Globalization, Gender, and the Family*

Wolfgang Keller†
University of Colorado, NBER, and CEPR

Hâle Utar‡
Bielefeld University and CESifo

June 27, 2019

This paper shows that globalization has far-reaching implications for the economy's fertility rate and family structure because it influences work-life balance. Employing population register data on all births, marriages, and divorces together with employer-employee linked data for Denmark, we show that lower labor market opportunities due to Chinese import competition lead to a shift towards family, with more parental leave and higher fertility as well as more marriages and fewer divorces. This shift is driven largely by women, not men. Correspondingly, the negative earnings implications of the rising import competition are concentrated on women, and gender earnings inequality increases. The paper establishes the market- versus family choice as a major determinant of trade adjustment costs. While older workers respond to the shock rather similarly whether female or male, for young workers the family response takes away the adjustment advantage they typically have–if the worker is a woman. The female biological clock–low fertility beyond the early forties–is central to this gender difference in adjustment, rather than the composition of jobs or workplaces, as well as other potential causes.

Keywords: Fertility, Earnings Inequality, Marriage, Divorce, Import Competition, Gender Gap
JEL Classification: F16; F66; J12; J13; J16

*First draft: December 2016. The study is sponsored by the Labor Market Dynamics and Growth Center (LMDG) at Aarhus University. Support from Aarhus University and Statistics Denmark are acknowledged with appreciation. We thank Henning Bunzel for his help with the data, Tibor Besedes, Ben Faber, Hank Farber, Dan Hamermesh, Beata Javorcik, Stephen Machin, John McLaren, Bob Pollak, Veronica Rappoport, Steve Redding, Andres Rodriguez-Clare, Esteban Rossi-Hansberg, and Kjetil Storesletten, as well as audiences at the ASSA 2018, UC Berkeley, Bielefeld, The Role of the Firm in the Labor Market Conference (Berlin), CAED Conference (Michigan), SETC Cagliari, CEPR ERWIT, Copenhagen, the Duke Trade Conference, EEA Geneva, EEA Cologne, ETSG Florence, IAB Nuremberg, IfW Kiel, the IZA/Barnard Gender and Family Conference, Kentucky, Munich, Oslo, Princeton, Trento, RIETI (Tokyo), UIBE (Beijing), and ETH Zurich for useful comments.

†Email: kellerw@colorado.edu.
‡Email: haleutar@gmail.com.

1 Introduction

Central to coping with labor market shocks from trade liberalization are the adjustment costs of workers as they seek to re-establish favorable earnings trajectories after the shock (Artuc, Chaudhuri, and McLaren 2010, Autor, Dorn, Hanson, and Song 2014).[1] This paper extends the analysis of trade-induced worker adjustment costs beyond worker age, skill, and the conditions of the local market to the market versus family choice.[2] Studying workers exposed to rising import competition from China in the 2000s, we show that as the trade shock lowers market employment opportunities the likelihood of shifting to family activities is crucial for a successful labor market adjustment, with gender and worker age playing central roles.

Using population register together with labor market data on workers matched to their firms, our study provides a longitudinal picture of individual-level family *and* labor market responses to rising import competition in Denmark from 1999-2007. There is a clear shift towards family due to lower labor market opportunities. Workers exposed to rising 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. We document the new finding that this shift caused by trade exposure is driven by women, not men. The direct implication is that rising import competition increases gender earnings inequality.

We study the responses of the 1999 cohort of Danish workers, both for Denmark's private-sector labor force of about one million and the subset of textile and clothing workers (about 10,000 in number). The latter are specifically affected by the removal of Multi-fibre Arrangement quotas on Chinese exports following the country's entry into the World Trade Organization (late 2001). This trade liberalization leads to an increase in fertility and parental leave among unmarried women by about one quarter, and their subsequent marriage probability is up by about a quarter at the same time when married women exposed to rising import competition are substantially less likely to divorce than non-exposed women.[3] These family responses go hand in hand with long-run labor earnings losses for women, almost 85 percent of one year's salary, in contrast to men who do not significantly lose earnings over a six-year period (2002 - 2007). Our findings from this change in trade policy are qualitatively confirmed for Denmark's labor force as a whole using an

[1] Autor, Dorn, and Hanson (2016) is a survey.

[2] See Becker's groundbreaking *Theory of Marriage* (1973). Synonymous to family in our paper is the term household. Companionship and children are among the main motivations for two individuals to live together (Becker 1973).

[3] Marriage forms a marital union whereas divorce ends the marital union. We thus see increased marriage and lower divorce rates both as signs of a higher level of non-market activity.

instrumental-variables approach exploiting industry variation in the change in import penetration.

Investigating the reasons for this gender difference with worker, firm, and partner information, the primary reason why women shift more towards family than men is not that women's original employment was concentrated in highly exposed firms or in more vulnerable occupations compared to men. There is no evidence that women experience a larger negative shock than men because the respective earnings losses at the original firm, and the likelihood of displacement from the original firm, are similar for men and women. Rather, men and women follow different paths of adjustment to the trade shock, with women moving relatively strongly towards family and incurring larger costs of labor adjustment.

Our explanation for this gender difference is the biological clock of a woman. Because women are unlikely to conceive beyond their early forties, they have a higher reservation value to stay in the labor market than men. Consequently, a given negative labor demand shock due to trade exposure will raise a woman's incentive of moving towards family by more than it does for a man. Furthermore, because the market penalty of fertility in terms of work interruptions tends to be higher for women than for men, this can reduce women's incentives to invest into the new human capital needed in a new job or sector. These arguments are supported by the finding that it is mostly younger women who account for the gender differential; in contrast, the adjustment of women past their fertile age is similar to that of men. Other explanations that we evaluate do not change this.

Much progress has been made in understanding adjustment costs to workers' re-establishing promising career paths after a trade liberalization shock. Artuc, Chaudhuri and McLaren (2010) and Dix-Carneiro (2014) show that younger workers perform better in terms of labor market adjustment than older workers, with Utar (2018) emphasizing the comparatively small loss of manufacturing-specific human capital of young workers. At the same time, young workers may have a relatively low labor market attachment, which increases worker adjustment costs in response to a trade shock (Autor, Dorn, Hanson, and Song 2014), or older workers may have relatively low adjustment costs because they are more protected by seniority rules (Oreopoulos, von Wachter, and Heisz 2012).[4] We also connect to key aspects of family economics (Greenwood, Guner, and Vandenbroucke 2017 is a survey). By highlighting the importance of age in its influence on fertility and the market-family work balance, our analysis sheds new light on worker adjustment costs whenever change in the workplace– driven by shocks, structural change, or policy decisions–necessitates a different

[4]To the extent that trade exposure reduces fertility through channels present after job loss–fear of career interruptions (Del Bono, Weber, and Winter-Ebmer 2015), increased uncertainty (Farber 2010), lower health risk (Browning, Dano, and Heinesen 2006), or increased mortality (Sullivan and van Wachter 2009)–, accounting for these factors will increase the positive fertility response reported below.

career path. Our results also inform the design of labor market policies that put greater emphasis on the potential fertility choices of workers.[5]

We also contribute to the large literature on the reasons behind behavioral gender differences in various settings (Bertrand 2010, Blau and Kahn 2017). While labor-saving household technology and birth control (Goldin and Katz 2002) are among the factors that have reduced the gender earnings gap in the post-WWII era, our finding that trade liberalization increases the gender earnings gap qualifies the presumption that globalization necessarily reduces gender inequality, and it complements recent evidence that exporting firms tend to pay men a wage premium relative to women (Boler, Javorcik, and Ullveit-Moe 2018).[6] By employing longitudinal micro data on firms and workers, we take account of gender composition differences, such as that women are relatively more likely to be clerks rather than managers. As in recent work on the importance of family friendly occupations and firms for gender equality (temporal flexibility; Bertrand, Goldin, and Katz 2010, Goldin 2014, Goldin and Katz 2016), differences in the fertility-age profile of men and women and children are central to the biological clock explanation of gender differences. In addition, our analysis emphasizes household factors such as partner income. We also complement recent work documenting the role of parenthood for gender earnings inequality using administrative data for Nordic countries (Angelov, Johansson, and Lindahl 2016, Kleven, Landais, and Sogaard 2018, respectively). One important difference is that, in the spirit of Becker (1973), we study the effect of a plausibly exogenous shock on the simultaneous choice of family and labor market activities rather than the impact of parenthood on gender inequality.

Furthermore, the impact of rising import competition, especially from China, has attracted a lot of attention recently (Autor, Dorn, and Hanson 2013, Autor, Dorn, Hanson, and Song 2014, Bloom, Draca, and van Reenen 2016, Ebenstein, Harrison, McMillan, and Phillips 2014, Hakobyan and McLaren 2018, Keller and Utar 2017, Pierce and Schott 2016a, Utar and Torres-Ruiz 2013, and Utar 2014, 2018). In addition to labor markets, a smaller but growing literature has studied the impact on non-labor market outcomes, including elections (Che, Lu, Pierce, Schott and Tao 2016, Autor, Dorn, Hanson, and Majlesi 2017).[7] Marriage responses in both the US and Denmark are

[5]Guided by the observation that men are more intensively employed in manufacturing than women, Brussevich (2018) focuses on the broad sectoral switch from manufacturing to services in her analysis of gender differences.

[6]Earlier work by Black and Brainard (2004) finds that import competition narrows the residual gender wage gap more rapidly in relatively concentrated industries, lending support to Becker's (1957) model of discrimination according to which increased market competition reduces employer discrimination in the long run. For an overview of the relationship between trade liberalization and gender inequality, see Pieters (2015).

[7]See also Dai, Huang, and Zhang (2018), Dix-Carneiro and Kovak (2017), Topalova (2010) on regional labor market effects of trade liberalization in emerging countries, as well as Anukriti and Kumler (2018)), and Kis-Katos, Pieters, and Sparrow (2018) for analyses of some family outcomes.

found to be consistent with Becker's (1973) prediction of higher gains to household formation when the earnings differential between the spouses is larger (see Autor, Dorn, and Hanson 2018 for the US), although an important difference is that import competition does not lower overall marriage rates in Denmark because workers there receive more transfer income than their U.S. counterparts.[8] By employing longitudinal information the present analysis extends existing work and shows that rising import competition plays an important role in shaping individual life cycle choices.

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. We also introduce the most important recent developments regarding family formation and fertility as well as parental leave in Denmark. Section 3 lays out the econometric framework. Section 4 shows that rising import competition has increased marriage and parental leave, as well as fertility for younger women, at the same time that it reduced the divorce likelihood of workers. Further, we document the key gender differential by demonstrating that all family impacts are largely due to women. Next we establish that increased family activity is the flip side of reduced market work by showing that women experience far higher earnings losses through import competition than men (section 5). Section 6 shows that the same patterns of textile workers' labor market-family choices are found for Denmark's entire private-sector labor force. Turning to the causes of the gender differential, section 7 introduces the biological clock argument and provides evidence on the central importance of children. We also discuss a number of other explanations, including initial exposure differences, occupational sorting, as well as the roles of partner income and women's networks. Section 8 contains a concluding discussion. The Appendix provides extended results for Denmark's entire private-sector labor force, an analysis of possible pre-trends using a placebo approach, further descriptive evidence, as well as more details on the quota-removal trade liberalization in textiles.

[8] In section 5 we show that trade exposure does not reduce personal income in the long-run because of insurance benefits and transfers, in contrast to the U.S. where such payments do not replace earnings losses (Autor, Dorn, Hanson, and Song 2014).

2 Import Shocks and Integrated Data on Individual-Level Market versus Family Behavior

The following provides background on recent trends in import competition and family patterns in Denmark. It also reviews information that allows us to identify the impact of rising import competition, employer-employee matched data which gives a comprehensive picture of the labor market situation of individual workers in Denmark, and population register data which provides information on all child births, marriages, and divorces. To give a starting point for the regression analysis we conclude this section by presenting descriptive evidence on the behavior of workers depending on their trade exposure and gender.

2.1 Rising Import Competition for Denmark's Workers

Many advanced countries have experienced rising import competition from the late 1990s on, especially as China joined the World Trade Organization (WTO) in December 2001. In order to identify causal impact of the competition with China we use a quasi-experimental set-up where we use a concrete policy change that was associated with China's WTO entry, the dismantling of binding quotas on Chinese textile exports that were part of the Multi-Fibre Agreement (MFA).[9]. In the absence of a discrete policy change affecting the entire economy, we use an instrumental-variables approach exploiting changes in import penetration. The following summarizes key aspects of the MFA liberalization, with more details given in Appendix H, while the more familiar instrumental-variable approach based on industry-variation is described in section 6, with more details given in Appendix B.

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 labor intensive sector in advanced countries. During the Uruguay multi-lateral trade liberalization round (1986 to 1994), it was agreed to bring textile trade in line with other world trade for which per the rules of the newly established WTO quotas are generally ruled out. Consequently, the MFA quotas were agreed to be abolished in four phases starting in the year 1995.

[9] A quota is a quantitative limit on how much can be traded.

Importantly, neither Denmark nor China were directly involved in negotiating the creation or removal of the textile quotas (as well as which goods would be covered in which of the four phases). This is because negotiations took place at the level of the EU, where Denmark's influence as a relatively small country is limited, while China did not influence the removal process because at the time, 1995, it was not a member of the WTO. Furthermore, as a non-WTO country, China did not benefit from the first two trade liberalization phases of 1995 and 1998. However once China became a member of the WTO in December 2001 it immediately benefited from the first three liberalization phases (1995, 1998, and 2002), and it also benefited from the fourth liberalization phase of 2005.

The liberalization of Chinese textile and apparel exports as the country entered the WTO can therefore be viewed as a quasi-natural experiment providing exogenous variation in exposure to rising import competition in Denmark's textile and apparel industries. This episode is established as a major trade shock with strong labor market effects in the literature (Bloom, Draca, and Van Reenen 2016, Harrigan and Barrows 2009, and Khandelwal, Wei, and Schott 2013, Utar 2014).[10]

Our identification strategy is based on information on whether a firm's product portfolio will be affected by the quota removal, the firm-worker link, and uncertainty about the timing of China's accession to the WTO. We define a firm to be exposed to rising import competition, or treated, if as of 1999 it has domestic production in any of the 8-digit Common Nomenclature (CN) goods for which China upon WTO entry will not face a quota anymore; while a control firm has no such production.[11] We first match administrative quota categories with the 8-digit CN goods. Firms producing quota goods are then identified by employing the domestic production database that report establishments' sales separately for each 10-digit products produced within Denmark.[12] Employing the employer-employee link, finally, we identify workers exposed to rising import competition from China as those working for firms that are exposed in this sense.

It is useful to compare our approach with research on job displacement, which typically contrasts workers who lose their employment (due to a recession or mass layoffs for example) with workers

[10]Utar (2014) employs the MFA quota liberalization to document firm responses to low-wage competition, with declines in production, employment and intangible capital followed by significant within-firm re-structuring, while Utar (2018) studies worker responses due to the quota removal, where displacement was followed by a shift to service jobs subject to substantial adjustment as workers have to acquire new sector-specific human capital. These papers do not discuss family outcomes or gender differentials with rising import competition.

[11]We employ the year 1999, three years before WTO entry, to reduce the influence of anticipation effects.

[12]Information on the firms' products comes from the domestic production data base (VARES). Despite its threshold of 10 or more employees, this database covers close to the universe of manufacturing workers because manufacturing firms with domestic production facilities below the threshold are extremely rare.

who were not laid off. In our case, treatment is defined based on the ex-ante criterion of the workers' firms' exposure to competition. As a consequence, the hazard of being displaced is relatively high for exposed workers but there is no one-to-one mapping between job loss and treatment as in the job displacement literature.

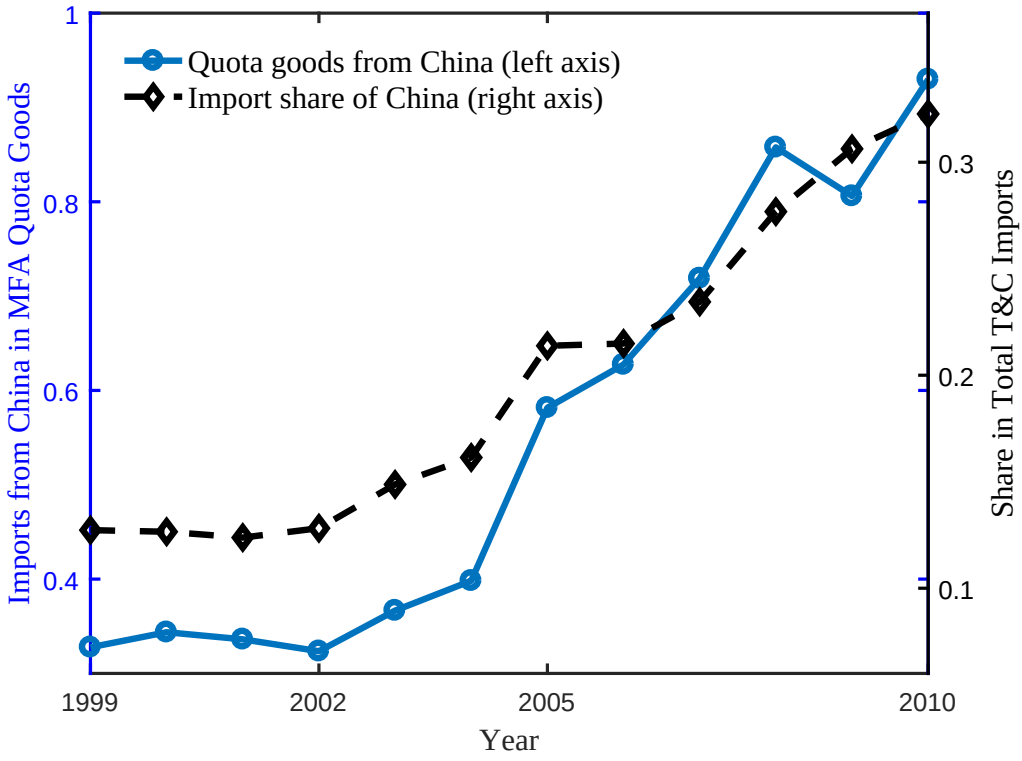


Figure 1: **Evolution of Chinese Imports in Response to Quota Removal**

Notes: The solid line shows Danish imports from China of MFA quota goods, relative to Danish value added in textile and clothing goods. The dashed line shows China's share in all Danish imports of textiles and clothing (T&C) goods.

Figure 1 shows the evolution of Danish textile and clothing imports in quota goods from China over 1999-2010.[13] As the overwhelming number of the quotas on China were fully utilized and China has a comparative advantage in textile production, imports from China substantially increased starting in the year 2002, as shown in Figure 1.[14] The liberalization process continued with expanding the size of remaining quotas and the last phase of removal in 2004-5.[15] Despite

[13]The import value is measured in multiples of the total value-added in the textile and clothing industry as of the year 1999 (around 1.3 billion Euro).

[14]Appendix H presents additional details of the quota liberalizations.

[15]Due to the surge of Chinese imports in the first few months of 2005 at the EU ports in response to the final phase

more products being subject to the last phase of removal, Utar (2014) documents a strong increase in the volume of affected goods coming from China along with decline in unit-prices of affected goods in response to both the 2002 and the 2005 removals, and finds a large overlap among firms producing goods subject to the 2002 (Phases I-II-III) and the 2005 quota removals.[16]. As the uncertainty regarding the timing and the coverage of the Phase IV quota liberalization for China were already resolved in January 2002, and the firm-level adjustment started that year (Utar, 2014), we take the entire post-2002 period to be our treatment period.[17]

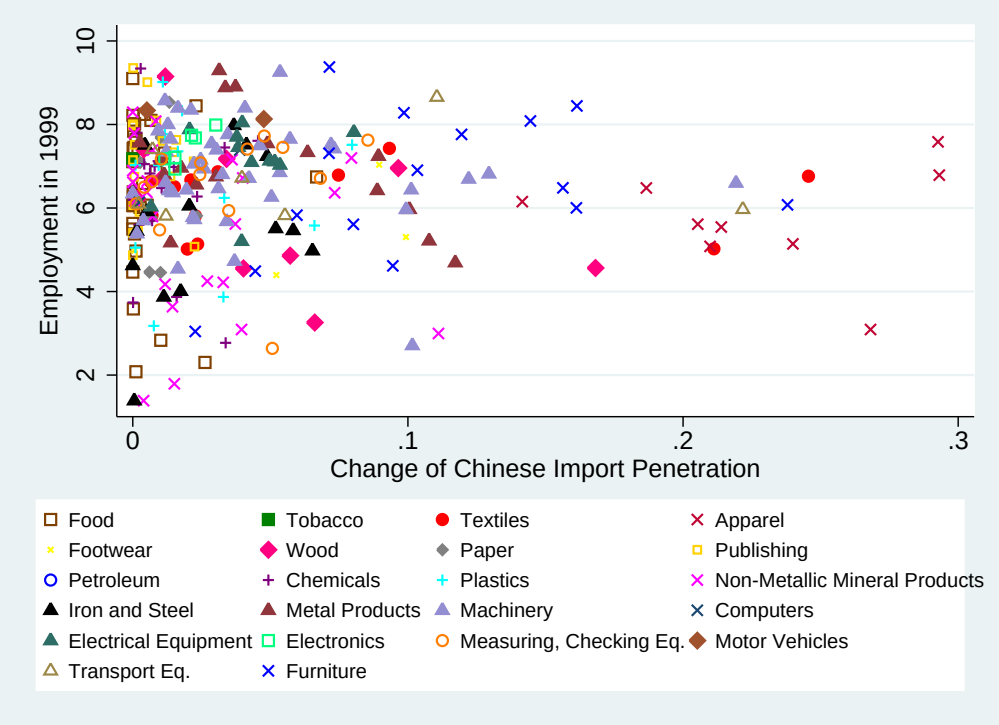


Figure 2: **Change in Chinese import penetration**

Notes: The figure shows the change in Chinese import penetration across six-digit industries. Each two-digit industry is given the same color and symbol. The vertical axis shows the logarithm of the total number of employees.

of the quota removal, the European Union renegotiated a few of the Phase IV quotas with China and they agreed on additional export quotas (governed by China) on those few categories until 2008. This event is popularly referred to and publicized as the Bra War.

[16] 87 percent of firms that produced goods subject to 2002 quota removal (Phase I, II, and III) were also producing goods subject to 2005 quota removal.

[17] See Appendix Section H for firm-level response to each of the removals.

2.1.2 Import Competition and the Overall Economy

Our second approach studies the impact of rising import competition in the entire private-sector economy by employing industry variation. Figure 2 shows the change in Chinese imports between 1999 and 2009 over absorption at the six-digit (NACE) industry level.

The figure indicates a large level of variation in Chinese import penetration in Denmark even within two-digit industries, which is the level of variation we will utilize. A threat to identification is that realized Danish imports from China may be correlated with domestic industry demand shocks, because then both labor outcomes and industry imports would be correlated with industry demand shocks. To address this potential issue we will instrument Danish industry imports from China with industry imports in other advanced countries (e.g., Autor, Dorn, and Hanson 2013). Further details on this approach are shown in section 6.

2.2 Workers and their Firms

Information on workers and their firms comes from the Integrated Database for Labor Market Research of Statistics Denmark (IDA database). It contains administrative records on virtually all individuals and firms in Denmark.[18] In constructing the sample we start out with annual information on all persons of age 15 to 70 residing in Denmark with a social security number, information on all establishments with at least one employee in the last week of November of each year, as well as information on all jobs that are active in that same week.

The analysis is based on the cohort of full time workers in the year 1999 who were employed by Denmark's private-sector economy, made positive wages, and were between 18 and 56 years old. We exclude workers who were not working full-time because their market versus family choices are likely to be different from those of full-time workers who have stronger labor market attachment.[19] The age constraint is applied because we want to ensure that workers in our sample would typically not go into retirement during the sample period. Our sample has about 1,600,000 workers. A subset are the workers who were employed in 1999 in Denmark's textile and clothing industry (about 10,000 in number). Whether the workers in 1999 are in textile production or in other parts of Denmark's private-sector economy, our cohort approach, following workers from

[18] For brevity, we use the term firm although our analysis includes workplaces that usually are not referred to as firms. These are not that common in the textile industry, however, they are in our analysis of Denmark's economy-wide labor force, see Section 6.

[19] Nevertheless, results that include part-time workers are similar, see below and Appendix E.

1999 until 2007 as they may switch firms, industries, or occupations, implies that our analysis yields a worker-level picture of trade adjustments throughout Denmark's entire economy. The year 2007 is chosen as the final year in our analysis in order to separate the impact of rising import competition from that of the Great Recession (2008).[20]

We examine the workers' annual salary, hours worked, unemployment spells, and job switching using information on the industry code of primary employment, the hourly wage, the worker's highest attained education level and labor market experience, as well as gender, age, immigration status, and occupation.[21] We also analyze movements into unemployment and outside of the labor force, including maternity leave and early retirement.

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. They include firm size (measured by employment), firm quality (proxied by the average firm wage), as well as the past separation rate of the firm. Being able to control for the specific situation of each worker in terms of industry, firm, and job is important for assessing the the importance of selection at different margins for our results. Furthermore, to the extent that a worker is not single, partner characteristics, including earnings, income, and whether the partner is exposed to rising import competition, are bound to matter. The analysis below will employ extensive information on how partner characteristics shape worker choices.[22]

Among the 1999 textile workers, close to half are exposed to rising import competition, see Table 1, on top. The table shows in Panel A a number of key characteristics as of 1999. Comparing treated with untreated workers in terms of their 1999 characteristics sheds light on the extent of their similarity before the onset of rising import competition.

Worker adjustment costs are generally increasing with age, not least because older workers tend to have a harder time to learn the skills needed in new jobs than younger workers. The average age of both treated and untreated workers is 39.2 years, and both sets tend to have between 14 and 15 years of labor market experience. Immigrants are somewhat less likely to work at firms subject to rising import competition, whereas average earnings are quite similar. In terms of family status,

[20] We also conduct an identification check by performing a placebo exercise with workers who we follow from 1999 backward to the year 1990. See Section 3 and Appendix, Section A.

[21] The Danish version of the International Standard Classification of Occupation (D-ISCO) at the four-digit level has about 400 different job types. See https://www.dst.dk/en/Statistik/dokumentation/nomenklaturer/disco-88.

[22] A number of interesting questions would call for aggregating individual-level information to the household level; for example, using regional exposure variation Dai, Huang, and Zhang (2018) show that higher import competition in China has increased the share of households in which only the man is employed. We do not perform a household-level analysis because workers without partner are central to some of our findings.

around 60 percent of treated workers are married, compared to about 58 percent for the untreated group.[23] Note that we will analyze the outcomes within each demographic groups separately and thus control for differences in marital status. The average number of children in our sample is 1.46 and the mean difference between treated and untreated workers is not statistically significant. All in all, Table 1 indicates that the differences between treated and untreated workers are relatively small. The same can be said about the propensity that treated and untreated workers have a new child and take parental leave in the year 1999; the former is somewhat higher for untreated workers while parental leave taking is slightly higher among treated workers. Quantitatively, about every 20th worker has a new child or takes parental leave in the year 1999.

Table 1: **Worker Characteristics by Exposure to Import Competition**

	Treated N = 4,743 **Average**	**Untreated** N = 5,255 **Average**	**Diff.**	**t-stat**
Age	39.206	39.228	-0.022	-0.111
Immigrant	0.053	0.076	-0.023	-4.607
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	-1.099
Parental Leave Take	0.053	0.050	0.003	0.687
College Educated	0.130	0.107	0.023	3.580
Vocational Educated	0.361	0.360	0.001	0.127
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 workers exposed (treated) and not exposed (untreated) to rising import competition from China. Treated workers are those whose firm manufactured in Denmark a product protected by a quota that would be removed with China's entry into the WTO; correspondingly, Untreated workers. Immigrant is an indicator for a worker who has first or second generation immigrant status. 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 distinguish three levels of formal education, at most high school, vocational education, and

[23] The share of single workers is about 28 percent for both treated and untreated workers.

college education or more.[24] Education levels matter for workers' adjustment to the negative labor demand shock of trade exposure because college education provides general skills that can facilitate switching from one job (or industry) to another. In our sample, the share of workers with vocational training is virtually the same for the sets of treated and untreated workers (36 percent, see Table 1). Every ninth of the untreated workers has college education, while in the treated set of workers college education is slightly more prevalent.

Workers hold a range of different jobs ranging from relatively low-paid laborers to highly-paid professionals and managers. A quantitatively important group are machine operators, typically making mid-level wages, who account for more than one third in both the set of treated and untreated workers. On the other hand, between 5 to 6 percent of all textile workers are managers. Generally, we do not see marked differences in terms of occupations between the sets of treated and untreated workers. Overall, Table 1 suggests that there are no strong differences between the sets of treated and untreated workers before the trade liberalization.

We now turn to describing the sample by trade exposure and by gender (see Table 2). For certain parts of our analysis it is natural to analyze subsets of workers. Specifically, to understand whether rising import competition affects divorce behavior we analyze workers who–as of the year 1999–are married, and for our analysis of fertility it is natural to focus on workers who are in their fertile age.[25] In Table 2 we distinguish two different samples, the workers that were unmarried and those that were married in 1999. Note that unmarried workers consists of single and co-habitating workers, that is workers who live with another person without being married. In our analysis we will be able to examine these two groups separately.

[24] Vocational education is an important institution in Denmark, it combines on the job training at firms with formal education at schools; it takes typically about 3 years. For an analysis of vocational training in the context of rising import competition, see Keller and Utar (2016) and Utar (2018).

[25] We take 36 years as the fertile age limit for women, and 45 years for men. Results are found to be similar for other plausible thresholds, see Appendix D.

Table 2: **Worker Characteristics By Gender and Family Status**

	Treated Mean	Untreated Mean	Diff	t-stat
Panel A. Women	N = 3,067	N = 2,521		
Age	39.29	39.22	0.07	0.26
Hourly Wage	134.88	134.23	0.65	0.55
Panel B. Married Women	N = 1,889	N = 1,533		
Age	42.18	41.90	0.28	0.91
Hourly Wage	136.02	135.11	0.91	0.59
Partner's Log Income	12.51	12.47	0.04	2.15
Panel C. Unmarried Women	N = 1,178	N = 988		
Age	34.66	35.06	-0.40	-0.91
Hourly Wage	133.05	132.87	0.19	0.11
Partner's Log Income	12.41	12.39	0.01	0.45
Panel D. Men	N = 1,672	N = 2,730		
Age	39.08	39.24	-0.16	-0.53
Hourly Wage	189.53	181.64	7.89	2.66
Panel E. Married Men	N = 974	N = 1,492		
Age	43.01	43.16	-0.15	-0.44
Hourly Wage	206.98	193.55	13.44	3.04
Partner's Log Income	12.14	12.15	-0.01	-0.44
Panel F. Unmarried Men	N = 698	N = 1,238		
Age	33.60	34.52	-0.53	-2.07
Hourly Wage	165.17	167.28	-2.11	-0.60
Partner's Log Income	12.06	12.12	-0.06	-2.00

Notes: Table shows averages of 1999 worker characteristics. See the text for definition of treated and untreated workers. Partner characteristics in the case of unmarried workers are for co-habitant.

Analyzing the sample by gender, we see that women account for a larger share of textile workers than men (about 5,600 versus 4,400 workers, respectively; see Table 2). This, to some extent, reflects the fact that textile production tends to be female intensive (sewing, stitching, etc, with relatively few brawny tasks). It is important to note that our empirical results do not simply reflect the gender difference in sample composition. To this end we employ a range of worker characteristics, detailed occupational indicator variables, or worker fixed effects. Despite for certain subgroups of workers the sample size is not very large (see Table 2), as we will show below exposed workers behave significantly different from non-exposed workers in a number of ways, and moreover, those patterns are similar to findings for all private-sector workers (see section 6).

Table 2 shows that there is essentially no age difference between exposed and not exposed workers, whether among married women, unmarried women or married men. We also see that married workers are in general older than unmarried workers. The average difference between married and unmarried is about seven years for women and nine years for men. In line with this age difference, hourly wages are higher for married workers in comparison to unmarried workers. However, note that wage differences between married versus unmarried are much pronounced among men than among women. This could be an indication that family activities may require more time for women away from the labor market in comparison to men. Hourly wages are quite similar across different demographic samples between exposed and untreated workers, indicating treated and untreated workers have very similar qualifications even within demographic groups. Table 2 also report partner income. Note that both male and female workers tend to be married to individuals not employed in the textile and apparel industries.[26] Among unmarried workers partner's log income report the mean log income of partners across workers who have co-habiting partners. Partner's income is higher for married women than for married men, which is a reflection of the gender earnings gap between men and women. At the same time, the differences in partner income between treated and untreated workers are at most moderate as Table 2 indicates.

Table 3 shows summary statistics for the 1999 cohort of private-sector workers in Denmark. There is a total of N = 1,654,485 individuals. On average, they are 38 years old, have 14 years of labor market experience, and about four percent of the workers are immigrants. Comparing workers by gender, we see that there is some difference in marriage rates as of the year 1999, 52 percent for men and 57 percent for women, which is possible because workers can be married to individuals outside of our sample. One reason for why overall there are somewhat more men than women in the sample is that women are relatively likely to work in the public sector.

Among the differences across gender is that the fraction of women with college education is relatively high, while men are relatively more frequently 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). Our analysis will take account of the possible influence of occupational sorting for our results.

[26] In our sample of close to 6,000 married workers, only about 12 percent of workers are married to another textile worker as of the year 1999.

Table 3: **Worker Characteristics in the Private-Sector Labor Force**

			Men		Women	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**
	N=1,654,485		**N=917,896**		**N=736,589**	
Age	38.201	9.869	38.047	10.051	38.394	9.633
Immigrant	0.042	0.200	0.045	0.207	0.038	0.191
Labor Market Experience	14.434	5.814	14.490	5.906	14.365	5.697
Married	0.543	0.498	0.521	0.500	0.570	0.495
Number of Children	1.336	1.152	1.263	1.178	1.428	1.112
Log Earnings	12.260	0.650	12.367	0.649	12.128	0.626
College	0.280	0.449	0.246	0.431	0.322	0.467
Vocational Educated	0.411	0.492	0.436	0.496	0.380	0.485
Birth Event	0.045	0.208	0.048	0.215	0.042	0.200
Divorce Event	0.008	0.088	0.007	0.085	0.008	0.092
Marriage Event	0.026	0.159	0.026	0.158	0.026	0.160
Managers	0.037	0.188	0.051	0.219	0.020	0.139
Professionals	0.143	0.350	0.147	0.354	0.138	0.345
Office Workers	0.129	0.335	0.059	0.235	0.216	0.412
Machine Operators	0.056	0.230	0.061	0.240	0.049	0.217

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

2.3 Family Activity: Marriage, Divorce, Birth, and Parental Leave 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. In 1968 it was 24.7 and 22.4 for men and women, respectively, while in the year 2008 these ages were 34.4 and 32. Education goals and an increased life expectancy are contributing factors. The long-term trend of delayed marriage slowed down recently, and the age at first marriage in 2014 was quite similar to 2008 for both men and women.

While marriage has come later for Danes, divorce rates have fallen from the mid-1980s to the mid-2000s. In 1986, the chance that a marriage would last for five years was about 86%, rising to above

89% by 1998 and above 91% by the year 2007. A number of factors seem to have contributed to the lower divorce rates, and as we will show below one of them is the response to rising import competition.[27] Marriage and divorce information for all Danish residents comes from Denmark's Central Population Register. We match this data to worker data with a unique person identifier.

An important aspect of family life is co-habitation (living together without being married), which for many (though not all) couples is the stage of life before marrying.[28] The share of persons living in a cohabiting relationship in Denmark has increased since the middle of the 20th century, as it did in many other high-income countries. During our sample period, the share of non-married cohabiting couples in all household types was stable at around 12-13%. In 2003, among all couples 22% were non-married and cohabiting in Denmark (Lund-Andersen 2015). In our sample too 22% of all couples are non-married and cohabiting couples.

One goal of household formation is to raise children. Since the year 1990 the total fertility rate in Denmark has been broadly stable.[29] At the same time, there have been fluctuations, in particular during the period 2002 to 2008 when Denmark's total fertility rate increased by almost 10%. Looking at the contribution of women at different ages to total fertility, as women's age at first birth has risen the contribution of women aged 25 years–traditionally accounting for the largest share– to fertility has fallen while the contribution of women aged 30 and 35 years has correspondingly increased. Overlaying this trend are more short-term changes. In particular, while the contribution to fertility by 25 year-aged women fell by 16% from 1996-2001 this decline was considerably slowed during the next five years (a decline of 4% between 2002-2007). While a number of factors may have contributed to this, lower opportunities in the labor market seems to have increased the incentives of relatively young women to have babies, as we will show below.[30] Child birth information is derived from Statistics Denmark's Fertility Database. It provides parental information with personal IDs on every child born in Denmark.

An indicator of reduced market work for the explicit purpose of child care is parental leave, which compared to having a new child is a less drastic form of family activity. By international standards,

[27] In the years after 2011, outside of our sample period, divorce rates in Denmark have begun to increase again.

[28] In 2013 82% of the weddings in Denmark involved couples who were already cohabiting at the time when they became married. The number was 86% in 2003 (Lund-Andersen 2015).

[29] 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 around 1,871 in 2010, compared to 1,925 for the United States. Source: Human Fertility Database, Max Planck Institute for Demographic Research (Germany) and Vienna Institute of Demography (Austria). Available at www.humanfertility.org.

[30] In addition to fertility and parental leave responses, it would be interesting to examine the impact of globalization on child outcomes. For the effect of extended childcare on child outcomes, see Dustmann and Schoenberg (2012).

parental childcare leave is generous in Denmark, though there have been some fluctuations in parental leave provision over time. Specifically, during the 1990s there was a step-by-step decrease of parental leave support, which was reversed in the early 2000s. From the year 2002 on, there is a maximum of 112 weeks of job-protected parental leave per child. Of this, the mother can take up to 64 weeks–18 weeks of maternity leave plus 46 weeks of parental leave–, while the father can take a maximum of 48 weeks, composed of 2 weeks of paternity leave and 46 weeks of parental leave (OECD Family Database).[31] The information on childcare leave spells comes from Statistics Denmark's social benefits statistics database which is a part of the income statistics registers (SHSS - *Sammenhængende socialstatistik* and OF *Offentligt forsørgede*).

In addition to these characteristics, there are other factors that may influence labor market versus family choices. In our cohort analysis we think of them primarily as characteristics as of the initial year of the sample, 1999.[32] Among unmarried workers, those cohabiting with another person may well act differently from single workers, not least because a cohabiting partner may either provide support or increase the worker's difficulties resulting from trade exposure depending on whether the partner him- or herself is exposed to rising import competition. Partner characteristics may play an important role in determining labor market versus family choices because they affect household income levels. Furthermore, children that live with a worker may affect the market work-family balance because the presence of children could influence the worker's human capital investment strategies and risk-taking behavior. For workers that have a partner as of the year 1999 (co-habitant or married), we employ information on the partner's exposure, earnings, education, age, and a range of other characteristics. Section 6.3.2 is specifically devoted to the role of partner income for our findings.

2.4 Descriptive Evidence on Labor and Family Responses of Textile Workers

In the previous section we have described the sample in terms of 1999 characteristics. The following shows the distribution of the cohort of textile workers in the final year of the sample, 2007, by exposure to rising import competition. Figure 3 shows that 50 percent of workers not exposed to rising import competition are still in manufacturing by 2007, while 29 percent have moved to the

[31] See https://www.oecd.org/els/family/

[32] Both the years 2000 and 2001 are chronologically before the onset of rising import competition, however, we will focus on 1999 to limit the possible influence of anticipation effects. In contrast, characteristics in year 2002 or later may themselves be outcomes of worker adjustment and hence are endogenous.

services sector. This confirms the general trend of a shift of employment away from manufacturing towards services.[33]

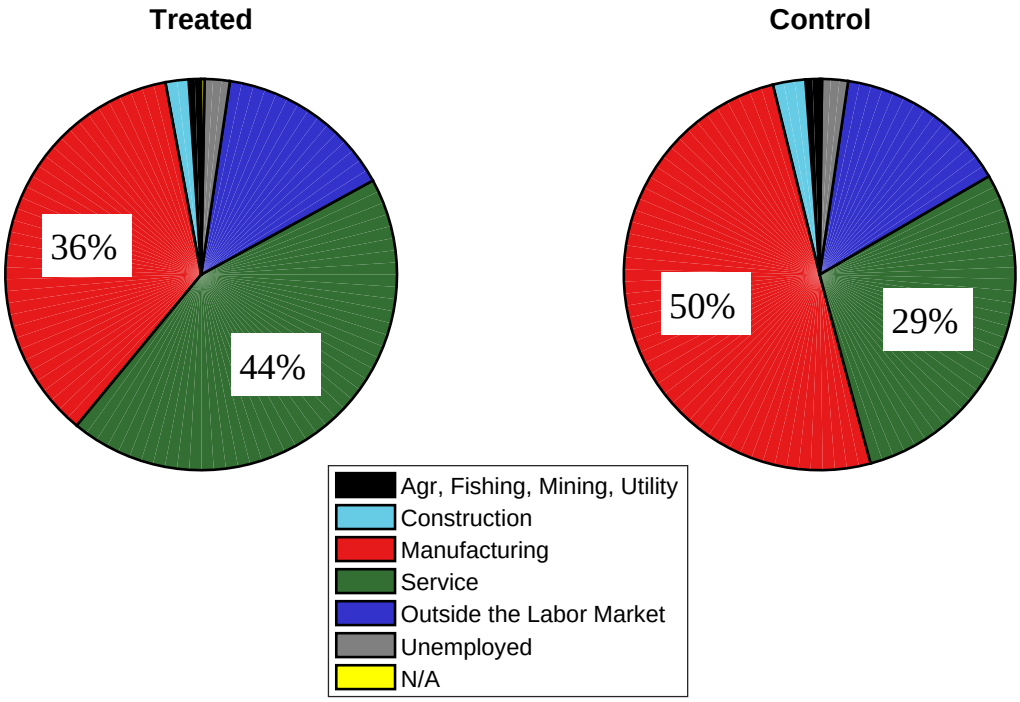


Figure 3: **Sectoral Distribution of Workers in 2007**

At the same time, Figure 3 shows that of the set of exposed workers, 44 percent are employed in the service sector by 2007, while only 36 percent have still a manufacturing jobs. This difference suggests that rising import competition has sped up structural change for exposed workers. If manufacturing firms exposed to new 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 (15, versus 14 percentage points, respectively). While Figure 3 shows that exposed workers are somewhat more likely to be out of the labor force than not exposed workers, overall Figure 3 suggests that the most important influence of trade exposure appears to be on the shift from manufacturing to services. Additional evidence on this sectoral shift is shown in Figures A-4 and A-5

[33]Other factors that may explain this shift towards services are the relocation of manufacturing jobs to other countries and relatively high rates of labor-saving technological change in manufacturing.

in Appendix I.

The following analysis provides evidence on key outcomes year-by-year. We begin with marriage rates. Figure 4 on top compares marriage rates of exposed and not exposed unmarried workers.[34] Note that China entered the WTO in December of 2001. Marriage rates were around five percent before 2002, and overall there is a downward trend until 2006 when marriage rates are around 3.5 percent. The reason for lower marriage rates over time is that not infrequently individuals marry and then stay with their partners, so we cannot observe them marrying again. Importantly, yearly marriage rates for exposed and not exposed workers were quite close to each other before the onset of the trade liberalization in year 2002. Once the trade liberalization had taken place, however, marriage rates of exposed workers rose relative to those of not exposed workers. In the year 2004, specifically, the marriage rate of exposed workers is around 5 percent, compared to not exposed workers of about 4 percent. By the year 2006 marriage rates for the two sets of workers have more or less converged again. This graph is consistent with a positive impact of trade exposure on marriage. Furthermore, the evolution over time suggests that this effect may have been strongest in the immediate aftermath of China's entry into the WTO.

We now turn to marriage patterns of treated and untreated workers by gender, see Figure 4, bottom. There, a striking difference between men and women emerges. Exposed women marry more than not exposed women during the treatment period, in contrast to men where exposure tends to reduce marriage rates. The overall increase in marriage rates during the treatment period (top of Figure 4) is thus due to the behavior of women. Lower marriage rates of exposed men may be in part due to the lower marriageability of men (for the U.S., see Autor, Dorn, and Hanson 2018). Figure 4 presents some initial evidence that trade exposure may increase the extent of family activities, with possibly stark differences between the behavior of men and women.

Given the positive marriage response of women, we turn to the fertility behavior of women next. Figure 5 shows annual birth rates for two subsamples of women, those who are unmarried as of 1999, versus those women who are married in 1999. Unmarried women are on average about seven years younger than married women (35 versus 42 years, see Table 2). Thus, the analysis sheds light not only on family status but also on the behavior of older versus younger women, and it is plausible that older women are relatively less influenced by fertility considerations because conception is more difficult.

Consistent with that, the birth rates of older women are relatively low (the two bottom lines in

[34] Here we drop the year 1999 from the analysis; by construction, the marriage rate in 1999 for all these women was zero.

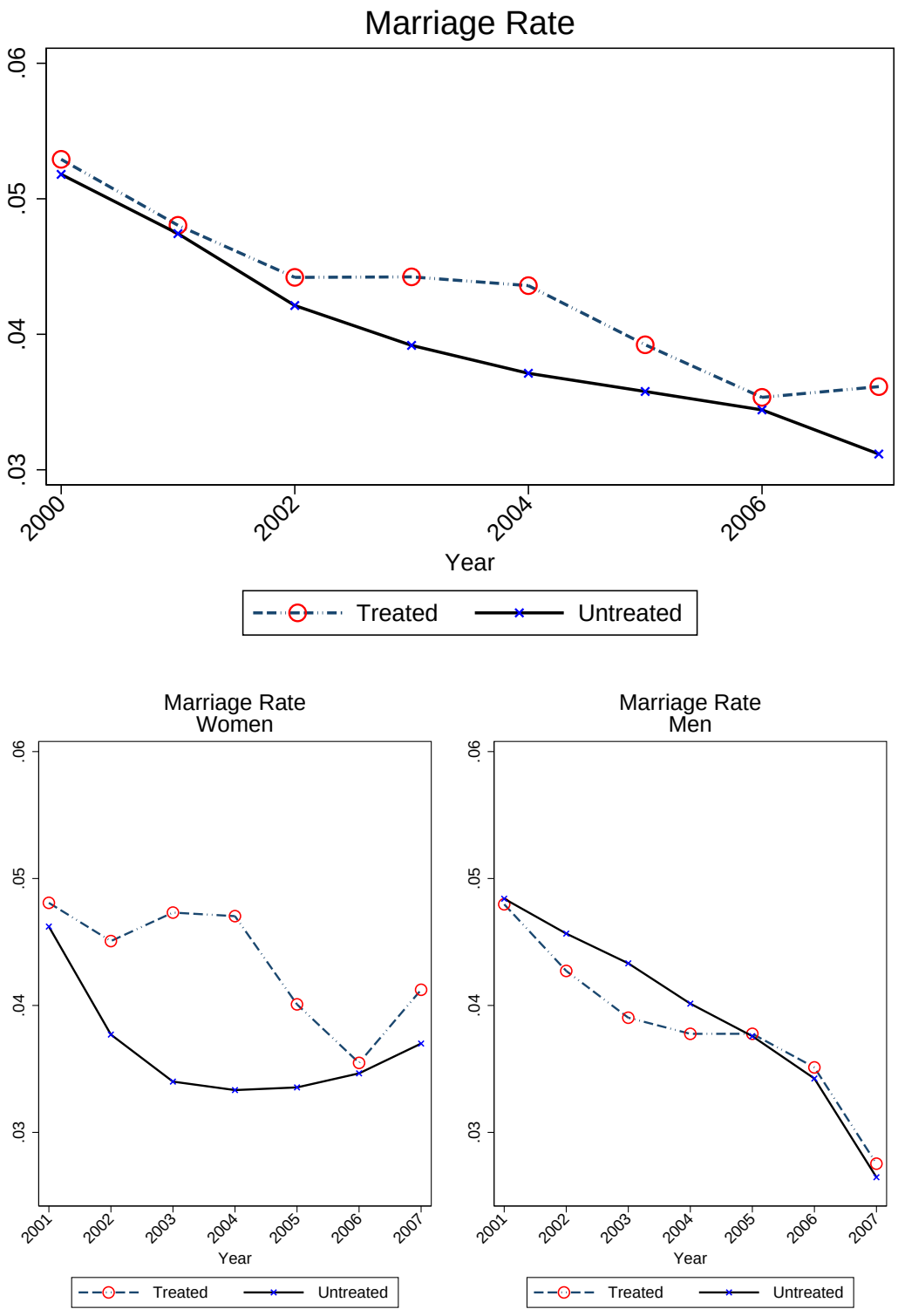


Figure 4: **Marriage in the Face of Chinese Import Competition**

Notes: Annual marriage rates of 1999 cohort of unmarried workers by trade exposure (top) and by gender and exposure (bottom); smoothed.

Figure 5), and interestingly, the birth rates of exposed and not exposed married women are virtually identical. In contrast, for younger women trade exposure is associated with higher birth rates in the treatment period, and especially between 2002 and 2004. This provides some initial evidence that trade exposure leads to a positive fertility response of especially younger women.

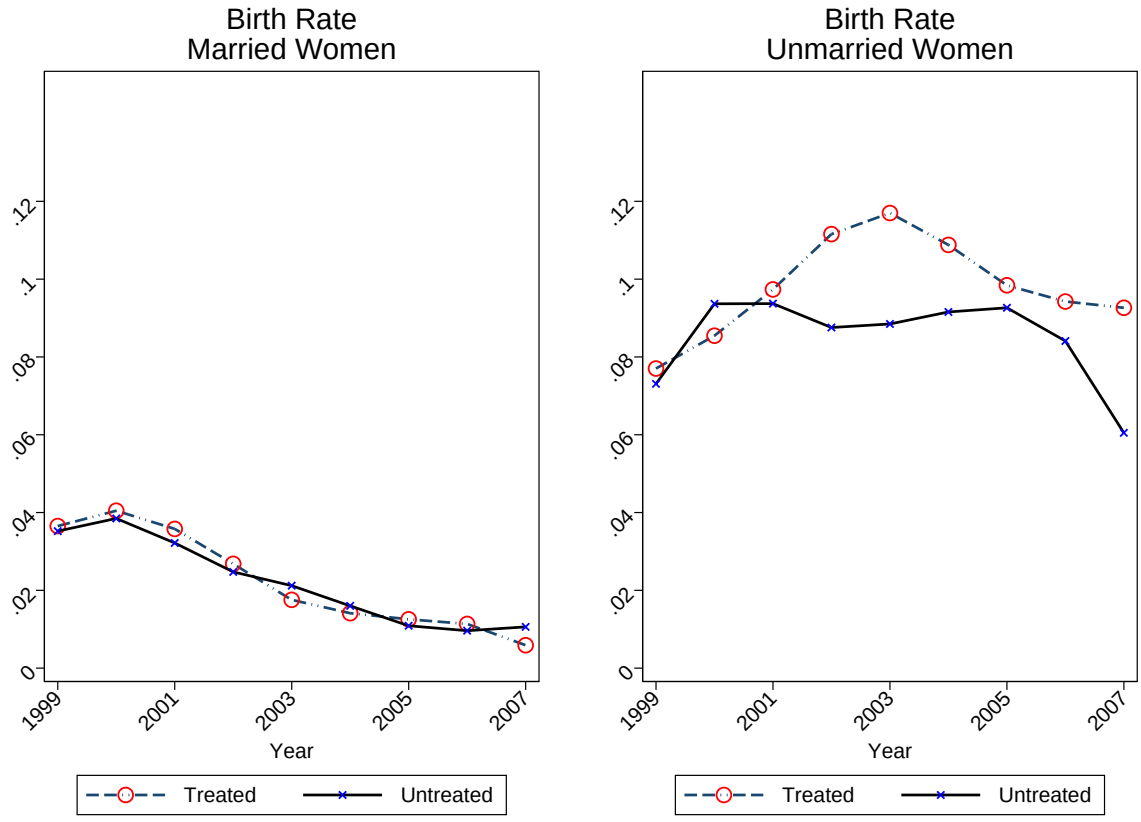


Figure 5: **Birth Rates of Married and Unmarried Women**

Notes: Birth rates for 1999 cohort of unmarried and married workers, by trade exposure (smoothed).

We show additional descriptive results in Appendix, section I. They show evidence consistent with exposure not only raising marriage and birth rates but parental leave uptake as well (Figure A-3). Consistent with the results from the figures above, women's response to rising import competition is generally stronger than that of men. Furthermore, we present evidence that exposure affects the workers' labor market outcomes. Results indicate that treated workers leave the manufacturing sector substantially faster than not treated workers, and conversely, treated workers transition to the services sector more rapidly than untreated workers (see Figures A-4a, A-4b). Worker transitions between sectors are consistent with the idea that trade exposure leads to higher sectoral mobility

for men compared to women (A-5).[35]

3 Estimation Approach

Our approach to estimating the causal impact of rising import competition is to utilize the removal of MFA quotas for China in a quasi-experiment. The analysis encompassing all workers economy-wide employs an instrumental-variables approach exploiting six-digit industry variation (see Figure 2) similar to Autor, Dorn, and Hanson (2013). Examining the workers initially employed in the textile and clothing sector, we dispense with the instrumental variables approach and employ a difference-in-difference strategy because the removal of MFA quotas provides plausibly exogenous variation (see discussion in section 2). The following describes this approach in more detail while we turn to the instrumental-variables approach in section 6.

Exploiting the drastic change with China entering the WTO in 2002 and the longitudinal structure of the data, we employ a difference-in-difference framework with worker fixed effects. By aggregating our sample into two, pre- and post-shock periods, we estimate the impact of import competition on the family outcome X_{is} of worker i in period s as follows:

$$X_{is} = \alpha_0 + \alpha_1 Post_s x Exposure_{i,99} + \alpha_2 Post_s + \delta_i + \varphi_{is}, \tag{1}$$

where $Exposure_{i,99}$ is an indicator for exposure to rising import competition that takes one if the worker was employed in 1999 in a firm domestically producing a quota-protected good from China, $Post_s$ is an indicator variable for the years 2002-2007, δ_i is a fixed effect for each worker i. s identifies the pre- and post-liberalization periods (years 1999-2001 and 2002-2007, respectively). By aggregating the annual data before and after the year 2002, our approach addresses the serial correlation and other concerns noted in Bertrand, Duflo, and Mullainathan (2004). Worker fixed effects imply that the coefficient α_1 is estimated from within-worker changes over time. Including worker fixed effects has the advantage that it eliminates the influence of any observed or unobserved heterogeneity across workers as of the initial period that may be correlated with workers' exposure to competition, such as workers' initial occupation, education, unobserved abilities or possible technological differences across workers' initial workplaces.

[35] By 2007, the difference between exposed and not exposed male workers is 15-16 percentage points both in terms of likelihood to be still in manufacturing and to have moved to the services sector; analogously, this difference for women is only 11-12 percentage points.

In addition we will examine the evidence for gender differences in the response to rising import competition by forming a triple difference-in-difference equation. In the least squares case, the specification becomes

$$X_{is} = \alpha_0 + \alpha_1 Post_s x Exposure_{i,99} + \alpha_2 Post_s x Exposure_{i,99} * Female_i + \alpha_3 Post_s + \alpha_4 Post_s * Female_i + \delta_i + \nu_{is}, \quad (2)$$

where $Female_i$ is equal to one if worker i is a woman. In this specification, α_2 measures the differential effect of rising import competition on women.

Identification The coefficient α_1 in equation (2) is the well-known linear difference-in-difference estimator, which gives the treatment effect under the standard identification assumption that in the absence of treatment the workers would have followed parallel trends. For example, if removal of quotas for other developing countries in 1995 and 1998 (quota removal Phase I and II, respectively) had led to increased competition and caused a differential trend between treated and untreated workers in the industry, identification would fail. Furthermore, the second half of the 1990s is also a period of European Union enlargement accompanied by increased trade integration with Eastern European countries.

In order to examine if these changes in the mid-90s trigger differential pre-trends across treatment and control groups we conduct a falsification exercise for the period 1990-1999, during which rising import competition due to the removal of import quotas on China associated with China's entry into the WTO was absent (placebo test). To do so we employ data on family and labor outcomes for our workers back to the year 1990. Then, without changing the definition of treatment (a worker's firm produces a MFA quota product as of 1999), we run specifications analogous to equation (2) for the period 1990-1999, with the subperiod 1990-94 assumed to be the pre- and the years 1995-99 assumed to be the post-shock period.

The results show that during the placebo period 1990-1999 there is no significant relationship between import competition and marriage, fertility, or divorce. For example, the point estimate for women in the marriage regression is positive but not precisely estimated (0.012, with a standard error of 0.013; N = 10,954).[36] There is no significant impact from import competition on labor

[36]The full set of these results are shown in the Appendix (Tables A-1 and A-2). Following workers back in time, note that some individuals are quite young in the year 1990, but we have confirmed that the influence of this on these results is limited.

market outcomes during this period either. Furthermore, there is no significant difference in how men and women behave in relation to import competition during the 1990s. Specifically, the point estimate in the marriage regression for men is similar to that for women given above (for men, it is 0.013 with a s.e. of 0.014, N = 8,550).[37] In sum, there is no evidence that the MFA removal phases I and II, the enlargement of the European Union with the Eastern European Countries, or any other factor has generated major differential pre-trends that would make it difficult to estimate causal effects during 1999-2007 with this identification strategy.

Linear gender effects, for example the lower propensity of women to work as a manager or lower average earnings of women in comparison to men, are captured by worker fixed effects. The triple difference in difference specification will also control for aggregate time trends that is specific to female workers. A remaining issue is whether rising import competition interacts with another worker characteristic that is correlated with gender, for example, that men are relatively more likely to be managers while women are relatively likely to be clerks. To examine that we conduct our analysis separately across different groups of workers. Generally, we do not find that the gender difference in the impact of rising import competition varies strongly across occupations or education (see Section G in the Appendix). Moreover, much of the gender difference we estimate is due to adjustment differences of workers after displacement; as long as they work at their initial firm, there is no significant difference in the behavior of men and women (see below). Thus while clearly some workers are more affected by rising import competition than others, we find no evidence that gender differences are driven by a particular worker characteristic.

One important concern is that rising import competition might be correlated with other aspects of globalization, such as technical change.[38] This is unlikely to be of critical importance in the context of the removal of trade quotas, both because all workers in the sample are initially working in the same sector and thus subject to the same secular technology shocks and because our definition of treatment is based on what exact 8-digit CN products firms produce within Denmark rather than their industry affiliation, and no single six digit industry consists entirely of treated or untreated firms.[39] Regardless, we will also estimate equation 2 additionally allowing for differential time trends across occupations (occupation x time), hence attributing all occupation-time variation to technology. (See Table A-11 in the Appendix.)

[37] See Section A of the Appendix for full results.

[38] See the discussion in Autor (2010).

[39] Technology shocks that are correlated with industry changes in import competition are a bigger concern for our instrumental-variables analysis, however, it has been shown that import competition and technical change are not strongly correlated in the case of Denmark (Keller and Utar 2016).

Changes in family status and the number of children are relatively rare, discrete events, and consequently, a natural estimation method is also probit regression. Family outcome X_{is} of worker i in period s is specified as follows:

$$X_{is} = f(\beta_1 Exposure_{i,99} * Post_s + \beta_2 Post_s + \beta_3 Exposure_{i,99} + \beta' W_{i,99} + \varepsilon_{is}), \;\; s = 0, 1 \;, \qquad (3)$$

where the vector $W_{i,99}$ contains 1999 characteristics of worker i, including on i's firm and partner (if applicable). [40] $Post_s$ captures the influence of aggregate trends affecting all workers. Of key interest is β_1 which estimates whether exposed workers show different outcomes compared to observationally similar non-exposed workers, relative to pre-shock years. We also allow for correlation within a group of workers employed by the same firm in 1999 and cluster standard errors by each worker's 1999 firm. For ease of exposition, we denote the difference-in-difference term $Exposure_{i,99} * Post_s$ by $ImpComp_{is}$, mnemonic for rising import competition.

4 Family Responses to Import Competition: Gender Matters

This section shows that in the face of rising import competition workers increase their family activities, especially women. This can be viewed as a substitution for employment in the labor market, as we show in the following section 5. We begin our analysis of family activities by examining the decisions of men and women to have new children.

4.1 Import competition and fertility

In this section we study the relationship between rising import competition and fertility decision of men and women. Our outcome variable is one if a female worker has become mother to a newborn child, or correspondingly, if a male worker has become father to a newborn child during a particular period, and zero otherwise. The sample is the set of fertile-age women and men, defined

[40] This includes the worker's age, gender, the number of children, an indicator for first or second generation immigrant status, an indicator for being married, an indicator for being a single parent, education (whether the most attained education is high-school degree), the average wage of the worker's firm, the separation rate of the worker's firm, the trade exposure status of the partner, and education of partner (whether the most attained education is high-school degree). The separation rate of the worker's workplace is defined as the percentage of employees that are not employed in the workplace in year 1999 with respect to 1998.

as below 37 (46) years for women (men) as of the year 1999.[41] Table 4 shows the results from estimating equations (1) and (2). For brevity, the difference-in-difference term *Post x Exposure* is denoted by ImpComp in the tables.

Table 4: **Import Competition and Newborn Children**

Sample	(1) All	(2) All	(3) All	(4) Men	(5) Women	(6) All	(7) Men	(8) Women
		Co-habiting or Single				Single		
ImpComp	0.009	0.063***	0.034	0.034	0.089**	-0.018	-0.018	0.132***
	(0.022)	(0.024)	(0.029)	(0.029)	(0.039)	(0.030)	(0.030)	(0.042)
ImpComp x Female	0.033		0.055			0.150***		
	(0.031)		(0.048)			(0.053)		
Worker FE	Y	Y	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	10,915	5,956	5,956	3,264	2,692	3,305	2,014	1,291

Notes: Dependent variable is one if worker *i* has a newborn child during period *s*, and zero otherwise. Estimation by least squares. Sample in column (1) is textile workers of fertile age (below 37 for women, below 46 for men as of 1999). The sample in columns (2) to (5) is workers not married as of 1999, in columns (6) to (8) workers neither married nor co-habitating as of 1999. Estimation of equation 1 in columns (2), (4), (5), (7), (8) and equation 2 in columns (1), (3) and (6). Post x Female is included but not reported in columns (1), (3) and (6). Robust standard errors clustered at the level of workers' 1999 firm are in parentheses. *, ** and *** indicate significance at the 10 %, 5% and 1% levels respectively.

A first result is that rising import competition does not lead to lower fertility, even though babies require significant additional expenditures. On the contrary, the estimates for men and women are positive though insignificantly different from zero, see column (1). Thus, even though the trade shock has the expected effect of reducing labor earnings of exposed workers–as will be shown below–it does not lead to fewer newborn children. We will return to this point below. Furthermore, there is some evidence that exposed women tend to respond more strongly in terms of fertility than exposed men because the point estimate for women in column (1) is more than four times that for men (0.042 versus 0.009, respectively).

Fertility decisions are part of a person's life cycle, and our approach of following a given set of workers is suitable to capturing these effects. Depending on the particular stage a worker is in, he

[41] Similar findings are obtained with alternative age thresholds, see Appendix D.

or she might want to have a new child, or not. An important aspect of this is whether a worker has found a partner. We are thus interested in the role of family status in the relationship between import competition and fertility. In the first step, we examine those workers who were not married as of year 1999. They can be co-habitating with someone, or they can be single. Recall from Table 2 that these workers are typically younger, which confirms that they are typically at an earlier stage in their lives. Column (2) shows that increased import competition increases birth rates for these workers. To understand the size of the fertility impact of trade exposure, note that the average of the dependent variable in column (2) is 0.28, so that about one in four workers in the sample have one or more newborn children during the years 1999 to 2007. The coefficient of 0.063 in column (2) means that trade exposure raises the probability of birth by just under one quarter. Thus, the trade-induced increase in fertility is substantial.

The following three columns show that the impact of trade exposure on fertility is driven mostly by women. First, we see that while the interaction specification in column (3) is qualitatively similar to before, quantitatively the tendency to have more children is stronger for unmarried than for married workers; this confirms Figure 5 above. Separate regressions for male and female workers in columns (4) and (5) show unmarried women respond by having new births. One in three of unmarried women have one or more new children during the sample period, which means that trade exposure raises fertility by a little more than one quarter (= 0.089/0.33). The coefficient for men is also positive but only about one third in size and not significant.

The finding that the fertility response for unmarried workers is stronger than for married workers is interesting because it suggests that the consequences of rising import competition are long-term in nature. It is not primarily the workers who are in a marital union that decide to have (or add) a child when hit by new import competition; rather, it is the earlier-stage unmarried workers who do so (also seen in Figure 5). The latter are typically relatively young, implying that their fertility choice will affect a relatively large part of their life and many years of possible participation in the labor market.

We can go further by separating workers who live with a partner (co-habitating) from those workers who have no partner (single). The set of results on the right side of Table 4 is for single workers (columns (6) to (8)). From the number of observations at the bottom of Table 4, we see that one in three workers who can have children (fertile-age) is single, and singles account for more than half of all unmarried fertile-age workers.

We see that it is particularly single women who respond to trade exposure by having children.[42] The Female interaction coefficient for singles is about three times the size as it is for all unmarried workers (column (6) versus column (3)). When we increase the sample to include the 1999 part-time workers, the coefficient on the Female interaction is 0.097 (s.e. of 0.040), indicating that the shift to family activities reflects more a shift of formerly full-time workers than the more gradual shift of workers who already are working part-time in 1999 (see Table A-10 in Section E).

The gender differential is confirmed by performing separate specifications for men and women (columns (7) and (8)). Specifically, the coefficient in column (8) means that for single women, trade exposure accounts for more than half of all new childbirth (= 0.132 relative to the mean of 0.22).

Overall, these results indicate not only that import competition has a sizable impact on fertility but it also demonstrates that the earnings impact of rising import competition is likely to manifest itself over a long period because single workers are relatively young and almost by definition at an early stage of their lives.[43]

4.2 Trade exposure and parental leave

This section examines the impact of higher competition through Chinese imports on parental leave uptake. Since women tend to take longer parental leaves than men, the outcome variable is a zero-one variable, indicating a spell of parental leave over a period. While some of the leave parents take may be associated with newborn children, our analysis encompasses all types of parental leave. The latter may be thought of as a more incremental move towards family activities, compared to the more drastic step of having another (or the first) child that we analyzed in section 4.1. Table 5 shows the results.

The outline of the parental leave analysis follows that of new births in the previous section, and it is interesting to see that the results are similar as well. This suggests that the parental leave effect of import competition is mainly driven by newborn children. First, notice that rising import competition does not lower parental leave taking; if anything it increases it, although the coefficients

[42] The analysis here does not distinguish between one or more children, though in the majority of cases it is only one. Also of interest is whether this is the first or an additional child; we study the role of existing children in the responses in section 6.3.3 below.

[43] While Table 4 shows least squares estimation results with worker fixed effects, similar findings are obtained when we employ probit models that control for an extensive set of 1999 worker, firm, and partner characteristics, see Table A-6 in Appendix C.

in column (1) are not precisely estimated. Furthermore, exposed women tend to take up more parental leave than exposed men based on point estimates, although the point estimate difference is somewhat smaller than for fertility (compare columns (1) in Tables 5 and 4, respectively). This suggests that gender differences are stronger for the family decision that typically requires a greater time commitment (new birth).

Focusing on unmarried workers, we find that their parental leave choices are also similar to these workers' fertility choices (columns (2) to (5)). First, exposed workers tend to take up more parental leave than workers not subject to rising import competition (column (2)). Quantitatively, the coefficient of 0.065 means that the marginal impact of trade exposure is about one quarter of all parental leave taking in the sample (= 0.065/0.25). This is somewhat higher than for new childbirths (23 percent). Furthermore, we see that women are contributing to the trade-induced increase in parental leave more than men (columns (3) to (5)). The coefficient for women of 0.078 means that trade exposure accounts for just under one quarter of all parental leave taking of unmarried women (= 0.078 relative to a dependent variable mean of 0.35 in column (5)).

Table 5: **Parental Leave and Import Competition**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Sample	All	All	All	Men	Women	All	Men	Women
		Co-habitating or Single				Single		
ImpComp	0.024	0.065***	0.037	0.037	0.078**	-0.021	-0.021	0.123***
	(0.019)	(0.023)	(0.026)	(0.026)	(0.039)	(0.026)	0.026)	(0.042)
ImpComp x Female	0.020		0.041			0.144***		
	(0.029)		(0.046)			(0.049)		
Worker FE	Y	Y	Y	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	10,915	5,956	5,956	3,264	2,692	3,305	2,014	1,291

Notes: Dependent variable is one if worker *i* takes parental leave during period *s*, and zero otherwise. Estimation by least squares. The sample in column (1) is textile workers of fertile age (below 37 for women, below 46 for men as of 1999). The sample in columns (2) to (5) is workers not married as of 1999, in columns (6) to (8) workers neither married nor co-habitating as of 1999. Estimation of equation 2 in columns (1), (3), and (6). Estimation of equation 1 in columns (2), (4), (5), (7), (8) and equation 2 in columns (1), (3) and (6). Post x Female is included but not reported in columns (1), (3) and (6). Robust standard errors clustered at the level of workers' initial firm are in parentheses. *, ** and *** indicate significance at the 10 %, 5% and 1% levels respectively.

As in the case of childbirth, the impact as well as the gender differential is further strengthened

when we concentrate on single workers (columns (6) to (8)). Exposed single women increase their parental leave uptake while exposed single men do not. The magnitude of the gender differential is comparable to that of child birth, and the marginal impact of trade exposure is about 54 percent of all parental leave taking for single women (= 0.123 relative to a mean of 0.23). This confirms the large impact of import exposure that we have seen for child birth in Table 4.

In order to take an advantage of worker fixed effects, we use above least-squares estimation. Supplementary results using probit models are presented in Table A-7 and confirm these results. In addition, we find similar results employing the same age threshold for men and women to distinguish younger from older workers, indicating that the key results do not depend on the lower age restriction for women than for men (below 37 versus 46 years, respectively, to be in fertile-age), see Table A-9 in Appendix D. Summarizing, exposure to rising import competition increases not only fertility but also parental leave uptake for the cohort of 1999 textile workers. Women, not men, account for most of this increase in family activities. In particular, it is younger women at a relatively early stage of their lives that shift in the face of lower labor market opportunities towards child-related activities. Given that the incidence is concentrated on relatively young workers who would often not otherwise retire from the labor market for many years, the earnings implications of rising import competition could be drawn out over a long period of time.

4.3 Marriage Responses to Rising Import Competition

Table 6 shows evidence on the workers' marriage behavior in the face of rising import competition. The sample includes all workers who are not married as of the year 1999.[44] In addition to import competition we include the following 1999 worker, firm, and partner characteristics: worker age, gender, number of children, and indicators for immigrant status, being single and living with child, as well as three different levels of education; firm variables are the average wage and separation rate; and partner variables are exposure to rising import competition and education indicators (results not shown to conserve space).[45]

[44]The marriage decision is directly relevant only for unmarried workers. Workers who in 1999 are married would have to divorce before marrying again; we analyze how divorce decision of workers are affected by the competition in section 4.4 below.

[45]In the case of co-habitating couples partner income may play an important role for the marriage decision; this is examined in section 7.3.2 below.

Table 6: Marriage Decisions and Import Competition

Sample	(1) Men	(2) Women	(3) All	(4) Fertile Age	(5) Fertile Age Single
ImpComp	-0.007	0.045*	-0.020	-0.058	-0.066
	(0.026)	(0.026)	(0.094)	(0.099)	(0.163)
ImpComp x Female			0.153*	0.176*	0.253*
			(0.092)	(0.103)	(0.148)
Worker, Firm, Partner Char's			Y	Y	Y
Worker Fixed Effects	Y	Y			
Time Fixed Effects	Y	Y	Y	Y	Y
Observations	3,874	4,336	8,163	5,912	3,283

Notes: Dependent variable is one if worker *i* married during period *s*, and zero otherwise. Sample is unmarried textile workers. Estimation method is least squares in columns 1 and 2 and probit in 3-5. Probit specifications include worker, firm and partner characteristics as described in the text. Partner characteristics are not applicable in column 5. Post x Female is included but not reported in column (3)-(5). Robust standard errors clustered at the level of workers' initial firm are in parentheses. *, ** and *** indicate significance at the 10 %, 5% and 1% levels respectively.

Table 6 indicates that workers do not marry less due to rising import competition (column 1 and 2). The point estimate for men is negative and imprecisely estimated at close to zero, whereas for women the coefficient indicates that trade exposure increases female workers' likelihood to get marry.

This result is important from a policy perspective because it suggests that the relatively high transfers to those adversely affected by import competition in Denmark is one reason why the overall marriage rate in Denmark has not fallen as it did due to import competition in the United States (Autor, Dorn, and Hanson 2018).[46] Furthermore, because the present estimates are based on life-cycle choices of individual workers whereas Autor, Dorn, and Hanson's (2018) analysis exploits regional variation over time, the two sets of findings can be viewed as complementing each other.

How large is the marginal marriage impact of rising import competition? A back-of-the-envelope

[46] We show below that trade-exposed Danish workers do not have significantly lower income, in contrast to earnings, than non-exposed workers. In the US, on the other hand, income of trade-exposed workers fell, and this made in particular male workers less marriageable (Autor, Dorn, and Hanson 2018).

calculation compares the marginal effect of import competition with the average marriage probability in the sample. The latter is 0.16, while the marginal effect of the Female interaction coefficient in the probit estimation (column 3) is about 0.04, and 0.045 according to the least-squares estimation (column 2). Accordingly, rising import competition accounts for a sizable portion, upwards of one quarter (= 0.04/0.16) of the overall marriage probability in the sample.

In column (4) we present results for the relatively young set of workers in their fertile age (women below 37, men below 46 in 1999). The Female interaction coefficient is positive and with 0.176 somewhat higher than before (coefficient in column 1 is 0.153). We conclude that the increase in marriage caused by rising import competition is disproportionately resulting from choices by younger, not older women. This finding is in line with our fertility and parental leave findings. To some degree marriage and child-related activities come in a bundle for these relatively young women. If instead of these fertile-age restrictions we examine the responses of workers who were aged 20 to 40 in the year 1999, we find similar results (see Table A-9, Appendix D).

Another important question is the role of co-habitation. Column 5 of Table 6 shows results for single (not co-habitating) workers of fertile age. We see that rising import competition particularly induces young single women to marry. This shows that trade exposure induces the relatively drastic change from single to married family status, and not only the comparatively incremental step from co-habitation to marriage. Furthermore, the analysis shows that it is particularly young singles for whom the difference in trade exposure-induced marriage between women and men is largest.

4.4 The Impact of Import Competition on Marriage Break-up

The final step in our analysis of family responses to trade exposure is to examine divorce behavior. Here we focus on workers that were married as of the initial year. Note that being married typically means that the workers are at a later stage in their lives, as reflected in their average age of about 42 years, in contrast to unmarried workers who are on average about 34 years (see Table 2). Given this age difference one would not necessarily expect that the motives of being in a marital union are the same for the two sets of workers. Table 7 shows the least squares results with worker fixed effects. Analogous results using probit are presented in Table A-8 in the Appendix.

Table 7: **Exposure to Import Competition Reduces Divorce Likelihood**

	(1) All	(2) All	(3) Men	(4) Women	(5) Men Fertile Age Workers	(6) Women Fertile Age Workers
ImpComp	-0.025***	-0.011	-0.011	-0.039***	-0.019	-0.085***
	(0.009)	(0.013)	(0.013)	(0.011)	(0.019)	(0.025)
ImpComp x Female		-0.027*				
		(0.016)				
Worker Fixed Effects	Y	Y	Y	Y	Y	Y
Time Fixed Effects	Y	Y	Y	Y	Y	Y
Observations	11,780	11,780	4,934	6,846	2,774	2,184

Notes: Dependent variable is one if worker *i* has a divorce during period *s*, and zero otherwise. Sample is textile workers who are married as of 1999. Estimation of equation 1 in columns (1) and (3)-(6), estimation of equation 2 in column (2). Post x Female is included but not reported in column (2). Robust standard errors clustered at the level of workers' 1999 firm are in parentheses. *, ** and *** indicate significance at the 10 %, 5% and 1% levels respectively.

We find that exposure to import competition reduces divorce likelihood. Employing difference-in-difference estimation with worker fixed effects yields a coefficient of -0.025 in the sample with both gender (column (1)). On average, the divorce rate for these workers is 0.049, and the impact of trade exposure is to reduce it to about half that. There are a number of reasons why trade exposure might lead to lower divorce rates. One of them is insurance. When employment opportunities vanish due to rising import competition, an existing marital union may provide income security that not exposed workers do not need to the same extent. While this is certainly possible, Danish workers have access to a relatively extensive system of insurance and government transfers, and spousal income support may be less needed than in other countries. We return to this issue by examining the role of partner income in section 7.3.2

The next set of results clarifies that the reduction of divorce probability is mainly driven by women. Column (2) presents a triple difference-in difference estimation results (equation 2), while columns (3) and (4), respectively, report estimates based on the sample of men and women separately. The marginal impact of trade exposure on divorce for women evaluated at the average divorce rate is with more than three quarters quite large (the average divorce rate for the sample underlying column (4) is 4.7 percent; -0.039/0.047 = -0.83).

For marriage decisions we have found above that relatively young individuals at an early stage of their lives react more strongly to trade exposure than older workers. It has also been shown that fertile age women respond strongly to rising import competition in terms of fertility and parental leave. The current set of workers was married at the beginning of the sample (the year 1999), and as one would expect they are typically older compared to the unmarried workers studied above. Despite that, is it still possible that planning for children plays a role in their divorce decisions? The standard deviation of the age of married women is about 9 years, implying that some married women are young enough that their divorce behavior may still be affected by their goals in terms of children. In the final set of results of Table 7 we thus focus on divorce decisions of workers in their fertile age (columns (5) and (6)).

We see that while men's divorce response to rising import competition is not much affected by age (column 5), women in their fertile years respond roughly twice as much to trade exposure as the average married women (columns (4) and (6), respectively). The tendency of exposed workers to remain in their marriages appears to be related to fertility, and as we have seen, also the divorce impact of trade exposure is concentrated on women. Furthermore, if instead of these fertile-age restrictions we examine the divorce rates of workers aged 20 to 40, we find similar results (see Table A-9 in the Appendix).

Summarizing, workers exposed to rising import competition increase their family activities in several dimensions. The previous two sections have shown that workers marry more and divorce less in response to trade exposure and women are central to the shift towards family activities in response to rising import competition.

5 Labor Market Outcomes by Gender

We have seen that in response to rising import competition women more strongly than men increase their family activities in number of dimensions. At the same time rising import competition has led to substantially lower earnings for Danish workers (Utar 2018). This section shows that labor market consequences of rising import competition are far from gender neutral, and how this interacts with family responses to rising import competition. We employ a triple difference in difference specification (equation 2) and estimate the gender differential effect of import competition on cumulative labor earnings, earnings per year of employment, cumulative hours worked, hours worked per year of employment, cumulative spells of unemployment, and cumulative personal in-

come. All earnings, hours, and income variables are normalized by the worker's own 1999 annual earnings, hours, and income respectively. The impact on cumulative variables that is captured by α_1 measures the long-run impact of the import competition. Results are shown in Table 8. Panel A shows results obtained by estimating equation 1), while Panel B reports gender specific results obtained by estimating equation 2 for the whole sample.

Table 8: **Labor Markets Hit by a Trade Shock: The Role of Gender**

	(1) Labor Earnings	(2) Earnings per year of Employment	(3) Hours Worked	(4) Hours per year of Employment	(5) Unem-ployment	(6) Personal Income
Panel A.						
ImpComp	-0.487**	-0.076**	-0.379**	-0.063***	1.040***	0.078
	(0.217)	(0.034)	(0.151)	(0.022)	(0.329)	(0.080)
Panel B. Analysis by Gender						
ImpComp	-0.082	0.002	-0.217	-0.021	0.806*	0.104
	(0.290)	(0.042)	(0.204)	(0.027)	(0.411)	(0.140)
ImpComp x Female	-0.754**	-0.161***	-0.275	-0.085**	-0.019	-0.032
	(0.352)	(0.056)	(0.216)	(0.033)	(0.407)	(0.149)
Worker Fixed Effects	Y	Y	Y	Y	Y	Y
Period Fixed Effects	Y	Y	Y	Y	Y	Y
Observations	19,650	19,212	19,426	18,943	19,650	19,644

Notes: Dependent variable is given on top of column for the period 1999 to 2007. The sample is all full time 1999 textile and apparel workers. Estimation is by least squares. The units in all earnings and hours results are multiples of worker *i*'s 1999 earnings and hours, respectively. The units in the personal income results, column (7), are multiples of worker *i*'s personal income in 1999. Personal Income includes unemployment insurance and government transfers. Unemployment is defined as the percentage of annual time in unemployment. Robust standard errors clustered at the level of workers' initial firm are in parentheses. ***, ** and * indicate significance at the 10 %, 5% and 1% levels respectively.

In Panel A of Table 8 we show evidence familiar from other studies that rising import competition from China has significantly lowered labor market opportunities of affected workers. In particular, the coefficient of -0.487 (column (1)) means that on average, exposed workers lose almost half of their annual earnings relative to non-exposed workers over the six post-shock years, or about 8 percent of their initial earnings per year of higher import competition. The reduction in earnings is

more strongly driven by a decline in hours worked rather than a decline in hourly wages (compare column (1) with (3)). Trade causes a significant increase in unemployment (column 5). Denmark is a country with relatively generous social benefits in addition to unemployment insurance benefits for involuntarily displaced workers. As a result, there is no long-run negative impact of the rising competition on workers' personal income (column 6). This is important when analyzing family-labor market choices of these workers.

After presenting the overall labor market effects, we turn to our interest, possible gender differences in trade adjustment. Panel B of Table 8 shows that the labor market impact of rising import competition varies strikingly by gender. In particular, the earnings point estimate for men is close to zero and not significant at standard levels, whereas the triple difference-in-difference coefficient (ImpComp x Female) is significantly negative, with women losing on average about 84 percent (-0.082 + (-0.754)) of the initial earnings –almost 14 percent per year of treatment during 2002-2007. The evolution of women's earnings losses over time is close to linear, with every year of treatment leading to essentially the same incremental earnings loss, see Figure A-1 in the Appendix.

In order to understand why the earnings impact of rising import competition concentrated on women, we distinguish several components of earnings (see columns (2) to (5)). The dependent variable in column (2) is cumulative earnings per year of employment. The result shows the same qualitative result–only women lose earnings, not men–, but the gender differential increases.[47] This means that women are doing relatively better staying employed at all rather than holding on to relatively well paid jobs.

The results for hours worked are shown in column (3). It shows that majority of earnings reduction due to trade are driven by reduction on hours worked, rather than hourly wages.Interestingly, the hours coefficient in Panel A is smaller (in absolute magnitude) than the earnings coefficient in column (1). This is consistent with employees working many hours that are relatively poorly paid. Panel B indicates that, as before women tend to see a greater reduction in hours than men but the Female interaction coefficient is not significant. The results in column (4) refine this analysis by showing that trade exposed women have significantly lower hours worked per year of employment than men. Importantly, these results are obtained with worker fixed effects so that differences in the composition of men's and women's initial jobs play no role.

In addition to employment disruptions or work in lower-pay jobs, earnings changes can be due to moving outside of the labor force (e.g. early retirement, sick or maternity leaves) or unemploy-

[47]The Female interaction coefficient is more than twice the all-sample coefficient in column (2), while in column (1) it is less than twice the size.

ment. It turns out that movements outside of the labor force, particularly, into early retirement are not important adjustment dimensions (not reported). In contrast, rising import competition has caused significant unemployment for exposed workers (see Panel A of column (5)). However, unemployment is unlikely to be important for the gender differential in earnings because there is little evidence that exposure has caused more unemployment for women than for men (see Panel B of column (5)). However, temporary spells out of the labor market such as parental leaves may contribute to the gender differential in earnings. We will show in section The following analysis will concentrate on labor earnings as it is a comprehensive measure of workers' labor market performance.

Finally, column (6) of Panel B shows evidence on any gender differential in the impact of trade exposure on personal income. We see that in contrast to labor earnings, there is no significant difference between the income impact of trade exposure for women and for men. Furthermore, the evolution of personal income over time is similar for men and women, as Figure A-2 in the Appendix shows. This is important in understanding the gender differential in family outcomes. The income effect, which is expected to have stronger impact on men as opposed women under household specialization, should decrease family activities. But in the context of Denmark, the income effect is muted via transfers.[48]. The opportunity cost effect of the negative labor demand shock and the resulting substitution from market to family activities, on the other hand, which is expected to be stronger on women, will not be affected by income support.

6 Analysis for all Private-Sector Workers

While analyzing the quota removal trade liberalization has a number of advantages, a concern may be that by covering a relatively small set of workers our findings may not generalize. In this section we summarize results for the whole economy based on the 1999 cohort of all (initially) full-time private-sector workers.[49] The impact of rising import competition is estimated, as in Keller and Utar (2016), by exploiting six-digit industry variation in the change of import penetration in Denmark. We control for two-digit industry fixed effects to avoid broad industry variations that are

[48]Utar (2018) shows that trade exposure significantly increases income transfers, especially transfers paid out of the Unemployment Insurance Fund.

[49]These workers were employed in mining, manufacturing, wholesale and retail trade, hotels and restaurants, transport, storage and communication, as well as real estate, renting and business activities. Workers employed in 1999 in public administration, education, and health are not part of our sample. Education and health sectors in Denmark are to a large extent publicly owned.

likely to be convoluted with technological changes.[50] Because the change in imports from China in Denmark might be endogenous we employ an instrumental-variables approach with Chinese imports in other advanced countries, geography-based transportation costs, and the share of retail trading firms –all at the six-digit level–as instruments.[51] An important identification condition of this approach is that China's export growth is primarily driven by its economic reform and the global decline in trade costs.[52] In the case of new births, the estimation equation is the following:

$$BIR_i^{2000-07} = \beta_0 + \beta_1 \Delta ImportP_i + \beta_2 ImportP_i xFemale_i + Z_i^W + Z_i^F + Z_i^P + \varepsilon_i. \quad (4)$$

The dependent variable $BIR_i^{2000-07}$ is an indicator variable that takes the value one if worker i is the parent of a new child over the period from 2000 to 2007, and zero otherwise. On the right hand side is the change in import penetration from China ($\Delta ImportP_i$) as well as 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. Occupations and two-digit industry fixed effects are always included.[53]. Specifications for other family outcomes (parental leave, marriage, and divorce) and labor market outcomes are analogous to this birth equation, with the following changes: the interaction of female with change in import penetration is dropped if the sample is only women or men, and it is replaced by exposure to import competition of the spouse in the divorce equation. The spousal exposure to import competition is also instrumented similarly as a worker's own exposure. The details of the analysis and the full set of results is presented in the Appendix B, and a summary of results is given in Table 9 below.

The first set of results is on child births, see column (1), where the sample is the close to 1 million workers of fertile age. We find evidence for a gender differential in trade-induced fertility decisions, with a positive and significant female interaction coefficient of 0.525. The coefficient for men is negative and weakly significant, but the point estimate for women is about three times as large as that for men. Parental leave responses to rising import competition vary by gender along the same lines, except that the difference is even larger: while women take more parental leave when exposed to rising import competition, men take less (column (2)). Overall, this evidence on the gender difference in birth and parental leave responses to rising import competition confirms our earlier findings for the sample of textile workers.

[50] Section B of the Appendix provides additional information on our approach as well as extended sets of results.

[51] The other countries are Australia, Finland, Germany, Japan, Netherlands, New Zealand, Switzerland, and the USA. The transportation costs is defined as the log average of the distance from Denmark's import partners in 1996.

[52] See Autor, Dorn, and Hanson (2013), Keller and Utar (2016) for further analysis.

[53] The full list of variables is presented in Appendix B

Table 9: **Economy-wide Family and Labor Market Responses to Import Competition**

	(1) Birth	(2) Par'l Leave	(3) Marriage	(4) Divorce Men	(5) Earnings	(6) Unemp-loyment	(7) Outside Labor Market
$\Delta ImportP$	-0.181*	-0.632***	0.039	-0.073	1.798	0.741**	0.011
	(0.100)	(0.172)	(0.105)	(0.085)	(3.231)	(0.368)	(0.274)
$\Delta ImportPxFemale$	0.525***	1.624***	0.341***		-10.882*	1.286**	0.739*
	(0.120)	(0.250)	(0.119)		(5.804)	(0.591)	(0.385)
Spouse's $\Delta ImportP$				-0.138***			
				(0.044)			
F-stat p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Observations	993,277	993,277	755,830	478,040	1,654,485	1,649,323	1,649,323

Notes: Dependent variable is given at top of column. For columns (1) to (4), the dependent variable is an indicator for that family outcome of worker *i* in 2000-2007, and zero otherwise. Earnings is cumulative earnings during 2000-2007, Unemployment is cumulative years with unemployment during 2000-2007, and Outside Labor Market is cumulative years outside the labor market during 2000-2007. Estimation by two-stage least squares; second-stage coefficients shown. Robust standard errors clustered at the industry level in parentheses. *, ** and *** indicate significance at the 10 %, 5% and 1% levels respectively.

Next, we turn to marriage decisions, and to the sample of unmarried workers as of 1999. Column (3) shows that rising import competition increases marriage likelihood for female workers (the interaction coefficient is significant at the one percent level and about nine times larger than that of men). Thus, our finding that import competition increases marriage rates in the quasi-experiment sample carries over to the economy as a whole. Furthermore, we show that increased marriage rates due to import competition are entirely driven by women, not men.

For the analysis of divorce behavior we take advantage of information at the household level, in particular that for every worker *i* we know his or her spouse, as well as the six-digit industry in which the spouse is employed.[54] The next specification shows the divorce impact of rising import competition on men who were married in year 1999. Column (4) shows that there is no significant impact of trade exposure on the divorce behavior of male workers. At the same time, if their wives were trade exposed, then their likelihood of divorce significantly drops. That is, for men, rather than their own exposure to import competition, their spouse's exposure to import

[54]The same information is available in the data for individuals living together who are not married (cohabiting).

competition significantly reduces likelihood of divorce over 2000-2007. These findings based on the larger sample of all (married) private-sector workers confirms our result that trade exposure induces female textile workers to stay in their marriages, in contrast to male textile workers whose marriage break-up rates are not substantially affected (unless they are married to another exposed worker).

The last three columns of Table 9 show evidence on the gender differential in labor market outcomes from rising import competition in the economy as a whole; the sample includes now more than 1.6 million workers. The results indicate that the negative impact of rising import competition on full-time employment is concentrated on women (column 5). Furthermore, we see that import competition significantly increases unemployment, and disproportionately so for women (column 6). If workers take leaves such as maternity leaves, these spells are considered outside the labor market, whereas unemployment spells are considered within the labor market. Workers can also go out of the labor market permanently by taking early retirement. Next we study whether there is gender differential on the impact of import competition on cumulative years outside the labor market (column 7). We find that import competition does not induce men to move outside the labor market, but it does women. In Appendix B we show that spells away from the labor force for women are driven by short-term, or temporary breaks rather than permanent leave.

In sum, while there are some differences overall we find strong evidence that the same gender differential in the family-labor market response to rising import competition found for the smaller quasi-experiment sample carries over to the 1999 cohort of all private-sector workers. In the following section, we will examine the reasons for this gender difference by returning to the quasi-experiment based on the removal of the import quotas on China.

7 Explaining the gender differences

7.1 Earnings differentials and human capital

A first step towards explaining the gender differential is to see which types of workers have suffered the largest earnings losses and whether the gender earnings differential is concentrated on workers whose family activities are most affected by trade exposure. A simple human capital argument predicts that younger workers tend to lose less than older workers because they adjust better. For one, younger workers have a greater incentive to move into better paying jobs in the presence of

any fixed costs of moving (such as training) because they have more years to re-coup the fixed costs. Moreover, younger workers have accumulated less sector- and firm-specific knowledge and are therefore more likely to transition to other jobs for a given size shock than older workers with more accumulated specific human capital.

Table 10 presents evidence on this. Panel A shows the results on earnings from any job the worker held during the sample period (long-run impact) and Panel B shows the impact on earnings from the initial employment (initial impact of the shock).

In Panel A column (1) we repeat the earlier result on the earnings effect of rising import competition. The coefficient on the difference-in-difference term *ImpComp*, which here gives the exposure impact for men, is close to zero and not significant at standard levels. Trade-exposed women, however, see their earnings fall on average by around 84 percent of their 1999 earnings (-0.836 = -0.082 + (-0.754)). Is this because women were more strongly exposed to the competition or due to a gender differential in adjusting to the shock after displacement?

Workers will respond to the shock by moving to different jobs, industries or occupations. The impact on the cumulative earnings will be the long-run impact of the shock, inclusive of workers' adjustment to the initial displacement. If there were a gender differential in the earnings at the initial firm this could indicate that the immediate impact of trade exposure was stronger for one of the genders. Exposure may trigger lower earnings in the initial firm for at least two reasons: first, the job disappears and the worker is displaced, and second, the worker moves to another job even though the original employer does not disappear.[55] We see in Panel B of column (1) that for earnings , mes at the initial firmn lose olosen average about 90 percent of their annual earnings due to exposure (column (1)). Importantly, there is no significant difference between men's and women's earnings losses at the initial firm, as evidenced by the Female interaction coefficient close to zero. This shows that the difference in cumulative labor earnings of women versus men (Panel A) is driven by the subsequent labor market (and family) adjustment of the workers to the shock rather than the immediate impact of trade exposure.

[55] Among the reasons for this may be reduced earnings or hours, or fear of that in the future.

Table 10: **The Earnings Differential by Age and Stage of Life**

Sample	(1) All	(2) Married	(3) Not Married	(4) Fertile Age	(5) Not Fertile Age
Panel A. Earnings from all Jobs					
ImpComp	-0.082	-0.462	0.496	0.257	-0.881***
	(0.290)	(0.329)	(0.393)	(0.347)	(0.283)
ImpComp x Female	-0.754**	-0.249	-1.501**	-1.036*	-0.021
	(0.352)	(0.380)	(0.662)	(0.575)	(0.343)
Panel B. Earnings from the Initial (1999) Job					
ImpComp	-0.913***	-1.165***	-0.605**	-0.823***	-1.111***
	(0.286)	(0.324)	(0.288)	(0.289)	(0.342)
ImpComp x Female	0.0882	0.318	-0.193	0.130	0.188
	(0.221)	(0.267)	(0.255)	(0.246)	(0.290)
Worker FE	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y
Observations	19,650	11,588	8,062	10,716	8,934

Notes: Dependent variable in Panel A is worker *i*'s cumulative earnings 1999 to 2007 from any job, expressed relative to the worker's 1999 earnings. Dependent variable in Panel B is worker *i*'s cumulative earnings 1999 to 2007 at the original 1999 textile job, expressed relative to the worker's 1999 earnings. Estimation is by least squares. Robust standard errors clustered at the level of workers' initial firm are in parentheses. *, ** and *** indicate significance at the 10 %, 5% and 1% levels respectively.

Distinguishing married from not married workers (columns (2) and (3)), unmarried workers, who can be either single or co-habiting, are typically at an earlier stage of life and younger than married workers. We see that unmarried men do not experience earnings losses due to the trade shock (Panel A, column (3)). This is in line with recent findings that younger workers perform relatively well in terms of labor market adjustment to a negative trade shock (Dix-Carneiro 2014 and Utar 2018). In contrast, over the six post-shock years unmarried women lose, on average, the equivalent of an entire initial annual earnings (point estimate of -1.501 + 0.496 = -1.005). This is not because unmarried men were less affected by the shock initially than unmarried women (Panel B, column (3)). Rather, the gender earnings gap is the consequence of different adjustment paths for men and

women.[56] Importantly, there is no evidence for a significant gender differential in the impact of trade exposure on labor earnings of married workers (column (2)) who are typically older (column (2)).

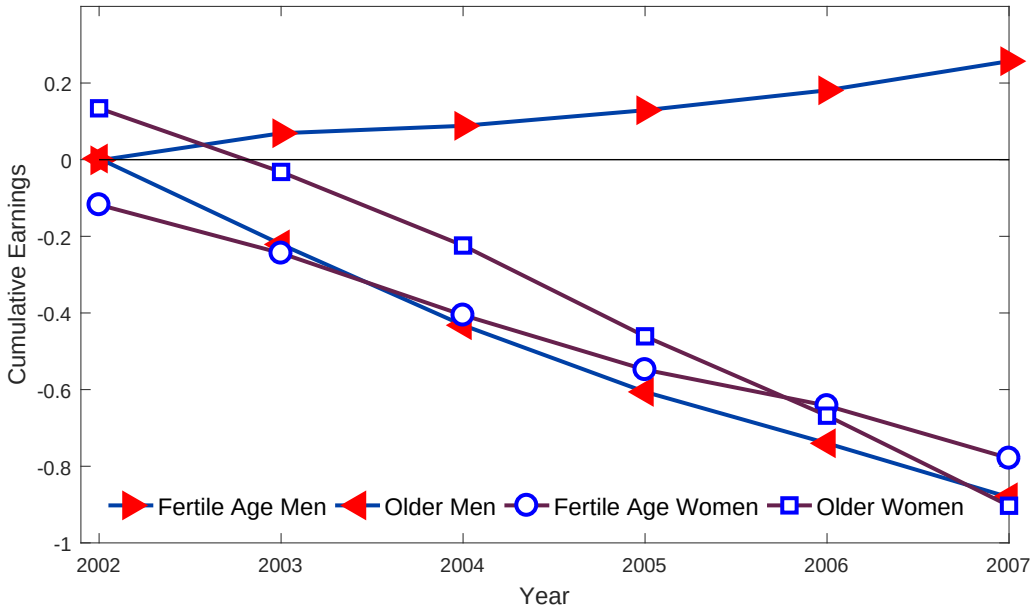


Figure 6: **The 'Missing' Earnings of Young Women**

Notes Shown are *ImpComp* treatment point estimates from least squares regressions with four different samples (fertile-age men, fertile-age women, not fertile-age men, not fertile-age women) and six different endpoints of the treatment period (1999-2002, 1999-2003, to 1999-2007). All regressions include worker and period fixed effects.

We show above that the family responses are stronger among initially unmarried but also fertile age female workers. Next, we focus on the gender differentials among the fertile age workers versus not. With a coefficient of about -0.9, column (5) in Panel A shows that relatively older workers experience long-run earnings losses that are larger than the average of about -0.5 for all workers (Table 8, column (1)). This is in line with human capital theory. But what is important, and new in the literature, is that both older women and older men adjust to the shock similarly, and there is no gender differential in adjusting to the trade shock. The gender differential is strongly

[56]Consistent with the more strongly negative effect of exposure on womens' earnings, Hakobyan and McLaren (2018) estimate that wage growth of exposed women in the U.S. was more reduced by the NAFTA liberalizations than that of exposed men; at the same time, they find this gender gap to be stronger for married than for single workers, not the reverse (see Panel A, columns (2) and (3)). Hakobyan and McLaren (2018) explain their finding by selective non-participation whereby higher-paid married female workers drop out of the labor force.

concentrated among fertile age workers (column 4). Especially the initial-job earnings losses of fertile-age women are not larger than those of men (column (4), Panel B). This means that young women do not move more strongly towards family than young men because the former experience a more severe shock on impact. Rather, the gender earnings gap is the consequence of different adjustment paths for men and women.

Despite the similar initial impact of the shock across fertile age men and women (column 4, Panel B), in the long-run fertile age women do not recover the initial impact of the shock and experience about 78 % of annual earnings reduction over the six post-shock years (column 4, Panel A). At the same time fertile age men recover the initial earnings loss perfectly well.[57]

This means that in adjusting to the negative labor demand shock, essentially young age does not carry any advantage for the earnings performance of women. Another way of thinking about this is that labor earnings of relatively young women are more similar to that of older workers than to that of relatively young men. Consider the dynamics of earnings as they evolve over the period 1999 to 2007. Figure 6 is based on regressions analogous to those in columns (4) and (5) where the length of the treatment period is varied from only the year 2002 to the years 2002-2007. The figure shows the point estimates for ImpComp by gender and by age. The key finding is that while young men perform well enough so that by 2007 there is no cumulative earnings loss compared to young not exposed men, the earnings performance of exposed young women is more negative and follows that of older exposed workers.

The fact that the earnings trajectories of exposed younger and older women are so similar does not mean that the underlying factors are the same. As we have seen in section 4, unmarried and fertile women are key to the move towards family in response to rising import competition. In contrast, older women, just like older men, presumably are constrained by the human capital costs of switching jobs discussed above. These results show that increased family activity, which are concentrated among relatively younger, unmarried and fertile age workers, is the flip side of the resulting gender earnings gap due to trade. We show here that the labor market-family choice eliminates the advantage of being ”young” for women in the presence of a negative labor market shock, but not for men.

[57] We obtain similar results when employing the common age threshold of 40 years for men and women, also see Section D in the Appendix.

7.2 Biological Clock and the Role of Children

The age pattern in the shift of women to family activities points to a biological clock argument. Central to this is the fact that women, in contrast to men, tend to have difficulties conceiving beyond their early forties. As a consequence, a woman's reservation value to stay in the labor market is relatively high, and a given negative labor market shock will provide a stronger incentive to a woman to take up family activities, versus committing to a new career path with the associated investment in training, compared to men. This holds as long as the woman's age is low enough so that fertility and caring for young children are still relevant issues. This argument explains both the gender difference in family responses to rising import competition and that women's labor earnings fall behind those of men as a consequence of this shift to family.

The age pattern of family and labor market outcomes is consistent with this explanation. In particular, Tables 4 and 5, respectively, show that the stronger impact of trade on fertility and parental leave for women than men is magnified for relatively young workers. Furthermore, Tables 6 and 7 show that marriage and divorce behavior of young women is more different from men's behavior than for older women. Finally, Table 10 has shown that, on the flip side, the gender differential for younger women in the labor market is larger than for older women. Further evidence for the role of the biological constraint can be provided by examining 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 activities using our rich data. Table 11 shows the results.

Each entry in Table 11 reports the difference-in-difference coefficient (and robust standard error), *ImpComp*, based on a least-squares regression with worker and period fixed effects. Results for Birth, Parental Leave, Marriage, and Divorce are shown by the four broad columns, separately for men and for women.

The first row of Table 11 shows the overall family response, irrespective of the worker's labor market position; this repeats results from the earlier Tables 4 to 7 for convenience.[58] The following two rows distinguish family responses while being employed in the original 1999 textile job from family responses after the worker has left the 1999 textile job. Finally, the lower rows distinguish two specific labor market positions after departing from the original textile job, namely (1) Outside of the labor force and (2) Unemployed. Our interest lies in which of these labor market positions,

[58] The birth and parental leave results are columns (4) and (5) of Tables 4 and 5, respectively, while marriage results are from columns (2) and (3) of Table 6 and divorce results are from Table 7, columns (4) and (5).

if any, is closely related to the worker's take-up of family activities.[59]

We begin with the family outcomes while the worker still works at the initial firm. The results show that trade exposure rarely generates a pro-family response at the original employer, neither for men nor for women (row 2). The coefficients tend to be small and insignificant.[60] In sharp contrast, rising import competition often triggers pro-family choices once a worker is not employed anymore at their initial firm, especially for women. The results show that exposed women are induced to take pro-family action in terms of all four outcomes (row 3). Taken together, this establishes that *change* of labor market position is correlated with exposure-induced family responses.

However, this does not necessarily constitute evidence in support of Becker's (1973) hypothesis that labor market and family activities are jointly determined. Perhaps trade exposure matters because by moving to a new job workers make a new set of acquaintances, and the increase in family activities is the consequence of that? The final rows of Table 11 show that there seems to be more to it than meeting new people. Rather, we see that women make often pro-family decisions out of relatively weak positions in the labor market. For example, a relatively large share of trade-induced new births occurs when the women is outside of the labor force (coefficient of 0.043, column (2)). The same cannot be said for men (coefficient of virtually zero, column (1)). Similarly, exposure-induced parental leave uptake for women who are unemployed or out of the labor force is important, whereas this is not the case for men (rows 4 and 5, columns (3) and (4)). Women who are outside of the labor market are also marrying due to rising import competition, in contrast to men (columns (5), (6), row 4).

[59] Recall that the labor market position of an individual is recorded every year in late November, while the definitions of the family outcomes cover the whole calendar year. It is thus in principle possible, for example, that in a given year an unemployed worker has taken parental leave from his job.

[60] The exception to this is the female divorce response, however, the corresponding divorce point estimate for men is similar in magnitude so it does not help to explain the gender differential.

Table 11: **Family Responses to Trade Exposure across Labor Market Positions**

	Birth		Parental Leave		Marriage		Divorce	
	(1) Men	(2) Women	(3) Men	(4) Women	(5) Men	(6) Women	(7) Men	(8) Women
Any Labor Market Position	0.034	0.089	0.037	0.078	-0.008	0.045	-0.011	-0.039
	(0.029)	(0.039)	(0.026)	(0.039)	(0.026)	(0.026)	(0.013)	(0.011)
At the Initial Job	-0.002	0.013	0.015	0.0120	-0.030	-0.001	-0.010	-0.014**
	(0.024)	(0.027)	(0.020)	(0.030)	(0.020)	(0.018)	(0.010)	(0.006)
After Leaving Initial Job	0.036	0.098***	0.0160	0.114***	0.022	0.046**	-0.001	-0.025***
	(0.023)	(0.032)	(0.021)	(0.035)	(0.019)	(0.020)	(0.011)	(0.009)
Of which:								
Out of Labor Force	-0.001	0.043***	-0.003	0.038**	-0.0004	0.013*	0.004	-0.003
	(0.005)	(0.016)	(0.003)	(0.017)	(0.003)	(0.007)	(0.003)	(0.003)
Unemployed	-0.010*	0.003	-0.006	0.027*	-0.005	-0.002	-0.003	-0.004
	(0.006)	(0.006)	(0.004)	(0.014)	(0.004)	(0.005)	(0.004)	(0.003)

Notes: Each cell gives a least squares coefficient and standard error estimate of *ImpComp* obtained from the estimation of equation 3, including worker and period fixed effects and a constant. For the sample sizes, see Tables 3 to 6. The sample of workers in columns (1) to (6) is unmarried workers, and in columns (7) and (8) it is married workers. Robust standard errors clustered at the level of workers' initial firm are in parentheses. *, ** and *** indicate significance at the 10 %, 5% and 1% levels respectively.

Overall, this analysis indicates that women tend to move towards family from a relatively weak labor market position.

Next, we use information on the individual worker transitions to examine the timing of the move towards family. If the move towards family precedes a weak labor market position, labor market consequences of rising import competition are less likely to be the cause for the worker's pro-family choice than if the latter is simultaneous or subsequent to the weakening of the labor market position. For example, instead of indicating a true move towards family, workers who have a new child or take parental leave may do this strategically to improve their labor market position by delaying a layoff that is on the horizon. In the following analysis, we focus on women because they are central to the move towards family, as shown above. Results are shown in Table 12.[61]

[61] Analogous results using the economy-wide sample are also quite similar (not shown).

Table 12: **The Timing of Unemployment and Child-related Activities**

	Births			Parental Leave		
	(1) All	(2) Before Unemployment	(3) During or After Unemployment	(4) All	(5) Before Unemployment	(6) During or After Unemployment
Import Comp	0.089**	0.050	0.052**	0.078**	0.028	0.059**
	(0.039)	(0.032)	(0.023)	(0.039)	(0.032)	(0.024)
Worker FE	Y	Y	Y	Y	Y	Y
Period FE	Y	Y	Y	Y	Y	Y
N	2,692	2,692	2,692	2,692	2,692	2,692

Notes: Dependent variable given at top of column. Estimation by least squares. Robust standard errors clustered at the level of workers' initial firm are in parentheses. *, ** and *** indicate significance at the 10 %, 5% and 1% levels respectively.

The panel on the left documents the impact of trade on fertility, while the panel on the right presents results on parental leave. The results in column (1) repeat earlier results for convenience (Table 4, column 5). The dependent variable for worker i is equal to one in period s if the worker had a new child in this period, and zero otherwise.[62] The results show that unmarried female workers respond to trade exposure by having more children, and as noted above the impact is quantitatively sizable.

The two following columns modify the definition of the dependent variable to investigate the timing of birth versus unemployment. In column (2) the dependent variable is equal to one if the worker has a new child and the worker has not (yet) had a period of unemployment, while the dependent variable is equal to one in column (3) if the worker has a newborn at the same time or following unemployment. While the point estimates in columns (2) and (3) are similar, only for birth-with-or-after unemployment is the impact of trade precisely estimated so that the coefficient is significant at standard levels.

The analysis of parental leave in Table 12 follows a similar structure. Notice that the coefficient capturing the family response to rising import competition is roughly twice as large when the family action is taken at least simultaneously with unemployment than before the unemployment spell.

These results from individual worker transitions strengthen the evidence that there is a substitution of family- for labor market work by exposed women, as opposed to a pro-family move that is

[62] Or more than one new child.

strategic or independent of the weakening labor market situation.

7.3 Other Explanations

7.3.1 Occupational Sorting and Temporal Flexibility

Central to the temporal flexibility hypothesis of Goldin (2014) is that women during their prime child-rearing years are more inclined to choose jobs that pay lower earnings than men because women want comparatively more to be able to have and raise children, which requires avoiding to work long and specific hours (for example, night shifts, on-call weekends, or 100 hours a week). Thus, occupational choices are made while taking account of family friendliness. This is related to our biological clock argument because biological conditions determine that women cannot relatively early in their professional life develop high-profile careers and then have children because later in life conception becomes more challenging.

One implication of children being at the core of the behavioral gender difference is that sorting of men and women into different occupations does not have to be important (see Goldin 2014 on the relative importance of within versus between effects for the gender wage gap in the US). The following provides evidence on the importance of occupational sorting for the gender differential in labor adjustment to trade liberalization.

Table 13 compares results for two sets of probit regressions, one without and one with four-digit occupational fixed effects. If sorting between occupations is important for gender differences, the inclusion of occupational fixed effects should lead to substantially smaller gender differentials because four-digit fixed effects eliminate a substantial part of the between variation. Table 13 shows, however, that our results with fixed effects are quite similar to those without occupational fixed effects. The largest point estimate difference is obtained for marriage responses, with 0.15 without and 0.18 with occupational fixed effects for the Female interaction variable. This difference is not that large, and moreover, adding occupational fixed effects does not decrease but increase the estimated gender differential. Clearly, sorting into different occupations is not central to the differential family response to import competition of men and women. This provides new evidence that within-occupation factors are central to explaining the gender differences.[63]

[63] That the gender differentials persist even with the inclusion of detailed occupational fixed effects is not surprising given that our probit results tend to be similar to those obtained using least squares estimation with worker fixed effects (worker fixed effects subsume occupational fixed effects as a special case).

Table 13: **Gender Differential in Family Response to Exposure: Within or Between Occupations?**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Marriage		Birth		Parental Leave		Divorce	
ImpComp	-0.020	-0.029	-0.012	-0.040	-0.104	-0.128	-0.102	-0.121
	(0.0945)	(0.0957)	(0.136)	(0.145)	(0.142)	(0.151)	(0.112)	(0.117)
ImpComp x Female	0.153*	0.184*	0.321**	0.330**	0.320**	0.316**	-0.188*	-0.196*
	(0.0922)	(0.0946)	(0.140)	(0.149)	(0.139)	(0.149)	(0.0970)	(0.104)
Observations	8,163	8,008	3,283	3,103	3,283	3,045	11,703	10,941
All controls	Y	Y	Y	Y	Y	Y	Y	Y
Period fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Four-digit Occupation FEs	-	Y	-	Y	-	Y	-	Y

Notes: Dependent variables are equal to one if worker in period s has married (columns 1-2), or has mothered/fathered a newborn baby (columns (3-4), or has taken a parental leave (columns (5-6), or has divorced (columns 7-8), zero otherwise. Sample: all unmarried workers as of 1999 (columns 1-2), all fertile age single workers as of 1999 (columns 3-6), all married workers as of 1999 (columns 7-8). Estimation by probit with period fixed effects (equation 1). All specifications include individual, partner, firm characteristics. Columns 2, 4, 6, 8 include in addition four-digit occupation fixed effects. Robust standard errors clustered at the 1999 firm level in parentheses. ^{c}, ^{b} and ^{a} indicate significance at the 10 %, 5% and 1% levels respectively.

In addition, estimating gender earnings differentials for major occupational groups and education levels separately there is no evidence for significant differences across occupations and education levels (see Appendix, Tables A-12 and A-13). This is further evidence that within-occupation factors such as the biological clock rather than occupational sorting are central to our findings.

7.3.2 Household Effects: Partner Income and Labor Market-Family Choice

While the analysis so far has focused on workers' individual choices it is important to consider the role that households may play for our results. One possibility is that partner income may provide insurance for the exposed worker, a 'first line of defense', in addition to administrative insurance and transfer payments. A simple indicator of the relative income of the two partners is whether worker *i* at the beginning of the sample period has higher or lower labor earnings than the partner of worker *i*. One reason why relative income in 1999 may matter for adjustment is that men have typically higher earnings than their female partner (in about 75% of the couples). The sample for the following results is married and co-habitating workers.

Table 14: **Partners' Income and Gender Differences**

	(1) Earnings Women	(2) Earnings Men	(3) Divorce Women	(4) Divorce Men	(5) Birth Women	(6) Birth Men
ImpComp	-0.236	-0.030	-0.003	-0.006	-0.044*	0.020
	(0.288)	(0.217)	-0.016	(0.010)	(0.025)	(0.018)
ImpComp x PartnerHigherInc	-0.351	-0.178	-0.031*	0.029	0.066**	-0.047
	(0.319)	(0.456)	(0.016)	(0.026)	(0.026)	(0.044)
Observations	8,624	6,148	8,828	6,320	8,828	6,320
R-squared	0.693	0.721	0.503	0.508	0.676	0.651

Notes: Dependent variable in columns (1)-(2) is cumulative earnings normalized by initial annual earnings. Dependent variable in columns (3)-(4) is an indicator for divorce, and in columns (5)-(6) it is an indicator for birth of a new child. PartnerHigherInc is an indicator for worker *i*s partner having higher labor earnings in 1999. Estimation by least squares with worker and period fixed effects. Robust standard errors clustered at the 1999 firm level in parentheses. *, ** and *** indicate significance at the 10 %, 5% and 1% levels respectively.

We have shown above that exposed women have reduced labor earnings compared to non-exposed women. The first set of results in Table 14 show that losses of women who make more than

their partner in 1999 tend to experience smaller earnings losses than women with a higher-income partner (column 1). This is consistent with exposed women being partially insured by their high-income partners, although the result is imprecisely estimated. Results for men with higher-income partners are qualitatively similar though the point estimate is smaller (column 2).

Gender differences become larger when we consider the role of partner income for family responses to trade exposure. In particular, neither male and female workers who are making more than their partner change significantly their divorce behavior when exposed to import competition (columns 3 and 4). In contrast, if a women has a higher income partner, exposure compells her to divorce less while if an exposed man has a higher income partner his probability of divorce does not fall.

Furthermore, we see that relative partner income also contributes to the gender differential in fertility responses. It is mostly women with a higher-income partner who decide to have a new child in response to rising import competition; if they are making more than their partner, in contrast, fertility drops due to trade exposure (column 5). The corresponding point estimate for men is smaller and of opposite sign (column 6). At the same time, the role of relative partner income for fertility based on Table 14 should not be overestimated, because we have seen earlier that it especially young, early-state-of-life women that are behind the fertility response. These women are typically single, and because they have no partner they are not included in the analysis of Table 14.

To summarize, while the importance of relative income is difficult to separately identify from other factors because the large majority of women have lower income than their male partners, our results indicate that in addition to their biological clock, partner income influences women's family responses to rising import competition.

7.3.3 Preferences for Children

The biological clock argument centers on the difference between men and women about how age affects their probability of future conception. All else equal, women will move more strongly towards family for a given negative labor market shock than men. Beyond this there may be differences in how the decisions of men and women are affected by children who are already present; this may be seen as preferences for children.[64] The following presents evidence on how the presence of young children affects family choices of exposed men and women, see Table 15.

[64]The deep causes of preferences may be various–including gender identity and discrimination–and to unpack these goes beyond the scope of this paper.

Table 15: **Preferences for Children**

	(1) Earnings Women	(2) Earnings Men	(3) Marriage Women	(4) Marriage Men	(5) Divorce Women	(6) Divorce Men
ImpComp	-0.562***	-0.376**	0.031	-0.01	-0.031***	-0.012
	(0.188)	(0.189)	(0.026)	(0.027)	(0.011)	(0.013)
ImpComp x Baby	0.264	1.695	0.246*	0.010	-0.070**	0.010
	(0.439)	(1.164)	(0.139)	(0.101)	(0.036)	(0.043)
Observations	6,672	4,792	2,354	2,488	6,846	4,934
R-squared	0.696	0.665	0.504	0.492	0.500	0.499

Notes: Dependent variable is cumulative earnings relative to initial year earnings in columns (1)-(2), a marriage indicator in columns (3)-(4), and a divorce indicator in columns (5)-(6). Sample is married workers in columns (1)-(2) and (5)-(6), and single workers in columns (3) and (4). Estimation by least squares with worker and period fixed effects. Baby is defined as the presence of a child aged less than 3 years old as of 1999. Robust standard errors clustered at the 1999 firm level in parentheses. *, ** and *** indicate significance at the 10 %, 5% and 1% levels respectively.

We have seen above that overall, trade exposure leads to lower relative labor earnings of women. The first two columns in Table 15 shows the influence of having a baby, defined as a child less than three years old on labor earnings in adjustment to trade liberalization. While the coefficients for the baby interaction variable are not significant, the presence of babies tends to reduce the earnings loss for both men and women, and the point estimate for men is higher than that for women.

Accounting for existing children is also important for life-cycle effects that may influence family responses to rising import competition. We see in the next set of results that the tendency of female workers to marry in response to exposure is significantly increased by the presence of a baby (column (3)). The same is not true for unmarried male workers (column (4)). Thus, the stronger shift towards family of women is not solely due to planning for future children. However, note that quantitatively the effect is relatively small and it vanishes once we drop women who live with a partner without being married from the sample (not shown).

In the following we turn to another family outcome, divorce, and the typically somewhat older workers that are married as of 1999. The last two columns show that exposed women who have a baby are more likely to remain in the marital union than women who do not, whereas the presence

of a baby has no bearing on the divorce behavior of men (columns (5) and (6)).

We conclude that the adjustment to a globalization shock is characterized by a gender difference not only because the biological clock affects women's preferences for future conception more strongly than men's but also because women's choices are more strongly guided by the desire to care for existing young children than men's.

We have also explored whether women's networks, proxied by the share of females at the 1999 firm, seem to affect the extent to which they shift from market work to family activities. The evidence for such effects however is limited, see Appendix, section J.

Summarizing, the gender differential in adjustment to trade liberalization is to some extent influenced by household insurance factors, in particular, trade-exposed women (but not men) are more likely to have a new child when their partner has higher income. Also, trade-exposed mothers of young children have a greater tendency to form and remain in a marital union than exposed fathers of young children, consistent with a stronger emphasis on family. Overall, though, our analysis has yielded evidence across multiple dimensions that a woman's biological clock, affecting the timing of her fertility decisions, has the most powerful impact on gender differences in adjustment to trade liberalization.

8 Concluding Remarks

Using population register data on all marriages, divorces and births together with employer-employee matched data from Denmark, we have shown that rising import competition due to the removal of textile quotas on China had a significant impact on gender inequality through its effect on the family-market work balance. Generally, single workers exposed to import competition more frequently marry, have children, and take parental leave, while married workers do not divorce their spouses as often as similar non-exposed workers. Strikingly, even though the negative earnings impact at the initial job is similar for men and women, the shift to family is gender biased in the sense that it is primarily driven by women, and correspondingly, the negative long-run earnings impact of import competition on women is much higher than for men. We show that these results carry over to the Danish economy at large.

We have also documented that the gender bias in the family-market work adjustment persists controlling for job, worker, and partner characteristics. Instead, there is strong evidence for what we

call the biological clock argument of gender earnings differences. It is especially young, early-stage-of-life women who cannot postpone conception (and caring for a young child) as well as men who are the driving force behind the gender differential. The shift towards family activities fully eliminates for women the adjustment cost advantage that young workers typically have over older workers.

This paper has provided evidence 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. According to our results the family margin is significant even in advanced countries with a substantial amount of family-oriented support systems, such as relatively generous parental leave and availability of childcare. There is clearly a need for future work on the importance of the market-family margin in adjusting to structural change.

References

[1] **Albanesi, S., and C. Olivetti** 2016. "Gender Roles and Medical Progress", *Journal of Political Economy*.

[2] **Angelov, N., P. Johansson, and E. Lindahl** 2016. "Parenthood and the Gender Gap in Pay", *Journal of Labor Economics* Vol. 34.

[3] **Artuc, E., S. Chaudhuri, and J. McLaren** 2010. "Trade Shocks and Labor Adjustment: A Structural Empirical Approach", *American Economic Review* Vol. 100(3): 1008–1045.

[4] **Autor, D., D. Dorn, and G. Hanson** 2018. "When Work Disappears: How Adverse Labor Market Shocks Affect Fertility, Marriage, and Children's Living Circumstances", *American Economic Review: Insights*, forthcoming.

[5] **Autor, David, David Dorn, and Gordon Hanson** 2016."The China Shock: Learning from Labor-Market Adjustment to Large Changes in Trade", *Annual Reviews in Economics*.

[6] **Autor, David, David Dorn, Gordon Hanson, and Jae Song** 2014."Trade Adjustment: Worker-Level Evidence", *Quarterly Journal of Economics* 129(4): 1799–1860.

[7] **Autor, David, David Dorn, and Gordon Hanson** 2013."The China Syndrome: Local Labor Market Effects of Import Competition in the United States", *American Economic Review* 103(4): 2121–2168.

[8] **Becker, G.** 1973. "A Theory of Marriage", Part I in *The Journal of Political Economy* 1973, 81(4): 813-846; Part II in *The Journal of Political Economy* 1974, 82(2): S11-S26.

[9] **Becker, G.** 1965. "A Theory of the Allocation of Time", *Economic Journal* Vol. 75, No. 299: 493–517.

[10] **Becker, G.** 1960. "An Economic Analysis of Fertility", in Demographic and Economic Change in Developed Countries, Columbia University Press for the NBER, pp. 209-240.

[11] **Becker, G.** 1957. *The Economics of Discrimination*, Chicago University Press: Chicago.

[12] **Bertrand, M.** 2010. "New Perspectives on Gender", Ch. 17 in *Handbook of Labor Economics*, Vol. 4b, North-Holland Elsevier Publishers.

[13] **Bertrand, M., E. Duflo, and S. Mullainathan** 2004. "How much should we trust difference-in-differences estimates?", *Quarterly Journal of Economics* Vol. 119, pp. 249–275.

[14] **Bertrand, M., C. Goldin, and L. Katz** 2010. "Dynamics of the Gender Gap for Young Professionals in the Financial and Corporate Sectors", *American Economic Journal: Applied Economics* Vol. 2: 228–255.

[15] **Bertrand, M., E. Kamenica, and J. Pan** 2015. "Gender Identity and Relative Income within Households", *Quarterly Journal of Economics*

[16] **Black, Sandra E., and Elizabeth Brainerd.** 2004. "Importing Equality? The Impact of Globalization on Gender Discrimination.", *Industrial and Labor Relations Review* 57(4): 540–559.

[17] **Blau, Francine D. and Lawrence M. Kahn.** 2017. "The Gender Wage Gap: Extent, Trends, and Explanations", *Journal of Economic Literature* 55(3): 789–865.

[18] **Blau, Francine D. and Lawrence M. Kahn.** 2006. "The U.S. Gender Pay Gap in the 1990s: Slowing Convergence.", *Industrial & Labor Relations Review* 60(1):45–66.

[19] **Bloom, Nicholas, Mirko Draca, and John Van Reenen** 2016. "Trade induced technical change? The impact of Chinese imports on innovation and information technology", *Review of Economic Studies*, 83: 87–117.

[20] **Boler, E., B. Javorcik, and K. H. Ullveit-Moe** 2015. "Working across Time Zones: Exporters and the Gender Wage Gap", Journal of International Economics Vol. 111: 122–133.

[21] **Brambilla, Irene, Amit Khandelwal and Peter Schott** 2010. "China's Experience Under the Multifiber Arrangement (MFA) and the Agreement on Textile and Clothing (ATC)", Robert Feenstra and Shang-Jin Wei (Eds.), China's Growing Role in World Trade, NBER, Cambridge: MA.

[22] **Browning, M., A. M. Dan, and E. Heinesen** 2006. "Job Displacement and Health Outcomes: A Representative Panel Study", Health Economics, 15(10): 1061–1075.

[23] **Brussevich, M.** 2018. "Does Trade Liberalization Narrow the Gender Wage Gap? The Role of Sectoral Mobility", *European Economic Review*, forthcoming.

[24] **Dai, M., W. Huang, and Y. Zhang** 2018. "How Do Households Adjust to Trade Liberalization? Evidence from China's WTO Accession", mimeo, Beijing Normal University.

[25] **Del Bono, E. A. Weber, and R. Winter-Ebmer** 2012. "Clash Of Career And Family: Fertility Decisions After Job Displacement", *Journal of the European Economic Association*, 10(4): 659–683.

[26] **Dix-Carneiro, R.** 2014. "Trade Liberalization and Labor Market Dynamics", *Econometrica* 82(3): 825–885.

[27] **Dix-Carneiro, Rafael, and Brian Kovak** 2017. "Trade Liberalization and Regional Dynamics", *American Economic Review*, 107(10): 2908–2946.

[28] **Dustmann, Christian and Uta Schoenberg** 2012. "Expansions in Maternity Leave Coverage and Childrens Long-Term Outcomes", *American Economic Journal: Applied Economics*, 4(3): 190-224.

[29] **Ebenstein, Avraham, Ann Harrison, Margaret McMillan, Shannon Phillips** 2014. "Estimating the Impact of Trade and Offshoring on American Workers using the Current Population Surveys", *The Review of Economics and Statistics*, 96 (3): 581–595.

[30] **Farber, Henry**, "Job Loss and the Decline in Job Security in the United States", in Labor in the New Economy, Katharine G. Abraham, James R. Spletzer, and Michael Harper (eds.), NBER.

[31] **Fernandez, R., Fogli, and Olivetti** 2004. "Mothers and Sons: Preference Formation and Female Labor Force Dynamics", *Quarterly Journal of Economics*, 19(4):1249–99.

[32] **Fortin, N.** 2011. "Gender Role Attitudes and Women's Labour Market Outcomes", mimeo, UBC.

[33] **Goldin, Claudia** 2014. "A Grand Gender Convergence: Its Last Chapter", *American Economic Review* 104(4): 1091–1119.

[34] **Goldin, Claudia and Lawrence F. Katz** 2002. "The power of the pill: Oral contraceptives and women's career and marriage decisions.", *Journal of Political Economy* 110(4): 730–770.

[35] **Goldin, Claudia and Lawrence F. Katz** 2016. "A Most Egalitarian Profession: Pharmacy and the Evolution of a Family-Friendly Occupation", *Journal of Labor Economics* Vol. 34: 705–746.

[36] **Greenwood, Jeremy, Nezih Guner, and Guillaume Vandenbroucke**. 2017. "Family Economics Writ Large.", *Journal of Economic Literature*, 55 (4): 1346-1434.

[37] **Hakobyan, Shushanik, and John McLaren**. 2018. "NAFTA and the Wages of Married Women", NBER Working Paper No. 24424.

[38] **Harrigan, James, and Geoffrey Barrows** 2009. "Testing the Theory of Trade Policy: Evidence from the Abrupt End of the Multifiber Arrangement", *The Review of Economics and Statistics*, 91(2): 282–294.

[39] **Hochschild, A., and A. Machung** 1989. *The second shift: working parents and the revolution at home*. New York: Viking.

[40] **Huttunen, K., and J. Kellokumpu** 2016. "The Effect of Job Displacement on Couples' Fertility Decisions", *Journal of Labor Economics* 34, no. 2 (Part 1): 403–442.

[41] **Keller, Wolfgang, and Hale Utar** 2016. "International Trade and Job Polarization: Evidence at the Worker-level', NBER Working Paper No. 22315.

[42] **Khandelwal, A., S. Wei, and P. Schott** 2013. "Trade Liberalization and Embedded Institutional Reform: Evidence from Chinese Exporters", *American Economic Review*, Vol. 103(6): 2169–2195.

[43] **Kis-Katos, Krisztina and Janneke Pieters and Robert Sparrow** 2018. "Globalization and social change: Gender-specific effects of trade liberalization in Indonesia", *IMF Economic Review*.

[44] **Kleven, H., C. Landais, and J. E. Sogaard** 2018. "Children and Gender Inequality: Evidence from Denmark", forthcoming, *American Economic Journal: Applied Economics*.

[45] **Lalive, Rafael, and Josef Zweimuller**. 2009. "How Does Parental Leave Affect Fertility And Return To Work? Evidence From Two Natural Experiments", *Quarterly Journal of Economics*, 124(3): 1363-1402.

[46] **Lund-Andersen, Ingrid** 2015. "Informal relationships - DENMARK", The Commission on European Family Law, National Report on Denmark.

[47] **OECD Family Database**, Detail in Change of Parental Leave by Country, https://www.oecd.org/els/family/

[48] **Oreopoulos, P., T. von Wachter, and A. Heisz**. 2012. "The Short- and Long-Term Career Effects of Graduating in a Recession", *American Economic Journal: Applied Economics* Vol. 4(1): 1–29.

[49] **Pierce, J., and P. Schott** 2016a. "The Surprisingly Swift Decline of U.S. Manufacturing Employment", *American Economic Review*, 106(7): 1632–62.

[50] **Pierce, J., and P. Schott** 2016b. "Trade Liberalization and Mortality: Evidence from U.S. Counties", mimeo.

[51] **Pieters, J.** 2015. "Trade Liberalization and Gender Inequality", IZA World of Labor, January.

[52] **Sullivan, D., and T. von Wachter** 2009. "Job Displacement and Mortality: An Analysis using Administrative Data", *Quarterly Journal of Economics* 124(3): 1265–1306.

[53] **Topalova, Petia** 2010. "Factor Immobility and Regional Effects of Trade Liberalization: Evidence on Poverty and Inequality from Indian Districts", *American Economic Journal: Applied Economics*, vol. 2(4): 1-41.

[54] **United Nations 2016**. Gender Statistics: Allocation of time and time use, http://unstats.un.org/unsd/gender/timeuse/ , accessed Nov 24, 2016

[55] **United Nations 2005**. Guide to Producing Statistics on Time Use: Measuring Paid and Unpaid Work, New York.

[56] **Utar, Hale** 2018. "Workers beneath the Floodgates: Low-Wage Import Competition and Workers' Adjustment", *Review of Economics and Statistics*, 100(4): 631-647.

[57] **Utar, Hale** 2014. "When the Floodgates Open: 'Northern Firms' Response to Removal of Trade Quotas on Chinese Goods", *American Economic Journal: Applied Economics*, 6 (4): 226-250.

[58] **Utar, Hale, and Luis B. Torres Ruiz.** 2013. "International Competition and Industrial Evolution: Evidence from the Impact of Chinese Competition on Mexican Maquiladoras", *Journal of Development Economics*, 105: 267-287.

[59] **World Bank** (2012), World Development Report, Washington, D.C.

9 For Online Publication - Appendix

A Placebo Results on Potential Pre-Trends

The following analysis checks for possible pre-trends by following our 1999 textile workers back to the year 1990 for a number of placebo exercises. As the pre-shock period we employ the period 1990-94, while the treatment period is assumed to be 1995-99. Table A-1 shows labor market and income results, separately for men (Panel A) and women (Panel B). Table A-2 reports in addition earnings and income results separately for married and unmarried workers, as well as evidence on three different family outcomes (birth, marriage, and divorce).

Beginning with Table A-1, notice that none of the coefficients is significantly different from zero at standard levels, neither for men nor for women. This is what one would expect in the absence of major pre-trends.

Turning to the results in Table A-2, we see that also here none of the estimated coefficients is significantly different from zero. Based on these findings we can rule out the possibility of major pre-existing trends for family and labor market variables, including at the subsample level.

Table A-1: **Potential Pre-Trends I: 1990-1999**

	(1) Earnings	(2) Personal Income	(3) Hours Worked	(4) Hourly Wage	(5) Unemployment
Panel A. Men					
$Exposure_{i,99} * Post95_s$	0.009	0.019	-0.009	0.017	-0.085
	(0.033)	(0.028)	(0.014)	(0.020)	(0.107)
N	8,248	8,248	7,964	7,964	8,248
Panel B. Women					
$Exposure_{i,99} * Post95_s$	0.013	-0.012	0.015	-0.002	-0.052
	(0.028)	(0.025)	(0.015)	(0.014)	(0.117)
N	10,374	10,374	9,850	9,850	10,374

Notes: Dependent variables on top of column. All variables are expressed in logs. They are the average annual value of earnings, personal income, hours worked, hourly wage and the unemployment index, respectively. Unemployment index takes the value of one when no unemployment is recorded in a given year, and ranges to 1001 which indicates unemployment for the whole duration of year. E.g., the value 501 indicates a half year of unemployment. Averages are taken across the pre- and post-1995 periods, namely 1990-1994 and 1995-1999. Estimation by least squares. All specifications include worker and time fixed effects. Robust standard errors clustered at the 1999 firm in parentheses.

Table A-2: **Potential Pre-Trends–Subsample Analysis**

	(1) Earnings	(2) Personal Income	(3) Divorce	(4) Marriage	(5) Birth
Panel A. Men					
$Exposure_{i,99} * Post95_s$	0.003	0.009	0.003	0.013	0.006
	(0.024)	(0.019)	(0.007)	(0.014)	(0.018)
N	8,550	8,542	8,550	8,550	8,550
Panel B. Women					
$Exposure_{i,99} * Post95_s$	0.024	-0.007	-0.003	0.012	0.017
	(0.027)	(0.013)	(0.006)	(0.013)	(0.016)
N	10,954	10,946	10,954	10,954	10,954
Panel C. Married Workers as of 1999					
$Exposure_{i,99} * Post95_s$	-0.014	0.020	0.003	0.029	0.005
	(0.032)	(0.025)	(0.007)	(0.023)	(0.027)
$Exposure_{i,99} * Post95_s * Woman_i$	0.042	-0.028	-0.002	-0.017	0.007
	(0.039)	(0.025)	(0.008)	(0.029)	(0.034)
N	11,548	11,548	11,548	11,548	11,548
Panel D. Unmarried Workers as of 1999					
$Exposure_{i,99} * Post95_s$	0.042	0.010	0.006	-0.011	0.014
	(0.032)	(0.021)	(0.013)	(0.009)	(0.020)
$Exposure_{i,99} * Post95_s * Woman_i$	-0.021	-0.012	-0.012	0.022	0.012
	(0.054)	(0.023)	(0.019)	0.014	0.031
N	7,956	7,940	7,956	7,956	7,956

Notes: Dependent variables at the top of the column. Estimation by least squares. All specifications include worker and time fixed effects and a constant. Regressions in Panels C and D also include $Post95_s * Woman_i$ but omitted from the table. Earnings variable is the average earnings over 1990-1994 and 1995-1999 normalized by the worker's own 1999 earnings. Similarly personal income variable is the average personal income across the pre- and post-1995 period normalized by the worker's own personal income as of year 1999. Divorce, Marriage, and Birth variables take 1 if the individual has an event of divorce, marriage, or birth (fathering or mothering a new born child) over the periods, 1990-1994 and 1995-1999, and zero otherwise. Robust standard errors clustered at the (initial) firm in parentheses.

B Results for the Private-Sector Danish Labor Force

In this section we provide additional detail on our results for the 1999 private-sector labor force discussed in section 6. The workers in this sample were in the year 1999 employed in a wide range of industries, including mining, manufacturing, wholesale and retail trade, hotels and restaurants, transport, storage and communication, as well as real estate, renting and business activities. Sectors that are not included as initial employment of workers in the sample are public administration, education, health, and a wide range of small personal and social service providers. Following Keller and Utar (2016) we estimate the impact of rising import competition by employing six-digit

NACE industry (or product line) variation in the change of import penetration in Denmark. We control for two-digit industry fixed effects to avoid broad industry variations that are likely to be convoluted with technological changes. Because the change in Danish imports from China across industries might be endogenous we employ an instrumental-variables approach. One instrument is the imports from China in eight other high-income countries.[65] Following Autor, Dorn, and Hanson (2013), the rationale is that China's export performance during these years is driven by her economic reform and globally falling trade costs.

We employ two additional instrumental variables: geography-based transportation costs and a measure of the importance of retail channels. These variables are the log average of the distance from Denmarks import partners using the 1996 imports as weights, and the ratio of the number of retail trading firms over the total number of importing firms for each six-digit manufactured product line (NACE) in 1996. The idea behind these variables is that a given improvement in productivity of Chinese firms raises Chinese exports by more in industries where trade costs are lower and where a high share of retail trading firms indicates the presence of existing trade channels.

For the analysis of marriage, in particular, the estimation equation is

$$MAR_i^{2000-07} = \beta_0 + \beta_1 \Delta ImportP_i + Z_i^W + Z_i^F + Z_i^P + \varepsilon_i. \tag{A-1}$$

The dependent variable $MAR_i^{2000-07}$ is an indicator variable that takes the value one if worker i gets married over the period from 2000 to 2007. On the right hand side we have the change in import penetration from China ($\Delta ImportP_i$), as well as measures of worker (Z_i^W), firm and product-line (Z_i^F) and partner Z_i^P characteristics as of year 1999.

Z_i^W includes 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), occupation (two-digit ISCO fixed effects), the logarithm of the hourly wage, the history of unemployment spells, an indicator whether the individual is a union member, and finally the worker's labor market experience as measured by the number of years in the labor market. Z_i^F includes the average wage in the firm, the size of the firm as measured by the full-time equivalent number of employees, the separation rate of workers from the original firm between 1998-1999, pre-trends in the employment in the six-digit product line of employer between 1993-1999, the share of college educated workers in the six-digit product line of employer, and two-digit industry (NACE) fixed effects.

Z_i^P includes partner characteristics, which include an indicator whether the individual has a partner (if not married), the partner's age, the partner's labor earnings, an indicator whether the partner is a Danish citizen, an indicator 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 ex-

[65] They are Australia, Finland, Germany, Japan, Netherlands, New Zealand, Switzerland, and the USA.

posure), the age difference between the partners, and an indicator whether the partner has higher earnings. All Z_i^W, Z_i^F , and Z_i^P characteristics, if they are not explicitly indicated otherwise, are of the year 1999. Specifications for divorce, parental leave, fertility and labor market outcomes are analogous to this marriage equation.

We estimate the impact of rising import competition by regressing family responses on the change in import penetration from Keller and Utar (2016) together with the same set of worker, firm, product line, and (if applicable) partner variables as in the main text. Fertility and parental leave results with close to one million fertile-age workers are shown in columns (1)-(4) of Table A-3.

For both new births and parental leave uptake we report results for two sets of dependent variables. The first is an indicator variable, and the second is the logarithm of the number of new births or days of parental leave (plus one). Notice that the specification exploits differences in exposure to import competition across six-digit industries within two-digit industries, and the number of different (six-digit) industries is approximately 760.

In the first-stage the instrumental variables all have the expected sign and are significant (not reported). The robust F-statistics are about 12.5 and 14 with p-values lower than 1 percent. According to the second-stage coefficients, exposure to import competition marginally reduces the probability that men have a new child (column (1)). In contrast, exposed women respond to rising import competition by having new births, as seen from the Female interaction variable. Focusing on the number of births does not strongly affect the results, except that the exposure coefficient for men loses statistical significance (column (2)).

We also see that exposed women increase their family activities by taking more parental leave than non-exposed women, and the gender difference in parental leave behavior is larger than for births (columns (3) and (4)). In particular, while exposure for women significantly increases parental leave uptake, it significantly reduces it for men.[66] This is true whether we consider the cumulative likelihood of taking parental leave or the cumulative days spent in parental leaves over 2000-2007.

Column (5) of Table A-3 presents the impact of rising import competition on marriage behavior for the economy-wide sample. Notice, first, that the point estimate is negative neither for women nor for men. This confirms that the non-negative marriage effects found above are generalizable and apply to all workers as a whole. This makes it more likely that the difference to findings for the U.S. in Autor, Dorn, and Hanson (2018) have to do with factors that are not industry-specific, such as the income transfer scheme enjoyed by Danish workers. Second, we find evidence for a significantly stronger marriage response to trade exposure by women compared to men. The point estimate for the former is about nine times as high, and it is precisely estimated. These results suggest that countries' response to the China shock may differ substantially depending on the underlying welfare and social policies in place.

The next section examines the impact of rising import competition on the workers divorce rate. We focus on the behavior of workers who were married in 1999, the initial year of the sample. Given that each worker was initially member of a couple and our sample is an economy-wide

[66] This is consistent with some level of division of labor at the level of the couple.

sample where a man's spouse is likely to be in our sample of women, and vice versa, it is natural to examine divorce responses of both of these individuals. We do this by constructing an import exposure of spouse variable and instrument it as we instrument the exposure to the worker him- or herself. See Table A-4 for the results.

Table A-4: **Import Competition and Divorce**

	(1) Women	(2) Men
Δ ImportP	-0.148	-0.073
	(0.115)	(0.085)
Partner's Δ ImportP	-0.061	-0.138***
	(0.066)	(0.044)
Worker Variables	Y	Y
Firm Variables	Y	Y
Product Line Variables	Y	Y
Partner Variables	Y	Y
Two-digit Occupation (ISCO) FE	Y	Y
Two-digit Industry (NACE) FE	Y	Y
First-stage F (Δ ImportP)	13.39	9.96
P-value	[0.000]	[0.000]
First-stage F (Partner's Δ ImportP)	859.99	806.76
P-value	[0.000]	[0.000]
Number of Clusters	748	752
Observations	419,870	478,040

Notes: Dependent variable is an indicator that is equal to one if a person has divorced during 2000-2007, and zero otherwise. Sample is all married full-time workers. Estimation by two-stage least squares. Instrumental variables are (1) Chinese imports in eight other high-income countries, (2) trade costs based on distance, and (3) share of retailing in all firms, all at the six-digit industry level. Reported is the robust Sanderson-Windmeijer F-statistic. Robust standard errors clustered at the level of the industry in parentheses. ^{c}, ^{b} and ^{a} indicate significance at the 10 %, 5% and 1% levels respectively.

The two-stage least-squares results show that trade exposure tends to lead to lower divorce probabilities, as we have seen for the quasi-experiment sample in the main analysis of the paper. Furthermore, there is evidence that women experience a stronger decline in divorce likelihood due to import competition than men. First, although not significant, the point estimate of trade exposure in the women equation is almost twice as large as the corresponding coefficient in the men's equation. Second, from the mens equation (column 2) we see that the import exposure to a man's spouse, almost always a women, leads to significantly lower divorce likelihood than a virtually identical man whose spouse is not exposed to rising import competition.

Overall, this shows that family responses to rising import competition documented in the text broadly generalize to the entire private-sector labor force.

Table A-3: **Family Responses and Rising Import Competition**

	(1) Birth Event	(2) Number of Births	(3) Parental Leave	(4) Number of Days in Parental Leave	(5) Marriage
ΔImportP	-0.181*	-0.158	-0.632***	-5.648***	0.039
	(0.100)	(0.096)	(0.172)	(1.440)	(0.105)
ΔImportP x Female	0.525***	0.497***	1.624***	18.390***	0.341***
	(0.120)	(0.104)	(0.250)	(2.680)	(0.119)
Worker Variables	Y	Y	Y	Y	Y
Firm Variables	Y	Y	Y	Y	Y
Product Line Variables	Y	Y	Y	Y	Y
Partner Variables	Y	Y	Y	Y	Y
Two-digit Occupation (ISCO) FE	Y	Y	Y	Y	Y
Two-digit Industry (NACE) FE	Y	Y	Y	Y	Y
First-stage F-stat (ΔImportP)	12.61	12.61	12.61	12.61	13.02
P-value	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
First-stage F-stat (ΔImportP x Female)	14.64	14.64	14.64	14.64	14.41
P-value	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Observations	993,277	993,277	993,277	993,277	755,830

Notes: Dependent variable in columns (1) and (3) is an indicator which is equal to one if the worker newly parented or took parental leave during 2000-2007, and zero otherwise. Dependent variables in columns (2) and (4) are the log number of new births plus one, and the log number of days spent in parental leave plus one, respectively. The dependent variable in column (5) is an indicator which is equal to one if the worker gets marry over 2000-2007. Sample is all fertile-age full time workers as of 1999 for columns (1)-(4) and all unmarried full-time workers as of 1999 for column (5). Estimation by two-stage least squares. Instrumental variables are (1) Chinese imports in eight other high-income countries, (2) trade costs based on distance, and (3) share of retailing in all firms, all at the six-digit industry level. Reported is the robust Sanderson-Windmeijer F-statistic. Robust standard errors clustered at the level of the industry in parentheses; 756 clusters. Partner variables in columns (1) and (2) are for co-habitating individuals. *, ** and *** indicate significance at the 10 %, 5% and 1% levels respectively.

We now turn the impact of rising import competition on the labor market outcomes of male and female workers in the entire private-sector economy. We employ an instrumental-variables approach analogous to equation A-1. Table A-5 shows the results.

First, note that rising import competition reduces cumulative earnings for women but not for men (column (1)). This confirms that the earnings differential we have observed for the textile workers is present in the economy as a whole. Similarly, women experience employment reduction over the long-run, but not men (column 2). Cumulative employment is measured in years and does not take into account the length of employment spell within a year. In column (3) we consider cumulative hours worked, we find a similar result. years of employment and hours worked results show that the gender differential in earnings is mainly driven by less time that women spend at work in the long-run rather than reduction in hourly wages (columns (1)-(3)). In column (4) we focus on the gender differential in cumulative years outside the labor market. Import competition does not induce workers to move outside the labor market if they are men, it does if they are women. Is this because women permanently move out of the labor market? In column (5) the dependent variable is the cumulative years in early retirement. Notice that our sample includes only workers who are not going to be in (normal) retirement age by the end of our sample period. However, early retirement is still an option for old enough workers. We find no effect of import competition on early retirement, whether men or women. That means that women's spells outside the labor market are temporary spells, such as being in maternity leave. Finally in column (6) we focus on cumulative years with unemployment spells, and the results show that import competition causes unemployment. We also find that the unemployment impact of import competition on women is significantly higher.

While all results with this economy-wide sample confirm the strong gender differential in the labor market consequences shown in the text, there are also some differences. In particular, here we find a significant gender differential for unemployment (column (6)). Gender differentials for the textile workers in these dimensions were less pronounced. This may be due in part to a more stringent analysis in the quasi-experiment as we make comparisons within the textile workers.

All in all, our analysis of the impact of rising import competition for the entire private-sector labor force has confirmed the strong evidence for gender differentials in worker adjustment that we have documented for the quasi-experiment sample in the main body of the paper.

Table A-5: **Labor Market Consequences of Exposure by Gender**

	(1) Cumulative Earnings	(2) Years of Employment	(3) Cumulative Hours Worked	(4) Out of Labor Force	(5) Early Retirement	(6) Unemployment
ImportP	1.798	-0.712	0.855	0.011	-0.130	0.741**
	(3.231)	(0.643)	(2.701)	(0.274)	(0.131)	(0.368)
ImportP x Female	-10.882*	-2.554**	-7.595*	0.739*	0.029	1.286**
	(5.804)	(1.005)	(4.015)	(0.385)	(0.135)	(0.591)
Worker Variables	Y	Y	Y	Y	Y	Y
Firm Variables	Y	Y	Y	Y	Y	Y
Product Line Variables	Y	Y	Y	Y	Y	Y
Partner Variables	Y	Y	Y	Y	Y	Y
Two-digit Occupation (ISCO) FE	Y	Y	Y	Y	Y	Y
Two-digit Industry (NACE) FE	Y	Y	Y	Y	Y	Y
Observations	1,654,485	1,654,485	1,628,487	1,649,323	1,649,323	1,649,323

Notes: Dependent variable in column (1) is cumulative earnings 2000 - 2007, in column (2) it is cumulative years of employment in column (3) cumulative hours worked. Dependent variable in column (4) is years outside of labor market; column (5) is a subset of this, years in early retirement; and dependent variable in column (6) is years in unemployment. Estimation by two-stage least squares. Instrumental variables are (i) Chinese imports in eight other high-income countries, (ii) trade costs based on distance, and (iii) share of retailing in all firms, all at the six-digit industry level. The robust Sanderson-Windmeijer first-stage F-statistics are 13.46 and 14.87 respectively for ImportP and ImportP x Female (p-values = 0.000). Robust standard errors clustered at the level of the six-digit industry (761 clusters) in parentheses. *, ** and *** indicate significance at the 10 %, 5% and 1% levels respectively.

C Probit Estimation Results for Birth and Parental Leave

This section presents probit results for child births and parental leave and divorce that complement Tables 4, 5, and 7 in the text.

Table A-6: **Import Competition and Births - Probit Results**

	(1) All	(2) All	(3) All	(4) M	(5) W	(6) All	(7) M	(8) W
		Co-habitating or Single				Single		
ImpComp	0.003	0.159**	0.094	0.092	0.237**	-0.008	-0.111	0.458***
	(0.074)	(0.074)	(0.085)	(0.102)	(0.113)	(0.136)	(0.167)	(0.173)
Marg. Effect	0.001	0.053	0.031	0.027	0.086	-0.002	-0.020	0.134
ImpComp x Female	0.072		0.071			0.317**		
	(0.082)		(0.104)			(0.140)		
Marg. Effect	0.022		0.024			0.080		
Worker, firm, partner vars	Y	Y	Y	Y	Y	Y	Y	Y
Time FEs	Y	Y	Y	Y	Y	Y	Y	Y
Pseudo R-sq	0.083	0.075	0.077	0.086	0.059	0.136	0.136	0.131
Predicted Prob	0.253	0.279	0.279	0.236	0.330	0.173	0.143	0.219
Observations	10,235	5,912	5,912	3,228	2,684	3,283	1,996	1,287

Notes: Dependent variable is one if worker *i* has a newborn child during period *s*, and zero otherwise. Estimation by probit regression. The sample in column (1) is textile workers of fertile age (below 37 for women, below 46 for men as of 1999). "M" is Men, "W" is Women. The sample in columns (2) to (5) is workers not married as of 1999, in columns (6) to (8) workers neither married nor co-habitating as of 1999. Robust standard errors clustered at the level of workers' 1999 firm are in parentheses. *, ** and *** indicate significance at the 10 %, 5% and 1% levels respectively.

Table A-7: **Trade Exposure and Parental Leave - Probit Results**

Sample	(1) All	(2) All	(3) All	(4) Men	(5) Women	(6) All	(7) Men	(8) Women
		Co-habitating or Single				Single		
ImpComp	0.003	0.155**	0.021	0.131	0.191*	-0.099	-0.189	0.370**
	(0.074)	(0.073)	(0.087)	(0.106)	(0.112)	(0.142)	(0.177)	(0.170)
Marg. Effect	0.001	0.048	0.006	0.031	0.071	-0.019	-0.024	0.110
ImpComp x Female	0.081		0.102			0.317**		
	(0.084)		(0.104)			(0.139)		
Marg. Effect	0.024		0.032			0.073		
Worker, firm, partner vars	Y	Y	Y	Y	Y	Y	Y	Y
Time FEs	Y	Y	Y	Y	Y	Y	Y	Y
Pseudo R-sq	0.090	0.073	0.085	0.076	0.052	0.138	0.122	0.118
Predicted Prob	0.232	0.249	0.249	0.168	0.347	0.151	0.103	0.226
Observations	10,235	5,912	5,912	3,228	2,684	3,283	1,996	1,287

Notes: Dependent variable is one if worker *i* takes parental leave during period *s*, and zero otherwise. Estimation by probit regression. The sample in column (1) is textile workers of fertile age (36 or below for women, 45 or below for men as of 1999). The sample in columns (2) to (4) is workers not married as of 1999, in columns (5) to (7) workers neither married nor co-habitating as of 1999. Robust standard errors clustered at the level of workers' 1999 firm are in parentheses. ^{c}, ^{b} and ^{a} indicate significance at the 10 %, 5% and 1% levels respectively.

Table A-8: **Import Competition and Divorce - Probit Results**

	(1)	(2)	(3)	(4)	(5)	(6)
					Fertile Age	
	All	All	Men	Women	Men	Women
ImpComp	-0.222**	-0.102	-0.122	-0.366***	-0.0934	-0.718***
	(0.095)	(0.112)	(0.131)	(0.141)	(0.153)	(0.217)
Marg. Eff	-0.015	-0.007	-0.010	-0.020	-0.010	-0.060
ImpComp x Female		-0.188*				
		(0.0970)				
Marg. Eff		-0.013				
Worker, firm, partner vars	Y	Y	Y	Y	Y	Y
Time FEs	Y	Y	Y	Y	Y	Y
Pseudo R-sq	0.109	0.110	0.085	0.139	0.081	0.138
Sample Prob	0.049	0.049	0.052	0.047	0.073	0.081
Observations	11,703	11,703	4,894	6,809	2,746	2,179

Notes: Dependent variable is one if worker *i* divorces during period *s*, and zero otherwise. Estimation by probit regression. Only workers who are married as of 1999 included in the sample. The sample in column (4) and(5) is married textile workers of fertile age. Robust standard errors clustered at the level of workers' initial firm are in parentheses. *, ** and *** indicate significance at the 10 %, 5% and 1% levels respectively.

The results of these probit regressions confirm the findings obtained using the least squares estimation with worker fixed effects in Tables 4, 5 and 7 in the text.

Next, we show the evolution of labor earnings and personal income of exposed men and women between 2002 to 2007.

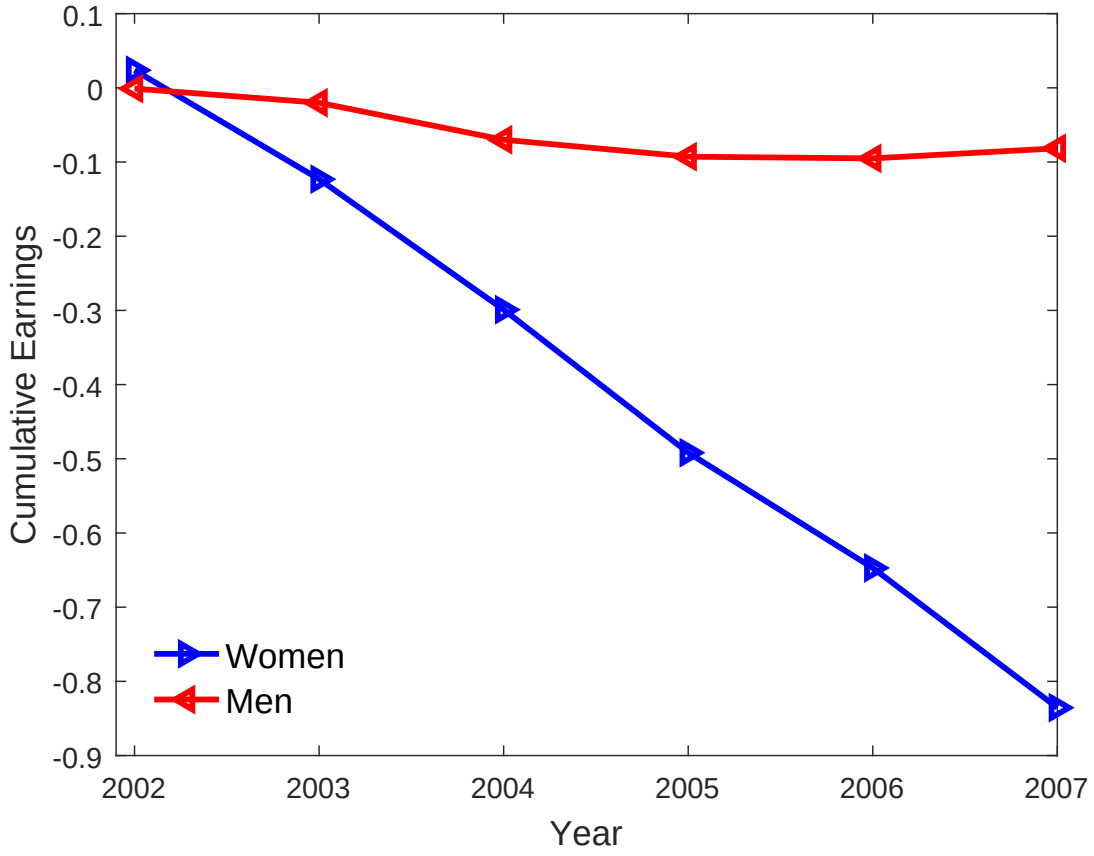


Figure A-1: Earnings dynamics of men and women

Notice that the evolution of earnings for women is approximately linear with additional years of treatment. The following Figure A-2 shows that the evolution of cumulative income is similar for men and women.

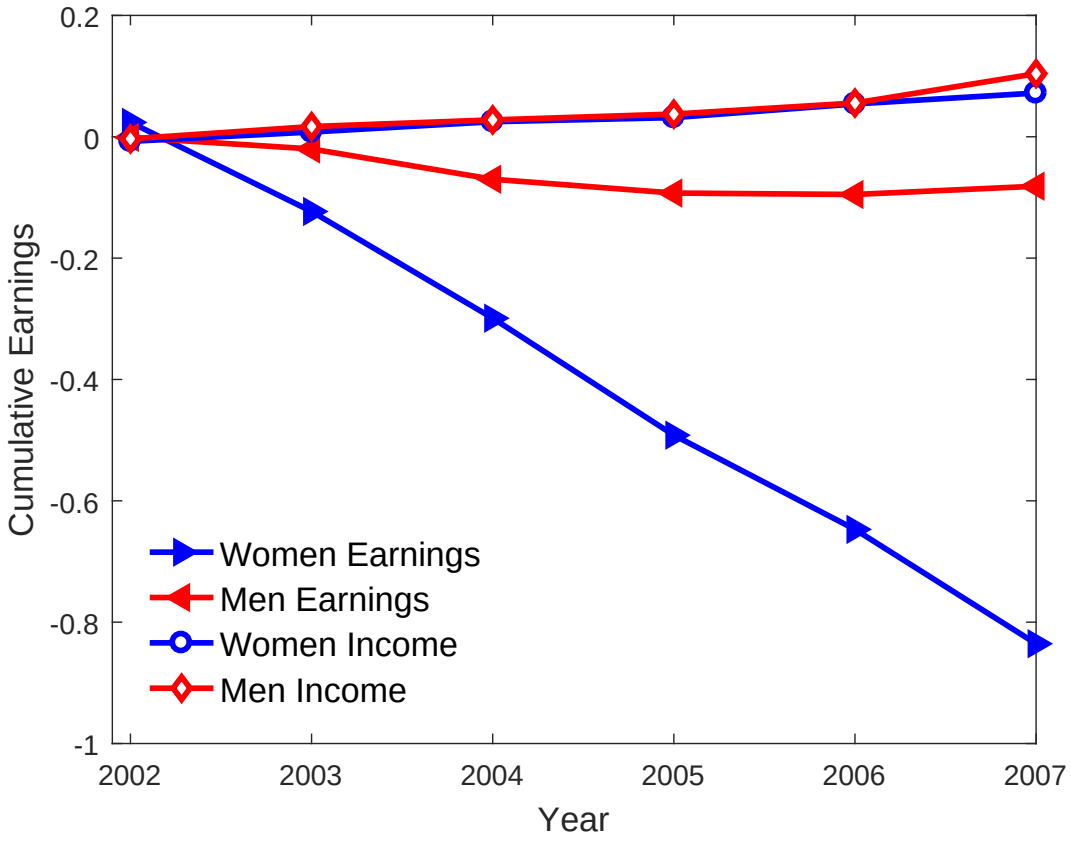


Figure A-2: Evolution of Income and Earnings Effects by Gender

D Alternative Age Limits for Men and Women

Emphasizing fertility considerations in womens' trade shock responses, the analysis so far has contrasted younger with older workers employing a fertile-age threshold of 37 years, and a corresponding threshold for men of 46 years old (both in 1999). In this section we provide alternative results for a common age restriction of 20 to 40 years for both men and women. Our particular interest is the extent to which the results for women aged 20 to 40 are similar to those of fertile-age women as defined below 37 years of age. See Table A-9 for the results.

To begin with, 20 to 40 years old single women respond to trade exposure by having new babies and taking parental leave (columns (2) and (4), respectively). Single women are precisely those who are responsible for the positive fertility and parental leave response among fertile-age women (see Table 4, column (8), and Table 5, column (8), respectively).

Furthermore, younger women exposed to rising import competition are significantly more likely to get marry, while exposed men are not (columns (6) and (5), respectively). This is in line with corresponding results for fertile-age workers, see column (5) of Table 6. Finally, exposed women between 20 and 40 years old also have a significant no-divorce response to rising import competition, in contrast to exposed men (last two columns of Table A-9. This is similar to our results for fertile-age men and women, see Table 7, column (7).

Table A-9: **Family Responses for Workers between 20 and 40 Years**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Birth		Parental Leave		Marriage		Divorce	
	Men	Women	Men	Women	Men	Women	Men	Women
ImpComp	-0.023	0.104***	-0.023	0.091**	-0.008	0.062*	-0.020	-0.087***
	(0.033)	(0.039)	(0.030)	(0.038)	(-0.033)	(-0.034)	(0.025)	(0.022)
Worker FEs	Y	Y	Y	Y	Y	Y	Y	Y
Time FEs	Y	Y	Y	Y	Y	Y	Y	Y
Observations	1,680	1,466	1,680	1,466	2,802	3,020	2,002	2,964
R-squared	0.597	0.586	0.592	0.611	0.436	0.414	0.490	0.500

Notes: Dependent variable given at top of column. Estimation by least squares with period and worker fixed effects. Sample in columns (1) to (4) is single, in columns (5) and (6) unmarried, and in columns (7) and (8) married workers, all as of 1999. All workers between 20 and 40 years old in 1999. Robust standard errors clustered at the level of workers' initial firm are in parentheses. *, ** and *** indicate significance at the 10 %, 5% and 1% levels respectively.

To summarize, our main results are robust to employing an alternative (and gender-neutral) restriction on age to distinguish younger from older workers.

E Analysis Inclusive of Part-time Workers

Table A-10: **Family Responses w/ Part-time Workers**

Dep. Var.	(1) Birth	(2) Parental Leave	(3) Marriage	(4) Divorce
ImpComp	-0.007	-0.009	-0.0158	-0.0123
	(0.024)	(0.020)	(0.0233)	(0.0125)
ImpComp x Female	0.097**	0.106***	0.055*	-0.022
	(0.040)	(0.037)	(0.030)	(0.0150)
Female x Time FEs	Y	Y	Y	Y
Occupation x Time FEs	Y	Y	Y	Y
Worker FEs	Y	Y	Y	Y
Time FEs	Y	Y	Y	Y
N	4,878	4,878	6,578	12,652
R-sq	0.596	0.609	0.501	0.497

The estimation sample includes both full- and part-time workers. In columns (1) and (2) the sample contains single fertile age workers, in columns (3) and (4) not-married and married workers respectively. All characteristics are as of 1999. All regressions include worker and time fixed effects as well as female by time fixed effects. Robust standard errors are clustered at the initial firm level. *, ** and *** indicate significance at the 10 %, 5% and 1% levels respectively.

F Differential Time Trends across Occupations

Table A-11 presents results when we additionally allow for differential time trends across occupations. Notice that in this way we kill of all variation that may be attributed to technological change. Our results confirm that women, despite similarly affected by the shock, respond to the shock differently than men. As the shock induces women to move towards family activities, they incur larger earnings losses in the longer-run than men. The results show that our quasi-experiment due to the removal quotas allow us to measure the impact of trade independent of technical change.

Table A-11: **Allowing for Differential Time Trends across Occupations**

	(1) Cumulative Earnings	(2) Earnings from the Initial Job	(3) Birth Event	(4) Parental Leave	(5) Marriage	(6) Divorce
Imp Comp	-0.199	-0.977***	-0.018	-0.021	-0.014	-0.010
	(0.267)	(0.285)	(0.031)	(0.027)	(0.027)	(0.013)
ImpComp x Female	-0.611*	0.148	0.144***	0.142***	0.062*	-0.028*
	(0.330)	(0.216)	(0.053)	(0.050)	(0.035)	(0.016)
Female x Time FEs	Y	Y	Y	Y	Y	Y
Occupation x Time FEs	Y	Y	Y	Y	Y	Y
Worker FEs	Y	Y	Y	Y	Y	Y
Time FEs	Y	Y	Y	Y	Y	Y
N	19,650	19,650	3,300	3,300	8,210	11,780

Notes: Estimation of equation 2. All regressions include time trends across major occupations. Major occupations are managers, professionals and technicians, office workers, production operators and labourers. Estimation samples in columns 3 and 4 include single fertile age workers, in column 5 unmarried workers and in column 6 married workers as of year 1999. Robust standard errors are clustered at the initial firm level. *, ** and *** indicate significance at the 10 %, 5% and 1% levels respectively.

G Gender Differentials by Occupation and by Education

The following Table A-12 summarizes evidence on differences in the earnings gender differential by occupation.

Table A-12: **Earnings Gender Differential by Occupation**

	(1) Managers	(2) Professionals and Technical Occupations	(3) Clerks	(4) Crafts	(5) Operators	(6) Laborers
Imp Comp	-0.349	-0.344	0.919*	0.329	-0.299	0.137
	(0.366)	(0.746)	(0.547)	(0.538)	(0.461)	(0.786)
ImpComp x Female	0.829	-0.492	-0.791	-1.015	-0.528	-1.848
	(0.698)	(1.048)	(0.872)	(0.815)	(0.517)	(1.301)
Female x Time FEs	Y	Y	Y	Y	Y	Y
Worker FEs	Y	Y	Y	Y	Y	Y
Time FEs	Y	Y	Y	Y	Y	Y
N	1,076	2,868	2,480	1,700	8,696	1,606

Notes: Dependent variable is cumulative earnings 1999-2007 over 1999 earnings. Sample is given at top of the column (as of 1999). Estimation of equation 2. Robust standard errors clustered at the 1999 firm level in parentheses. *, ** and *** indicate significance at the 10 %, 5% and 1% levels respectively.

We see that there is no strong evidence that the gender earnings differential in the adjustment to trade liberalization differs significantly across occupational groups.

The following table shows cumulative earnings regressions for three groups of workers, those with college education and above, with vocational education, and those with at most high school education. These education levels are as of the first year of the sample period, 1999.

Table A-13: **Earnings Differential and Education**

	(1) College	(2) Vocational School	(3) High School
ImpComp	-0.291	-0.134	-0.0292
	(0.838)	(0.302)	(0.429)
ImpComp x Female	-0.354	-0.554	-0.989*
	(1.119)	(0.558)	(0.521)
Female x Time FEs	Y	Y	Y
Worker FE	Y	Y	Y
Time FEs	Y	Y	Y
Observations	2,312	7,088	9.778

Notes: Dependent variable is labor earnings from all jobs from 1999 to 2007, relative to 1999 earnings. Estimation is by least squares. Robust standard errors clustered at the 1999 firm level in parentheses. *, ** and *** indicate significance at the 10 %, 5% and 1% levels respectively.

The results indicate that the gender earnings differential is declining in skill as measured by formal education. On average, female workers with at most high school education earn roughly one annual salary less than male workers with the same education over the sample period, or about 17 percent per year of treatment.

H Trade Liberalization in Textiles and Clothing

H.1 The Multi Fibre Arrangement System

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, trade in textiles and clothing was governed by bilateral agreements. As the number of agreements grew, the Multi-fibre Arrangement (MFA) was introduced in 1974 to govern the world trade in textile and clothing. The European Union negotiated most (MFA) quotas for the bloc of countries as a whole, and since 1993 any member state-specific restrictions were 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 provision for phasing it out in four steps 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 equivalent to 16% of 1990 imports at the beginning of 1995, 17% at the beginning of 1998, 18% at the beginning of 2002, and the remaining 49% at the beginning of 2005. 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"). These categories are excluded from our treatment definition.

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 or 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 mainly on a bilateral basis for neighboring countries in Eastern Europe (Europe Agreements) and the Mediterranean. 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 with the highest quota utilization were

China, India, Pakistan and Indonesia.

In 1998, China's 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%.

H.2 Textile Quotas

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 will be 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. 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. 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 it is available from the author.

H.3 The Timing of the Trade Shock

It is worth asking whether we utilize the end of the MFA or the entry of China into the WTO as the onset of rising import competition. The two occurrences are related to each other. The empirical strategy exploits the expiration of the MFA quotas for China due to its WTO membership. The abolishment of the MFA quotas were scheduled in 1995 and therefore there was no uncertainty associated with its timing. However, China was not able to benefit from these quota removals as it was not a member of the WTO. The uncertainty that matters for the difference-in-difference estimation strategy comes from uncertainty regarding China's accession to the WTO, as well as its timing.

Further, Utar (2014) documents strong overlap between firms producing quota products that are subject to the 2002 and the 2005 removal for China[67] and shows that firms have already started to

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

adjust to the increased competition by downsizing starting year 2002 even if more of their products were subject to the 2005 removal.

We repeat here the analysis conducted in Table D-6 in Online Appendix for "When the Floodgates Open: NorthernFirms Response to Removal of Trade Quotas on Chinese Goods" adjusted for our sample, 1999-2007. $MFAQ2_j$ is an indicator variable, as in Utar (2014), that takes 1 if firm j produces a quota good as of year 1999 which is subject to the 2002 removal for China. Similarly, $MFAQ5_j$ takes 1 if firm j produces a quota good as of year 1999 which is subject to the 2005 removal for China. We, then estimate the following equation at the firm-level over 1999-2007:

$$\ln Y_{jt} = \alpha_0 + \alpha_1 MFAQ2_j xPost2002_t + \alpha_2 MFAQ5_j xPost2005_t + \delta_j + \tau_t + \varepsilon_{jt} \qquad \text{(A-2)}$$

In equation A-2 Y_{jt} denotes the firm-level outcome variable, indicator variables $Post2002_t$ and $Post2005_t$ take 1 on and after the respective removal years, δ_j denotes firm fixed effects and τ_t denotes year fixed effects. The results from this exercise are reported in Table A-14. These results show that reduction in firm-level revenue was stronger in response to the 2005 removal yet the employment response of firms to the 2002 removal was strong to the 2002 removal (columns 3 and 4). Columns 5 show that firm-level employment among less educated workers drops 16% annually in response to the 2002 removal even 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) are even stronger. The annual reduction is estimated to be 20% (column 6). The finding that the employment reduction is especially strong on production workers is an indication that the employment reaction to the 2002 removal is not due to voluntary separations but firm lay-offs.

H.4 Importance of China's entry into the WTO

It is useful to compare the importance of China's entry into the WTO with the implications for Danish workers of the earlier liberalizations for other countries' exports to Denmark, such as the phase II relaxation that occurred in the year 1998.

The European Union kept a relatively open trade policy in the textile and clothing sector throughout the 1990s except for some 'sensitive MFA quota categories' which were mostly the subject of the 2005 (Phase IV) quota abolishment. For example, developing countries subject to the MFA quotas, such as India, Indonesia, Pakistan, Thailand, did not experience any quota removal as part of Phase II. For Indonesia all active quotas imposed were subject to Phase IV abolishment except 2 quotas (categories 21 and 33) which were subject to Phase III and were removed in 2002. Similarly, for India no quotas were in place that were subject to Phase I and II removal. There were only 2 quota categories that were subject to the Phase III (categories 24 and 27) and they were removed in 2002. The remaining 15 categories were removed in 2005 (source: SIGL). The quotas imposed to these countries were mostly subject to Phase IV abolishment and were removed in 2005.

The EU has no textile quotas for the least developed countries. For example, Bangladesh was bene-

Table A-14: **Firm-level response to the quota removals**

	(1) Log Sales	(2) Log Value Added	(3) Log Employment	(4) Log Full-time Equivalent Number of Employees	(5) Log Employees w/ High School Education	(6) Log Employees w/ Textile Production Education
MFAQ2xPost2002	-0.075	-0.081	-0.123***	-0.146**	-0.164***	-0.201***
	(0.064)	(0.061)	(0.059)	(0.057)	(0.053)	(0.046)
MFAQ5xPost2005	-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	yes	yes	yes	yes	yes	yes
Year FEs	yes	yes	yes	yes	yes	yes
N	4,555	4,536	4,503	4,545	4134	4,134

The estimation sample includes yearly observations of textile and clothing firms over 1999-2007. Definition of dependent variables follow Utar (2014). Robust standard errors are clustered at the firm level. *, ** and *** indicate significance at the 10 %, 5% and 1% levels respectively.

fitting from the General System of Preferences, and no textile quotas were imposed on Bangladesh throughout the sample period.

Argentina, Brazil, Macao and Pakistan had 1 category, Hong Kong 4 and South Korea 6 categories removed in Phase I and II. The highest utilization rate among these quotas removed under the Phase I or II was 49.6 % for category 100 from Korea. This category was not subject to quota for any other country. Giving the overall share imports from these countries and the differences of quota categories imposed across these countries, it is difficult to disentangle the impact of Phase I and II removal from the general liberalization in the textiles and clothing industry.

I Additional Descriptive Evidence

This section extends our discussion of the descriptive evidence in section 2 by showing additional event-study style data plots. We begin with parental leave taking. Figures A-3 show annual rates of parental leave for male and female workers, by exposure to rising import competition. While the men's rates are quite close to each other, for women the parental leave rates of the exposed group of workers are higher than those of the not exposed group in every year after the shock.

Figure A-4a shows that female workers transition out of the manufacturing sector. With transitions into other sectors of the economy, as well as into unemployment and exits from the labor force, the probability of being in manufacturing will fall over time. However, we see in our data that the decline among the exposed group of workers is stronger and the treated and untreated workers starts diverging in year 2002 with the first year of the shock. Bottom part of Figure A-4b shows that rather than labor market exit, the main destination market for these women leaving the manufacturing is the service sector.

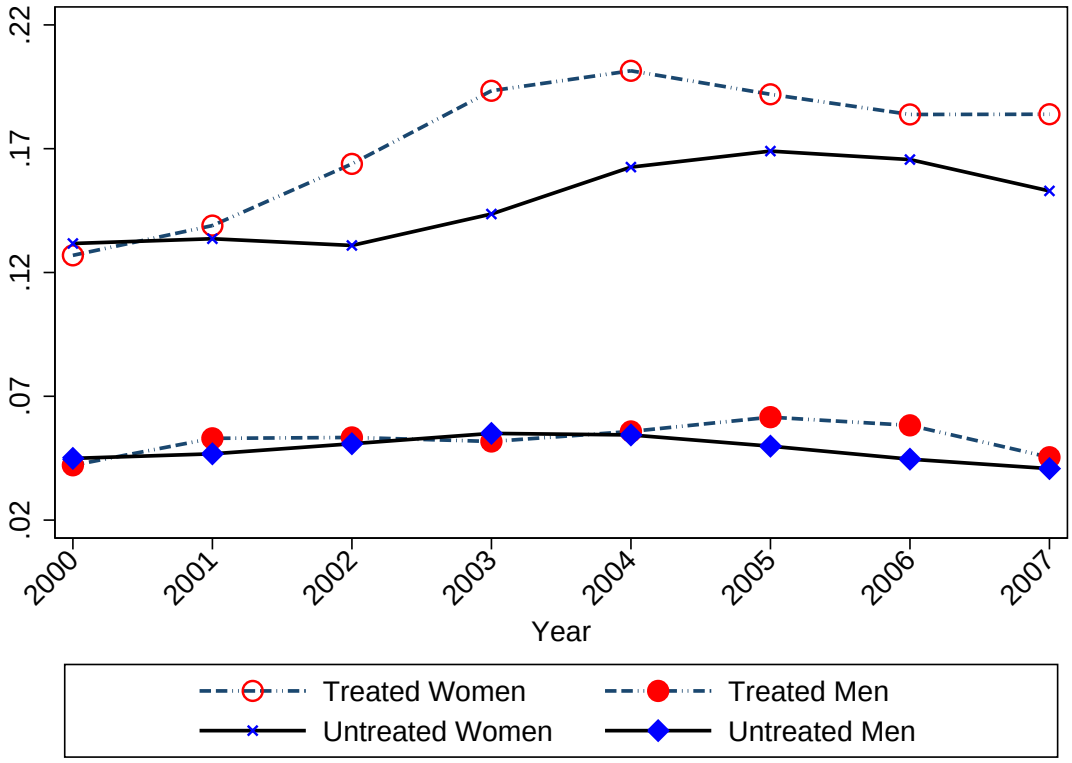
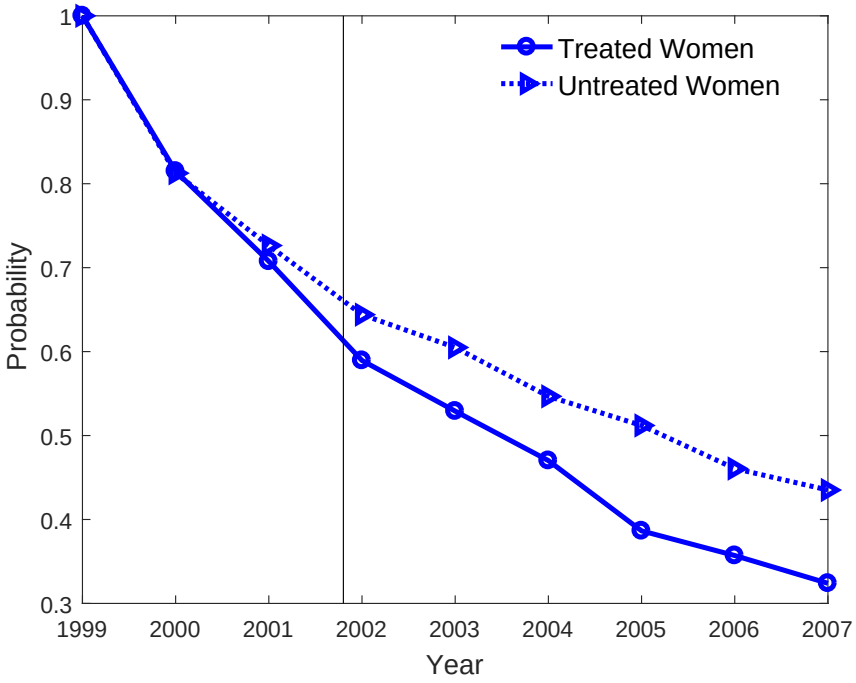
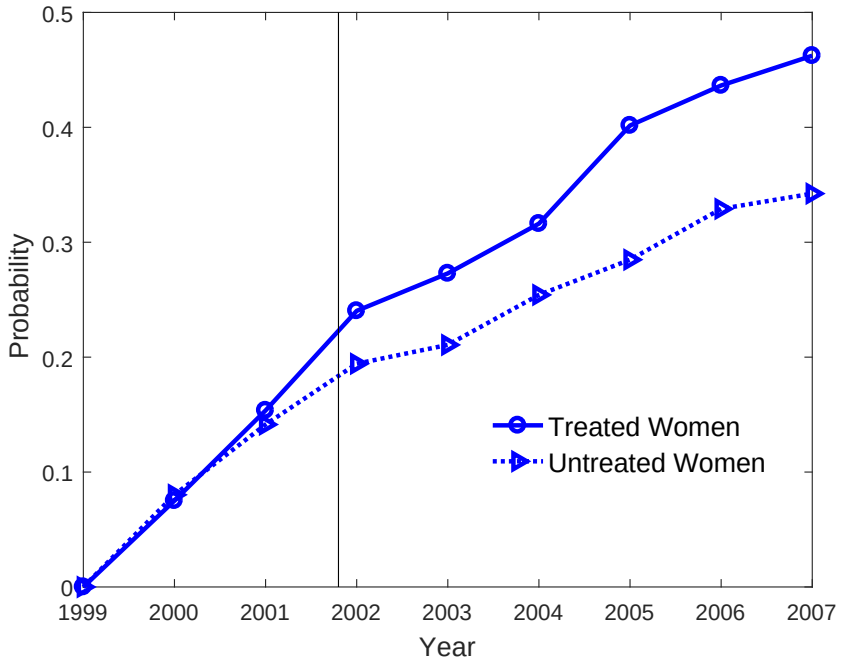


Figure A-3: Parental Leave Taking by Gender and Exposure

Notes: Figure shows annual parental leave rates of male and female textile workers from 1999 to 2007. China entered the WTO in December 2001.



(a) Probability of Staying in the Manufacturing



(b) Probability of Switching to the Service Sector

Figure A-4: **Sectoral Shift of Women in Response to Import Competition**

Notes: Figure shows the likelihood of having a manufacturing job (top) and likelihood of switching to a service sector employment (bottom) depending on import competition for female workers. See text for definition of exposure.

Figure A-5 draws the difference in likelihood of staying in the manufacturing between men and women among the treated and the untreated group of workers. It shows that men, in general, are more likely to stay in the manufacturing in comparison to women. This is in line with the idea that secular declining trend in manufacturing is especially driven by women because the light manufacturing where women workers are likely to be employed is either moving to offshore locations or automated. However, it is interesting to observe that in response to the labor demand shock men move out of the manufacturing more strongly than women (Figure A-5), leading to a decline in gender differential in likelihood of having a manufacturing job.

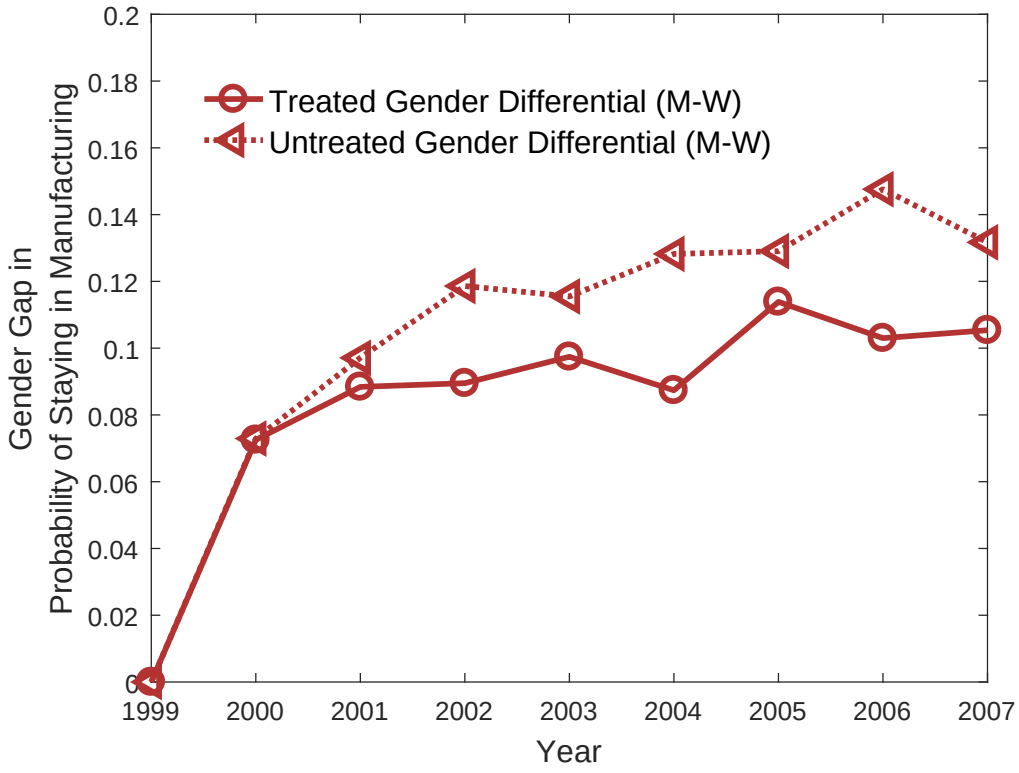


Figure A-5: **Gender Differential in the Tendency of Switching Away from Manufacturing**

Notes: Figure shows the difference in the likelihood of staying in manufacturing between men and women, by exposure to import competition.

J Women's Networks and Gender Norms

This section examines whether the stronger shift of women towards family may be in part due to network effects and gender norms. While identifying these factors is always a challenge with non-

experimental data, the following provides some evidence by employing information on the gender composition of the labor force. In particular, we hypothesize that women who originally work in firms with a relatively high share of female workers may behave different from women who work in a male-dominated firm because the former have stronger female-worker networks. Furthermore, women employed in firms with a relatively high share of female workers might be more strongly exposed to female work culture than others. Both of these reasons would lead to a higher labor market attachment of women employed in such firms, which may reduce the extent to which they shift to family activities.[68] See Table A-15 for results. Recall that in this table the ImpComp stands for the difference-in-difference term *Exposure x Post*.

Table A-15: **Women's Network and Gender Differences**

	(1) Earnings	(2) Earnings	(3) Divorce	(4) Divorce	(5) Marriage	(6) Marriage
ImpComp	-0.509***	-0.266	-0.039***	-0.007	0.045*	-0.098
	(0.178)	(0.751)	(0.011)	(0.047)	(0.026)	(0.115)
ImpComp x ShareWomen		-0.403		-0.049		0.227
		(1.132)		(0.067)		(0.166)
Observations	6,672	6,672	6,846	6,846	4,336	4,336
R-squared	0.690	0.690	0.497	0.498	0.439	0.440

Notes: Dependent variable is cumulative earnings relative to 1999 earnings in columns (1)-(2), a divorce indicator in columns (3)-(4), and a marriage indicator in columns (5)-(6). Estimation is by least squares. Sample is married women in columns (1)-(4) and unmarried women in columns (5)-(6), both as of 1999. *ShareWomen* is the share of women in the labor force at the worker's 1999 firm. Estimation by least squares with worker and period fixed effects. Robust standard errors clustered at the 1999 firm level in parentheses. *, ** and *** indicate significance at the 10 %, 5% and 1% levels respectively.

The first column shows that married women exposed to rising import competition suffer significant earnings losses relative to not exposed married women, quantitatively about 50% of their initial annual earnings. There is some indication that women employed in firms with a relatively high share of women experience larger earnings losses, although the coefficient is not significant at standard levels (column (2)).

We also see that exposed women working in their original firm together with relatively many other women tend to divorce less than exposed women who worked in a male-dominated firm (columns (3) and (4)). Again, however, the estimate is not significant at standard levels. The same can be said about marriage responses, see columns (5) and (6).

Thus, while there is some indication that the family response of women working in female-dominated firms differs from that of women in male-dominated firms, we do not find strong evi-

[68] A high female labor force share in the worker's 1999 firm may also imply lower rates of displacement if men behave more competitively in terms of avoiding to be fired than women; Bertrand (2009) reviews the evidence on gender differences in competitive behavior.

dence that women's networks are important for our findings of gender differentials in the adjustment ot trade liberalization.