty-two percent versus six percent, respectively).

We estimate the impact of import competition from China by employing six-digit NACE industry variation in the change of Chinese import penetration in Denmark. In the case of earnings the estimation equation is as follows:

$$Earnings_i^{2000-09} = \beta_0 + \beta_1 \Delta IMP_{j(i)} + \beta_2 \Delta IMP_{j(i)} \times Female_i + Z_i^W + Z_i^F + Z_i^P + \varepsilon_i. \qquad \text{(A2)}$$

The dependent variable $Earnings_i^{2000-09}$ is worker $i's$ cumulative earnings over 2000-2009 measured in worker i's average annual earnings over 1996-1999. The key right hand side variable is the change in import penetration–imports over domestic absorption– from China in the industry (j) of employment of worker i in 1999, $\Delta IMP_{j(i)}$. Figure A5 shows substantial variation in the change in import penetration across industries. This is the case even within two-digit industries, which are given the same symbol and color in Figure A5.

We also include several control variables on the right hand side of equation (A2). In addition to the extensive worker characteristics discussed in the text–the term Z_i^W–we exploit the employer-employee link to include the following firm characteristics as of 1999, denoted by Z_i^F: the average wage and the size of the firm as measured by the full-time equivalent number of employees as proxies for firm quality, as well as the separation rate of workers from the firm between 1998-1999. The separation rate, which is defined as the percentage of workers who left the company from one to another, allows us to control for differential pre-trends at the firm level. We also include a number of important characteristics of the six-digit industry of employment of worker i' as of 1999 (in addition to the two-digit industry fixed effects already mentioned). They are employment growth between 1993-1999 (to control for pre-trends) and the share of college educated workers (to control for industry's propensity to technical change).

Finally, we utilize information on worker i's partner as of 1999, if applicable. The vector Z_i^P depending on the specification either includes spouse or cohabitant characteristics. In the case of cohabitants, the vector includes whether the individual has a cohabitant partner, the partner's age in four age categories, the partner's labor earnings, an indicator of whether the partner is a Danish

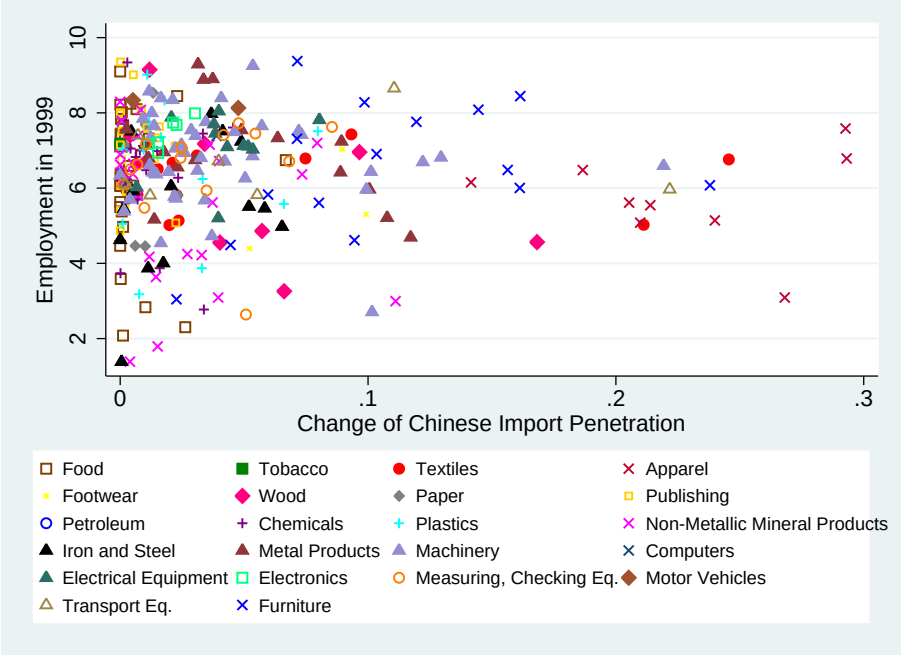

Figure A5: **Change in Chinese Import Penetration**

Notes: Figure shows the change in Chinese import penetration across six-digit industries, when each two-digit industry is given the same color and symbol. The vertical axis shows the logarithm of the number of employees in 1999.

citizen, an indicator of whether the partner is employed in manufacturing, an indicator whether the partner is employed in the same six-digit product line, and an indicator whether the partner is employed in a highly trade exposed industry (95th percentile and above of trade exposure).[30] Spouse characteristics additionally include the age difference between worker i and worker i's spouse and an indicator variable showing whether spouse has higher earnings as of 1999. We include these variables because workers with specific characteristics can be selected in exposed industries, and these characteristics might influence a worker's labor market-family choice. For example, due to the structural shift from manufacturing to other sectors, workers whose partner is employed in manufacturing might plausibly adjust differently to heightened import competition compared to workers with partners employed in the services sector. Furthermore, despite the social policies available in Denmark, adjustment to a labor demand shock might depend on partner's earnings or age.

Specifications for marriage, parental leave, fertility and other labor market outcomes are analogous to equation (A2).

[30] We distinguish four age categories for partners: These are below age 26, between age 26 and 36, between age 37 and 47, and age 48 and higher, where the first category is the excluded category.

We construct the measure of Chinese import competition by developing a mapping between the international trade data at the eight-digit product level from Statistics Denmark's UHDI (firm-level trade) database and Denmark's six-digit industry classification, DB93. To do that we utilize the domestic production database that reports the eight-digit products produced in Denmark matched with manufacturing plants and their primary industrial activity at the six-digit level.[31]

In order to construct ΔHIP_j^{CH} we use trade data from the United Nation's COMTRADE database in the six-digit Harmonized System classification.[32] To construct $Open_j^{Dist}$ we use bilateral distance data from CEPII, at http://www.cepii.fr.

A.6.1 First-stage Regression Results

Table A16 show the first-stage coefficients for different subsamples that we use in the analysis. As noted in the text, the instrumental variables have the expected signs and are strongly correlated with the change in Chinese import penetration.

[31] Our mapping follows the match between Combined Nomenclature (CN) and Classification of Products by Activity (CPA) available at Eurostat's RAMON database. We adapt this according to Danish industrial production using Statistics Denmark's VARES (domestic production) database. The mapping between trade (CN and Harmonized System, HS) and production data (DB93) is created separately for the three CN/HS versions, CN/HS-1996, CN/HS-1999 and CN/HS-2009. To construct Danish consumption figures at the six-digit DB93 level, we employ data on exports and imports from the UHDI database together with manufacturing revenue obtained from Statistics Denmark's FIRE database.

[32] Data for the European countries comes from Eurostat and is available in the eight-digit CN classification. Data for the non-European countries comes from the United Nation's COMTRADE database in the six-digit Harmonized System classification.

Table A16: **Instrumental-Variables Results: First-Stage Coefficients**

	(1)	(2)	(3)	(4)
	Full Sample		Fertile Age Sample	
	ΔIMP_j	$\Delta IMP_j \times \text{Female}_i$	ΔIMP_j	$\Delta IMP_j \times \text{Female}_i$
ΔHIP_j^{CH}	0.002***	-0.001**	0.002***	-0.001**
	(0.001)	(0.0002)	(0.001)	(0.0002)
$Open_j^{Dist}$	0.017***	0.007***	0.016***	0.007***
	(0.005)	(0.002)	(0.005)	(0.002)
$\Delta HIP_j^{CH} \times$ Female	-0.000	0.003***	-0.000	0.003***
	(0.0002)	(0.001)	(0.0002)	(0.001)
Worker Variables	✓	✓	✓	✓
Firm Variables	✓	✓	✓	✓
Six-digit Industry Variables	✓	✓	✓	✓
Partner Variables	✓	✓	✓	✓
Two-digit Occupation FE	✓	✓	✓	✓
Two-digit Industry FE	✓	✓	✓	✓
Sanderson-Windmeijer F stat	19.739	16.007	18.934	16.061
N	1,671,774	1,671,774	903,629	903,629

Notes: All regressions include the full-set of Z_i^W, Z_i^F, and Z_i^P variables laid out above. FE stands for fixed effects. Robust standard errors clustered at the level of the six-digit industry in parentheses (761 clusters). *, ** and *** indicate significance at the 10 %, 5% and 1% levels respectively.

A.6.2 Gender Differentials among Fertile-Age Workers

Table A17 presents the results for the family and labor market adjustment among workers who are between 18 and 39 years of age in the year 1999; N = 903,629. In Panel A we focus on family variables, whereas Panels B, C, and D provide evidence of different aspects of the workers' labor market adjustment. As the trade shock induces women to move disproportionately towards family (Panel A), it also induces significant occupational change for these women (Panel C, column (4)). The new occupations are likely less career-oriented as women face career interruptions due to child birth. From finding a Female interaction coefficient in column (4) that exceeds the corresponding coefficient in column (2), we conclude that women earn less in their new occupations (Panel C, Table A17) and contribute to the finding of an overall worse labor market adjustment of fertile age women, see column (1), Panel B. The results also show that import competition generates a strong push to the service sector, and this effect is even stronger for women (Panel D, column (2)). These results complement our heterogeneity findings with respect to childbirth (Table 7) and indicate that loss of specific human capital associated with this broad sector switch is important in understanding why machine operators move stronger toward family than service workers or office clerks.

Table A17: **Family and Labor Market Adjustment of Fertile-Age Workers**

Panel A.	(1) Birth (indicator)	(2) No. of Births	(3) Parental Leave	(4) Marriage
ΔIMP_i	-0.205	-0.346	-0.284**	-0.118
	(0.126)	(0.271)	(0.132)	(0.115)
$\Delta IMP_i \times$ Female	0.507***	0.917***	0.310***	0.653***
	(0.118)	(0.218)	(0.112)	(0.129)
Panel B.	Earnings	Earnings @ Initial 6-dig Ind	Employment	Employment @ Initial 6-dig Ind
ΔIMP_i	0.590	-14.270*	-0.795	-9.421**
	(3.782)	(7.523)	(0.901)	(4.791)
$\Delta IMP_i \times$ Female	-13.460*	0.587	-3.269**	0.526
	(7.654)	(2.925)	(1.514)	(1.914)
Panel C.	Earnings @ Initial Occupation	Earnings @ Different Occupations	Employment @ Same Occupation	Employment @ Diff Occupations
ΔIMP_i	2.230	2.879	-3.205	2.410
	(5.361)	(6.044)	(3.868)	(3.501)
$\Delta IMP_i \times$ Female	-15.450**	1.995	-10.440***	7.175***
	(6.771)	(2.927)	(4.029)	(2.740)
Panel D.	Years in Manufacturing	Years in Service Sector	Outside Labor Mkt	Unemployment
ΔIMP_i	-5.479	5.907*	0.315	12.510**
	(4.066)	(3.584)	(0.405)	(5.363)
$\Delta IMP_i \times$ Female	-7.003***	3.298*	1.240*	17.810*
	(1.929)	(1.764)	(0.710)	(9.961)

Notes: Dependent variable at top of column. 'Birth', 'Parental Leave' and 'Marriage' are indicator variables taking 1 for the respective events over 2000-2009. All other dependent variables are cumulative over 2000-2009. Sample is all workers between 18 and 39 years old as of 1999; N = 903,629. Initial 6-dig Ind stands for the worker's 6-digit industry as of 1999 and initial occupation is the worker's 1-digit ISCO occupation as of 1999. Estimation analogous to equation (4) by two-stage least squares; second-stage coefficients shown. All regressions include two-digit industry and occupation fixed effects, and the set of worker-, firm-, and spouse/partner characteristics as discussed in Section A.6. Robust standard errors clustered at the level of the six-digit industry (756 clusters) in parentheses. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

B Background on Textile Trade Liberalization

B.1 The Multi Fibre Arrangement System and China's WTO Entry

When the General Agreement on Tariffs and Trade (GATT) was signed in 1948, world trade in textile and clothing was excluded from the agreement; instead, it was governed by bilateral agreements. As the number of bilateral agreements grew, the Multi-fibre Arrangement (MFA) was introduced in 1974 to govern world trade in textile and clothing. The European Union (EU) negotiated most quotas for the bloc of countries as a whole, and since 1993 any member state-specific restriction was removed and the quotas started to be managed at the EU level. In 1995 the Agreement on Textiles and Clothing (ATC) replaced the MFA and made provisions for phasing it out in four steps (called phases) over a period of 10 years. The liberalizations occurred at the beginning of the years 1995, 1998, 2002 and 2005. Based on the volume of imports in 1990, quotas were eliminated on 16% of 1990 imports at the beginning of 1995, an additional 17% at the beginning of 1998, 18% at the beginning of 2002, and the remaining 49% at the beginning of 2005.[33]

Between 1986 and 1994 the EU executed MFA quotas towards 19 countries. These were Argentina, Brazil, China, Czechoslovakia, Hong Kong, Hungary, India, Indonesia, the Republic of Korea, Macao, Malaysia, Pakistan, Peru, Philippines, Poland, Romania, Singapore, Sri Lanka and Thailand. Under the later ATC system, the selection of MFA products to be integrated into the normal WTO system was left to the decision of the importing country. The EU started its phasing-out process by integrating mainly products on MFA categories with no quotas towards WTO members. The same approach was chosen by the USA. During the first two phases, the EU integrated 34 MFA categories, but only very few existing quotas with respect to WTO members.

During the same time the EU also liberalized quotas on a bilateral basis for neighboring countries in Eastern Europe (Europe Agreements) and the Mediterranean area. Among the list of 19 countries above, the Czech Republic, Slovakia, Hungary, Poland, and Romania already had established quota free access to the European market before 1999. In 1997 about 70% of the total EU import value of textiles and clothing was imported without any quantitative restrictions, while the other 30% was imported under quota. Among the 81 categories for which EU quotas existed, only 18 were utilized at an average of more than 70% between 1996 and 1998. The exporting countries that had the highest quota utilization rates were China, India, Pakistan and Indonesia. In 1998, China's

[33] Due to the surge of Chinese imports in the first few months of 2005, the EU renegotiated the quotas with China, with the result that they agreed on additional quotas on certain products until 2008 (the so-called "Bra War"). We account for these categories in our analysis.

share of textiles and apparel imports of Denmark was a little over 10% compared to 2.8%, 0.7% and 1.3% respectively for India, Pakistan and Indonesia. By 2007 China's share reached 26%, while the respective shares of India, Pakistan and Indonesia were 6%, 1%, and 0.5%).

It is useful to compare the importance of China's entry into the WTO in 2002 with earlier and later quota liberalizations (Phases I and II in 1995 and 1998, respectively, and Phase IV in 2005). China was strongly restricted by the MFA quotas before it entered the WTO because the EU did not liberalize 'sensitive' MFA quota categories during the 1990s. At the same time, quotas on close to half of all textile imports (using 1990 values) were only lifted through the Phase IV liberalization in the year 2005. Our analysis defines all years 2002 to 2009 as the treatment period, thereby covering both the Phase I, II, and III liberalizations (in 2002) as well as the Phase IV quotas (in 2005). See Table B1 for evidence that both episodes led to substantial labor market effects.

B.2 A Product-Firm-Level Indicator of Treatment

The *Systeme Integre de Gestion de Licenses* (SIGL) database provides categories of textile and clothing products that are subject to trade quotas in the European Union for a particular year. We employ this data to identify firms in Denmark that are affected by the quota removals on Chinese exports following that country's entry into the WTO. The quota categories are administrative descriptions of quota products that do not follow standard statistical product classifications. For one, the quotas have a varying degree of coverage; for example, the quota category *Gloves, mittens and mitts, knitted or crocheted* covers nine products at the 8-digit Common Nomenclature (CN) level, while the category *Woven fabrics of synthetic filament yarn obtained from strip or the like of polyethylene or polypropylene, less than 3 m wide* corresponds to a single 8-digit CN product. Quota categories include both textile and clothing products.

Also, a given category does not necessarily cover a technologically or materially homogeneous group of products, nor does it have to be comprehensive. For example, *ramie bedspreads* are covered by the quota restriction for China while *cotton bedspreads* are not, and *Brasseries of all types of textile material* is covered, in contrast to *Corselettes of all types of textile materials*. The source of the correspondence between quota categories and eight-digit products is Utar (2014), and is available from the author.[34]

Our main measure of exposure to import competition depends on whether a firm domestically

[34]If the quota product manufactured by one firm would be a close substitute to the non-quota product manufactured by another firm, this would mean that some workers we classify as not exposed are in fact exposed; if this contamination would be quantitatively important our analysis would underestimate the causal effect of the shock.

manufactured in the year 1999 a product for which the quota on China would be lifted due to China's entry into the WTO. If this is the case, the firm is exposed (produces quota goods, for short). Figure B1 shows the difference in Danish imports from China for quota and non-quota goods.

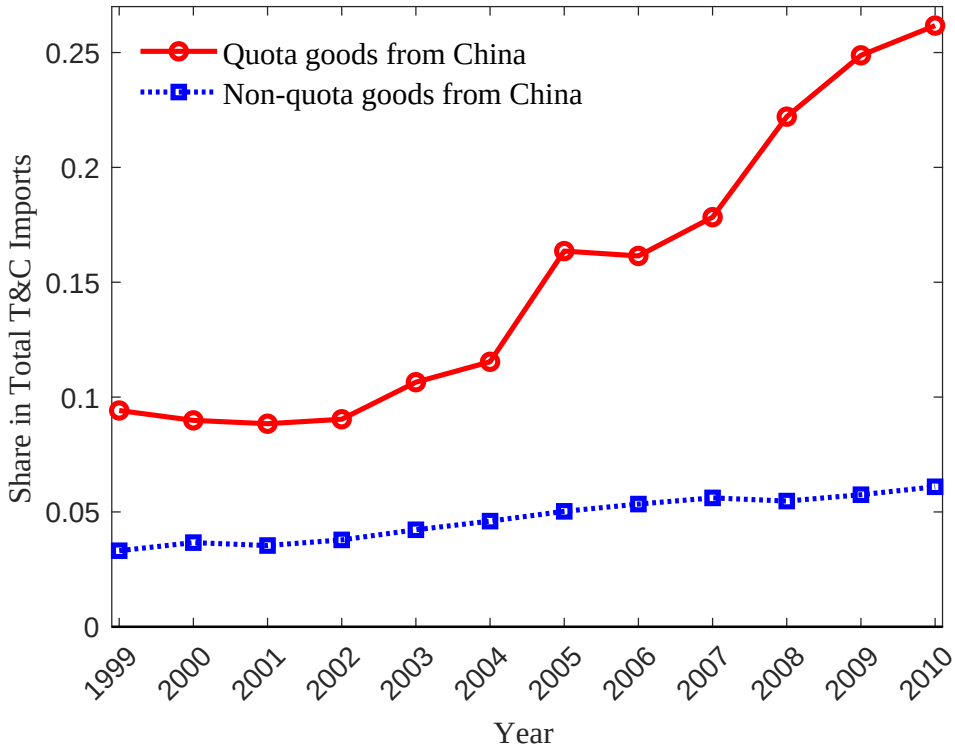

Figure B1: Import Share of China in Quota versus Non-quota textile Goods

B.3 MFA Quota Removals in 2002 and 2005

There are two natural possibilities for dating the timing of the trade liberalization, the end of the MFA system (last step in 2005) and China's entry into the WTO (in 2002). While the two events are related to each other, our empirical strategy exploits the expiration of the MFA quotas for China due to its WTO membership. A key reason for that is that the abolishment of the MFA quotas were scheduled in 1995 and therefore there was no uncertainty associated with its timing. Moreover, in January 2002 several quota categories that were subject to Phase I, II and III were removed for China. The shock that matters for the difference-in-differences estimation strategy comes from uncertainty regarding China's accession to the WTO, as well as its timing because it signifies the beginning of the quota removal for China and the unexpectedly dramatic response of

Chinese suppliers to the removal.

Employing the year 2002 as the beginning of the treatment period implies that we do not distinguish between phases I to III (in 2002) and phase IV (in 2005) of the MFA liberalizations. One concern is that because the liberalizations in phase IV were the most comprehensive–perhaps advanced countries left the most 'sensitive' quotas for Phase IV–, our analysis might underestimate the trade liberalization effects. At the same time, there was strong overlap between firms producing quota products that are subject to the 2002 and the 2005 removal for China, and firms strongly reacted to the removal of quotas already in 2002 by downsizing even if more of their products were subject to the 2005 removal (Utar 2014).[35] As a consequence, it is challenging to estimate the effects of the 2002 and 2005 liberalizations separately. The following reports a number of key results based on earlier work (Utar 2014).

The variable $Q2002_f$ in equation (B1) is an indicator variable that takes 1 if firm f produces a quota good as of year 1999 which is subject to the 2002 removal for China. Similarly, $Q2005_f$ is 1 if firm f produces a quota good as of year 1999 which is subject to the 2005 removal for China. Further, $Post02_t$ is an indicator for years 2002 and later, while $Post05_t$ denotes the years 2005 and later. The following equation is estimated at the firm-level for the period 1999-2007:

$$\ln Y_{ft} = \alpha_0 + \alpha_1 Q2002_f \times Post02_t + \alpha_2 Q2005_f \times Post05_t + \delta_f + \zeta_t + \varphi_{ft} \qquad \text{(B1)}$$

In equation (B1) Y_{ft} denotes one of several firm-level outcome variables, δ_f denotes firm fixed effects and ζ_t denotes year fixed effects. The results are reported in Table B1. We see that the reduction in sales is stronger in response to the 2005 removals yet employment responds more to the 2002 removals (columns (1), (3) and (4)). Column (5) show that employment for less educated workers drops 16% annually in response to the 2002 removal even when one controls for the impact of the 2005 removal. The impact of the 2002 removal on workers with vocational education on textile production (machine operators) is even stronger. The annual reduction is estimated to be 20% (column (6)).

Overall, the results in Table B1 provide evidence for substantial employment effects for both the 2002 and the 2005 quota liberalizations that would be difficult to fully separate with any research

[35] Among 191 firms producing products subject to the 2005 removal 97 of them were also producing products subject to the 2002 removal.

Table B1: **The 2002 versus 2005 Quota Removals: Firm-level Evidence**

	(1) Sales	(2) Value Added	(3) Employment	(4) Full-time Employment	(5) Employees w/ High School Education	(6) Employees w/ Textile Production Education
Q2002 × Post02	-0.075	-0.081	-0.123***	-0.146**	-0.164***	-0.201***
	(0.064)	(0.061)	(0.059)	(0.057)	(0.053)	(0.046)
Q2005 × Post05	-0.158***	-0.187***	-0.081	-0.125**	-0.152***	-0.049
	(0.059)	(0.067)	(0.054)	(0.059)	(0.046)	(0.037)
Firm FEs	✓	✓	✓	✓	✓	✓
Year FEs	✓	✓	✓	✓	✓	✓
N	4,555	4,536	4,503	4,545	4134	4,134

Notes: The estimation sample is annual observations for textile and clothing firms over 1999-2007. All dependent variables in logs. Full-time employment is number of full-time equivalent employees. FE stands for fixed effects. Robust standard errors are clustered at the firm level. *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively. Source: Utar (2014).

design. Therefore we adopt the approach of treating all years 2002 and later as the treatment period.

C Sources of Data and Variable Definitions

C.1 Data Sets

Integrated Database for Labor Market Research (IDA)

The IDA Database is the main source of information on workers. It provides a snapshot of the labor market for each year at the end of November. There is demographic and education information on every resident in Denmark between the age of 15 and 74 with a unique personal identification number. Compiled from separate establishment and job files, it provides the labor market status of each individual, as well as the annual salary and hourly wage, occupational position, and industry code of their primary employment. Employment status is based on the last week in November of each year.[36] Demographic information on individuals include their marital status (married, widow, same-sex partnership, and single).

Production Database (VARES)

The database is part of the industrial commodity production statistics collected by Statistics Denmark. Production is reported following the Combined Nomenclature (CN) classification at the eight-digit level for all firms with ten or more employees. We employ the VARES database to identify firms that manufacture domestically in Denmark products subject to rising competition due to the removal of import quotas (the Multi-fiber Arrangement) on Chinese goods after 2001. While some manufacturing firms have less than ten employees, such firms typically outsource their production, and consequently we can identify virtually all firms that domestically produce quota products using VARES. The reporting unit is the "Kind of Activity Unit" (KAU), which is the sum of a company's workplaces in the same main industry. Reporting units provide as well their company identification code, allowing us to match the eight-digit production information with other firm-level information.

Business and accounting statistics (FIRE)

This dataset by Statistics Denmark compiles business and accounting data, as well as tax reports, value-added tax (VAT) reports, and information from incorporated companies. It is employed in

[36] Thus our results will not be influenced by short-term unemployment spells or training during a year as long as the worker has a primary employment in the last week of November of each year.

this paper to create the employment growth 1993-99 variable in the firm's industry, as well as other measures at the six-digit industry level. The information covers virtually all firms for most sectors, including manufacturing, construction, retail, mining, as well as hospitality, transportation, telecommunication, real estate, rental, information technology, R&D and other business services.[37]

International trade data (UHDI)

The data comes from Denmark's customs records together with monthly reports to Statistics Denmark from about 8,000 firms in Denmark in which their trade with other countries of the European Union (EU) is reported. This is supplemented with information on EU trade from VAT returns, which are mandatory for virtually all firms in Denmark. Thus the data-set covers the entire universe of trading firms. The information of each record gives shipment date, value, and weight, and if applicable the shipment's quantity. It also provides information on the eight-digit product classification according to the Combined Nomenclature system, as well as a unique firm identifier. Statistics Denmark aggregates this data into annual information for each triplet of product-firm-country.

Data on Marriages and Divorces

Marriage and divorce events are derived from the population registers that cover all marriages and divorces in Denmark. The database reports marital status of each individual as well as the date in which the marital status has changed. The data also allow us to distinguish homosexual from heterosexual couples. Our results are not affected by including or excluding homosexual couples.

Data on Childbirth

The administrative data on childbirths, "Boern", cover all births by women living in Denmark at the time of the birth. The data come from the Central Population Register (CPR) and Statens Serum Institut (SSI). The database includes information on the date of birth, gender, birth weight, gestation length, as well as unique identifiers for the newborn, the mother, and the father.

Data on Parental Leave

Our information on childcare leave spells comes from the Social Benefits Database of Statistics Denmark. Social benefits statistics database is a part of the income statistics registers (SHSS - *Sammenhængende socialstatistik* and OF *Offentligt forsørgede*). Until 2007 the dataset provides

[37] Firms must satisfy certain minimum sizes: at least 0.5 full-time equivalent employment, as well as certain minimum sales, between 150,000 and 200,000 Danish Kroner in manufacturing and 500,000 Danish Kroner in wholesale trade. 1 Danish Kroner is about 0.15 $ US in 2019.

the number of days in a parental leave in each year and month. After 2007, it provides the start and the end date for each leave.

In Denmark, the state guarantees paid parental leave at the unemployment insurance level (80% of the wage up to a cap). Mothers can take a paid leave for four weeks before and fourteen weeks after childbirth. Fathers can take two weeks leave associated with childbirth. Otherwise, parents can share thirty-two weeks of full-compensation leave for childcare purposes.

C.2 Industry Classifications

The IDA database provides industry codes for each wage earner based on administrative sources rather than surveys. For persons who work at a specific workplace, typically a firm, the personal industry code is equal to the industry code of the workplace following the Danish Industrial Classification (detailed below). If a person does not have a specific workplace, for example the person works from home or performs duties at several different locations, such as day care providers, the personal industry code is assigned according to the person's work performed. Similarly, if a person's workplace is not a particular physical location, for example a nurse employed by the municipality to provide care for elderly people in their residences, the person's workplace (employer) is the municipality while the person's personal industry code is defined by the work performed, in this case the "nursing homes" industry.

We employ the Danish Industrial Classification (*Dansk Branchekode*; abbreviated DB) at the six-digit level. Throughout the sample period three different systems apply, DB93, DB03 and DB07. DB93 is a six-digit nomenclature that follows the NACE Rev. 1 classification (NACE stands for Nomenclature Générale des Activités Économiques dans la Communaté Européenne). Denmark's DB03 classification was introduced in the year 2003 and it follows the NACE Rev. 1.1 system. In 2008 DB03 was replaced with DB07, which follows NACE Rev. 2. The first four digits of the Danish Industrial Classifications are identical to the corresponding NACE system. We employ concordances provided by Statistics Denmark to record economic activity consistently.

C.3 Education

The *IDA-personer* files specify for each individual the level of the highest completed education or professional training (*Erhvervskompetancegivende uddannelse*). We generally distinguish three education levels, which are college education, vocational education (or, training) and at most a high school degree.

C.4 Occupation Classification

The information on worker occupation in the IDA database is provided in terms of the Danish version of the United Nation's occupational classification system, called D-ISCO; here, ISCO stands for International Standard Classification of Occupations. Examples of four-digit occupations include silk-screen textile printers, textile pattern makers, tailors, bleaching machine operators, stock clerks, data entry operators, bookkeepers, accountants, cutting machine operators, supply and distribution department managers. Because employers and labor unions pay close attention to occupational codes, data quality is high compared to other countries.

Table C1: Variables used in the Economy-Wide Analysis

Variable Name	Variable definition
Vector Z_i^W	
Female	Equal to 1 if worker is female, 0 otherwise
Immigrant	Equal to 1 if worker is first or second generation immigrant, 0 otherwise
Age	Worker's age in years as of 1999
Married	Equal to 1 if worker is married as of 1999, 0 otherwise
Widow	Equal to 1 if worker is widowed as of 1999, 0 otherwise
Same Sex Union	Equal to 1 if worker has ever been in a same-sex union as of 1999, 0 otherwise
No of Children	The number of children that worker has as of 1999
Children^2	Square of No of Children
College	Equal to 1 if worker attended a college as of 1999, 0 otherwise
Vocational	Equal to 1 if highest attained education of worker is vocational school as of 1999, 0 otherwise
High School	Equal to 1 if highest attained education of worker is a general high school as of 1999, 0 otherwise
Unemployment History	Summation of unemployment spells of worker from 1980 until 1999 (expressed in months)
Log Hourly Wage	Log of hourly wage of worker in 1999
Union Membership	Equal to 1 if worker is a member of a union in 1999, 0 otherwise
UI Membership	Equal to 1 if worker is a member of Unemployment Insurance (UI) as of 1999, 0 otherwise
Experience	Number of years worker is in the labor market as of 1999
Vector Z_i^F	
Separation Rate	Share of workers who are not employed in the firm (of worker) from 1998 to 1999
Log Firm Wage	Logarithm of average hourly wage paid in the firm (of worker) in 1999
Firm Size	Full-time equivalent number of employees in the firm (of worker) in 1999
Industry Pre-Trend	Percentage change between 1993-1999 in the total number of employees in worker's 6-digit NACE industry in 1999
Industry College Share	Share of workers with college education in the 6-digit NACE industry (of worker) in 1999
Vector Z_i^P	
Have a Partner	Equal to 1 if worker is co-living with a partner (married or otherwise), 0 otherwise
Partner Age	Age of worker's partner as of 1999 in four categorical variables
Partner's Earnings	Annual earnings of worker's partner as of 1999 (in log)
Partner Danish Citizen	Equal to 1 if worker's partner as of 1999 is Danish citizen, 0 otherwise
Partner in Manufacturing	Equal to 1 if worker's partner as of 1999 works in the manufacturing sector, 0 otherwise
Partner in Same 6-digit NACE	Equal to 1 if worker's partner as of 1999 works in the same 6-digit NACE industry as worker, 0 otherwise
Partner in Exposed Industry	Equal to 1 if worker's partner as of 1999 works in a 6-digit NACE industry with at least 95th percentile exposure to Chinese Import Competition (ΔIMP), 0 otherwise
Higher Earning Spouse	Equal to 1 if worker's spouse as of 1999 earns more than worker, 0 otherwise
Spouse Age Difference	Equal to 1 if worker's spouse is at least 10 years older than worker, 0 otherwise