Globalization and Gender-Specific Patterns in Individual Fertility Decisions

Andreea Alexandra Piriu

In the German post-reunification context dominated by economic uncertainty and structural change, this paper studies the effects of import shocks from China on the fertility decisions of individuals working in the German manufacturing sector between 1995 and 2016. While focusing on trade shocks related to Chinese imported goods, the paper explores individual fertility via the labor market outcomes of manufacturing workers, roughly a fifth of German employment. I investigate the gender-specific effects of Chinese import competition on individual fertility and explain the channels mediating each of them. I find that globalization affects overall fertility negatively, but the effect is positive for women and negative for men. Results indicate a reduction in the employment opportunity of individuals, an increase in marginal employment and higher economic insecurity. There is a substitution effect in the labor supply of women, here prevalently concentrated in low-technology sectors: as female earnings fall and their opportunity cost of work is lower, the prospect of having children possibly becomes a more rewarding alternative. Given concerns over low fertility in Germany, findings are particularly important for understanding the German social and economic structure that enabled the country's post-reunification transformation but also allowed heavy labor market segmentation and atypical work.

Introduction

Over the past decades, the world economy has seen a rise in interaction and integration among people, markets, and institutions. This phenomenon is known as *globalization*, and national economies have not only undergone social and cultural changes but have also confronted different dynamics of politics and foreign affairs.

A catalyst in the global integration among markets is the support for freer trade. As seen in the most recent years of the history of globalization, the growth of international trade volumes is an outcome of globalization,

Andreea A. Piriu is Postdoctoral Research Fellow in Economics at the Department of Environmental Science and Policy, University of Milan, Italy and Global Labor Organization (GLO) Affiliate. Email: Andreea.Piriu@unimi.it

with advanced economies experiencing productivity gains as a result of the use of inputs from low-income countries.

Although there may be gains from trade, import competition was shown to have caused the manufacturing sector in advanced economies to deteriorate (Autor, Dorn, and Hanson 2013; Acemoglu et al. 2016). Amidst population aging, different working patterns, and altered labor market conditions, there is a need to comprehend the full set of challenges posed by globalization, as population dynamics attain a distinct level of complexity. With fertility decision patterns noticeably changing at differing paces for different reasons across countries (Becker 1991; Lee, Galloway, and Hammel 1994; Bongaarts and Watkins 1996; Casterline 2001; Bongaarts and Casterline 2018), the challenges to the individual posed by a globalizing world become increasingly more evident and, therefore, individual fertility decisions belong to the core of the discussion on globalization.

While drawing on previous evidence, this paper distinctly contributes to the literature by exploring how shocks from increased import exposure can affect *individual* fertility decisions and how these effects differ for men and women in the German labor market. Through the lens of gender, the paper also disentangles the different mechanisms through which import competition is likely to affect individual fertility. The analysis focuses on trade shocks related to Chinese imported goods, that is, imports that are directly traceable to manufactured goods from China. This allows exploration of individual fertility decisions via trade-induced labor market conditions for manufacturing-sector workers, who represent roughly a fifth of German employment (Destatis 2019). Fertility decisions are given by the probability of having a child based on a birth event observed the year that a child is born within a German household where at least one of the parents is or has been employed in manufacturing.

Germany offers a unique setting for the analysis of fertility patterns and labor market conditions. Previously known as "the sick man of Europe," Germany has been through a period of high unemployment and structural reforms since reunification but also saw a remarkable transformation since the mid-1990s because of lower trade barriers, reduced labor unit costs, and an increased use of imported inputs in tradeable sectors such as manufacturing (Dustmann et al. 2014). Although being Europe's largest exporter and one of the world's economic locomotives, Germany has been subject to significant compositional shifts in the German labor force and has perennially expressed concern over low fertility (Goldstein and Kreyenfeld 2011; Dudel and Klüsener 2016).

After the fall of the Berlin Wall, the dynamics of East Germany were different from those of the West, and despite initially higher fertility among Eastern German women as a result of severe industry restructuring (Liepmann 2018), fertility levels remained depressed overall. Birth rates in East Germany fell from 12.0 to 5.1 per 1,000 between 1989 and 1994,

while those in the West remained stable at roughly 11.0 per 1,000 (Conrad, Lechner, and Werner 1996; Adler 1997). Furthermore, the divide between East and West Germany remained prominent throughout and after the 1990s amidst high unemployment, deunionization, nonstandard work, less generous family policies, and divergent family models (Adler 1997; Kreyenfeld 2004; Leitner, Ostner, and Schmitt 2008). Neither the dual-earner East German model nor the male-breadwinner West German model could overcome the social and economic conditions in the new German states. The dominant economic insecurity and the reduction in state support for families and childcare mostly fueled sentiments of frustration regarding the value of children, eventually taking a toll on long-term German birth and marriage trends.

In the German postreunification context dominated by economic insecurity and structural change, this paper studies effects of Chinese import competition on individual fertility decisions between 1995 and 2016. In contrast with Autor et al. (2013) who use a regional measure of Chinese import penetration, the paper breaks down the regional variation in import penetration into variation by industry of employment, thus exploiting an industry–state variation. Accordingly, individual fertility decisions vary by both industry and state of employment. Differentials between federal states are important in postreunification Germany because of the significant divide between East and West Germany, but the industry dimension of a region's yearly exposure to Chinese imports also matters, in that it may be easier for individuals to entertain the prospect of child-rearing depending on their industry of work.[1] That is, some industries may be more sought-after than others as being more friendly toward childbearing. Additionally, some industries outperform others in certain geographical areas, hence it makes relatively more sense to consider a variation that is more in tune with yearly regional economic performance, where an industry shock is weighed by a regional weight.

In studying the causal effects of import competition on individuals, competition from China is instrumented with a monetary measure of exposure to Chinese imports in other high-income countries—Australia, Canada, and Japan. As in Dauth, Findeisen, and Suedekum (2014), the instrument group excludes direct neighbors and members of the Economic and Monetary Union (EMU) because of high between-country similarities and economic integration. Unlike Autor, Dorn, and Hanson (2013) and Dauth, Findeisen, and Suedekum (2014), the instrument group also excludes European countries such as the United Kingdom, Norway, Sweden, and Finland, irrespective of their (non)membership status in the EMU, as these countries are German trading partners and have access to the North and Baltic Seas (see the section Empirical Framework for additional details). The instrumental variable (IV) identifies the presumably exogenous component of import competition from China and rules out variation due to

shocks to German product demand. The supply shock argument is contextual to China's accession to the World Trade Organization in late 2001.

The baseline specification estimates a linear probability model, where the probability of having a child is based on observing the birth of a child in a household the year the child is born. Depending on the formulation of import exposure (increments to capture the expansion in imports over time, or genuine levels), results indicate an individual fertility decline of 1.0 p.p. using changes, and 1.7 p.p. using levels, equivalent to a drop of 23 and 39 percent on mean sample fertility, respectively. In addition, the effect is not driven by union disruption or differences between states or industries. Results are also robust across different subgroups of individuals, though the effect is stronger for workers in high-tech manufacturing.

General potential mechanisms mediating the negative effect of import competition on individual fertility are related to a reduction in employment opportunities and an increase in the individual probability of low-paid employment. When analyzed by gender, import competition affects both male and female fertility by reducing their employment opportunity, but effects are negative for men and positive for women.[2] Results indicate that men have an increased probability of marginal employment and decreased probability of sticking to their trade, with negative effects on male fertility. Similarly, globalization affects women in terms of job autonomy, job security, marginal employment, and economic security. This in turn translates into a *positive* effect on female fertility, as the female opportunity cost of work falls and women appear to substitute work with having children.

Moreover, the resulting positive effect on female fertility is in line with theory (Becker 1973; Becker 1974; Becker 1991) and current evidence (Gries and Grundmann 2014; Cigno, Giovannetti, and Sabani 2018; Liepmann 2018; Keller and Utar 2018). The rigid German employment system, the gap between standard and nonstandard employment, declining training and firm-specific skills, and low union density (Aoyama and Castells 2002; Gallie 2007; Dustmann et al. 2014) positions Germany below the Western European average for job autonomy (Esser and Olsen 2012). Particularly common among women in medium- and low-skilled jobs in Germany are nonstandard forms of employment and low pay (Weinkopf 2014; Eichhorst and Tobsch 2015; Botsch 2015).

Since most female workers in the sample are concentrated in low-technology industries (ergo, low-wage employment), this paper also studies the effect of import exposure on the probability of having children for women working in low-technology industries. Here, the positive effect of import competition on female fertility is considerably larger than the baseline effect. This is backed up by results showing a large decline in earnings. Results show that there is a *substitution effect* in the labor supply of female workers, whose opportunity cost of work is lower and the prospect of

having children possibly becomes a more rewarding alternative. The effect is stronger for women in low-technology industries.

This paper introduces new perspectives from theory and data. It documents that globalization primarily affects individual fertility via reduced employment opportunities, but this translates into a negative effect on male fertility and a positive effect for women. The paper also contributes to evidence that women in manufacturing may be hindered from upgrading to positions that require more skills, as they are typically employed in low-autonomy, low-paid jobs from which they move away to pursue childbearing, with no guarantee that they might return to the labor market. Results are particularly important in the context of the German postreunification economic conditions that facilitated expansion but allowed heavy labor market segmentation and atypical work. Overall, findings in this paper suggest that fertility decline is a response to structural change.

Policymakers should therefore be aware that, in the absence of a united front to protect and enhance a strong synergy between social and individual institutions that understands individuality while governing the family, the economy and work, the current dynamics of globalization interfere with the individual and society in hidden ways, possibly also unjustly disguised under misconceptions that work and child-rearing are incompatible. Further fertility decline is inherent unless welfare institutions in advanced countries become aware of the structural challenges posed by globalization to individual preferences and circumstances, and enable more effective, accessible childcare and family planning under equitable working conditions for men and women alike.

Following the introduction in the first section, the second section discusses related evidence on fertility behavior and individual fertility decisions. The third section describes the methodology used to obtain the results, while the fourth section presents the baseline results backed up by robustness and heterogeneity checks. The fifth section examines potential mechanisms by which import exposure may affect individual fertility. The sixth section analyzes the gender-specific effects of Chinese imports on individual fertility and explains the channels mediating each of them. The last section concludes and reviews implications for gender-specific dynamics affecting individual fertility behavior in the context of globalization.

Related literature

Over the past decades, the wage structure in advanced countries has significantly changed (Bound and Johnson 1989; Katz and Murphy 1992; Murphy and Welch 1992; Juhn et al. 1993; Krugman 2008) amid higher import penetration (Autor, Dorn, and Hanson 2013; Dauth, Findeisen, and Suedekum 2014, 2017) and automation or offshoring of routine production tasks (Autor, Dorn, and Hanson 2015; Acemoglu and Restrepo 2020).

Although nonroutine content may shield workers against offshoring (Baumgarten, Geishecker, and Görg 2013), job-loss fears and economic insecurity are predominant, especially in Germany (Geishecker et al. 2012). In the context of globalization, fertility decline likely underpins much more subtle characteristics (Casterline 2001) as individual preferences regarding family formation, childbearing, and child-rearing have changed.

The link between import competition and individual fertility has been explored only to a small degree so far, though previous research raises some important questions that together seem to point in the same direction. Early evidence links the total fertility rate with female labor participation rates (Brewster and Rindfuss 2000; Ahn and Mira 2002; Adsera 2004) and points to the role of working women in advanced economies to explain shifting macro fertility patterns. More recent literature relating *individual* unemployment to fertility behavior (Adsera 2005; Adsera 2011) shows how job displacement from exogenous shocks negatively affects fertility behavior (Lindo 2010; Del Bono, Weber, and Winter-Ebmer 2012).

Following reunification, Germany underwent severe restructuring of collective wage bargaining and company-level strategies, which saw greater flexibility in collective workers' wage agreements and put Germany on a growth path as Europe's largest exporter. Nonetheless, this restructuring process affected the German wage distribution and employment structure (Dustmann et al. 2014) and gave rise to dualized labor markets characterized by an increase in nonstandard forms of employment, wage dispersion, and low pay (Aoyama and Castells 2002; Gallie 2007; Eichhorst and Tobsch 2015). Yet employment relationships also changed, particularly as increased competition from cheaper imports put additional financial pressure on employers (Bertrand 2004). As a result, individuals may decide differently about having children and about other aspects of their life that traditionally used to be compatible with work.

In Becker's family economics tradition, children are "produced" by each family through inputs of various market goods and services and the time of family members (Becker 1974). A married woman is more likely to be in the labor force when her own wage rate is higher or when her husband's wage rate is lower (Becker 1974). Accordingly, evidence from pre-war Prussia shows that fertility declines with increases in female labor supply, real income, and health workers (Lee, Galloway, and Hammel 1994). Similarly, McDonald (2000) argues that fertility transition is associated with high gender equity in individual institutions such as education and market employment coupled with low gender equity within families or in family-oriented institutions.

More recent studies also attribute an important role to women in fertility decision making as related to the fertility transition in Western societies (McDonald and Moyle 2018). As labor markets become more competitive and increasingly segmented, Liepmann (2018) finds that East

German women of all skill levels postpone childbearing in order not to put their labor market situation at risk. Other evidence documenting changing patterns of fertility and marital behavior includes delaying motherhood due to career planning and the lack of family-friendly institutions (Bratti and Tatsiramos 2012); changes in children's living circumstances away from the conventional following a negative economic shock, with an increase in the number of single-headed, child-rearing households living in poverty (Black et al. 2003; Autor et al. 2019); and trends in marital and nonmarital birth rates that do not correspond to the trend in marriage rates after a positive economic shock (Kearney and Wilson 2018).

Furthermore, considering Becker's model of household specialization (Becker 1973), Autor, Dorn, and Hanson (2019) decompose trade shocks into components affecting male versus female employment and show that import shocks reduce male earnings and employment opportunities, increase male idleness, and widen the male–female mortality gap, thus eventually affecting fertility via lower male employment opportunities and impaired social function. Evidence so far supports the idea that male social function is thought to be a driver of fertility and is often studied in relation to the economic opportunities available to men. Nevertheless, having children is usually a shared decision and, therefore, evidence on female workers must also be explored.

Given that women have relatively less stable labor participation over the life course, there is little evidence to link trade-induced shocks in female manufacturing employment with fertility. Nevertheless, as the nature of jobs is changing, factors that contribute to female employment conditions may help reveal some of the dynamics involved in fertility. Despite women's massive contribution to the overall rise in German employment rates postreunification, and better women's labor market integration than in the 1990s, there is still a persistent gender gap (Eichhorst and Tobsch 2015; Botsch 2015). This is because women occupy different forms of part-time work, such as temporary agency work, which were instrumental to gearing up German manufacturing throughout the 1990s, leading to a departure from collective wage agreements and equivalent full-time employment. Weinkopf (2014) notes that women's employment growth is primarily based on a steadily rising number of part-time and mini-jobs—a very particular German institution that provides incentives to keep the monthly earnings below €450. However, this expansion of nonstandard work and the growth of low pay, particularly among women in medium- and low-skilled occupations, created a further divide and an institutionally driven form of market duality.

Since institutions play an important role in the balance between the individual and competitive labor markets, the question is not if but to what extent fertility decline is a response to structural change. Adler (1997) argues that fertility and marriage decline in Germany is not a result of the rapid

change in individual attitudes regarding the value of children but rather induced by factors related to the nature of employment, state support for family leave, and childcare.

Contextually with postreunification family policies and uncertain employment conditions, Liepmann (2018) emphasizes permanent changes to the labor demand and to the composition of mothers in East Germany after the fall of the Berlin Wall. Furthermore, Germany's contrasting family models contributed to depressing fertility. While the dual-earner model of East Germany historically encouraged childbearing and the balancing of work and family responsibilities, the West German model was based on the "male-breadwinner" paradigm (Leitner, Ostner, and Schmitt 2008). Yet, given great structural change, neither of these models was sustainable. In times of great economic uncertainty, societies where work and children are compatible seem to do better in terms of fertility (Kreyenfeld 2004), with recent female fertility rates in East Germany surpassing those in the West (Dudel and Klüsener 2016). Factors preventing West German fertility from catching up with other Western European regions are still prevalently of an institutional nature (Klüsener, Neels, and Kreyenfeld 2013).

Consequently, in a low-fertility setting such as that of Germany, the reduction in woman-friendly policies, the changing nature of employment, and great economic uncertainty are among the lingering effects of reunification affecting birth and marriage rates. Given that trade shocks also propel economic uncertainty and affect labor markets, they are equally important in determining the extent of fertility decline. Evidence hitherto allows us to conclude that it is primarily men whose prospect of having children is impaired because of a negative income effect from trade shocks, hence the overall fertility decline, but this may have different implications for women.

Methodology

This section covers the empirical framework, data, and the empirical specification used in the paper. First, it explains that import competition is calculated in levels, year-on-year, and varies with industry and state of employment. Second, it constructs an instrument that isolates the exogenous variation in rising imports from China. Third, it describes data sources and the final sample of individuals. Last, it presents the empirical specification that gives the baseline results, and that is later used to investigate the main effect by gender.

Empirical framework

This paper reformulates the approach in Autor, Dorn, and Hanson (2013) to give an industry-state year-on-year variation for 16 German federal states (NUTS 1 level) and 22 manufacturing industries (two-digit level industries

as per the Statistical Classification of Economic Activities Revision 1, hereafter NACE Rev. 1) over 22 years from 1995 to 2016.

As an original contribution, this different computation of import exposure is matched with individual fertility decisions. Fertility behavior is hereby measured by a dichotomous variable capturing the probability of having a newborn. This probability is based on observing the birth event of a child in a household where at least one parent was employed in manufacturing for at least 1 year during the panel period 1995–2016. The import exposure measure is formulated as follows:

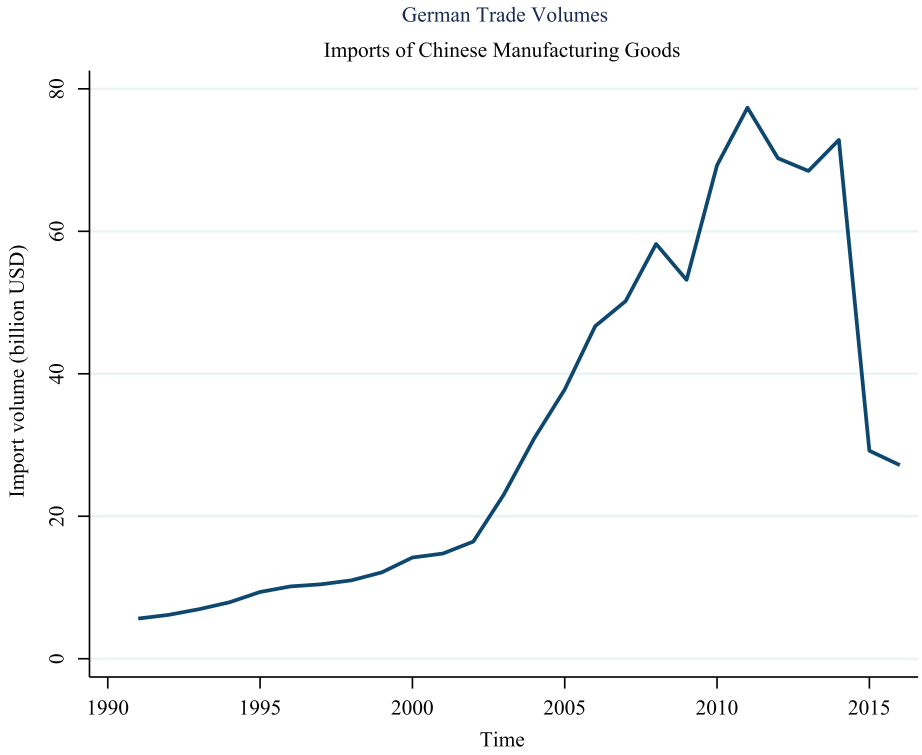
$$IE_{jkt} = \frac{E_{jkt}}{E_{jt}} * \frac{M_{kt}}{E_{kt}}, \quad (1)$$

where E_{jkt} is the number of employees working in region j and industry k at time t, while E_{jt} is the yearly number of employees working in region j. The term M_{kt} is the yearly import value for an industry k as mapped from the Standard International Trade Classification Revision 3 (SITC Rev. 3) to NACE Rev. 1. The term E_{kt} is an industry's employment level at time t. For all levels employed in the analysis, t runs from 1995 to 2016.

The resulting measure is the yearly EUR value for exposure to Chinese imports for employees working in region j and industry k at time t. To put it more simply, the first ratio gives the share of an industry k's employment in regional employment at time t, while the second ratio can be seen as the import shock per employee in industry k at time t.

Next, I instrument Equation (1) using Chinese imports into three high-income countries, that is, Australia, Canada, and Japan. Considering the countries in the instrument group, the instrument captures the supply-driven variation in rising import competition, as China's transition from a centrally planned economy to a decentralized market economy allowed participation in global value chains and increased international trade. This transition is concomitant with the years considered in this panel. As in Dauth et al. (2014), the instrument group excludes direct neighbors and members of the EMU because high between-country similarity and economic integration would prevent identification and violate the exclusion restriction. However, unlike Autor, Dorn, and Hanson (2013) and Dauth, Findeisen, and Suedekum (2014), the instrument group also excludes European countries such as the United Kingdom, Norway, Sweden, and Finland, irrespective of their (non)membership status in the EMU. This choice is motivated purely by observed continuous trade flows in the sample period 1995–2016 between Germany and countries such as the United Kingdom, Norway, Sweden, and Finland. Although not direct neighbors by land, these countries are German trading partners and neighbors by sea (North and Baltic Seas), which might affect regional performance in Germany and

FIGURE 1 Germany's imports from China. Source: Author's computations based on UN Comtrade data.



would violate the exclusion restriction. Equation (2) instruments for Chinese import competition as follows:

$$INST_{jkt} = \frac{E_{j,k,t-1}}{E_{j,t-1}} * \frac{M_{k,t}^{AUS/CAN/JPN}}{E_{k,t-1}}. \quad (2)$$

Equation (2) uses lagged industry and regional employment levels[3] to mitigate against any shocks which simultaneously impact the country's imports and regional performance variables.

In sum, since unobserved demand shocks may increase imports simultaneously with the probability of having children in Germany, the instruments isolate the exogenous variation in the supply-driven component of imports from China and Eastern Europe (EE).

Data

Figure 1 shows the remarkable increase in Germany's imports from China since the mid-1990s. Imports from China fell during the Great Recession in 2008, yet they picked up shortly after the financial crisis to exceed precrisis levels and decreased after 2014 as a result of rising trade tensions.

Data sources. Data on German individuals are sourced from the German Socio-Economic Panel (GSOEP), a representative longitudinal dataset with information on individuals and households running since 1984 (Wagner, Frick, and Schupp 2007; Goebel et al. 2019). Among the extensive individual and household characteristics, there is also information on individuals' industries of employment, which here is matched with import data coming from the UN Comtrade Database and the OECD Structural Analysis Database (OECD 2018). Annual state-level employment numbers (E_{jt}) and industry-level employment (E_{kt}), as well as annual statistics of employees working in state j and industry k (E_{jkt}) are sourced from Eurostat and the Federal Statistical Office of Germany (Destatis). The lagged employment levels in the instrument (Equation 2) come from the OECD Structural Business Statistics Database.[4]

Final sample. The final sample contains 39,666 observations corresponding to 6,440 individuals who are observed, on average, for nine years and who belong to 5,892 households. Individuals are aged 18–50 (i.e., reproductive age), and they live in households where they are reported as either "head of household" or "partner."

The sample consists of all individuals who were employed in a manufacturing industry at least once during the panel period. These are individuals who (1) have stayed in the same manufacturing industry throughout the panel period, (2) have transitioned to a different manufacturing industry, or (3) have entered either the service sector or nonemployment. This ensures the inclusion in the final sample of workers who have changed their employment sector to services or went into nonemployment.[5]

Descriptive statistics. The dependent variable that captures individual fertility behavior is the probability of having a newborn child based on observing the birth event of a child within a household in a certain year. This is a dichotomous variable which equals 1 if there is an observed birth event in a household in the year that a child was born to the parents of that household and equals 0 otherwise. The effects of import competition on fertility are estimated with a linear probability model, as detailed in the Section Empirical Specification.

Table 1 shows individual-level descriptive statistics. The probability of a birth event is 0.044 on average, with a standard deviation of 0.204. The mean age of the individual is 39 years and 4 months, while the average age at the observed birth event is 33 years and 8 months and distributed as in Figure 2.[6]

The shares of men and women in the sample are 69.1 percent and 30.9 percent, respectively. The average number of years spent in education is 12. Most individuals in the sample are married (i.e., 70.7 percent), while 15.6

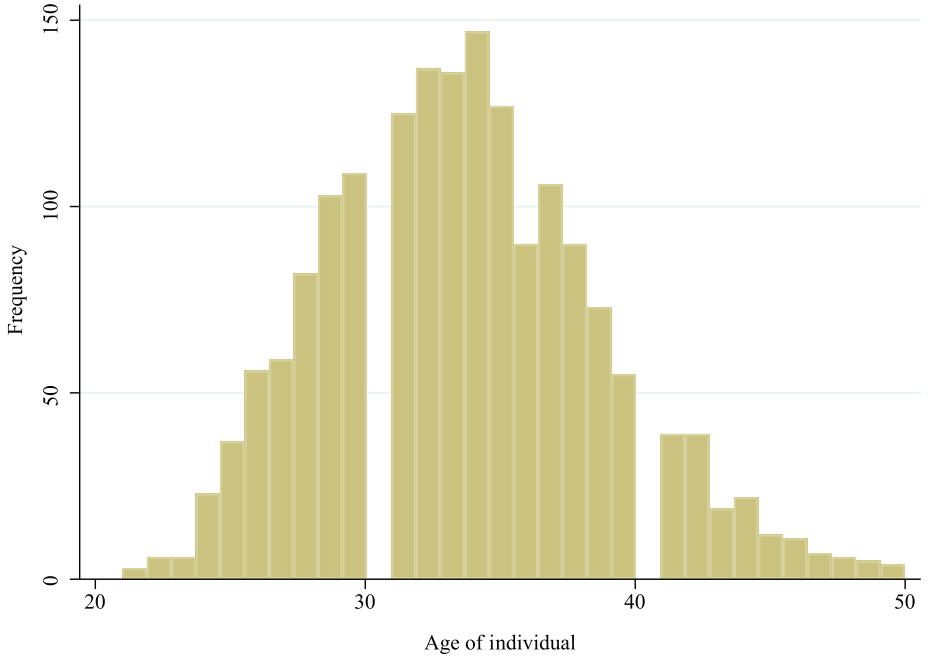
TABLE 1 Descriptive statistics on individual-level variables [WG/QC: For layout of the all tables, please follow the publisher's pdf file.]

Variable	Mean	Standard deviation	*N*
Birth event within household	0.044	0.204	39,666
Age of individual	39.306	6.925	39,666
Age of individual at birth event	33.657	5.103	1,734
Male	0.691	0.462	39,666
Female	0.309	0.462	39,666
Number of years of education	12.137	2.536	39,666
German national	0.883	0.322	39,666
Number of persons in household	3.171	1.301	39,666
Number of children in household	1.089	1.083	39,666
College degree	0.176	0.38	39,666
High school degree	0.699	0.458	39,666
< High school degree	0.125	0.331	39,666
Married	0.707	0.455	39,666
Single	0.156	0.363	39,666
Divorced	0.069	0.253	39,666
Separated	0.022	0.147	39,666
Widowed	0.004	0.064	39,666
East Germany	0.162	0.368	39,666
Employed full time	0.856	0.351	39,666
Employed part time regular	0.11	0.312	39,666
Employed part time irregular	0.031	0.174	39,666
Employed in vocational training	0.002	0.049	39,666
Years at current employer	9.646	8.045	39,633
Annual work hours of individual	2,085.705	645.717	39,666
Hourly wage	16.619	10.776	39,666
Individual labor earnings	34,953.858	24,453.464	39,666
Income from secondary employment	240.857	1,494.569	39,666
Income from self-employment	2,109.341	11,826.407	39,666
Unemployment benefit	101.61	779.458	39,666
Maternity benefit	38.584	509.439	39,666
Child allowance	2,257.966	2,223.692	39,666
Housing benefit	40.552	298.616	39,666
Household labor income	52,906.796	32,359.745	39,666
Household imputed rent	1,284.147	2,556.185	39,666
Total household taxes	18,643.695	15,340.31	39,666

percent are single and about 10 percent all together are divorced, separated, or widowed. Individual annual earnings are EUR 34,954 on average, with an average number of annual work hours around 2,086.

Table 2 presents statistics on import exposure. Exposure to Chinese imports is EUR 48 on average. It follows that any EUR 100 increase in Chinese

FIGURE 2 Age of individual at birth event. Source: Author's computations based on final sample.



competition will be interpreted as an increase of 1.56 standard deviations of the mean. The industries that are the most exposed to Chinese imports are high-tech and medium-high–tech industries. Yet there may be negative spillover effects on industries at all technological intensity levels through interindustry linkages.

For more insight into the distribution of working women across Germany, Table A.6 in the online Appendix shows that the share of working women in the economically active population at all ISCED levels is 45.1 percent, on average. However, data suggest that the share of women falls below average in North-Rhine-Westfalia, Lower Saxony, and Rheinland-Pfalz, which are also incidentally the states where 33 percent of the observations on women are concentrated.[7]

Empirical specification

The effect of import competition on individual fertility is estimated with a linear probability model using the following specification:

$$birth_{ijkt} = \alpha_i \ + \alpha_t \ + \beta_1 * IE_{jkt} \ + \gamma I_{it} + \delta E_{kt} + \tau S_{jt} + \varepsilon_{ijkt}, \qquad (3)$$

where the dependent variable is the observed birth event (dichotomous) for an individual i working in region j and manufacturing industry k at time t.

TABLE 2 Descriptive statistics on Chinese import exposure (EUR)

Variable	Mean	Std. Dev.	Min.	Max.
Exposure to Chinese imports	48	64	0	841
Industries with the lowest import exposure per worker (j,k,t)				**Value (EUR)**
16 Manufacturing of tobacco				0.2
22 Publishing, printing and reproduction of recorded media				9.28
21 Manufacturing of pulp, paper, and paper products				9.77
23 Manufacturing of coke, refined petroleum prod., nuclear fuel				16.46
20 Manufacturing of wood products (exc. furniture)				25.70
Industries with the highest import exposure per worker (j,k,t)				**Value (EUR)**
18 Manuf. of wearing apparel; dressing and dyeing of fur				276.47
31 Manuf. electrical machinery and apparatus n.e.c.				292.84
29 Manuf. of machinery and equipment n.e.c.				330.79
32 Manuf. of radio, television, and communication equipment				661.50
35 Manuf. other transport equipment				841.48
Observations				39,666

NOTES: j, region, k, industry, t, time.

The coefficient on import exposure (β_1) estimates the *causal* effect of Chinese import competition on individual fertility at *jkt* level.

Since there are differences in fertility behavior across individuals and years, the model includes individual fixed effects (a_i) and year fixed effects (a_t) to absorb time-invariant unobserved shocks and thus wipe out confounders that could bias the estimates. Fixed effects (FEs) mitigate against unobserved heterogeneity within the model, thus allowing exploitation of the within-individual changes in fertility behavior while controlling for shocks in different time periods. The source of identifying variation is thus given by the within-individual changes in import penetration over time, while leveraging industry variation and state variation should the individual change industry or state of employment because of import competition. The terms I_{it}, E_{kt}, and S_{jt}. are vectors of control variables for time-varying, observable individual, industry, and state characteristics, and ε_{ijkt} is the model's error term.

Individual controls include age and age squared, dummies for education level, marital status, nationality (if German national or foreign national), and household income. Industry and state controls include the share of employment in manufacturing by industry, the number of workers

engaged by manufacturing industry, the share of manufacturing workers by state, and the share of working females in the economically active population at all ISCED levels by state.

Furthermore, identification that relies on a model whose estimation simply accounts for fixed effects and controls for several individual, industry, and state characteristics might still suffer from endogeneity. In the identification of the effect, potential endogeneity is therefore addressed by the IV per Autor, Dorn, and Hanson (2013), where Chinese import exposure is instrumented with a variable constructed as in Equation (2). As per Angrist and Pischke (2015), the instrument is valid if (1) it affects individual fertility choices only through import exposure, (2) demand shocks in the destination countries are uncorrelated with shocks in the origin countries that generate exogenous variation in the trade volume, and (3) conditional on the control vectors, there is no unobserved factor correlated with the instrument.[8]

Consequently, to mitigate against endogeneity bias and ensure instrument validity per assumptions 1 to 3, individual FEs first rule out time-invariant, between-individuals differences in fertility behavior not related to Chinese import exposure. Then, conditional on individual, industry, and state characteristics, the year FEs typically correct for additional endogeneity biases by reducing variability potentially resulting from changes related to unobserved time-specific shocks.[9] Finally, the model allows for standard errors to be correlated between workers within the same industry and federal state of employment.

Results

Table 3 reports coefficient point estimates of baseline Equation (3) for Chinese import exposure. In column (1), the Ordinary Least Squares (OLS) coefficient on import exposure is strongly significant when including individual fixed effects and the full set of controls.[10] The estimates give a 1.0 p.p. decrease in an individual's probability of having a newborn upon a EUR 100 increase in competition from Chinese imports (where a EUR 100 increase in Chinese import exposure is within 1.56 standard deviations of the mean).

Furthermore, when including year fixed effects in the OLS estimation (Table 3, column 2), the effect on birth stays negative but it becomes insignificantly different from zero.[11] As later shown, the OLS coefficient only turns significant when using increments of imports (to capture their import penetration over time) instead of import levels.

Columns (3)–(5) estimate the baseline specification in Equation (3) by a fixed-effects instrumental variable regression (FEIV, or FE2SLS). With individual controls and individual fixed effects, the probability of having a newborn decreases by 1.2 p.p. from a EUR 100 increase in Chinese import

TABLE 3 Baseline estimates - individual fertility and exposure to Chinese imports

	(1)	(2)	(3)	(4)	(5)
Exposure to Chinese imports	−0.010*** [0.003]	−0.002 [0.004]	−0.012* [0.007]	−0.014** [0.007]	−0.017** [0.008]
Estimator	OLS	OLS	FEIV	FEIV	FEIV
Individual controls	yes	yes	yes	yes	yes
Industry controls	yes	yes	no	yes	yes
State controls	yes	yes	no	yes	yes
Individual fixed effects (FEs)	yes	yes	yes	yes	yes
Year FEs	no	yes	no	no	yes
Observations	39,666	39,666	39,664	39,664	39,664
First-stage results			0.047*** [0.0008]	0.050*** [0.0009]	0.047*** [0.0008]
Kleibergen–Paap *F*-statistic			3,577.5	3,398.0	3,152.3

Mean depvar = 0.044
$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.
NOTES: The dependent variable is birth, that is, a dichotomous variable which gives value 1 if there is a birth event within a household in a certain year, or zero otherwise. IE China is the yearly monetary exposure (measured in hundreds) to Chinese imports for an employee working in region *j* industry *k* at time *t*. OLS estimates in column (1) include the full set of controls as in column (5), except for time effects. Estimations in columns (2) and (5) add time dummies. Clustered standard errors reported in brackets.

competition (Table 3, column 3). When adding further industry and state controls (column 4), the effect remains negative and becomes more significant. The final specification of the baseline model (column 5) includes year fixed effects in addition to the individual fixed effects and all controls, thus focusing on within-individual time variation while leveraging an individual's state and industry variation. The coefficient stays negative, is significant at 5 percent, and has the same size as in column (4), giving a 1.7 p.p. decrease, equivalent to a 39 percent decrease on the mean probability of having a child.[12]

Table 3 also reports first-stage statistics and Kleibergen–Paap F-tests which are indicative of a strong instrument for Chinese import competition. Additionally, all specifications allow standard errors to be correlated between workers within the same industry and state.

Robustness and heterogeneity

This section performs several checks which suggest that baseline coefficients are robust. Table 4 summarizes several robustness checks. To determine the range of the effect other than in levels, panel (a) runs the analysis with the increments of imports (shifts) to capture their expansion over time. The OLS estimation with individual and year FEs gives a strongly significant coefficient, marking a 0.5 p.p. decline in fertility (or 11.4 percent on average). This result is more comparable with the OLS estimation in Table 3,

TABLE 4 Robustness checks

	Coefficient	Standard error	First stage		Observations
			Kleibergen–Paap *F*-statistic		
(a) FEIV regression (Table 3, column 5) with increments of imports	−0.010**	0.005	2,003.1	0.307***	29,324
OLS (Table 3, column 2) with increments of imports	−0.005***	0.002	n/a	n/a	31,348
(b) Adding state fixed effects (FEs)	−0.017**	0.008	3,129.7	0.047***	39,664
(c) Adding industry FEs	−0.017*	0.010	4,019.8	0.039***	39,664
(d) Individual-industry FEs	−0.033**	0.015	1,931.6	0.031***	38,605
(e) Change of marital status					
Excludes divorcees who entered panel as married or single	−0.017**	0.008	2,930.8	0.047***	37,089
Married individuals	−0.018*	0.010	1,673.0	0.045***	23,282
(f) Polynomial time-region trends	−0.019**	0.008	2,786.7	0.045***	39,664
(g) Restricting to age 45 or below	−0.019**	0.009	2,269.3	0.047***	30,292
(h) Running the analysis with imports from Eastern Europe (EE)					
EE import exposure (baseline Table 3, column 5)	−0.022**	0.009	5,45.0	0.641***	39,666
EE import exposure with state FEs (robustness)	−0.022**	0.009	534.5	0.633***	39,666
EE import exposure with industry FEs (robustness)	−0.016*	0.009	1,223.5	0.721***	39,666
EE import exposure with individual-industry FEs (robustness)	−0.033**	0.014	817.5	0.554***	38,607

Mean depvar = 0.044.
$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.
NOTES: The dependent variable is birth, that is, a dichotomous variable which gives value 1 if there is a birth event within a household in a certain year, or zero otherwise. The endogenous independent variable is Chinese import competition for an employee working in region *j* industry *k* at time *t*. Panel (a) runs the analysis with shifts (the increment of imports) to capture the expansion of imports over time (both OLS and FEIV), omitting year 1995. Estimates in panels (b) to (h) use import competition computed as in Equation (1) using levels. Panel (b) adds state effects, while panel (c) adds industry effects. Panel (d) further adds individual-industry fixed effects. Panel (e) excludes divorcees/separated individuals who originally entered as married or single individuals, then restricts the analysis to married individuals. Panel (f) runs the analysis with polynomial region-time trends, while panel (g) restricts the analysis to individuals aged 45 and below. Panel (h) runs the analysis for import competition from Eastern Europe and a few robustness checks. Standard errors are clustered between workers within the same industry and state.

column (1) and gains more empirical support when running the FEIV full specification with the increments of imports. In the FEIV case, the effect using changes in imports gives a 1.0 p.p. decrease in the probability of having a child, equivalent to a 23 percent decrease on mean probability. Results here are therefore more comparable with the estimates obtained using genuine levels.

Table 4, panel (b) adds state effects to the baseline specification. Coefficient point estimates from Table 3 do not change, indicating that within-state variation does not influence changes in fertility across individuals employed in industry k and state j at time t.

Panel (c) adds industry fixed effects to the baseline equation to wipe out any unobserved industry-specific shocks, thus focusing on within-industry variation over time for the same individual. Results do not change: the effect remains negative and significant, indicating a 1.7 p.p. decline equivalent to a 39 percent decrease on mean probability of having a child.

Panel (d) in Table 4 adds individual-industry fixed effects. In this case, the coefficient of interest is identified from the time variation and the geographical variation in individual fertility decisions (i.e., the realization of a birth event) and import exposure with its instrument for a given manufacturing worker while employed in the same industry. Remarkably, for workers staying in the same industries, the probability of having children decreases by 3.3 p.p., roughly double the baseline effect.

Table 4 (panel e, first row) shows that the effect in the baseline is not driven by divorcees or separated individuals who enter the panel as married or single (i.e., individuals who enter the panel as married or single and change marital status to divorced or separated by the end of the observation period). These individuals may compromise their probability of having children as they are more susceptible to union disruption. This step further restricts the analysis to individuals who entered the panel as married and remained so throughout; the coefficient is consistent with the baseline (Table 4, panel e, second row). Panel (f) runs the estimation with polynomial region-year trends; the coefficient stays negative and significant at a 5 percent level, denoting a 1.9 p.p. decrease in the probability of having a child. Moreover, panel (g) restricts the analysis to individuals aged 18–45 years old.[13] The coefficient stays negative and significant at 5 percent, giving a 1.9 p.p. decline in fertility—slightly higher than the baseline.

To account for trade integration with Eastern Europe and in line with evidence on Germany (Dauth, Findeisen, and Suedekum 2014, 2017; Giuntella, Rotunno, and Stella 2021), panel (h) now runs a parallel analysis with Eastern European imports in lieu of Chinese imports.[14] Results are similar to the baseline.

Last, estimates are consistent across all subgroups of individuals. Table 5 shows estimates when interacting import exposure with a series of dummies for gender, educational achievement, part-time irregular work,

TABLE 5 Heterogeneity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Exposure to CHN imports	−0.016** [0.008]	−0.017** [0.008]	−0.017** [0.008]	−0.019** [0.008]	−0.019** [0.008]	−0.023*** [0.009]	−0.026** [0.011]
Import Exposure × Ed.(<HS)	−0.014 [0.016]						−0.012 [0.016]
Import Exposure × part-time irreg.		0.008 [0.013]					0.032 [0.021]
Import Exposure × dummy 0–5 years			−0.0003 [0.009]				0.0002 [0.010]
Import Exposure × dummy 11–20 years				0.006 [0.009]			0.008 [0.009]
Import Exposure × med-low–tech					−0.005 [0.020]		−0.002 [0.020]
Import Exposure × high-tech						0.032*** [0.010]	0.032*** [0.011]
Dummy < high school	−0.011 [0.020]						−0.011 [0.020]
Dummy part-time irreg.		−0.030** [0.014]					−0.030** [0.014]
Dummy 0–5 years tenure			−0.002 [0.006]				−0.003 [0.006]
Dummy 11–20 years tenure				−0.008 [0.005]			−0.010* [0.005]
Dummy med-low–tech					−0.004 [0.009]		−0.006 [0.010]
Dummy high-tech						−0.019 [0.014]	−0.021 [0.014]
Observations	39,664	39,664	39,626	39,626	39,664	39,664	39,626
Kleibergen–Paap *F*-statistics	1,510.1	54.2	1,113.4	1,531.9	811.7	2,401.7	185.8

Mean depvar = 0.044.
*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.
NOTES: The dependent variable is birth, corresponding to the probability of observing a birth event within a household in a certain year. IE China is the monetary exposure to Chinese imports for an employee working in region *j* industry *k* at time *t*. Variables in interactions are dummies for education level (less than high school), part-time irregular work, short tenure (0–5 years with current employers), long tenure (11–20 years), dummies for technological intensity (if working in a medium-low–technology or a high-tech industry). All regressions include the same controls and effects as in Table 3, column (5). The coefficients reported are estimated by FEIV. Clustered standard errors in brackets.

short and long tenure with current employer, and various levels of technological intensity according to the industry of work, for example, low technology, medium-low technology, medium-high technology, and high technology (Eurostat 2018a). The coefficient on Chinese import competition stays negative and significant across all subgroups of individuals. Most interestingly, the effect is larger for individuals in high-tech industries by roughly a third over its baseline estimate with increasing import competition from China (2.3 p.p. vs. baseline 1.7 p.p. decrease, representing a further 13.6 percent decline, that is, up to 50 percent on mean individual fertility).

TABLE 6 General mechanisms

	Log earnings (1)	Low-paid employment (2)	Secondary employment (3)	Income satisfaction (4)
(a) IE China	−0.028	0.018**	−0.013*	−0.028**
Coefficient	[0.025]	[0.008]	[0.007]	[0.013]
Kleibergen–Paap *F*-statistics	3496.3	3152.3	3152.3	2090.1
First stage	0.037*** [0.0006]	0.047*** [0.0008]	0.047*** [0.0008]	0.045*** [0.001]
Observations	39,664	39,664	39,664	25,913

Mean earnings = EUR 34,953.9
Mean low employment = 0.152
Mean secondary employment = 0.077
Mean income satisfaction = 0.706 .
$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.
NOTES: The dependent variables are column headings (1)–(4). The independent variable is Chinese import exposure. Column (1) gives the effect on log of individual earnings. Column (2) runs the analysis on the probability of being in low employment, equal to 1 if the individual's annual labor earnings are below EUR 15,000 or zero otherwise. In column (3), secondary employment is a dichotomous variable equaling 1 if the individual has earnings from a second job. Column (4) reports results for a dichotomous variable which equals 1 if the individual rates satisfaction with his personal income with any score from 6–10 and equals 0 if the score is 0–5. All regressions are estimated by FEIV and include the full set of controls in Table 3, column 5. Clustered standard errors reported in brackets.

Potential mechanisms

Having children can represent an investment to couples, thus an option but not necessarily an obligation, albeit equally seen as the quantum of personal wishes, tradition, and expectations. This section looks at some general mechanisms that lie behind individual fertility behavior.

Table 6, column (1) gives the estimates for the effect of import competition on individual labor earnings. The coefficient is not significant but is negative and nonzero across all individuals in the sample. However, the distributional effects of trade are highly unequal across individuals. Dauth et al. (2021) show that import shocks mostly hurt low-skilled workers in Germany. In turn, the narrowly defined labor market experience and education translate into smaller wage-and-salary returns and increased wage inequality (Juhn, Murphy, and Pierce 1993), ergo into low-paid, low-skilled groups.

Furthermore, Table 6, column (2) tests the findings in Dauth, Findeisen, and Suedekum (2021) that import competition mostly affects low-skilled workers. Germany did not have a national minimum wage until recently. The introduction of the German national minimum wage in January 2015 affected 15 percent of all employees, who were earning below this value before it was enacted (Caliendo et al. 2018; Dustmann et al. 2021). Set at EUR 8.50 per hour, a year's worth of gross earnings would amount to roughly EUR 15,000–16,000. As a result, I define the probability of low employment as a dichotomous variable equaling 1 if the individual is earning below EUR 15,000 and zero otherwise. Estimates in column (2)

show that individuals are 1.8 p.p. more likely to be in low employment as a result of increased Chinese competition, meaning a 12 percent increase on average.[15]

In the same fashion, labor market theory emphasizes that low-paid jobs are a prevalent form of secondary employment arising in dual markets, or segmented labor markets (Reich, Gordon, and Edwards 1973; Dickens and Lang 1985). Consequently, estimates in Table 6, column (3) point to a 1.3 p.p. decrease, or a 17 percent decrease in mean probability of having a second job, where the probability of having second job is a dichotomous variable that equals 1 if the individual has any earnings from secondary employment and zero otherwise. Results are consistent with recent literature showing a negative income effect from trade shocks (Section Related Literature).

Similarly, higher Chinese import competition lowers individual satisfaction with personal income by 2.8 p.p. (that is, 3.8 percent on mean observed income satisfaction). Individual satisfaction with personal income can be an indicator of future orientation and family organization, and thus can affect fertility intentions (Bernardi, Ryser, and Le Goff 2013; Hanappi et al. 2017).

Differences in fertility decisions: Inspecting the mechanisms for male and female workers

As both men and women are jointly important in contemporary household decision making regarding family formation, the paper now focuses on studying what lies behind individual childbearing decisions through the lens of gender. This section analyzes gender-specific effects of Chinese imports on individual fertility and explains the channels potentially mediating each of them. Having contextualized the labor market conditions in Germany following reunification (Section Related Literature), here I do not focus on employment *per se*, but rather on employment opportunity in the form of *type* of employment (such as marginal employment and low-paid employment), alongside other job stressors and working conditions induced by globalization. As Geishecker, Riedl, and Frijters (2012) showed, economic uncertainty is an outcome of globalization, cheaper imports, and offshoring.

Table 7 investigates effects of import exposure by gender. Import exposure measures for male and, separately, female employees are obtained by interacting import exposure with a male dummy and a female dummy, respectively. While the overall effect on fertility is negative, the gender-specific effect shows opposing results. When examining by gender, results show that male fertility drops by 3.0 p.p., marking a 68 percent decline on the mean probability of having a child. The effect on female workers is positive, denoting a 2.6 p.p. increase in female fertility, equivalent to a 59 percent increase on mean probability of having a child (Table 7, panel a).

TABLE 7 Gender-specific effects: male and female fertility and mechanisms

	Coefficients	Standard error	Kleibergen–Paap *F*-statistics	Observations
(a) Effects by gender				
Effect on total fertility	−0.017**	0.008	3,152.3	39,664
Import exposure male component	−0.030***	0.009	2,833.8	39,664
Import exposure female component	0.026***	0.008	940.7	39,664
(b) Male fertility mechanisms				
Marginal employment	0.007***	0.002	2,833.8	39,664
Working in occupation trained for	−0.030***	0.011	2,815.1	39,482
Low-paid employment	0.032***	0.007	2,833.8	39,664
Working in a small company	0.016**	0.007	2,833.8	39,664
(c) Female fertility mechanisms				
Job autonomy	−0.027**	0.013	940.0	39,601
Marginal employment	0.034**	0.016	940.7	39,664
Worried about job security	0.036*	0.021	921.9	38,856
Worried about finances	0.047***	0.018	934.2	39,546
(d) Women in low technology				
Effect on female fertility	0.109**	0.052	105.6	6,662
Job autonomy	−0.146**	0.060	98.4	6,640
Log earnings	−0.483*	0.256	108.8	6,662

Mean probability fertility = 0.044.
$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.
NOTES: The dependent variable is birth, that is, a dichotomous variable which gives value 1 if there is a birth event within a household in a certain year, or zero otherwise. Import exposure is the yearly monetary exposure (measured in hundreds) for an employee working in region *j* industry *k* at time *t*.
Panel (a) gives the gender-specific effects of Chinese import competition, with its male and female components. Panel (b) reports the male fertility mechanisms mediating the effect on male fertility. Panel (c) reports the female fertility mechanisms mediating the effect on female fertility. Panel (d) restricts the analysis to women in low- and medium-low–technology manufacturing industries and details the channels likely affecting female fertility in low-tech. All regressions are estimated by the fixed-effects instrumental variable and include the full set of controls in Table 3, column 5. Clustered standard errors are reported.

Male fertility: Inspecting the mechanisms

Table 7, panel (b) runs the analysis on a series of channels potentially mediating the negative effect on male fertility: marginal employment, sticking to one's trade (i.e., working in the occupation for which one has trained initially), low-paid employment, and career stagnation. Marginal employment is a dichotomous variable, equal to 1 if the individual works in some form of marginal employment (atypical work and part-time irregular work). Low-paid employment is also a dichotomous variable described in the section Potential Mechanisms. Working in the occupation for which one has trained initially is a binary variable equal to 1 if the individual sticks to the trade for which they trained initially and zero otherwise. The variable "career stagnation" gives the individual probability of not being able to advance in their career, equaling 1 if the individual works in a small company

and zero otherwise. Findings show that men are 0.7 p.p. more likely to be in marginal employment, equivalent to a 21 percent increase on average probability of being marginally employed. Similarly, men are 3.0 p.p. less likely to stick to their original trade due to Chinese competition, marking a 5 percent decrease on average individual probability of being employed in the occupation for which they trained. Also, the globalization effect on low-paid employment is roughly double the effect in Table 6, column 2 (section Potential Mechanisms). Last, men are also 1.6 p.p. more likely to work in a small company, or 8.5 percent on average, as a result of increased import competition.

Female fertility: Inspecting the mechanisms

Table 7, panel (c) investigates which mechanisms could explain this dramatic increase and looks at job security, autonomy on the job, economic security, and the probability of being in marginal employment. As with men, females are more likely to be employed in some form of marginal employment such as part-time employment with import competition, while job autonomy decreases and economic insecurity increases. Here, part-time employment is a dichotomous variable equal to 1 if the woman is in part-time employment and zero otherwise. Job autonomy is also defined as a dichotomous variable equal to 1 if the woman works in a high-autonomy job. Job security equals 1 if the individual is somewhat concerned or very concerned with their job security and zero otherwise, while economic uncertainty equals 1 if the individual is somewhat or very worried about finances. Particularly, job autonomy decreases by 2.7 p.p., or 11 percent on average; part-time employment increases by 3.4 p.p., or 31 percent on average. Job insecurity and economic insecurity increase by 3.6 p.p. and 4.7 p., both equivalent to 6 percent on average, respectively.

Substitution effect: Further evidence on female fertility

Women working in manufacturing may face more difficulties of reconciling work with life in low-autonomy, low-paid jobs that they might not find particularly rewarding. The hypothesis that women would consider whether it is worth leaving work to have a child is in line with theory and evidence on female labor market participation.

Gallie (2007) points out that the rigidity of the German system in maintaining strong skill identities slowed workers' adaptation to changing work patterns during rapid technological change. In addition, the proportion of firms engaging in employee training and apprenticeship declined during the 1990s. With firm skills and union density declining (Gallie 2007), both of which are necessary to signal high autonomy in production, the effects of rising import competition might be even stronger. Esser and Olsen (2012) note that Germany is below the Western European average for job

autonomy—a situation persisting since the 1980s, characterized by female overrepresentation in low-wage positions that do not grant women much autonomy (Fagan and Burchell 2002; Kirmeyer and Shirom 1986). Coupled with the growth of low-paid and agency work among women (Eichhorst and Tobsch 2015; Botsch 2015), reduced job autonomy can therefore affect female fertility.

Since the majority of the female workers in the sample are concentrated in low-technology industrial sectors (thus potentially low-wage employment), the paper moves on to study the effect of import exposure on the probability of having children in this subgroup. Specifically, 54.9 percent of the observations on women in the baseline sample (or 6,739 out of 12,274 observations) belong to low-technology or medium-low–technology industries, hereafter simply "low-tech." Restricting the analysis to these women gives a women's low-tech sample that contains 1,311 female individuals.

Table 7, panel (d) shows that the effect on female fertility for women in low-tech industries is roughly four times the effect across all females in panel (a). Specifically, for female workers in low-tech industries, the probability of having children increases by 10.9 p.p. with a EUR 100 rise in Chinese import competition. Accordingly, I investigate which mechanisms could explain this dramatic increase and look at autonomy on the job and individual annual earnings. Consistent with Keller and Utar (2018) for Denmark, Table 7, panel (d) finds a decline in earnings coupled with a decrease in job autonomy for female workers in low-tech industries with increased Chinese competition. Results show a reduction of 14.6 p.p. in the probability of being employed in a high-autonomy job. This is equivalent to saying that the effect of Chinese competition on the job autonomy of women working in low-tech industries is six times the effect on all females in panel (c). Notably, findings here coincide with data showing that the share of women is below average in North-Rhine-Westfalia, Lower Saxony, and Rheinland-Pfalz, which are also incidentally the states where 33 percent of the observations on women are concentrated (Table A.6 in the online Appendix).

Overall, these findings add to the evidence on women in manufacturing and their employment conditions, confirming that the low-autonomy, low-paid jobs are a widespread phenomenon. Results point to a substitution effect in the labor supply for female workers in low-tech industries, whose opportunity cost falls to the extent that the prospect of having children possibly becomes a more rewarding alternative. This result is in line with evidence from Gries and Grundmann (2014), who find a positive effect on fertility from trade in low-skill–intensive sectors, and Liepmann (2018) showing how women most severely affected by industry restructuring increase their fertility.

As Brewster and Rindfuss (2000) emphasize, women's labor force participation has traditionally been less stable, and fertility decisions do not imply solely childbearing but also *child-rearing* (i.e., the act of bringing up

children). The latter may be particularly difficult in roles where work and personal decisions are incompatible, yet role incompatibility depends highly on institutional factors characteristic to the country.

Although Germany has a strong commitment toward families, backed by child and housing allowances along with generous maternal leave packages, Hantrais (1997) points out that such family-friendly policies have not been matched by high rates of female economic activity among women of childbearing age nor by high birth rates. In sum, welfare cannot entirely compensate for the lost economic opportunities of women, while men are subject to trade-induced shocks that directly affect their employment and economic opportunities.

Concluding remarks

This paper studies the effects of import competition on individual fertility decisions. It distinctly contributes to the evidence on economic opportunity as an outcome of globalization. I find that globalization affects overall fertility negatively, whereas the gender-specific effect on fertility is positive for women and negative for men. Results show a reduction in employment opportunity and an increase in marginal employment for both men and women, alongside economic uncertainty.

Findings regarding the overall fertility decline are in line with evidence from the United States (Autor, Dorn, and Hanson 2019). Results also indicate that, as the female opportunity cost of work falls, the prospect of having children possibly becomes a more rewarding alternative. The positive effect on female fertility is consistent with evidence from Germany (Liepmann 2018). These findings also maintain relevance when considering effects in neighboring countries, that is, Denmark (Keller and Utar 2018).

Given concerns over low fertility in Germany, overall findings are particularly relevant to understanding the German social and economic structure that enabled the country's transformation but that also resulted in heavy labor market segmentation and atypical work. This likely implied burdensome costs for individuals and their future orientation. The paper thus adds to the evidence on the structural issues Germany faced after reunification, but also to the huge industrial change in production capabilities to accommodate globalization, with possibly hidden effects.

Fertility decisions do not encompass solely childbearing but also the act of bringing up children, or child-rearing. Where incompatibility between work and family is perceived, generous welfare and family-friendly policies cannot entirely make up for lost economic opportunities, especially as increased import competition poses additional pressure on the financial security of individuals. Child-rearing might be perceived as a challenge in the context of import competition, which affects not only labor market conditions in import-competing sectors but also continually interferes with

social norms, expectations, and individuals' future orientation. As male workers face lower economic opportunity, women in manufacturing are distinctly affected: entangled in a sort of *conditioning trap*, women who suffered a large income effect appear to substitute work with the prospect of having children, as current working conditions and low female presence in high-tech sectors still reflect a certain sluggishness in adapting to new trends of better work–life balance, and this may be decisive when it comes to reentering the labor market. The absence of the necessary congruence between these individual, social, and political factors may eventually cause workers to lose faith in a social security system where welfare institutions do not actively respond to the structural change in labor market conditions and cannot eventually compensate for the overall loss in fertility.

In sum, findings in this paper suggest that there is space for fertility and childcare policy consistent with the requirements of competitive labor markets and a globalized world but also with individual and social institutions. Current family planning and childcare services might not account for mixed patterns in the population's reproductive choices. Further fertility decline is inherent unless welfare institutions in advanced countries become aware of the structural challenges posed by globalization to individual preferences and circumstances, and enable more effective, personalized, accessible childcare and family planning under equitable working conditions for men and women alike.

Acknowledgments

I thank the PDR editor and the anonymous reviewers for their excellent feedback. Special thanks go to Massimiliano Bratti, Klaus F. Zimmermann, Alessandro Cigno, Alexander Kritikos, and Paolo Berta for their comments on a preliminary version; Alessandro Olper, Tindara Addabbo, Alessandro Missale, and Catalin Dragomirescu-Gaina for their encouragement and support. I am also very grateful to GLO Fellows and Affiliates, seminar participants at the University of Milan, workshop participants at the Italian Econometric Association, participants at the EBES conference series, and the DIW staff. Data providers bear no responsibility for the analysis of the data, representing the author's views only. Open Access Funding provided by Universita degli Studi di Milano within the CRUI-CARE Agreement.

Data availability statement

The longitudinal data on individuals in this study come from the German Socio-Economic Panel (G-SOEP)—an annually run, household-based survey by the German Institute for Economic Research (DIW Berlin) and the Kantar Group—and are available upon request from DIW Berlin. All other data (i.e., data on imported goods and employment) are publicly available.

Computations using public data will be made available following a reasonable request from authors interested in replicating the analysis.

Notes

1 Trade-induced labor market effects can differ substantially across individuals depending on their sector of work (Helpman et al. 2017; Adão, Kolesár, and Morales 2019; Kim and Vogel 2021).

2 When gender is not considered, the total effect on fertility is negative for all individuals in the representative sample. When investigating by gender, the effect is still negative for men but positive for women, as the negative effects on male fertility are much stronger and outweigh the effects for women in this sample. The positive fertility effect is in line with evidence from Liepmann (2018), who finds that women most severely affected by industry restructuring have relatively more children.

3 The term t-1 is shorthand to denote, specifically, five-year lags for Australia and 10-year lags for Canada and Japan (see Section 2.3 in the online Appendix for further details).

4 See Section 2.1 in the online Appendix for a detailed account of data handling, particularly how import data are matched with individual data (with reference to Eurostat 2018a, 2018b, Eurostat 2018c, 2018d; Deutsche Bundesbank 2019).

5 I provide full transition probabilities between sectors and in-out manufacturing over time in Tables A.1–A.4 in online Appendix A. There is a gender gap affecting women in terms of the likelihood of transitioning to other sectors (see the intersectoral mobility breakdown by gender in Tables A.2 and A.3 in the online Appendix). On average over time, roughly 90 percent of all individuals who work in manufacturing in a certain year stay in manufacturing in the next period. For a full explanation on how sampling is performed, see online Appendix B, Section 2.2.

6 As per Table A.5 in the online Appendix. The table gives additional details on the empirical distribution of the male and female parent's age at the birth event, as well as variations in the age at birth and in the number of children per household alongside import expansion over time. Fertility is procyclical and the lingering effects of reunification marked a clear decline. However, trends in the number of children and the parent's age at birth also seem to vary positively with import expansion over time, except for recent years after sanctions on China.

7 Tables A.8–A.10 in the online Appendix provide further details on the German federal states, females in employment by occupational status over time, and the gender composition of employment in the manufacturing sector over time (as per Destatis 2019, Destatis 2021). Table A.7 gives a gender breakdown of the sample observations on individuals in manufacturing industries according to their level of technological intensity.

8 See online Appendix B for more details on testing IV assumptions and a discussion with reference to Bound, Jaeger, and Baker (1995), Staiger and Stock (1997), Greene (2000), Baum (2001), Stock and Yogo (2005), Schaffer and Stillman (2010), Conley, Hansen, and Rossi (2012), Clarke (2014), and van Kippersluis and Rietveld (2018).

9 Eventually, the model also introduces industry FEs and state FEs as robustness checks to wipe out the variation in fertility behavior due to unobserved shocks to regional or industry performance. With state and industry FEs, the aim is checking whether state-specific or industry-specific shocks drive the total effect on fertility (results are robust).

10 Besides individual FEs and the full set of controls described in the section Empirical Specification, column (1) includes also the Herfindahl–Hirschmann market concentration index as a time-variant gravity control variable.

11 Absorbing unobservable time shocks would not be of much help in an OLS estimation with import exposure in levels and a dichotomous dependent variable that is ob-

served sporadically (i.e., the 0–1 probability of having a child corresponding to when a birth event is observed). Most controls used in the baseline would be absorbed into fixed effects, hence it is likely that fixed effects capture all variation in the data.

12 The mean probability of having a child corresponding to observing a birth event in a household in a certain year is provided in all tables.

13 The average age at onset of menstrual irregularity is 47.5 years, and women aged 45+ are likely to experience abnormal uterine bleeding, which would make pregnancy difficult (Ferrell et al. 2006; McNamara, Batur, and DeSapri 2015).

14 The measure for exposure to EE imports amasses five countries: Poland, Czech Republic, Slovakia, Hungary and Romania (see online Appendix C for further details).

15 Mean probability of being in low employment (< EUR 15,000) in the estimation sample is 0.152, in line with what Caliendo et al. (2018) and Dustmann et al. (2021) note for the proportion of German employment in low-paid employment.

References

Acemoglu, Daron, David Autor, David Dorn, Gordon H. Hanson, and Brendan Price. 2016. "Import Competition and the Great US Employment Sag of the 2000s." *Journal of Labor Economics* 34(S1): S141–S198.

Acemoglu, Daron, and Pascual Restrepo. 2020. "Robots and jobs: Evidence from US Labor Markets." *Journal of Political Economy* 128(6): 2188–2244.

Adão, Rodrigo, Michal Kolesár, and Eduardo Morales. 2019. "Shift-Share Designs: Theory and Inference." *The Quarterly Journal of Economics* 134(4): 1949–2010.

Adler, Marina A. 1997. "Social Change and Declines in Marriage and Fertility in Eastern Germany." *Journal of Marriage and the Family* 59(1): 37–49.

Adsera, Alicia. 2004. "Changing Fertility Rates in Developed Countries. The Impact of Labor Market Institutions." *Journal of Population Economics* 17(1): 17–43.

———. 2005. "Vanishing Children: From High Unemployment to Low Fertility in Developed Countries." *American Economic Review* 95(2): 189–193.

———. 2011. "Where Are the Babies? Labor Market Conditions and Fertility in Europe." *European Journal of Population /Revue Européenne de Démographie* 27(1): 1–32.

Ahn, Namkee, and Pedro Mira. 2002. "A note on the changing relationship between fertility and female employment rates in developed countries," *Journal of Population Economics* 15(4): 667–682.

Angrist, Joshua D., and Jörn-Steffen Pischke. 2015. *Mastering Metrics: The Path from Cause to Effect*. Princeton, NJ: Princeton University Press.

Aoyama, Yuko, and Manuel Castells. 2002. "An Empirical Assessment of the Informational Society: Employment and Occupational Structures of G-7 Countries, 1920–2000." *International Labour Review* 141: 123–159.

Autor, David H., David Dorn, and Gordon H. Hanson. 2013. "The China Syndrome: Local Labor Market Effects of Import Competition in the United States." *American Economic Review* 103(6): 2121–2168.

———. 2015. "Untangling Trade and Technology: Evidence from Local Labour Markets." *The Economic Journal* 125(584): 621–646.

———. 2019. "When Work Disappears: Manufacturing Decline and the Falling Marriage Market Value of Young Men." *American Economic Review: Insights* 1(2): 161–178.

Baum, Christopher F. 2001. "Residual Diagnostics for Cross-Section Time Series Regression Models." *The Stata Journal* 1(1): 101–104.

Baumgarten, Daniel, Ingo Geishecker, and Holger Görg. 2013. "Offshoring, Tasks, and the Skill-Wage Pattern." *European Economic Review* 61: 132–152.

Becker, Gary S. 1973. "A Theory of Marriage: Part I." *Journal of Political Economy* 81(4): 813–846.

———. 1974. "On the Relevance of the New Economics of the Family." *American Economic Review* 6 (2): 317–319.

———. 1991. *A Treatise on the Family* (enlarged edition). Cambridge, MA: Harvard University Press.

Bernardi, Laura, Valérie-Anne Ryser, and Jean-Marie Le Goff. 2013. "Gender Role-Set, Family Orientations, and Women's Fertility Intentions in Switzerland." *Swiss Journal of Sociology* 3 (1): 9–31.

Bertrand, Marianne. 2004. "From the Invisible Handshake to the Invisible Hand? How Import Competition Changes the Employment Relationship." *Journal of Labor Economics* 22(4): 723–765.

Black, Dan A., Terra G. McKinnish, and Seth G. Sanders. 2003. "Does the Availability of High-Wage Jobs for Low-Skilled Men Affect Welfare Expenditures? Evidence from Shocks to the Steel and Coal Industries." *Journal of Public Economics* 87(9–10): 1921–42.

Bongaarts, John, and Susan Cotts Watkins. 1996. "Social Interactions and Contemporary Fertility Transitions." *Population and Development Review* 22(4): 639–82.

Bongaarts, John, and John B. Casterline. 2018. "From Fertility Preferences to Reproductive Outcomes in the Developing World." *Population and Development Review* 44(4): 793–809.

Botsch, Elisabeth 2015. "The Policy on Gender Equality in Germany: In-depth Analysis for the FEMM Committee. Brussels: DG Internal Policies." European Parliament. Accessed May 5, 2021. https://www.europarl.europa.eu/RegData/etudes/IDAN/2015/510025/IPOL_IDA(2015)510025_EN.pdf.

Bound, John, and George E. Johnson. 1989. "Changes in the Structure of Wages During the 1980s: An Evaluation of Alternative Explanations." *NBER Working Paper No. w2983*. Cambridge, MA: National Bureau of Economic Research. https://www.nber.org/papers/w2983.

Bound, John, David A. Jaeger, and Regina M. Baker. 1995. "Problems with Instrumental Variables Estimation When the Correlation between the Instruments and the Endogenous Explanatory Variable is Weak." *Journal of the American Statistical Association* 90(430): 443–450.

Bratti, Massimiliano, and Konstantin Tatsiramos. 2012. "The Effect of Delaying Motherhood on the Second Childbirth in Europe." *Journal of Population Economics* 25(1): 291–321.

Brewster, Karin L. and Ronald R. Rindfuss. 2000. "Fertility and Women's Employment in Industrialized Nations." *Annual Review of Sociology* 26(1): 271–296.

Caliendo, Marco, Alexandra Fedorets, Malte Preuss, Carsten Schröder, and Linda Wittbrodt. 2018. "The Short-Run Employment Effects of the German Minimum Wage Reform." *Labour Economics* 53: 46–62.

Casterline, John B. 2001. "The Pace of Fertility Transition: National Patterns in the Second Half of the Twentieth Century." *Population and Development Review* 27: 17–52.

Cigno, Alessandro, Giorgia Giovannetti, and Laura Sabani. 2018. "The Role of Trade and Offshoring in the Determination of Relative Wages and Child Labour." *The Journal of International Trade & Economic Development* 27(3): 267–292.

Clarke, Damian. 2014. "PLAUSEXOG: Stata Module to Implement Conley et al.'s Plausibly Exogenous Bounds." *Statistical Software Components*, S457832. Accessed May 7, 2021. https://ideas.repec.org/c/boc/bocode/s457832.html.

Conley, Timothy G., Christian B. Hansen, and Peter E. Rossi. 2012. "Plausibly Exogenous." *Review of Economics and Statistics* 94(1): 260–272.

Conrad, Christoph, Michael Lechner, and Welf Werner. 1996. "East German Fertility after Unification: Crisis or Adaptation?" *Population and Development Review* 22(2): 331–358.

Dauth, Wolfgang, Sebastian Findeisen, and Jens Suedekum. 2014. "The Rise of the East and the Far East: German Labor Markets and Trade Integration." *Journal of the European Economic Association* 12(6): 1643–1675.

———. 2017. "Trade and Manufacturing Jobs in Germany." *American Economic Review* 107(5): 337–342.

———. 2021. "Adjusting to Globalization in Germany." *Journal of Labor Economics* 39(1): 263–302.

Destatis (Statistisches Bundesamt). 2019. "Industry: Manufacturing." Last modified May 29, 2019. Accessed June 17, 2019. https://www.destatis.de/EN/Themes/Economic-Sectors-Enterprises/Industry-Manufacturing/Tables/key-data-manufacturing.html.

———. 2021. "Microcensus 12211, Genesis Online Databank." Accessed June 25, 2021. https://www-genesis.destatis.de/genesis/online.

Del Bono, Emilia, Andrea Weber, and Rudolf Winter-Ebmer. 2012. "Clash of Career and Family: Fertility Decisions after Job Displacement." *Journal of the European Economic Association* 10(4): 659–683.

Deutsche Bundesbank. 2019. "Exchange Rates, Euro Foreign Exchange Reference Rates, Gold." Accessed January 14, 2019. https://www.bundesbank.de/en/statistics/exchange-rates/exchange-rates-euro-foreign-exchange-reference-rates-gold-prices/exchange-rates-euro-foreign-exchange-reference-rates-gold-795814.

Dickens, William T. and Kevin Lang. 1985. "A Test of Dual Labor Market Theory." *The American Economic Review* 75(4): 792–805.

Dudel, Christian, and Sebastian Klüsener. 2016. "Estimating Male Fertility in Eastern and Western Germany Since 1991: A New Lowest Low?" *Demographic Research* 35: 1549–1560.

Dustmann, Christian, Bernd Fitzenberger, Uta Schönberg, and Alexandra Spitz-Oener. 2014. "From Sick Man of Europe to Economic Superstar: Germany's Resurgent Economy." *Journal of Economic Perspectives* 28(1): 167–188.

Dustmann, Christian, Attila Lindner, Uta Schönberg, Matthias Umkehrer, and Philipp Vom Berge. 2021. "Reallocation Effects of the Minimum Wage." *The Quarterly Journal of Economics* qjab028. https://doi.org/10.1093/qje/qjab028.

Eichhorst, Werner, and Verena Tobsch. 2015. "Not So Standard Anymore? Employment Duality in Germany." *Journal for Labour Market Research* 48(2): 81–95.

Esser, Ingrid, and Karen M. Olsen. 2012. "Perceived Job Quality: Autonomy and Job Security within a Multi-Level Framework." *European Sociological Review* 28(4): 443–454.

Eurostat. 2018a. "Aggregations of Manufacturing NACE Rev 1.1." Brussels: European Commission. Accessed November 30, 2018. https://ec.europa.eu/eurostat/cache/metadata/Annexes/htec_esms_an2.pdf.

———. 2018b. "Structural Business Statistics." Brussels: European Commission. Accessed October 12, 2018. https://ec.europa.eu/eurostat/web/structural-business-statistics/data/database.

———. 2018c. "Reference and Management of Nomenclatures (RAMON)." Brussels: European Commission. Accessed October 7, 2018. https://ec.europa.eu/eurostat/ramon/index.cfm?TargetUrl=DSP_PUB_WELC.

———. 2018d. "Correspondence Tables." Brussels: European Commission. Accessed October 10, 2018. https://ec.europa.eu/eurostat/web/nace-rev2/correspondence_tables.

Fagan, Colette, & Brendan Burchell 2002. "Gender, Jobs and Working Conditions in the European Union." Dublin: European Foundation for the Improvement of Living and Working Conditions. Accessed July 10, 2019. https://files.eric.ed.gov/fulltext/ED475394.pdf

Ferrell, Rebecca J., James A. Simon, Steven M. Pincus, Germán Rodríguez, Kathleen A. O'Connor, Darryl J. Holman, and Maxine Weinstein. 2006. "The Length of Perimenopausal Menstrual Cycles Increases Later and to a Greater Degree than Previously Reported." *Fertility and Sterility* 86(3): 619–624.

Gallie, Duncan. 2007. "Production Regimes and the Quality of Employment in Europe." *Annual Review of Sociology* 33: 85–104.

Geishecker, Ingo, Maximilian Riedl, and Paul Frijters. 2012. "Offshoring and Job Loss Fears: An Econometric Analysis of Individual Perceptions." *Labour Economics* 19(5): 738–747.

Giuntella, Osea, Lorenzo Rotunno, and Luca Stella. 2021. "Trade Shocks, Fertility, and Marital Behavior." IZA Discussion Paper No. 14224. Bonn: IZA.

Goebel, Jan, Markus M. Grabka, Stefan Liebig, Martin Kroh, David Richter, Carsten Schröder, and Jürgen Schupp. 2019. "The German Socio-Economic Panel (SOEP)." *Jahrbücher für Nationalökonomie und Statistik* 239(2): 345–360.

Goldstein, Joshua R., and Michaela Kreyenfeld. 2011. "Has East Germany Overtaken West Germany? Recent Trends in Order-Specific Fertility." *Population and Development Review* 37(3): 453–472.

Greene, William H. 2000. *Econometric Analysis*. Upper Saddle River, NJ: Prentice–Hall.

Gries, Thomas and Rainer Grundmann. 2014. "Trade and Fertility in the Developing World: The Impact of Trade and Trade Structure." *Journal of Population Economics* 27(4): 1165–86.

Hanappi, Doris, Valérie-Anne Ryser, Laura Bernardi, and Jean-Marie Le Goff. 2017. "Changes in Employment Uncertainty and the Fertility Intention—Realization Link: An Analysis Based on the Swiss Household Panel." *European Journal of Population* 33(3): 381–407.

Hantrais, Linda. 1997. "Exploring Relationships between Social Policy and Changing Family Forms within the European Union." *European Journal of Population/Revue Européenne de Démographie* 13(4): 339–379.

Helpman, Elhanan, Oleg Itskhoki, Marc-Andreas Muendler, and Stephen J. Redding. 2017. "Trade and Inequality: From Theory to Estimation." *The Review of Economic Studies* 84(1): 357–405.

Juhn, Chinhui, Kevin M. Murphy, and Brooks Pierce. 1993. "Wage Inequality and the Rise in Returns to Skill." *Journal of Political Economy* 101(3): 410–442.

Katz, Lawrence F., and Kevin M. Murphy. 1992. "Changes in Relative Wages, 1963–1987: Supply and Demand Factors." *The Quarterly Journal of Economics* 107(1): 35–78.

Kearney, Melissa S., and Riley Wilson. 2018. "Male Earnings, Marriageable Men, and Nonmarital Fertility: Evidence from the Fracking Boom.," *Review of Economics and Statistics* 100(4): 678–690.

Keller, Wolfgang and Hâle Utar. 2018. "Globalization, Gender, and the Family." *NBER Working Paper No. w25247*. Cambridge, MA: National Bureau of Economic Research. https://www.nber.org/papers/w25247

Kim, Ryan, and Jonathan Vogel. 2021. "Trade Shocks and Labor Market Adjustment." *American Economic Review: Insights* 3(1): 115–130.

Kirmeyer, Sandra L., and Arie Shirom. 1986. "Perceived Job Autonomy in the Manufacturing Sector: Effects of Unions, Gender, and Substantive Complexity." *Academy of Management Journal* 29(4): 832–840.

Klüsener, Sebastian, Karel Neels, and Michaela Kreyenfeld. 2013. "Family Policies and the Western European Fertility Divide: Insights from a Natural Experiment in Belgium." *Population and Development Review* 39(4): 587–610.

Kreyenfeld, Michaela., 2004. "Fertility Decisions in the FRG and GDR: An Analysis with Data from the German Fertility and Family Survey." *Demographic Research* 3: 275–318.

Krugman, Paul R. 2008. "Trade and Wages, Reconsidered." *Brookings Papers on Economic Activity* 2008 (1): 103–154.

Lee, Ronald D., Patrick R. Galloway, and Eugene A. Hammel. 1994. "Fertility Decline in Prussia: Estimating Influences on Supply, Demand, and Degree of Control." *Demography* 31(2): 347–373.

Leitner, Sigrid, Ilona Ostner, and Christoph Schmitt. 2008. "Family Policies in Germany." In *Family Policies in the Context of Family Change*, edited by Ilona Ostner and Christoph Schmitt, 175–202. Wiesbaden: VS Verlag für Sozialwissenschaften.

Liepmann, Hannah. 2018. "The Impact of a Negative Labor Demand Shock on Fertility: Evidence from the Fall of the Berlin Wall." *Labour Economics* 54: 210–224.

Lindo, Jason M. 2010. "Are Children Really Inferior Goods? Evidence from Displacement-Driven Income Shocks." *Journal of Human Resources* 45(2): 301–327.

McDonald, Peter. 2000. "Gender Equity in Theories of Fertility Transition." *Population and Development Review* 26(3): 427–439.

McDonald, Peter and Helen Moyle. 2018. "Women as Agents in Fertility Decision-Making: Australia, 1870–1910." *Population and Development Review* 44(2): 203–230.

McNamara, Megan, Pelin Batur, and Kristi T. DeSapri. 2015. "Perimenopause." *Annals of Internal Medicine* 162(3): ITC1-ITC16.

Murphy, K.M. and F. Welch. 1992. "The Structure of Wages." *The Quarterly Journal of Economics* 107(1): 285–326.

OECD. 2018. "*Structural Analysis Database*." Paris: Organisation for Economic Co-operation and Development. Accessed October 7, 2018. http://www.oecd.org/industry/ind/stanstructuralanalysisdatabase.htm.

Reich, Michael, David M. Gordon, and Richard C. Edwards. 1973. "A Theory of Labor Market Segmentation." *The American Economic Review* 63(2): 359–365.

Schaffer, Mark E., and Steven Stillman. 2010. "XTOVERID: Stata Module to Calculate Tests of Overidentifying Restrictions after xtreg, xtivreg, xtivreg2 and xthtaylor." http://ideas.repec.org/c/boc/bocode/s456779.html

Staiger, Douglas and James H. Stock. 1997. "Instrumental Variables Regression with Weak Instruments." *Econometrica* 65: 557–586.

Stock, James H. and Motohiro Yogo. 2005. "Testing for Weak Instruments in Linear IV Regression." In *Identification and Inference for Econometric Models: Essays in Honor of Thomas Rothenberg*, edited by Donald W.K. Andrews and James H. Stock, 80–108. Cambridge: Cambridge University Press.

van Kippersluis, Hans, and Cornelius A. Rietveld. 2018. "Beyond Plausibly Exogenous." *The Econometrics Journal* 21(3): 316–331.

Wagner, Gert G., Joachim R. Frick, and Jürgen Schupp. 2007. "The German Socio-Economic Panel Study: Scope, Evolution and Enhancements." *SOEP Papers on Multidisciplinary Panel Data Research No.*. 1. Berlin: Deutsches Institut für Wirtschaftsforschung (DIW).

Weinkopf, Claudia. 2014. "Women's Employment in Germany." *Revue de l'OFCE* 2: 189–214.