

Erten, Bilge; Leight, Jessica; Zhu, Lianming

Working Paper

The Effects of FDI Liberalization on Structural Transformation and Demographic Change: Evidence from China

IZA Discussion Papers, No. 16094

Provided in Cooperation with:

IZA – Institute of Labor Economics

Suggested Citation: Erten, Bilge; Leight, Jessica; Zhu, Lianming (2023) : The Effects of FDI Liberalization on Structural Transformation and Demographic Change: Evidence from China, IZA Discussion Papers, No. 16094, Institute of Labor Economics (IZA), Bonn

This Version is available at:

<https://hdl.handle.net/10419/272721>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

DISCUSSION PAPER SERIES

IZA DP No. 16094

**The Effects of FDI Liberalization
on Structural Transformation and
Demographic Change: Evidence from China**

Bilge Erten
Jessica Leight
Lianming Zhu

APRIL 2023

DISCUSSION PAPER SERIES

IZA DP No. 16094

The Effects of FDI Liberalization on Structural Transformation and Demographic Change: Evidence from China

Bilge Erten

Northeastern University and IZA

Lianming Zhu

Osaka University

Jessica Leight

International Food Policy Research Institute

APRIL 2023

Any opinions expressed in this paper are those of the author(s) and not those of IZA. Research published in this series may include views on policy, but IZA takes no institutional policy positions. The IZA research network is committed to the IZA Guiding Principles of Research Integrity.

The IZA Institute of Labor Economics is an independent economic research institute that conducts research in labor economics and offers evidence-based policy advice on labor market issues. Supported by the Deutsche Post Foundation, IZA runs the world's largest network of economists, whose research aims to provide answers to the global labor market challenges of our time. Our key objective is to build bridges between academic research, policymakers and society.

IZA Discussion Papers often represent preliminary work and are circulated to encourage discussion. Citation of such a paper should account for its provisional character. A revised version may be available directly from the author.

ISSN: 2365-9793

IZA – Institute of Labor Economics

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany

Phone: +49-228-3894-0
Email: publications@iza.org

www.iza.org

ABSTRACT

The Effects of FDI Liberalization on Structural Transformation and Demographic Change: Evidence from China*

How does foreign direct investment (FDI) liberalization shape structural transformation and demographic change in developing countries? We provide new evidence on this question using five waves of Chinese census data between 1990 and 2015, exploiting quasi-exogenous variation in FDI liberalization induced by multiple waves of regulatory relaxation. We find that counties more exposed to liberalization experience a relative shift out of agricultural employment into manufacturing and services for both men and women. Exposure to FDI liberalization also reduces the probability of marriage, and induces a decline in the birth rate and the share of women with children.

JEL Classification: F23, F63, J13

Keywords: foreign direct investment, structural transformation, demographic change, China

Corresponding author:

Bilge Erten
Department of Economics
43 Leon Street
312A Lake Hall
Northeastern University
Boston, MA 02115
USA
E-mail: b.erten@northeastern.edu

* We thank Loren Brandt, Maggie Chen, Alejandro Estefan, Ridwan Karim, Hani Mansour, Brian McCaig, Jennifer Poole, and Feicheng Wang as well as seminar participants at the American Economic Association Meetings, Duke-Kunshan University, International Food Policy Research Institute, Istanbul Technical University, Lehigh University, Göttingen University, iFLAME - IESEG, the University of Massachusetts Amherst, Zhejiang University, and IIM - Calcutta for their comments and suggestions. Any errors are our own.

1 Introduction

Over the last thirty years, China has experienced a dramatic expansion of foreign direct investment (FDI) as its economy has increasingly integrated with global markets. Annual inflows of FDI, concentrated in export-oriented manufacturing, were around \$40 billion even in 1996 and tripled by 2015 (Hu et al. 2002; Hsu et al. 2023). The rise of FDI also coincided with two major shifts in the Chinese economy: a dramatic pattern of structural transformation as labor shifted out of agriculture and into manufacturing and services (Figure 2b), and a continued decline in fertility (Figure 2d) (Yang et al. 2022).

A substantial body of theoretical and empirical work has shown that the structural transformation and industrialization process in developing countries is related to declines in fertility (Galor and Weil 1996, 2000; Doepke 2004; Greenwood and Seshadri 2002). As industrialization pulls both men and women out of agriculture, increases in the opportunity costs of women’s time, shifts in gender norms, and gendered changes in labor market trajectories can affect both marriage and fertility. This pattern has also been observed for trade shocks in particular (Do et al. 2016). Yet, little is known about the impact of FDI liberalization – as distinct from other globalization-related shocks — on either structural change itself or the associated declines in fertility.

In this paper, we exploit cross-industry and cross-local labor market variation in FDI liberalization stemming from China’s market reforms to provide novel evidence about the effects of FDI on both margins of interest: structural and demographic change. We identify labor demand shocks that are concentrated in tradable sectors, and investigate the impacts of these shocks on local labor market adjustment (including shifts of labor from agriculture to non-agricultural production), marriage formation, and fertility. Our analysis employs a newly compiled dataset of shifts in FDI regulation between 1997 and 2011 and five waves of Chinese census data across 2,491 counties from 1990 to 2015.

The impact of relaxing FDI regulations on structural change in local labor markets is *a priori* ambiguous. The direct effect on manufacturing and services employment is expected to be positive: in China, FDI inflows are concentrated in non-primary industries (Lu et al.

2017). In addition, the entry of foreign firms in encouraged sectors may shift productive resources towards the same sectors if domestic firms benefit through knowledge spillovers, input sharing, and labor pooling (Blomström and Kokko 1998). On the other hand, domestic firms may lose market share to more productive multinationals, reducing employment (Aitken and Harrison 1999). If the relaxation of FDI regulations does shift workers out of agriculture into manufacturing and services, women may attain better earnings opportunities, leading to a higher opportunity cost of family formation and childbearing (Galor and Weil 1996), and parents might postpone marriage and reduce their number of children (Becker and Lewis 1973).

The main empirical challenge in estimating the impact of FDI liberalization on structural change within counties is that more dynamic counties may be simultaneously more likely to attract FDI and industrialize for other reasons, generating a spurious positive correlation. We address this challenge by using plausibly exogenous variation in exposure to relaxation of FDI regulations linked to initial sectoral composition of employment at the county level. Using public regulatory documents, we construct an index of FDI regulation by characterizing the degree of liberalization or de-liberalization experienced by each tradable subsector during five waves of revisions to FDI regulations (1997, 2001, 2004, 2007, and 2011). We then construct a shift-share policy shock at the county level using initial employment weights in conjunction with these industry-level shocks.

Our empirical analysis relies on a shift-share design for inference, following Borusyak et al. (2022). Here, identification does not require that FDI liberalization is random or that the geographic distribution of FDI-liberalized industries is random. Rather, in a difference-in-difference setup with a shift-share design, the identifying assumption is that there are no simultaneous shocks to a county that cause both industrialization or demographic change and liberalization in the key industries in which foreign firms in that county are concentrated (Borusyak et al. 2022). We provide balance tests of FDI liberalization exposure to county characteristics; control for a range of FDI policy determinants, initial county characteristics, and other shocks; and show evidence for permutation tests to support this assumption. We provide two main results.

First, counties more exposed to FDI liberalization experienced a significant relative decline

in the share of agricultural employment, and a corresponding increase in the shares of manufacturing and services employment, inducing structural transformation. These effects were parallel for men and women. Second, FDI liberalization reduced the probability of marriage for both men and women, leading to decreases in the birth rate and the share of women with children. These effects are concentrated among individuals entering their prime reproductive years (ages 18–39) at the beginning of the liberalization period, and given that these cohorts have all reached a minimum of age 36 in the final wave of data, the observed decline represents a decline in marriage and fertility and not merely a postponement.

Our findings complement work on the effects of FDI on firm-level outcomes, manufacturing sector, and macro-level indicators (Feenstra and Hanson 1997; Alfaro 2016; Lu et al. 2017) by focusing on local labor demand shocks to analyze the full arc of structural transformation including the pull of labor out of agriculture. Our study also relates to correlational evidence on FDI and labor market outcomes at the region level (Rong et al. 2020; Mühlen and Escobar 2020). Using quasi-experimental variation in FDI regulations, we isolate the impacts of these regulatory changes on structural change outcomes.¹

In addition to providing evidence that FDI liberalization fosters structural transformation at the local level, our analysis indicates that these local labor demand shocks have important demographic implications. This is true even though the effects of FDI liberalization on male and female labor force outcomes are parallel, a pattern distinct from that found in a large literature analyzing the effect of trade shocks on male-female labor market gaps (Juhn et al. 2013). Our paper also relates to the effects of trade shocks on fertility (Keller and Utar 2022) and evidence of adverse effects of import competition shocks on fertility, driven by men’s falling economic fortunes (Autor et al. 2019; Giuntella et al. 2022). Our work complements these studies by focusing on a positive local demand shock driven by enhanced export access in a developing country. Similar to these papers, we find a decline in marriage formation and fertility; however, these are linked to an improvement in economic fortunes of both women and men whose

¹Our paper relates to studies on the effects of trade liberalization in China, although the majority of this literature focuses on firm-level outcomes (Brandt and Morrow 2017; Brandt et al. 2017; Khandelwal et al. 2013). One closely related paper analyzed the effects of WTO accession on structural transformation, finding evidence that increased access to US markets shifted productive factors out of agriculture and into manufacturing and services in China (Erten and Leight 2021).

employment opportunities shift, in parallel, from agriculture into manufacturing and services.

2 Context and Data

2.1 Context: FDI Regulations in China

Following a centrally-planned, closed-economy model, China was characterized by an almost complete absence of foreign-invested enterprises (FIEs) until the late 1970s. This economic strategy drastically changed in December 1978 with the initiation of an open-door policy, and from the late 1970s to the early 1990s, a series of laws regulating FDI were introduced in order to facilitate the entry of foreign firms (Lu et al. 2017; Hsu et al. 2023).² Appendix Figure A1 illustrates that consistent with this policy goal, China did experience extremely rapid growth in FDI starting in the early 1990s, accelerating further after its entry into the World Trade Organization in 2001.

In June 1995, the central government announced a "Catalogue for the Guidance of Foreign Investment Industries" (henceforth, the Catalogue). The Catalogue was modified in 1997, and classified products into four categories in which (i) FDI was supported, (ii) FDI was permitted, (iii) FDI was restricted, or (iv) FDI was prohibited. As we explain in Section 2.2, we use this classification to create FDI regulation measures. The central government substantially revised these regulations in March 2002 after China's WTO accession in 2001, and then made minor revisions in November 2004. To further expand the opening-up policy and shift away from encouraging FDI in low-technology and high-polluting industries, further revisions were made in October 2007 and December 2011.

2.2 Measuring Exposure to FDI Regulation

Our measure of FDI regulation is based on the FDI Catalogue following the mapping and industry classification proposed by Lu et al. (2017). First, tradable products were classified

²In July 1979, a "Law on Sino-Foreign Equity Joint Venture" was passed to encourage FDI. In September 1983, "Regulations for the Implementation of the Law on Sino-Foreign Equity Joint Ventures" were issued by China's State Council of China, they were revised in three times until the "Law on Foreign Capital Enterprises" was passed in April 1986. Moreover, the "Detailed Rules for the Implementation of the Law on Wholly Foreign-Owned Enterprises" were issued in October 1990.

into three groups: (i) the supported category, i.e., products where FDI was supported; (ii) the permitted category (not explicitly listed); (iii) the restricted/prohibited category, i.e., products where FDI was restricted or prohibited.

Next, we compare the changes across each two consecutive versions of the Catalogue, allowing us to create an FDI regulation index at the product level, $FDI RegIndex_{pt}$:

- Liberalized products: These are products for which FDI regulations were reduced and more FDI was encouraged as of year t : $FDI RegIndex_{pt} = 1$.
- No-change products: These are products for which FDI regulations did not experience a change as of year t : $FDI RegIndex_{pt} = 0$.
- De-liberalized products: These are products for which FDI became more restricted and regulations for FDI inflows increased: $FDI RegIndex_{pt} = -1$.

We then map products in each version of the Catalogue to the 4-digit Chinese industrial classification 2002 version (CIC2002) using the Industrial Product Catalogue from the National Bureau of Statistics (NBS) of China.³ As a final step, we manually map the 4-digit industry code (CIC2002) to 3-digit industry classification in the 1990 census data (Chinese industrial classification 1984 version, CIC1984). We define $FDI RegIndex_{it}$ as the simple (unweighted) industry mean of the product-level variable $FDI RegIndex_{pt}$ across all products p in a given 3-digit industry i in a given year t . $FDI RegIndex_{it}$ thus varies continuously between -1 and 1 .⁴

Figure 1 provides an illustration of the patterns of FDI liberalization and de-liberalization experienced over this period. Figure 1a shows the proportion of industries that were subject to FDI liberalization and de-liberalization over time. There are two meaningful waves of liberalization: the first wave in the period 1998–2001, corresponding to China’s accession to the WTO, and the second wave in the period 2004–2007, during which China encouraged FDI into more

³Examples of industries that were identified in each of the above categories can be found in Appendix A. Among the industries that experience the most pronounced de-liberalization are ferroalloy smelting and iron casting and iron melting, consistent with a policy shift away from polluting heavy industry; among the industries experiencing the most pronounced liberalization are motorcycle and computer manufacturing.

⁴The only exception is the index defined as of the 2005 census; this captures two waves of liberalization or de-liberalization, and thus can vary from -2 to 2 .

environmentally-friendly and technologically advanced industries. De-liberalization measures are concentrated in the post-2004 period as investments into pollution-intensive sectors were discouraged. Figure 1b shows a histogram of the cumulative FDI regulation measures experienced by all industries observed; this cumulative variable is not used directly in the analysis, but captures the overall direction of policy during this period. There are 33 industries that experienced cumulative de-liberalization during this period, and 74 which experienced no net changes in FDI regulations. However, the majority (131 industries, or 55%) experienced net liberalization. More details are provided in Appendix Section A.

We then compute county-level exposure to FDI regulation measures as the employment-share-weighted-average FDI regulation index across the three-digit tradable industries active in the county:

$$FDIRegIndex_{ct} = \sum_i s_{ic} FDIRegIndex_{it},$$

where c indexes counties, i indexes 3-digit industries, and L represents employment in a tradable subsector.⁵ s_{ic} denotes the share of employment by industry i in county c in 1990, measured prior to FDI liberalization to abstract from any potential relationship between counties' industry structure and changes in FDI policy. $FDIRegIndex_{ct}$ takes the form of a shift-share measure where the initial employment shares from the 1990 census are the "shares" and the industry FDI regulatory changes are the "shocks".⁶

Across counties, the unweighted county-level FDI regulation index averages 0.003 and has a standard deviation of 0.53 (Panel D in Appendix Table A2). Appendix Figure A2 illustrates the regional variation in the changes in FDI regulations across counties.

⁵The subsectors included in this calculation encompass all subsectors of tradable production: agriculture and other primary subsectors as well as all subsectors of industry.

⁶The FDI regulation index constructed using a particular round of revisions applies to the period from that round of revisions until the next round. For example, the regulation changes between the 1995 and 1997 catalogues are used to construct a policy change variable that applies to the years 1997 to 2001. Since only one census round was collected in this period (corresponding to the year 2000), the FDI policy change applies to this year. Similarly, the (cumulative) regulation changes from 1997 to 2001 and 2001 to 2004 are used to create a policy variable that applies to the census round 2005; the 2004 to 2007 regulation changes create a policy variable that applies to the census round 2010; and the 2007 to 2011 regulation changes create a policy variable that applies to the census round 2015. This data structure is also summarized in Table A1 in the Appendix.

2.3 Local Variation in Fertility Policies

The One Child Policy (OCP) limiting births in China was enacted in 1979, and drove a substantial decline in fertility by 1990; it then continued to drop to around one in 2015 (Yang et al. 2022). In the early 1990s, a “1.5 child policy” was implemented in rural China, allowing for a second child if the first child was a girl; two children (or more) were allowed in more remote provinces, and for ethnic minority households (Li et al. 2011; Ebenstein 2010). Recent policies allowing for two children (2015) or three children (2021) for all households fall outside our time period. From 1990 to 2015, there has also been substantial cross-sectional variation in the intensity of OCP enforcement, with some localities characterized by weaker enforcement and thus higher excess fertility (Li et al. 2011; Huang et al. 2021). In Section 3.5, we document that our results are robust to controlling for variation in the local enforcement intensity of OCP across counties.

2.4 Census Data

We use data from the China population census by combining the 1990, 2000, and 2010 census waves and the 2005 and 2015 one-percent population censuses. The census contains detailed information on region of residence, labor market engagement, industry, demographic characteristics, marriage, fertility, and migration.

For our analysis, we restrict the sample in each census wave to individuals who are of prime working age (18–39) in 1997, the year in which the first wave of FDI liberalization was initiated (i.e., they were born between 1958 and 1979). We also report some findings for the broader population aged 18–60 in 1997.⁷ Individual-level data is then collapsed to county-level means, using a set of 2491 counties observed consistently across the census waves.⁸ All outcomes are calculated as employment shares relative to the total population observed in that county and wave in the target cohorts. We also demonstrate that our results are robust to using an age-based sampling strategy that samples individuals of the same age in each census wave, as distinct

⁷The only caveat to this sampling strategy is that in the 1990 wave, we exclude individuals born before 1972, who were under 18 as of 1990. All other waves include the full set of birth cohorts.

⁸We track counties as their boundaries changed, using information from the Ministry of Civil Affairs, to link them and ensure statistical consistency. We also deal with cases where a county changes its name or code but without changing its administrative boundary. Those counties are treated as the same unit.

from this cohort-based strategy.

Appendix Table A2 provides an overview of summary statistics for variables of interest at the county level and Figure 2 reports trends over time.⁹ Figure 2a suggests a slight decline in the share of employed individuals in the population of the target ages, and Figure 2b displays a substantial shift of labor out of agriculture into manufacturing and services. Marriage rates exhibit a slight decline in the last decade (Figure 2c), and the probability that a woman reports having any children has declined more rapidly (Figure 2d).

2.5 Firm Data

Our primary data source for firm outcomes is the Annual Survey of Industrial Enterprises (ASIE) from 1998–2013, a survey of medium and large-size firms, while we also report supplementary results using the firm census from 1995, 2004 and 2008. (Both sources include only formal firms.)¹⁰ The latter has the advantage of analyzing a representative sample of firms; however, it is only available for three years. The firm-level data provide detailed information on firm geographical location, ownership structure, and economic characteristics such as employment and sales.¹¹ Using each source, we construct the log of the county-level sum of outcomes of interest (total employment, sales and the number of firms for domestic and foreign firm, respectively). Appendix Table A3 provides an overview of summary statistics from the firm data; we observe using ASIE data that an average county has three times as many domestic firms as foreign firms. Given the time structure of the firm data is distinct from the time structure of the census data, we also summarize in Appendix Table A1 how the FDI shocks constructed map into each wave of census and firm data.

⁹In order to capture trends, we generate nationwide means for a sample that is aged 18–39 in each census wave, rather than reporting trends for our key analysis cohorts given that they are aging over the period.

¹⁰The ASIE includes all state-owned firms as well as all firms reporting annual sales above 5 million yuan in 1998–2010 and sales over 20 million yuan in 2011–2013.

¹¹We use information on ownership structure to classify a firm as a foreign firm if more than 25% of its registered capital is held by the foreign investors.

3 Effects of China’s FDI Liberalization

3.1 Identification Strategy

Our baseline specification examines whether counties with greater exposure to FDI liberalization experience differential changes in outcomes of interest. We estimate the following specification:

$$Y_{ct} = \beta FDI RegIndex_{ct} + \mathbf{X}'_{ct}\gamma + \delta_c + \delta_t + \epsilon_{ct}, \quad (1)$$

where c denotes county and t the survey year. Y_{ct} represents county-level outcomes described in Section 2. $FDI RegIndex_{ct}$ is the county-level FDI regulation index, and β is the coefficient of interest capturing the response of county outcomes to exposure to FDI regulatory changes. The terms δ_c and δ_t represent county and year fixed effects; these fixed effects absorb characteristics of counties that are time-invariant as well as national shocks that affect all counties identically in a particular year. We weight all regressions by the initial county population in 1990 (n_c), and cluster standard errors at the county level; the sample period is 1990 to 2015.

The reduced-form relationship in equation (1) will identify the effect of relaxations in FDI regulations on structural transformation and demographic outcomes if $FDI RegIndex_{ct}$ satisfies the exclusion restriction: $E[n_c FDI RegIndex_{ct} \epsilon_{ct}] = E[\sum_i n_c s_{ic} FDI RegIndex_{it} \epsilon_{ct}] = 0$. This requirement will be satisfied if industry-level shocks are uncorrelated with the average county-level characteristics that co-vary with structural transformation and demographic outcomes (Borusyak et al. 2022; Xu 2022).

To test the exogeneity of industry-level FDI policy shocks to county-level characteristics, we follow Borusyak et al. (2022) and calculate each industry’s exposure to these characteristics and correlate them with changes in industry-level FDI regulation for each wave. The county-level pre-treatment characteristics include the manufacturing employment share, rural hukou share, fertility rate, Han ethnic group share, child population by gender, average years of education, and county’s distance to its nearest port.¹² Each industry’s share-weighted average exposure \bar{X}_i to a characteristic X_c is calculated as $\bar{X}_i = (\sum_c n_c s_{ic} X_c) / (\sum_c n_c s_{ic})$, and normalized to have

¹²Appendix B.1 provides descriptions and sources of data for these variables.

zero mean and unit variance. The shifts in industry-level FDI regulation index for each wave, $FDIRegIndex_i$ are regressed on the transformed county-level characteristics \bar{X}_i :¹³

$$FDIRegIndex_i = \alpha + \bar{X}_i' \beta + \epsilon_i. \quad (2)$$

Appendix Table A4 reports the results and shows that a majority of the initial county characteristics are uncorrelated with the FDI policy shocks of interest, consistent with our identifying assumption. (Only six out of 40 coefficients estimated are statistically significant at the five percent level.) Note that we control for county-level characteristics if they are significantly correlated with any of the FDI policy changes in the baseline specifications, to net out any direct effect that these county characteristics may have on structural transformation and demographic outcomes.¹⁴

Our baseline specification also includes a rich additional set of controls (X'_{ct}). This includes four determinants of FDI shown to predict FDI flows at the industry level (Lu et al. 2017) — export intensity, industry average age, number of firms, and new product intensity — converted to county-level averages and interacted with year fixed effects.¹⁵ We also control for several other policy changes whose timing overlaps with FDI liberalization: the average changes in China’s import tariffs; the average exposure of the county to the elimination of quotas on textiles and clothing imports due to the phasing out of the Multi-Fiber Arrangement (MFA); the average changes in other non-tariff barriers; the average changes in production subsidies; the average changes in the share of state-owned enterprises; the average US import Normal Trade Relations (NTR) tariff rates applying to goods produced by each county; and the time-invariant NTR gap and contract intensity interacted with year dummies. Appendix B.2 provides details on data sources and construction of these variables.

¹³The regressions are weighted by $n_i = \sum_c n_c s_{ic}$, measuring the average county-level exposure to FDI shock.

¹⁴The correlated county-level characteristics include manufacturing employment share, rural hukou share, fertility rate, average years of education, and county’s distance to its nearest port.

¹⁵The first three measures come from the 1995 firm census, the earliest firm level data available. Since information on new product intensity is not available in the 1995 firm census, we use data from the 1998 Annual Survey of Industrial Firms (ASIF) for creating this index. All FDI determinants at the industry level are converted to county-level measures by using initial (1990) industry employment shares of the county as weights.

3.2 FDI Liberalization and Local Labor Demand Shocks

We begin by analyzing the effects of FDI liberalization on total employment and sales of non-agricultural firms, as well as the number of firms, in counties more affected by the shift in FDI liberalization. These measures allow us to verify that liberalization does in fact lead to a positive shift in local labor demand, and thus identify the primary channel for any effects on structural transformation and fertility.

Panel A of Table 1 presents the results from estimating our primary specification of interest, equation (1). The coefficient estimates are all significant and positive, indicating a positive impact of exposure to FDI liberalization on firm-level employment and sales, as well as the number of firms, in more affected regions. The estimate in Column (1) implies that one standard deviation increase in FDI regulation index predicts a 0.4 log points relative increase in total employment of firms in affected counties, or a 19 percent increase relative to the change in outcome mean over the sample period, 1998–2013.¹⁶ The estimates in Columns (2) and (3) reveal that a one standard deviation increase in FDI liberalization predicts a 0.7 and 0.2 log points relative increase in the total sales of firms and the number of firms in affected counties, respectively. These effect sizes similarly correspond to a 16 to 19 percent increase relative to the change in outcome means.

We next examine whether these effects are driven by foreign firms, or whether domestic firms experience any spillover effects from the entry of foreign firms on their employment, sales, or total number. Panels B and C of Table 1 report the impact of FDI liberalization on the same outcomes aggregated to the county level using the sample of foreign firms and domestic firms, respectively. The coefficient estimates are all positive, precisely estimated, and similar in magnitude, ranging between 15 to 20 percent relative to changes in outcome means over the sample period, 1998–2013. These findings highlight that there was increased entry of foreign firms in counties more affected by FDI liberalization, as well as a positive effect on local domestic firms, jointly generating a relative increase in total employment. Findings reported in Appendix Table A5 corroborate these findings using data from the firm census.

¹⁶From 1998 to 2013, log employment increased from an average of 6.347 to 8.435 at the county level. This implies that FDI liberalization is associated with an increase in log employment by 19% ($0.40/(8.435-6.347)$).

3.3 FDI Liberalization and Structural Transformation

We now analyze the effects of FDI liberalization on labor market adjustment across the agricultural and non-agricultural sectors in Table 2. The first four columns present estimates for the total employment share, and population shares employed in agriculture, manufacturing, and services, respectively, at the county level. The last two columns report estimates for the shares of population that are unemployed or not in the labor force (NILF).

Panel A estimates the impact of rising FDI liberalization on the employment shares of the population aged 18–60 in 1997, the year in which the first wave of FDI liberalization began. Estimates in panel A, columns 1 to 4, indicate that increased exposure to FDI liberalization reduces agricultural employment and increases manufacturing and service employment. We find no evidence of a significant change in total employment, unemployment, or nonparticipation.

Panel B of Table 2 reports estimates for the population that is identified as within prime reproductive age years (aged 18–39) in 1997, and the estimated coefficient magnitudes are slightly larger for this subsample. From 1990 to 2015, the average county shows an increase in the share of population aged 18–39 engaged in manufacturing from 10% to 14%, a four percentage-point increase. Column 3 implies that a one standard deviation increase in FDI regulation index predicts a 1.2 percentage point (0.53×0.022) increase in manufacturing employment share. Thus, a back-of-the-envelope calculation suggests that FDI liberalization accounts for 30% of the overall shift in manufacturing employment.¹⁷ Panels C and D of Table 2 report parallel effects for men and women, and the estimates indicate that the labor market effects are largely similar; we consistently fail to reject the hypothesis that the estimated effects are different by gender. Further details about heterogeneous effects with respect to age and education are provided in Appendix C.

¹⁷Similarly, a one standard deviation increase in FDI regulation index is associated with a 2.9 percentage point relative decline in share of agricultural employment and a 1.5 percentage point relative increase in the share of service employment, accounting for a 7% and 5% of the changes in outcome means from 1990 to 2015. The relative magnitudes are smaller here since the changes in outcome means are greater. The share of agriculture declined from 67% to 28% while that of services increased from 12% to 40% from 1990 to 2015.

3.4 FDI Liberalization, Marriage and Fertility Outcomes

In this section, we evaluate whether exposure to FDI liberalization policy affected marriage and fertility outcomes, focusing on the sample of individuals in their prime reproductive ages of 18–39. Panels A and B of Table 3 present the impact of exposure to the policy change on marital status among women and men, respectively. Column 1 and 2 estimates show that exposure to FDI liberalization deters marriage formation, leading to a 1.4 percentage point decline in the probability of marriage and a corresponding increase in the probability of never marriage. We find corresponding results for fertility, measured as births per 1,000 women and percent of women with children for the same age group of 18–39, as reported in columns 4–5 in Panel A. (While it is possible that women who shift out of agriculture also experience an adjustment in their hukou status that would restrict their ability to have a second child, it is evident that the effect is also significant for the probability of reporting any child, a status that would be unaffected by shifts in hukou.)

From 1990 to 2015, the average county shows an decrease in the share of women aged 18-39 who have children from 67% to 62%, a 5 percentage-point decline. Our coefficient estimates imply that one standard deviation increase in FDI regulation index predicts a 1.5 percentage point (0.53×0.027) decline in this measure, or 30% of the overall shift. Note that we cannot attribute this shift in fertility to a shock in a particular year or at a particular age; we interpret these findings as the cumulative effect of shocks over the full 25-year period on the probability of having achieved a certain status (married, or reporting a child) as of the final year, at which point the youngest members of the sample are 36 and have presumably largely completed their fertility.

3.5 Robustness Checks

Alternate specifications Appendix Table A8 reports robustness checks for the primary results on margins of labor market adjustment in response to the FDI policy change. In Panel A, we re-estimate the primary results for an alternative FDI liberalization shock constructed by assigning a zero value to the FDI regulation index for nontradable sectors. To ensure that the results are

not driven by industry outliers, we conduct two additional robustness checks: in Panel B, we construct an alternate FDI regulation index by excluding industries characterized by the lowest value of the industry-level FDI index; and in Panel C, we construct an alternative FDI regulation index by excluding industries characterized by the highest level of liberalization. The results in all three panels are consistent with our primary results in Table 2. Additional robustness checks (again consistent) for the sample aged 18–60 are reported in Table A9, and additional robustness checks for the marriage and fertility results are reported in Appendix Tables A10 and A11. Finally, Appendix Table A12 reports results by excluding all control variables except county and year fixed effects; these estimates are consistent with our primary estimates in Tables 2 and 3 though larger in magnitude.

Permutation tests We also conduct a permutation test by randomly dividing industries into more welcome, less welcome, or no-change categories, and randomizing the policy implementation period. We thus generate a false FDI regulation index, $FDI RegIndex_{it}^{false}$, and convert the industry-level measure to county-level exposure to false FDI regulation as: $FDI RegIndex_{ct}^{false} = \sum_i s_{ic} FDI RegIndex_{it}^{false}$. The permutation ensures that $FDI RegIndex_{ct}^{false}$ should not have any effect on labor market, marital status and fertility outcomes, provided that our estimation is correctly specified. We conduct this random data-generating process 500 times, and report the average and standard deviation of the 500 estimates in Panels D of Appendix Tables A8 and A9 for labor market outcomes and Tables A10 and A11 for marital status and fertility outcomes for women and men, respectively. The average of estimates for $FDI RegIndex_{ct}^{false}$ is close to zero and highly insignificant, suggesting that our estimates are not driven by other confounding factors.¹⁸

Age-based sample We re-estimate our findings using an alternate sample defined consistently by age over time, rather than by year of birth: specifically, individuals aged 18–39 in each census wave. These findings are reported in Appendix Table A13 for labor market, marital status, and fertility outcomes, and are consistent with the primary results.

¹⁸The standard deviation of the 500 estimates is similar to the standard errors reported in Tables 2 and 3, lending support to the confidence in the estimated standard errors.

Neighboring County Effects Our identification strategy relies on the assumption that only the local labor market shock is relevant to structural transformation and demographic outcomes. However, in reality there could be spillover effects across county borders, and to account for the effects of these cross-border shocks, we construct a measure of FDI liberalization of neighboring counties as $FDI RegIndex_{ct}^{neighbor} = \sum_{k \in dist_c} \gamma_{ck} FDI RegIndex_{kt}$, and include the measure in the specifications. Here, $dist_c$ denotes the set of counties within a r -mile radius of the county c , and γ_{ck} denotes the employment share of residents of county k in the neighboring counties of the county c in 1990. We report results by including FDI shocks of the neighboring counties within a 50-mile radius in Appendix Table A14 and a 300-mile radius in Table A15.¹⁹ We find that the results are highly consistent, indicating that cross-county spillovers of FDI liberalization do not confound our estimates.

Migration We explore the effects of FDI liberalization on migration, measured as the immigration rate (the percentage of the total population of the reference cohorts, aged 18–39 in 1997, that is a reported in-migrant), and the emigration rate (the percentage of the same population that is a reported out-migrant) following Imbert et al. (2022).²⁰ In both cases, migration is defined as any move across county lines and we focus on migrants moved away to seek jobs. The results reported in Appendix Table A16 show no evidence of a significant change in migration in response to regional FDI policy changes. These results further ameliorate the concern that our estimates are confounded by the possibility of cross-border worker migrations induced by FDI liberalization in neighboring counties.

One Child Policy To evaluate the robustness of the estimated effects of FDI liberalization on fertility, we also explore including additional control variables for variation in the imposition of the OCP. We do this by drawing on two existing sources of data. The first is county-level variation in the excess fertility rate (above OCP policy targets) in 1981, prior to any FDI

¹⁹The results are robust to the inclusion of FDI shocks of neighboring counties within a 100-mile, 150-mile, 200-mile, and 250-mile radius.

²⁰The immigration rate is measured as the share of migrants who arrived in a given destination relative to the total number of non-migrant residents in that destination. The emigration rate is measured as the share of migrants who departed a region relative to the total number of residents in that origin region. Migration data are available from the 2000, 2005, 2010, and 2015 census rounds.

liberalization, a variable employed by [Li and Zhang \(2017\)](#) as a proxy for local enforcement of fertility policy. The second variable is province-level variation in the average penalty for violating the policy, again calculated in the pre-1990 period, as analyzed by [Huang et al. \(2021\)](#). In both cases, we match these variables to our existing sample and include interactions between the baseline OCP variable and census wave fixed effects. The results reported in Appendix Tables [A17](#) and [A18](#) are entirely consistent with our primary results. Hence, we conclude that local variation in the OCP enforcement is not driving the observed patterns.

4 Conclusion

In this paper, we study the effects of China’s FDI liberalization on structural transformation and demographic transitions. Our findings indicate that counties more exposed to FDI liberalization experienced a significant relative decline in the share of agricultural employment, and a corresponding increase in the shares of manufacturing and services employment; there is also a decline in the rate of marital formation and births. Our findings have broader implications for the economic and demographic consequences of globalization-related shocks. To the extent that such shocks induce sectoral shifts in employment of men and women, they are likely to have significant effects on pace of demographic transition in developing countries. Consistent with a broader literature on the effects of industrialization on fertility, policies that move women and men towards higher productivity sectors have the potential to reduce birth rates by deterring marriage and increasing the opportunity cost of having children.

References

- Aitken, Brian J. and Ann E. Harrison**, "Do Domestic Firms Benefit from Direct Foreign Investment? Evidence from Venezuela," *American Economic Review*, June 1999, 89 (3), 605–618.
- Alfaro, Laura**, "Gains from Foreign Direct Investment: Macro and Micro Approaches," *The World Bank Economic Review*, March 2016, 30, S2–S15.
- Autor, David, David Dorn, and Gordon Hanson**, "When Work Disappears: Manufacturing Decline and the Falling Marriage Market Value of Young Men," *American Economic Review: Insights*, September 2019, 1 (2), 161–78.
- Becker, Gary S and H Gregg Lewis**, "On the Interaction between the Quantity and Quality of Children," *Journal of Political Economy*, 1973, 81 (2, Part 2), S279–S288.
- Blomström, Magnus and Ari Kokko**, "Multinational corporations and spillovers," *Journal of Economic Surveys*, 1998, 12 (3), 247–277.
- Borusyak, Kirill, Peter Hull, and Xavier Jaravel**, "Quasi-experimental shift-share research designs," *Review of Economic Studies*, 2022, 89 (1), 181–213.
- Brandt, Loren and Peter Morrow**, "Tariffs and the organization of trade in China.," *Journal of International Economics*, 2017, 104, 85–103.
- , **Johannes Van Biesebroeck, Luhang Wang, and Yifan Zhang**, "WTO accession and performance of Chinese manufacturing firms," *American Economic Review*, 2017, 107 (9), 2784–2820.
- Do, Quy-Toan, Andrei A. Levchenko, and Claudio Raddatz**, "Comparative advantage, international trade, and fertility," *Journal of Development Economics*, 2016, 119, 48–66.
- Doepke, Matthias**, "Accounting for fertility decline during the transition to growth," *Journal of Economic growth*, 2004, 9 (3), 347–383.
- Ebenstein, Avraham**, "The "missing girls" of China and the unintended consequences of the one child policy," *Journal of Human Resources*, 2010, 45 (1), 87–115.

- Erten, Bilge and Jessica Leight**, "Exporting out of agriculture: The impact of WTO accession on structural transformation in China," *Review of Economics and Statistics*, 2021, 103 (2), 364–380.
- Feenstra, Robert C and Gordon H Hanson**, "Foreign direct investment and relative wages: Evidence from Mexico's maquiladoras," *Journal of International Economics*, 1997, 42 (3), 371–393.
- Galor, Oded and David N. Weil**, "Population, Technology, and Growth: From Malthusian Stagnation to the Demographic Transition and Beyond," *American Economic Review*, September 2000, 90 (4), 806–828.
- **and David Weil**, "The Gender Gap, Fertility, and Growth," *American Economic Review*, 1996, 86 (3), 374–87.
- Giuntella, Osea, Lorenzo Rotunno, and Luca Stella**, "Globalization, Fertility and Marital Behavior in a Lowest-Low Fertility Setting," 2022. NBER Working Paper 30119.
- Greenwood, Jeremy and Ananth Seshadri**, "The US demographic transition," *American Economic Review*, 2002, 92 (2), 153–159.
- Hsu, Wen-Tai, Yi Lu, Xuan Luo, and Lianming Zhu**, "Foreign direct investment and industrial agglomeration: Evidence from China," *Journal of Comparative Economics*, 2023, *forthcoming*.
- Hu, Albert GZ, Gary H Jefferson et al.**, "FDI impact and spillover: evidence from China's electronic and textile industries," *the world Economy*, 2002, 25 (8), 1063–1076.
- Huang, Wei, Xiaoyan Lei, and Ang Sun**, "Fertility Restrictions and Life Cycle Outcomes: Evidence from the One-Child Policy in China," *Review of Economics and Statistics*, 2021, 103 (4), 694–710.
- Imbert, Clement, Marlon Seror, Yifan Zhang, and Yanos Zylberberg**, "Migrants and firms: Evidence from china," *American Economic Review*, 2022, 112 (6), 1885–1914.
- Juhn, Chinhui, Gergely Ujhelyi, and Carolina Villegas-Sanchez**, "Trade liberalization and gender inequality," *American Economic Review*, 2013, 103 (3), 269–73.

Keller, Wolfgang and Hale Utar, “Globalization, gender, and the family,” *The Review of Economic Studies*, 2022, 89 (6), 3381–3409.

Khandelwal, Amit, Peter K. Schott, and Shang-Jin Wei, “Trade liberalization and embedded institutional reform: Evidence from Chinese exporters,” *American Economic Review*, 2013, 103 (6), 2169–2195.

Li, Bingjing and Hongliang Zhang, “Does population control lead to better child quality? Evidence from China’s one-child policy enforcement,” *Journal of Comparative Economics*, 2017, 45 (2), 246–260.

Li, Hongbin, Junjian Yi, and Junsen Zhang, “Estimating the effect of the one-child policy on the sex ratio imbalance in China: Identification based on the difference-in-differences,” *Demography*, 2011, 48 (4), 1535–1557.

Lu, Yi, Zhigang Tao, and Lianming Zhu, “Identifying FDI spillovers,” *Journal of International Economics*, 2017, 107, 75–90.

Mühlen, Henning and Octavio Escobar, “The role of FDI in structural change: Evidence from Mexico,” *The World Economy*, 2020, 43 (3), 557–585.

Nunn, Nathan, “Relationship-specificity, incomplete contracts, and the pattern of trade,” *Quarterly Journal of Economics*, 2007, 122 (2), 569–600.

Pierce, Justin R and Peter K Schott, “The surprisingly swift decline of US manufacturing employment,” *American Economic Review*, 2016, 106 (7), 1632–1662.

— and —, “Trade liberalization and mortality: evidence from US counties,” *American Economic Review: Insights*, 2020, 2 (1), 47–64.

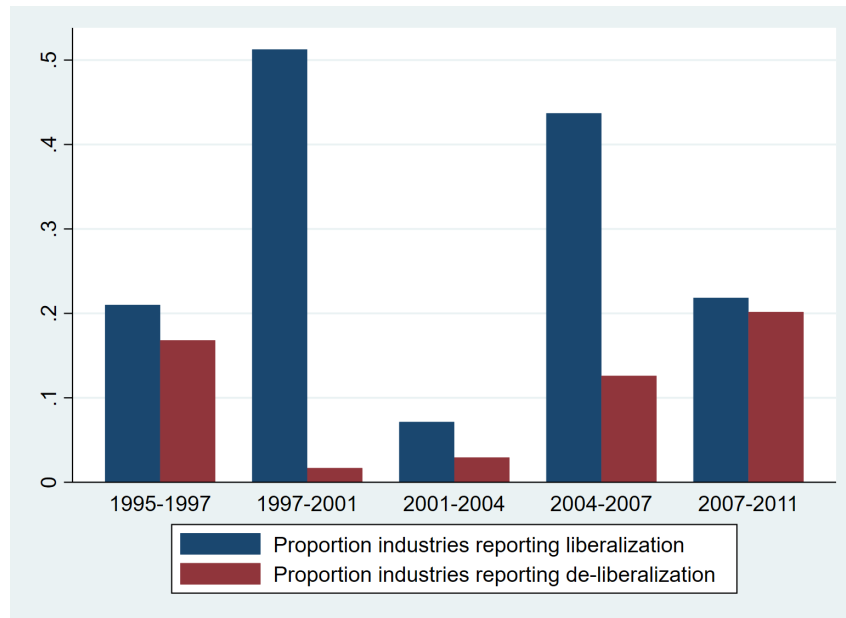
Rong, Shu, Kai Liu, Si Huang, and Qi Zhang, “FDI, labor market flexibility and employment in China,” *China Economic Review*, 2020, 61, 101449.

Xu, Chenzi, “Reshaping global trade: the immediate and long-run effects of bank failures,” *The Quarterly Journal of Economics*, 2022, 137 (4), 2107–2161.

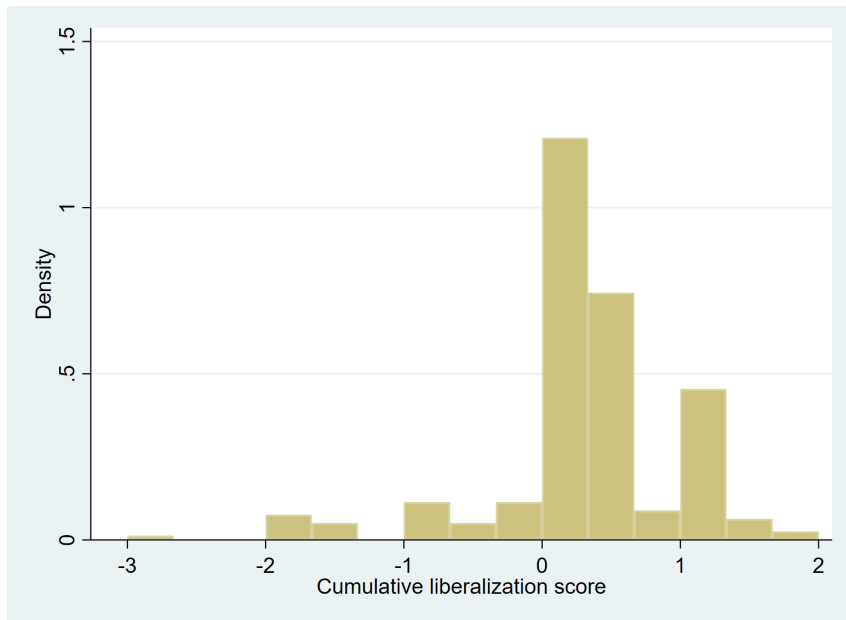
Yang, Shucui, Quanbao Jiang, and Jesús J Sánchez-Barricarte, “China’s fertility change: an analysis with multiple measures,” *Population Health Metrics*, 2022, 20 (1), 1–14.

FIGURE 1: FDI LIBERALIZATION SHOCKS AT INDUSTRY LEVEL

(A) FDI regulation measures by wave

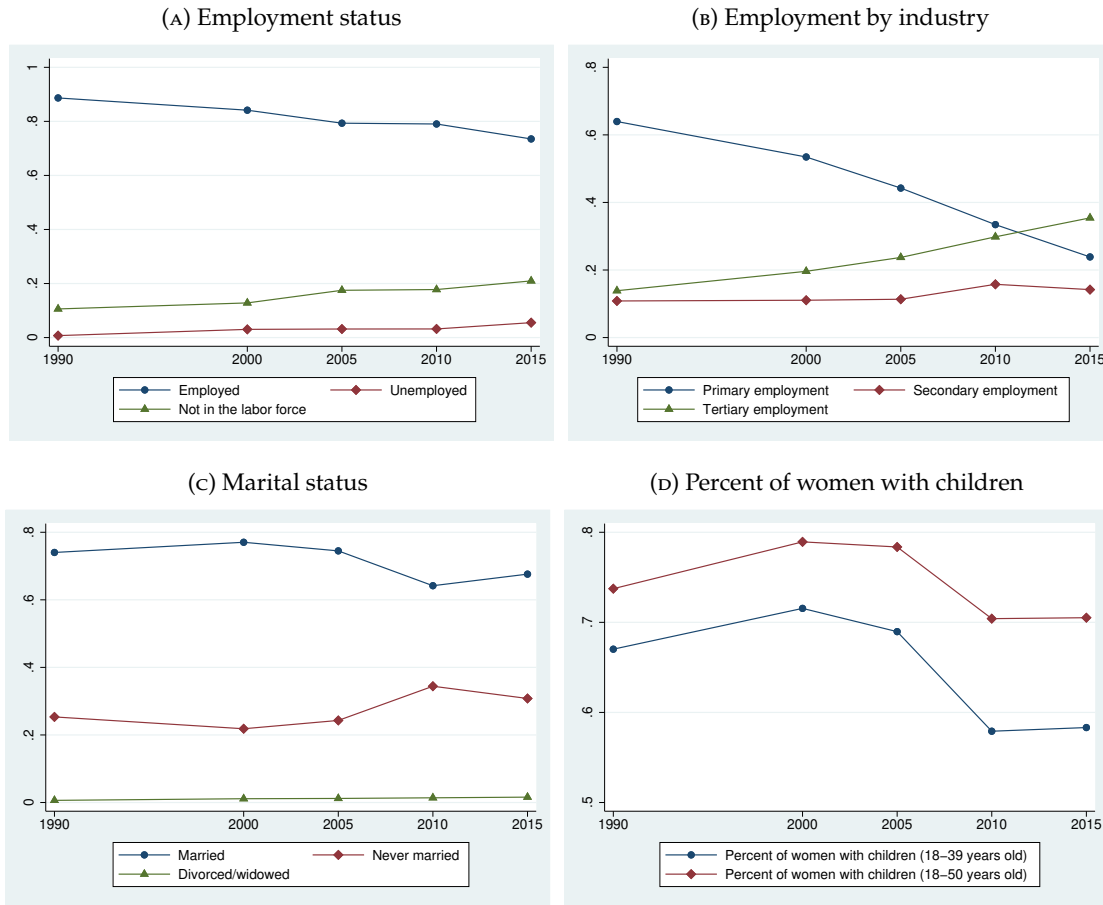


(B) Distribution of cumulative FDI regulation measures



Note: The data comes from the Catalogue for the Guidance of Foreign Investment Industries from 1995 to 2011 for 238 subsectors of tradable production. Panel A plots the proportion of industries for which the Catalogue reports increased FDI liberalization and de-liberalization measures by waves of the Catalogue; the omitted category is industries reporting no regulatory changes in that wave. Panel B reports the cumulative sum of FDI regulation measures experienced at the industry level; this sum is not directly used in the analysis, but provides an overview of the direction of regulatory shifts during this period.

FIGURE 2: EMPLOYMENT, MARRIAGE AND FERTILITY IN CHINA (1990–2015)



Note: Figure 2a plots the employment status (share of employed, unemployed and not in the labor force to working-age population) from 1990–2015. Figure 2b plots the employment by industry (share of employment in primary, secondary and tertiary industry) from 1990–2015; the sum of shares by industry is equal to the share of the population that is employed. Employment data are from the 1990, 2000, 2005, 2010 and 2015 population census. Figure 2c plots the marital status (share of married, never married, divorced and widowed to women ages 18–39 years old) from 1990–2015. Figure 2d plots the percent of women (number of children per women ages 18–39 years old and women ages 18–50 years old) from 1990–2015. Data on marital status, fertility and number of children are from the 1990, 2000, 2005, 2010 and 2015 population census.

TABLE 1: EFFECTS OF FDI LIBERALIZATION ON EMPLOYMENT, SALES AND NUMBER OF FIRMS

	Log employment (1)	Log sales (2)	Log # firms (3)
Panel A: All firms			
FDI Liberalization	1.040*** (0.297)	1.630*** (0.449)	0.575*** (0.180)
Observations	39824	39824	39824
Outcome mean	7.37	10.88	3.98
Panel B: Foreign firms			
FDI Liberalization	0.787*** (0.225)	1.321*** (0.372)	0.181** (0.075)
Observations	39824	39823	39824
Outcome mean	4.53	8.01	1.28
Panel C: Domestic firms			
FDI Liberalization	1.099*** (0.314)	1.686*** (0.467)	0.637*** (0.194)
Observations	39824	39824	39824
Outcome mean	7.08	10.58	3.69
County fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Year fixed effects			
× County initial characteristics	Yes	Yes	Yes
× FDI determinants	Yes	Yes	Yes
× Other policies	Yes	Yes	Yes

Notes: Data are from ASIF 1998–2013. County initial characteristics controls include county’s manufacturing employment share, rural hukou share, fertility rate, average years of education, and distance to its nearest port. FDI determinants controls include county’s exposure to export intensity, industry average age, new product intensity, and total number of firms. Other policies include changes in China’s import tariffs, changes in non-trade barriers, changes in production subsidies, changes in share of number of state-owned enterprises, NTR gap, contract intensity, and time-varying MFA exposure and NTR tariff rates. Regressions are weighted by 1990 county population. Standard errors are clustered at the county level and shown in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels.

TABLE 2: FDI LIBERALIZATION AND LABOR MARKET ADJUSTMENT

	All sectors (1)	Agri (2)	Manu (3)	Service (4)	Unemployed (5)	NILF (6)
Panel A: Population ages 18-60 in year 1997						
FDI Liberalization	-0.004 (0.011)	-0.065*** (0.014)	0.021*** (0.006)	0.039*** (0.012)	0.000 (0.004)	0.004 (0.010)
Observations	12445	12445	12445	12445	12445	12445
Outcome mean	0.86	0.51	0.10	0.25	0.03	0.11
Panel B: Population ages 18-39 in year 1997						
FDI Liberalization	-0.006 (0.014)	-0.069*** (0.016)	0.030*** (0.008)	0.033* (0.017)	-0.006 (0.006)	0.012 (0.012)
Observations	12444	12444	12444	12444	12444	12444
Outcome mean	0.87	0.49	0.11	0.27	0.03	0.10
Panel C: Male ages 18-39 in year 1997						
FDI Liberalization	0.004 (0.011)	-0.069*** (0.019)	0.022** (0.011)	0.051** (0.020)	-0.000 (0.007)	-0.003 (0.008)
Observations	12443	12443	12443	12443	12443	12443
Outcome mean	0.93	0.49	0.12	0.32	0.03	0.04
Panel D: Female ages 18-39 in year 1997						
FDI Liberalization	-0.017 (0.018)	-0.075*** (0.018)	0.037*** (0.009)	0.021 (0.016)	-0.010 (0.009)	0.027 (0.018)
Observations	12442	12442	12442	12442	12442	12442
Outcome mean	0.81	0.48	0.10	0.22	0.04	0.16
Panel E: Test of coefficient equality between male and female						
<i>p</i> -value	0.201	0.732	0.196	0.136	0.353	0.065
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects						
× County initial characteristics	Yes	Yes	Yes	Yes	Yes	Yes
× FDI determinants	Yes	Yes	Yes	Yes	Yes	Yes
× Other policies	Yes	Yes	Yes	Yes	Yes	Yes

Notes: County initial characteristics controls include county's manufacturing employment share, rural hukou share, fertility rate, average years of education, and distance to its nearest port. FDI determinants controls include county's exposure to export intensity, industry average age, new product intensity, and total number of firms. Other policies include changes in China's import tariffs, changes in non-trade barriers, changes in production subsidies, changes in share of number of state-owned enterprises, NTR gap, contract intensity, and time-varying MFA exposure and NTR tariff rates. Regressions are weighted by 1990 county population. Standard errors are clustered at the county level and shown in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels.

TABLE 3: FDI LIBERALIZATION, MARRIAGE, AND FERTILITY

	Married (1)	Never married (2)	Widowed divorced (3)	Births per 1,000 women (4)	Percent of women with children (5)
Panel A: Female ages 18-39 in year 1997					
FDI Liberalization	-0.020** (0.008)	0.028*** (0.006)	-0.008 (0.007)	-7.818*** (2.391)	-0.024** (0.009)
Observations	12445	12445	12445	12445	12445
Outcome mean	0.88	0.10	0.03	48.16	0.80
Panel B: Male ages 18-39 in year 1997					
FDI Liberalization	-0.020*** (0.007)	0.024*** (0.007)	-0.004 (0.003)		
Observations	12445	12445	12445		
Outcome mean	0.80	0.18	0.03		
County fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects					
× County initial characteristics	Yes	Yes	Yes	Yes	Yes
× FDI determinants	Yes	Yes	Yes	Yes	Yes
× Other policies	Yes	Yes	Yes	Yes	Yes

Notes: County initial characteristics controls include county's manufacturing employment share, rural hukou share, fertility rate, average years of education, and distance to its nearest port. FDI determinants controls include county's exposure to export intensity, industry average age, new product intensity, and total number of firms. Other policies include changes in China's import tariffs, changes in non-trade barriers, changes in production subsidies, changes in share of number of state-owned enterprises, NTR gap, contract intensity, and time-varying MFA exposure and NTR tariff rates. Regressions are weighted by 1990 county population. Standard errors are clustered at the county level and shown in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels.

For Online Publication

Appendix A Coding FDI Liberalization

As described in Section 2.2, industries over this period experience both liberalization and de-liberalization, as well as some reporting no change. Here, we provide some more detailed industry-specific examples for industries at the 4-digit level.

- Liberalized industries: Under the metal product manufacturing industry, metal materials (e.g., aluminum and aluminum-magnesium alloys) for aerospace and production of nickel-containing stainless steel were listed in the supported category in the 2011 Catalogue, but they were in the permitted category in the 2007 Catalogue. All other products remained unchanged in both 2007 and 2011 Catalogues. This industry is thus designated as a liberalized industry in 2004.
- No-change industries: Under the plastic products industry, production of polyimide fresh-keeping film, agricultural film, and digestion and recycling of waste plastic were listed in the supported category in both the 2002 and 2004 Catalogues, and all other products were in the permitted category in both Catalogues. This industry is thus designated as no-change in 2004.
- De-liberalized industries: Under the ferrous metallurgy and rolling industry, production of heavy iron plate, galvanized and highly corrosive lead-zinc alloy plate and coated board, and scrap processing were listed in the supported category in the 2002 Catalogue, while these products were in the permitted category in the 2004 Catalogue. For all other products, there were no change in categories. Such industries were designated as de-liberalized industries.

The major subsectors of primary production — agriculture, forestry, fishing, and mining — generally do not experience major regulatory changes in this period. The majority of primary industries are characterized by a cumulative FDI variable of either zero — indicating no regulatory change — or -1 , suggesting a mild shift toward de-liberalization. The subsectors corresponding to food crops and other agriculture are both characterized by a cumulative liberalization score of zero.

Appendix B Definition and Data Sources of Variables

B.1 County Characteristics

The county level characteristics employed as controls in the regressions are listed as below. The following three variables are constructed using the 1990 China Population Census:

- Manufacturing employment share: The ratio of the population employed in manufacturing to the total working-age population.

- Rural hukou share: The ratio of the population holding local household registration (hukou) to total population.
- Fertility rate: average births to women aged 18-39 years old.
- Han ethnic group share: The ratio of the Han population to the total population.
- Years of education: The county's average years of education of population aged above six.
- Child population by gender: female and male population aged under 18 years old.

The following variable comes from China City Statistical Yearbook:

- Distance to the nearest port: The county's distance to its nearest port.

B.2 Policy Controls

Other policy controls employed in the main regressions are listed below.

- Changes in import tariffs: Tariff data are obtained from the website of the World Integrated Trade Solution (WITS). The HS product level tariff measures are aggregated to 3-digit industry classification in the 1990 census data, using the concordance between the Chinese Industrial Classification (CIC) system and HS codes. The simple average ad valorem tariff for each industry from the period of 1992 to 2007 is computed. The county-level exposure of tariff changes is calculated using the 1990 employment-share-weighted-average tariff change between 1992 and 2007 across 3-digit industries in the county.
- Changes in non-tariff barriers (NTB): We use the volume of licensing of exports and imports as the NTB measure. Licensing data for each designated HS product is collected from the website of the China's Ministry of Commerce from 1997 to 2007. The product data are aggregated to the 3-digit industry level using the concordance between CIC system and HS codes. The county-level exposure to NTB change is computed as the 1990 employment-share-weighted-average NTB change between 1997 and 2007 across 3-digit industries in the county.
- Changes in production subsidies: Data on firm subsidies are drawn from the Annual Survey of Industrial Enterprises (ASIE) from 1998 to 2007. The ASIE data cover all state-owned enterprises (SOEs) and non-SOEs with annual sales above 5 million renminbi. A firm's production subsidy ratio is measured as the fraction of total subsidies divided by total sales. The mean value across firms in each 4-digit industry in the ASIE data is used as the industry measure of production subsidies. The 4-digit industry level data are manually mapped to the 3-digit industry classification in the 1990 census data. We calculate each county's exposure to changes in production subsidies as the 1990 employment-share-weighted-average industry subsidies change between 1998 and 2007 across 3-digit industries in the county.
- Changes in the share of state-owned enterprises (SOEs): We use the same ASIE data to calculate the share of SOEs for each industry as the ratio of the number of SOEs to the total

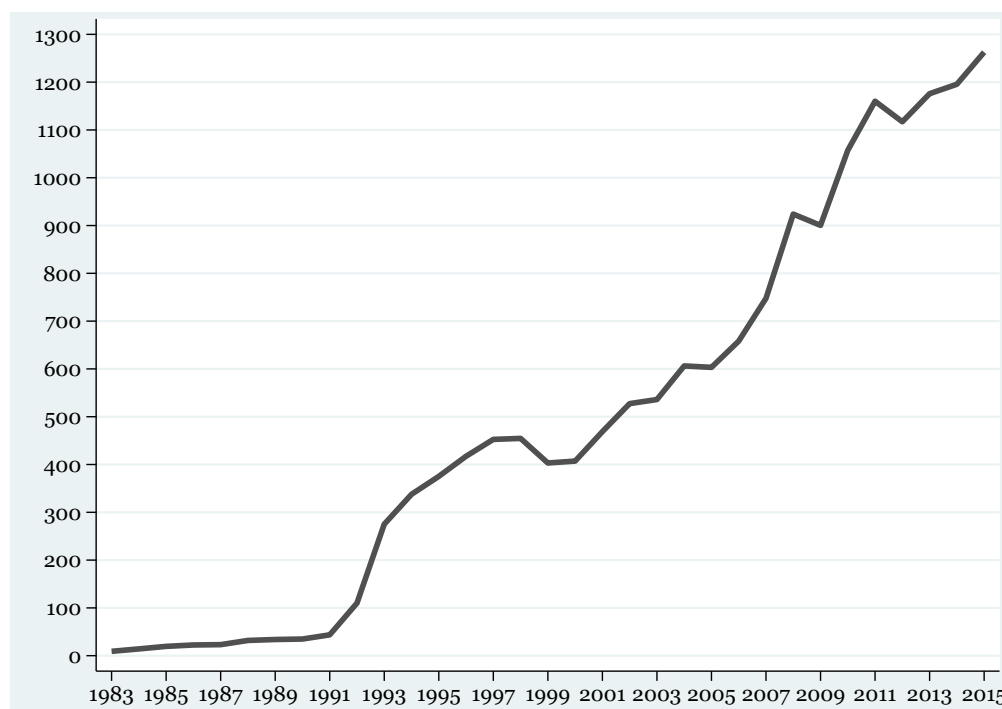
number of firms. The measure is then manually mapped to the 3-digit industry classification in the 1990 census. We calculate the change over time in this measure at the industry level between 1998 and 2007, and then calculate county-level exposure as the 1990 employment-share-weighted-average change in SOE ratio between 1998 and 2007 across 3-digit industries.

- **Contract intensity:** We use the input relationship-specific index constructed by [Nunn \(2007\)](#), measuring the share of inputs that are not sold on an organized exchange, for each industry in 1987 US input-output table. The 1987 IO industry is mapped to the HS 10-digit product level using concordance provided by the Bureau of Economic Analysis, and then averaged to the HS 6-digit level. The HS product level is converted to 3-digit industry level using concordance between CIC system and HS codes. We then calculate county-level exposure to contract intensity, using the 1990 employment-share-weighted-average input relationship-specific index across 3-digit industries in the county.
- **NTR gap:** We follow [Pierce and Schott \(2016\)](#) and measure industry-level exposure to Permanent Normal Trade Relations to China (PNTR) as the difference between the higher tariff rate (non-MFN tariff) that would have applied in the case of the revocation of China's NTR status and the lower NTR rate (MFN tariff). Tariff data at the HS product level are obtained from the WITS database, and aggregated to 3-digit industry in the 1990 census using the concordance between CIC system and HS codes. The county-level exposure to PNTR is then calculated using employment-share-weighted NTR gap in 1999 across 3-digit industries in the county.
- **Time-varying NTR tariff rates:** We use the U.S. import tariff rate at the HS product level as a measure of NTR tariff rates. The tariff data are obtained from the WITS database, and then aggregated up to the 3-digit industry classification in the 1990 census data. The county-level exposure to NTR tariff is computed using employment-share-weighted US import tariff rates for the period of 1990 to 2015 across 3-digit industries in the county.
- **Time-varying MFA exposure:** Quota fill rate is measured based on each industry's exposure to Multifiber Arrangement (MFA) for each phase. The industry-time varying MFA is calculated using the cumulative fill rates as each phase of MFA expiration takes place. We refer to [Khandelwal et al. \(2013\)](#) and [Pierce and Schott \(2020\)](#) for a detailed description on the background of MFA and its policy measure. The county-level exposure to MFA is calculated using employment-share-weighted MFA rates across 3-digit industries in the county.

Appendix C Heterogeneous effects

Tables [A6](#) and [A7](#) further examine potential patterns of heterogeneity in the primary effects of the FDI shock on labor market outcomes with respect to education and age. Table [A6](#) indicates that the estimated effects are smaller for the most educated workers with 12 or more years of educational attainment (Panel C) relative to less educated workers (Panels A and B), which is not surprising given that highly-educated workers have a lower likelihood of working in agriculture. Estimates in Table [A7](#) suggest the effects are meaningfully larger for younger workers, with the magnitude of the substitution out of agriculture, for example, about twice as large for workers 18–25 vis-a-vis workers 36 or older in the year 1997.

FIGURE A1: FOREIGN DIRECT INVESTMENT (REALIZED), 1983–2015 (USD 100 MILLION)



Note: The annual data on foreign direct investment is drawn from the China Foreign Economic Statistical Yearbook as reported by the National Bureau of Statistics of China: <http://www.stats.gov.cn/tjsj/nds/j/2019/indexeh.htm>. The unit of measurement is USD 100 million.

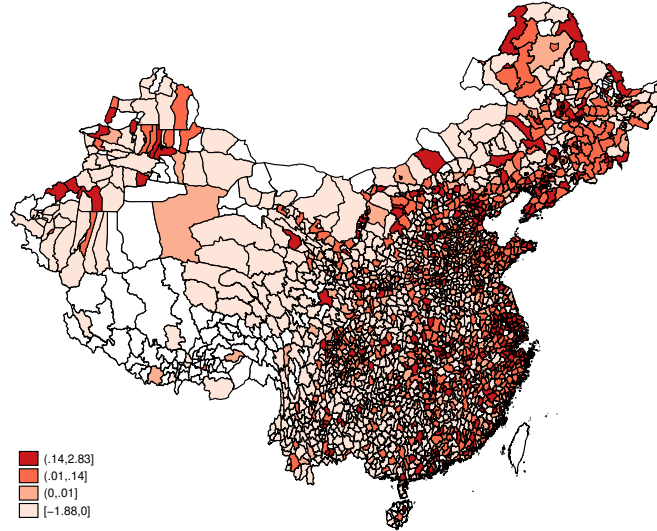
TABLE A1: MAPPING FDI SHOCK TO POPULATION CENSUS AND FIRM DATA

FDI Catalogue	Date issued	Effective date	FDI shock	Years of pop census	Years of firm data (ASIE)	Years of firm census
N/A	N/A	N/A	Baseline FDI shock: 0	1990	N/A	1995
1997 Revision	Dec 31, 1997	Jan 1, 1998	Change 1995–1997	2000	1998–2001	N/A
2002 Revision	Mar 4, 2002	Apr 1, 2002	Change 1997–2002	2005 ^a	2002–2004	2004
2004 Revision	Nov 30, 2004	Jan 1, 2005	Change 2002–2004	2005 ^a	2005–2007	N/A
2007 Revision	Oct 31, 2007	Dec 1, 2007	Change 2004–2007	2010	2008–2011	2008
2011 Revision	Dec 24, 2011	Jan 30, 2012	Change 2007–2011	2015	2012–2013	N/A

Notes: This table reports how the FDI shocks are mapped into the multiple waves of population census and firm data from the ASIE and the firm census. The FDI Catalogue was first promulgated and became effective on June 20, 1995.

^a: For the 2005 mini-census data, we use the change in FDI shock from 1997 to 2004 since there are two revisions implemented in this time period.

FIGURE A2: COUNTY-LEVEL EXPOSURE TO FDI REGULATION



Note: This figure plots the county-level exposure to FDI regulation, computed as the employment-share weighted-average changes in FDI regulation index between 1995 and 2011 across all of the Chinese three-digit industries. Employment data are from the 1990 population census. Data on FDI regulation index are from Catalogue for the Guidance of Foreign Investment Industries from 1995 to 2011.

TABLE A2: SUMMARY STATISTICS

	Obs (1)	Mean (2)	S.D. (3)	Min (4)	Max (5)
Panel A. Employment (as percentage of population ages 18-39 in year 1997)					
Total employment	12,454	0.871	0.103	0.000	1.000
Employment in agriculture	12,454	0.485	0.296	0.000	1.000
Employment in manufacturing	12,454	0.113	0.127	0.000	0.872
Employment in services	12,454	0.272	0.182	0.000	1.000
Unemployed	12,454	0.031	0.043	0.000	1.000
Not in the labor force	12,454	0.098	0.083	0.000	1.000
Panel B. Marriage and fertility (as percentage of women ages 18-39 in year 1997)					
Married	12,453	0.876	0.126	0.000	1.000
Never married	12,453	0.096	0.135	0.000	0.967
Widowed / divorced	12,453	0.028	0.031	0.000	0.600
Births per 1,000 women	12,453	48.146	54.169	0.000	500.000
Percent of women with children	12,453	0.800	0.166	0.016	1.000
Panel C. Marriage (as percentage of men ages 18-39 in year 1997)					
Married	12,455	0.798	0.164	0.034	1.000
Never married	12,455	0.176	0.174	0.000	0.966
Widowed / divorced	12,455	0.027	0.024	0.000	0.278
Panel D. FDI Regulation					
FDI Regulation Index	12,455	.003	.53	-1.72	1

Notes: Panel A presents summary statistics for labor market variables, and Panels B and C present summary statistics for marriage and fertility for women and men, respectively. Panel D presents the summary statistics of FDI regulation index between 1995 and 2011. All variables are summarized at the county level. Data in Panels A, B and C are from the 1990, 2000, 2005, 2010, and 2015 population census sample. Panel D presents summary statistics for our main measure of FDI liberalization, constructed using data from the Catalogue for the Guidance of Foreign Investment Industries from 1995 to 2011.

TABLE A3: SUMMARY STATISTICS: MANUFACTURING FIRMS

	Obs (1)	Mean (2)	S.D. (3)	Min (4)	Max (5)
Total employment (in logs)	39,856	7.371	5.603	0.693	22.229
Foreign firms	39,856	4.524	3.837	0.000	14.299
Domestic firms	39,856	7.080	5.912	0.000	22.229
Total sales (in logs)	39,856	10.876	8.250	0.693	28.113
Foreign firms	39,855	8.005	6.502	0.000	20.549
Domestic firms	39,856	10.576	8.566	0.000	28.113
Total number of firms (in logs)	39,856	3.976	3.221	0.693	16.296
Foreign firms	39,856	1.276	1.435	0.000	7.803
Domestic firms	39,856	3.687	3.495	0.000	16.296

Notes: This table presents summary statistics on firm characteristics for all manufacturing firms, foreign and domestic manufacturing firms from the Annual Survey of Industrial Firms 1998–2013.

TABLE A4: FDI LIBERALIZATION AND INITIAL COUNTY-LEVEL CHARACTERISTICS

	Shift in FDI liberalization				
	(1)	(2)	(3)	(4)	(5)
Manu emp share	0.006 (0.071)	0.091** (0.042)	-0.003 (0.009)	0.044 (0.079)	-0.165** (0.068)
Rural pop share	-0.380 (0.241)	0.052 (0.065)	0.021 (0.018)	0.433 (0.272)	0.334** (0.152)
Fertility rate	-0.379*** (0.113)	0.098* (0.058)	0.023 (0.029)	0.102 (0.131)	0.218* (0.121)
Han ethnic group share	-0.033 (0.060)	-0.002 (0.017)	-0.009 (0.008)	-0.067 (0.078)	0.070 (0.048)
Years of education	-0.349 (0.214)	0.143* (0.082)	0.062 (0.046)	0.597** (0.261)	0.273* (0.164)
Distance port	0.134** (0.057)	0.034 (0.053)	0.029 (0.024)	-0.069 (0.102)	-0.062 (0.077)
Female child	0.902 (0.813)	-0.314 (0.572)	0.313 (0.314)	-0.064 (1.206)	0.916 (0.909)
Male child	-0.875 (0.825)	0.342 (0.577)	-0.274 (0.298)	0.188 (1.185)	-1.018 (0.920)
Observations	238	238	238	238	238

Notes: The table reports the correlation between FDI liberalization at the industry level and the employment-weighted industry exposure to initial county-level characteristics. The dependent variable is changes in FDI regulation index for each wave: FDI policy change between 1995 and 1997 (column 1), change between 1997 and 2002 (column 2), change between 2002 and 2004 (column 3), change between 2004 and 2007 (column 4), and change between 2007 and 2011 (column 5). County-level characteristics are observed at baseline in 1990, including county's share of employment in manufacturing sector, share of population with rural hukou, fertility rate, share of Han ethnic population, average years of education, distance to its nearest port, and female and male population aged under 18. Regressions are weighted by the average county-level exposure to FDI shock. Standard errors are shown in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels.

TABLE A5: EFFECTS OF FDI LIBERALIZATION ON EMPLOYMENT, SALES AND NUMBER OF FIRMS (CENSUS DATA)

	Log employment (1)	Log sales (2)	Log # firms (3)
Panel A: All firms			
FDI Liberalization	2.202*** (0.748)	3.070*** (1.144)	1.153** (0.463)
Observations	7467	7467	7467
Outcome mean	8.33	11.72	5.48
Panel B: Foreign firms			
FDI Liberalization	1.465*** (0.511)	2.660*** (0.868)	0.367** (0.161)
Observations	7467	7467	7467
Outcome mean	4.68	7.94	1.59
Panel C: Domestic firms			
FDI Liberalization	2.342*** (0.797)	3.207*** (1.193)	1.297** (0.509)
Observations	7467	7467	7467
Outcome mean	8.09	11.47	5.25
County fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Year fixed effects			
× County initial characteristics	Yes	Yes	Yes
× FDI determinants	Yes	Yes	Yes
× Other policies	Yes	Yes	Yes

Notes: Data are from the firm censuses conducted in 1995, 2004 and 2008. FDI determinants controls include county's exposure to export intensity, industry average age, new product intensity, and total number of firms. County initial characteristics controls include county's manufacturing employment share, rural hukou share, fertility rate, average years of education, and distance to its nearest port. FDI determinants controls include county's exposure to export intensity, industry average age, new product intensity, and total number of firms. Other policies include changes in China's import tariffs, changes in non-trade barriers, changes in production subsidies, changes in share of number of state-owned enterprises, NTR gap, contract intensity, and time-varying MFA exposure and NTR tariff rates. Regressions are weighted by 1990 county population. Standard errors are clustered at the county level and shown in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels.

TABLE A6: FDI AND MARGINS OF LABOR MARKET ADJUSTMENT: HETEROGENEITY BY EDUCATION

	All sectors (1)	Agri (2)	Manu (3)	Service (4)	Unemployed (5)	NILF (6)
Panel A: Years of education 0-6 years						
FDI Liberalization	-0.017 (0.017)	-0.058*** (0.021)	0.016 (0.010)	0.025 (0.015)	0.011* (0.006)	0.006 (0.016)
Observations	12431	12431	12431	12431	12431	12431
Outcome mean	0.84	0.63	0.07	0.14	0.02	0.14
Panel B: Years of education 7-12 years						
FDI Liberalization	0.017* (0.010)	-0.073*** (0.015)	0.025*** (0.007)	0.064*** (0.014)	-0.002 (0.005)	-0.015 (0.010)
Observations	12414	12414	12414	12414	12414	12414
Outcome mean	0.85	0.46	0.12	0.27	0.04	0.11
Panel C: Years of education 12 years or above						
FDI Liberalization	0.023* (0.013)	-0.018 (0.011)	0.011 (0.017)	0.029 (0.023)	-0.006 (0.006)	-0.017 (0.011)
Observations	11294	11294	11294	11294	11294	11294
Outcome mean	0.91	0.06	0.08	0.77	0.02	0.06
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects						
× County initial characteristics	Yes	Yes	Yes	Yes	Yes	Yes
× FDI determinants	Yes	Yes	Yes	Yes	Yes	Yes
× Other policies	Yes	Yes	Yes	Yes	Yes	Yes

Notes: County initial characteristics controls include county's manufacturing employment share, rural hukou share, fertility rate, average years of education, and distance to its nearest port. FDI determinants controls include county's exposure to export intensity, industry average age, new product intensity, and total number of firms. Other policies include changes in China's import tariffs, changes in non-trade barriers, changes in production subsidies, changes in share of number of state-owned enterprises, NTR gap, contract intensity, and time-varying MFA exposure and NTR tariff rates. Regressions are weighted by 1990 county population. Standard errors are clustered at the county level and shown in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels.

TABLE A7: FDI AND MARGINS OF LABOR MARKET ADJUSTMENT: HETEROGENEITY BY AGE

	All sectors (1)	Agri (2)	Manu (3)	Service (4)	Unemployed (5)	NILF (6)
Panel A: Age 18-25 in year 1997						
FDI Liberalization	-0.004 (0.011)	-0.073*** (0.015)	0.028*** (0.007)	0.042*** (0.014)	-0.003 (0.004)	0.007 (0.010)
Observations	12445	12445	12445	12445	12445	12445
Outcome mean	0.86	0.49	0.11	0.26	0.03	0.11
Panel B: Age 26-35 in year 1997						
FDI Liberalization	0.000 (0.014)	-0.054*** (0.015)	0.013* (0.007)	0.042*** (0.012)	0.003 (0.004)	-0.003 (0.013)
Observations	12445	12445	12445	12445	12445	12445
Outcome mean	0.85	0.54	0.09	0.23	0.03	0.12
Panel C: Age 36-45 in year 1997						
FDI Liberalization	0.038* (0.019)	-0.014 (0.018)	0.013*** (0.005)	0.039*** (0.014)	-0.008 (0.006)	-0.031 (0.019)
Observations	12432	12432	12432	12432	12432	12432
Outcome mean	0.75	0.55	0.06	0.15	0.02	0.23
Panel D: Age 46-60 in year 1997						
FDI Liberalization	-0.000 (0.031)	-0.004 (0.031)	0.020 (0.012)	-0.016 (0.014)	0.014** (0.006)	-0.014 (0.032)
Observations	7452	7452	7452	7452	7452	7452
Outcome mean	0.70	0.56	0.04	0.10	0.01	0.29
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects						
× County initial characteristics	Yes	Yes	Yes	Yes	Yes	Yes
× FDI determinants	Yes	Yes	Yes	Yes	Yes	Yes
× Other policies	Yes	Yes	Yes	Yes	Yes	Yes

Notes: County initial characteristics controls include county's manufacturing employment share, rural hukou share, fertility rate, average years of education, and distance to its nearest port. FDI determinants controls include county's exposure to export intensity, industry average age, new product intensity, and total number of firms. Other policies include changes in China's import tariffs, changes in non-trade barriers, changes in production subsidies, changes in share of number of state-owned enterprises, NTR gap, contract intensity, and time-varying MFA exposure and NTR tariff rates. Regressions are weighted by 1990 county population. Standard errors are clustered at the county level and shown in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels.

TABLE A8: ROBUSTNESS CHECKS: ALTERNATIVE MEASURES OF FDI LIBERALIZATION (AGES 18-39 IN YEAR 1997)

	All sectors (1)	Agri (2)	Manu (3)	Service (4)	Unemployed (5)	NILF (6)
Panel A: FDI liberalization measured including nontradable sectors						
FDI Liberalization	0.001 (0.018)	-0.068*** (0.020)	0.035*** (0.011)	0.034 (0.021)	-0.012 (0.008)	0.010 (0.015)
Observations	12444	12444	12444	12444	12444	12444
Outcome mean	0.87	0.49	0.11	0.27	0.03	0.10
Panel B: FDI liberalization measured excluding industries with the lowest value of FDI index						
FDI Liberalization	-0.003 (0.015)	-0.080*** (0.016)	0.045*** (0.008)	0.032* (0.017)	-0.005 (0.007)	0.008 (0.013)
Observations	12444	12444	12444	12444	12444	12444
Outcome mean	0.87	0.49	0.11	0.27	0.03	0.10
Panel C: FDI liberalization measured excluding industries with the highest value of FDI index						
FDI Liberalization	-0.007 (0.014)	-0.073*** (0.015)	0.031*** (0.008)	0.035** (0.017)	-0.005 (0.007)	0.012 (0.012)
Observations	12444	12444	12444	12444	12444	12444
Outcome mean	0.87	0.49	0.11	0.27	0.03	0.10
Panel D: Permutation test						
False FDI Liberalization	-0.0007 (0.019)	-0.0024 (0.029)	0.0014 (0.018)	0.0004 (0.025)	0.0007 (0.008)	0.00001 (0.017)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects						
× County initial characteristics	Yes	Yes	Yes	Yes	Yes	Yes
× FDI determinants	Yes	Yes	Yes	Yes	Yes	Yes
× Other policies	Yes	Yes	Yes	Yes	Yes	Yes

Notes: County initial characteristics controls include county's manufacturing employment share, rural hukou share, fertility rate, average years of education, and distance to its nearest port. FDI determinants controls include county's exposure to export intensity, industry average age, new product intensity, and total number of firms. Other policies include changes in China's import tariffs, changes in non-trade barriers, changes in production subsidies, changes in share of number of state-owned enterprises, NTR gap, contract intensity, and time-varying MFA exposure and NTR tariff rates. Regressions are weighted by 1990 county population. Standard errors are clustered at the county level and shown in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels.

TABLE A9: ROBUSTNESS CHECKS: ALTERNATIVE MEASURES OF FDI LIBERALIZATION (AGES 18-60 IN YEAR 1997)

	All sectors (1)	Agri (2)	Manu (3)	Service (4)	Unemployed (5)	NILF (6)
Panel A: FDI liberalization measured including nontradable sectors						
FDI Liberalization	-0.001 (0.013)	-0.063*** (0.018)	0.027*** (0.008)	0.035** (0.015)	-0.004 (0.005)	0.005 (0.012)
Observations	12445	12445	12445	12445	12445	12445
Outcome mean	0.86	0.51	0.10	0.25	0.03	0.11
Panel B: FDI liberalization measured excluding industries with the lowest value of FDI index						
FDI Liberalization	-0.002 (0.011)	-0.075*** (0.014)	0.034*** (0.006)	0.039*** (0.012)	0.002 (0.004)	0.000 (0.010)
Observations	12445	12445	12445	12445	12445	12445
Outcome mean	0.86	0.51	0.10	0.25	0.03	0.11
Panel C: FDI liberalization measured excluding industries with the highest value of FDI index						
FDI Liberalization	-0.003 (0.011)	-0.066*** (0.014)	0.023*** (0.006)	0.040*** (0.012)	0.001 (0.004)	0.002 (0.010)
Observations	12445	12445	12445	12445	12445	12445
Outcome mean	0.86	0.51	0.10	0.25	0.03	0.11
Panel D: Permutation test						
False FDI Liberalization	-0.0005 (0.017)	-0.0023 (0.028)	0.0010 (0.015)	0.0008 (0.022)	0.0006 (0.006)	-0.0001 (0.016)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects						
× County initial characteristics	Yes	Yes	Yes	Yes	Yes	Yes
× FDI determinants	Yes	Yes	Yes	Yes	Yes	Yes
× Other policies	Yes	Yes	Yes	Yes	Yes	Yes

Notes: County initial characteristics controls include county's manufacturing employment share, rural hukou share, fertility rate, average years of education, and distance to its nearest port. FDI determinants controls include county's exposure to export intensity, industry average age, new product intensity, and total number of firms. Other policies include changes in China's import tariffs, changes in non-trade barriers, changes in production subsidies, changes in share of number of state-owned enterprises, NTR gap, contract intensity, and time-varying MFA exposure and NTR tariff rates. Panel A additionally controls for interactions between year fixed effects and share of employment in service sector. Regressions are weighted by 1990 county population. Standard errors are clustered at the county level and shown in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels.

TABLE A10: ROBUSTNESS FOR FEMALE MARRIAGE AND FERTILITY: ALTERNATIVE MEASURES OF FDI LIBERALIZATION (AGES 18-39 IN YEAR 1997)

	Married (1)	Never married (2)	Widowed divorced (3)	Births per 1,000 women (4)	Percent of women with children (5)
Panel A: FDI liberalization measured including nontradable sectors					
FDI Liberalization	-0.023** (0.010)	0.035*** (0.008)	-0.012 (0.008)	-11.325*** (3.079)	-0.030** (0.012)
Observations	12445	12445	12445	12445	12445
Outcome mean	0.88	0.10	0.03	48.16	0.80
Panel B: FDI liberalization measured excluding industries with the lowest value of FDI index					
FDI Liberalization	-0.020** (0.008)	0.030*** (0.006)	-0.010 (0.007)	-7.455*** (2.405)	-0.029*** (0.010)
Observations	12445	12445	12445	12445	12445
Outcome mean	0.88	0.10	0.03	48.16	0.80
Panel C: FDI liberalization measured excluding industries with the highest value of FDI index					
FDI Liberalization	-0.020*** (0.008)	0.028*** (0.006)	-0.008 (0.007)	-8.258*** (2.397)	-0.024** (0.010)
Observations	12445	12445	12445	12445	12445
Outcome mean	0.88	0.10	0.03	48.16	0.80
Panel D: Permutation test					
False FDI Liberalization	-0.0004 (0.014)	0.0008 (0.013)	-0.0004 (0.005)	-0.3271 (3.558)	-0.0007 (0.016)
County fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects					
× County initial characteristics	Yes	Yes	Yes	Yes	Yes
× FDI determinants	Yes	Yes	Yes	Yes	Yes
× Other policies	Yes	Yes	Yes	Yes	Yes

Notes: County initial characteristics controls include county's manufacturing employment share, rural hukou share, fertility rate, average years of education, and distance to its nearest port. FDI determinants controls include county's exposure to export intensity, industry average age, new product intensity, and total number of firms. Other policies include changes in China's import tariffs, changes in non-trade barriers, changes in production subsidies, changes in share of number of state-owned enterprises, NTR gap, contract intensity, and time-varying MFA exposure and NTR tariff rates. Panel A additionally controls for interactions between year fixed effects and share of employment in service sector. Regressions are weighted by 1990 county population. Standard errors are clustered at the county level and shown in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels.

TABLE A11: ROBUSTNESS FOR MALE MARRIAGE: ALTERNATIVE MEASURES OF FDI LIBERALIZATION (AGES 18-39 IN YEAR 1997)

	Married (1)	Never (2)	Widowed (3)
Panel A: FDI liberalization measured including nontradable sectors			
FDI Liberalization	-0.020** (0.009)	0.025*** (0.010)	-0.005 (0.004)
Observations	12445	12445	12445
Outcome mean	0.80	0.18	0.03
Panel B: FDI liberalization measured excluding industries with the lowest value of FDI index			
FDI Liberalization	-0.021*** (0.007)	0.025*** (0.007)	-0.004 (0.004)
Observations	12445	12445	12445
Outcome mean	0.80	0.18	0.03
Panel C: FDI liberalization measured excluding industries with the highest value of FDI index			
FDI Liberalization	-0.020*** (0.007)	0.024*** (0.007)	-0.004 (0.003)
Observations	12445	12445	12445
Outcome mean	0.80	0.18	0.03
Panel D: Permutation test			
False FDI Liberalization	0.00004 (0.014)	0.0001 (0.013)	-0.0002 (0.004)
County fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Year fixed effects			
× County initial characteristics	Yes	Yes	Yes
× FDI determinants	Yes	Yes	Yes
× Other policies	Yes	Yes	Yes

Notes: County initial characteristics controls include county's manufacturing employment share, rural hukou share, fertility rate, average years of education, and distance to its nearest port. FDI determinants controls include county's exposure to export intensity, industry average age, new product intensity, and total number of firms. Other policies include changes in China's import tariffs, changes in non-trade barriers, changes in production subsidies, changes in share of number of state-owned enterprises, NTR gap, contract intensity, and time-varying MFA exposure and NTR tariff rates. Panel A additionally controls for interactions between year fixed effects and share of employment in service sector. Regressions are weighted by 1990 county population. Standard errors are clustered at the county level and shown in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels.

TABLE A12: ROBUSTNESS CHECKS: COUNTY AND YEAR FIXED EFFECTS ONLY

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Population ages 18-39 in year 1997						
	All sectors	Agri	Manu	Service	Unemployed	NILF
FDI Liberalization	-0.052*** (0.003)	-0.176*** (0.005)	0.084*** (0.003)	0.040*** (0.004)	0.028*** (0.002)	0.024*** (0.003)
Observations	12454	12454	12454	12454	12454	12454
Outcome mean	0.87	0.49	0.11	0.27	0.03	0.10
Panel B: Female ages 18-39 in year 1997						
	Married	Never married	Widowed divorced	Births per 1,000 women	Percent of women with children	
FDI Liberalization	-0.023*** (0.002)	0.031*** (0.002)	-0.008*** (0.001)	-10.438*** (0.637)	-0.025*** (0.003)	
Observations	12453	12453	12453	12453	12453	
Outcome mean	0.88	0.10	0.03	48.15	0.80	
Panel C: Male ages 18-39 in year 1997						
	Married	Never married	Widowed divorced			
FDI Liberalization	-0.032*** (0.003)	0.034*** (0.002)	-0.002* (0.001)			
Observations	12455	12455	12455			
Outcome mean	0.80	0.18	0.03			
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The regressions only include county and year fixed effects, and are weighted by 1990 county population. Standard errors are clustered at the county level and shown in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels.

TABLE A13: ROBUSTNESS CHECKS: AGE-BASED SPECIFICATION

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Population ages 18-39 in each wave						
	All sectors	Agri	Manu	Service	Unemployed	NILF
FDI Liberalization	-0.027** (0.013)	-0.083*** (0.016)	0.033*** (0.008)	0.023* (0.013)	0.002 (0.004)	0.025** (0.011)
Observations	12445	12445	12445	12445	12445	12445
Outcome mean	0.82	0.46	0.11	0.25	0.04	0.15
Panel B: Female ages 18-39 in each wave						
	Married	Never married	Widowed divorced	Births per 1,000 women	Percent of women with children	
FDI Liberalization	-0.026** (0.010)	0.029*** (0.010)	-0.003 (0.003)	-0.020 (3.196)	-0.024** (0.010)	
Observations	12445	12445	12445	12445	12445	
Outcome mean	0.74	0.25	0.01	63.42	0.68	
Panel C: Male ages 18-39 in each wave						
	Married	Never married	Widowed divorced			
FDI Liberalization	-0.026*** (0.009)	0.025** (0.010)	0.001 (0.002)			
Observations	12445	12445	12445			
Outcome mean	0.62	0.36	0.02			
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects						
× County initial characteristics	Yes	Yes	Yes	Yes	Yes	Yes
× FDI determinants	Yes	Yes	Yes	Yes	Yes	Yes
× Other policies	Yes	Yes	Yes	Yes	Yes	Yes

Notes: County initial characteristics controls include county's manufacturing employment share, rural hukou share, fertility rate, average years of education, and distance to its nearest port. FDI determinants controls include county's exposure to export intensity, industry average age, new product intensity, and total number of firms. Other policies include changes in China's import tariffs, changes in non-trade barriers, changes in production subsidies, changes in share of number of state-owned enterprises, NTR gap, contract intensity, and time-varying MFA exposure and NTR tariff rates. Regressions are weighted by 1990 county population. Standard errors are clustered at the county level and shown in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels.

TABLE A14: ROBUSTNESS CHECKS: CONTROLLING FOR FDI LIBERALIZATION OF NEIGHBORING COUNTIES (50-MILE RADIUS)

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Population ages 18-39 in year 1997						
	All sectors	Agri	Manu	Service	Unemployed	NILF
FDI Liberalization	-0.006 (0.014)	-0.073*** (0.016)	0.032*** (0.008)	0.035** (0.017)	-0.006 (0.007)	0.012 (0.012)
Observations	12444	12444	12444	12444	12444	12444
Outcome mean	0.87	0.49	0.11	0.27	0.03	0.10
Panel B: Female ages 18-39 in year 1997						
	Married	Never married	Widowed divorced	Births per 1,000 women	Percent of women with children	
FDI Liberalization	-0.020** (0.008)	0.028*** (0.006)	-0.008 (0.007)	-7.700*** (2.367)	-0.024** (0.009)	
Observations	12445	12445	12445	12445	12445	
Outcome mean	0.88	0.10	0.03	48.16	0.80	
Panel C: Male ages 18-39 in year 1997						
	Married	Never married	Widowed divorced			
FDI Liberalization	-0.020*** (0.007)	0.024*** (0.007)	-0.004 (0.003)			
Observations	12445	12445	12445			
Outcome mean	0.80	0.18	0.03			
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects						
× County initial characteristics	Yes	Yes	Yes	Yes	Yes	Yes
× FDI determinants	Yes	Yes	Yes	Yes	Yes	Yes
× Other policies	Yes	Yes	Yes	Yes	Yes	Yes

Notes: County initial characteristics controls include county's manufacturing employment share, rural hukou share, fertility rate, average years of education, and distance to its nearest port. FDI determinants controls include county's exposure to export intensity, industry average age, new product intensity, and total number of firms. Other policies include changes in China's import tariffs, changes in non-trade barriers, changes in production subsidies, changes in share of number of state-owned enterprises, NTR gap, contract intensity, and time-varying MFA exposure and NTR tariff rates. Regressions are weighted by 1990 county population. Standard errors are clustered at the county level and shown in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels.

TABLE A15: ROBUSTNESS CHECKS: CONTROLLING FOR FDI LIBERALIZATION OF NEIGHBORING COUNTIES (300-MILE RADIUS)

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Population ages 18-39 in year 1997						
	All sectors	Agri	Manu	Service	Unemployed	NILF
FDI Liberalization	-0.003 (0.013)	-0.055*** (0.018)	0.027*** (0.008)	0.025 (0.018)	-0.007 (0.006)	0.010 (0.011)
Observations	12444	12444	12444	12444	12444	12444
Outcome mean	0.87	0.49	0.11	0.27	0.03	0.10
Panel B: Female ages 18-39 in year 1997						
	Married	Never married	Widowed divorced	Births per 1,000 women	Percent of women with children	
FDI Liberalization	-0.017** (0.008)	0.025*** (0.006)	-0.008 (0.007)	-7.662*** (2.413)	-0.021** (0.009)	
Observations	12445	12445	12445	12445	12445	
Outcome mean	0.88	0.10	0.03	48.16	0.80	
Panel C: Male ages 18-39 in year 1997						
	Married	Never married	Widowed divorced			
FDI Liberalization	-0.016** (0.007)	0.021*** (0.007)	-0.005 (0.003)			
Observations	12445	12445	12445			
Outcome mean	0.80	0.18	0.03			
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects						
× County initial characteristics	Yes	Yes	Yes	Yes	Yes	Yes
× FDI determinants	Yes	Yes	Yes	Yes	Yes	Yes
× Other policies	Yes	Yes	Yes	Yes	Yes	Yes

Notes: County initial characteristics controls include county's manufacturing employment share, rural hukou share, fertility rate, average years of education, and distance to its nearest port. FDI determinants controls include county's exposure to export intensity, industry average age, new product intensity, and total number of firms. Other policies include changes in China's import tariffs, changes in non-trade barriers, changes in production subsidies, changes in share of number of state-owned enterprises, NTR gap, contract intensity, and time-varying MFA exposure and NTR tariff rates. Regressions are weighted by 1990 county population. Standard errors are clustered at the county level and shown in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels.

TABLE A16: EFFECTS OF FDI LIBERALIZATION ON MIGRATION

	Total population (1)	Male (2)	Female (3)	Rural-urban migration (4)
Panel A: Immigration rate in destination county				
FDI Liberalization	-0.017 (0.017)	-0.005 (0.006)	-0.003 (0.004)	0.003 (0.008)
Observations	9956	9956	9956	9956
Outcome mean	0.07	0.03	0.02	0.04
Panel B: Emigration rate from origin county				
FDI Liberalization	0.012 (0.011)	0.005 (0.007)	0.007 (0.005)	0.005 (0.009)
Observations	9956	9956	9956	9956
Outcome mean	0.11	0.07	0.04	0.08
County fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Year fixed effects				
× County initial characteristics	Yes	Yes	Yes	Yes
× FDI determinants	Yes	Yes	Yes	Yes
× Other policies	Yes	Yes	Yes	Yes

Notes: County initial characteristics controls include county's manufacturing employment share, rural hukou share, fertility rate, average years of education, and distance to its nearest port. FDI determinants controls include county's exposure to export intensity, industry average age, new product intensity, and total number of firms. Other policies include changes in China's import tariffs, changes in non-trade barriers, changes in production subsidies, changes in share of number of state-owned enterprises, NTR gap, contract intensity, and time-varying MFA exposure and NTR tariff rates. Regressions are weighted by 1990 county population. Standard errors are clustered at the county level and shown in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels.

TABLE A17: MARRIAGE AND FERTILITY EFFECTS: CONTROLLING FOR LOCAL VARIATION IN EFR

	Married (1)	Never married (2)	Widowed divorced (3)	Births per 1,000 women (4)	% women with children (5)
Panel A: Female ages 18-39 in year 1997					
FDI Liberalization	-0.020** (0.008)	0.028*** (0.006)	-0.008 (0.007)	-7.818*** (2.391)	-0.024** (0.009)
Observations	12445	12445	12445	12445	12445
Outcome mean	0.88	0.10	0.03	48.16	0.80
Panel B: Male ages 18-39 in year 1997					
FDI Liberalization	-0.020*** (0.007)	0.024*** (0.007)	-0.004 (0.003)		
Observations	12445	12445	12445		
Outcome mean	0.80	0.18	0.03		
County fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects					
× County initial characteristics	Yes	Yes	Yes	Yes	Yes
× FDI determinants	Yes	Yes	Yes	Yes	Yes
× Other policies	Yes	Yes	Yes	Yes	Yes

Notes: County initial characteristics controls include county's manufacturing employment share, rural hukou share, fertility rate, average years of education, and distance to its nearest port. FDI determinants controls include county's exposure to export intensity, industry average age, new product intensity, and total number of firms. Other policies include changes in China's import tariffs, changes in non-trade barriers, changes in production subsidies, changes in share of number of state-owned enterprises, NTR gap, contract intensity, and time-varying MFA exposure and NTR tariff rates. Regressions are weighted by 1990 county population. Standard errors are clustered at the county level and shown in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels.

TABLE A18: MARRIAGE AND FERTILITY EFFECTS: CONTROLLING FOR LOCAL VARIATION IN FINES

	Married (1)	Never married (2)	Widowed divorced (3)	Births per 1,000 women (4)	% women with children (5)
Panel A: Female ages 18-39 in year 1997					
FDI Liberalization	-0.020** (0.008)	0.028*** (0.006)	-0.008 (0.007)	-7.818*** (2.391)	-0.024** (0.009)
Observations	12445	12445	12445	12445	12445
Outcome mean	0.88	0.10	0.03	48.16	0.80
Panel B: Male ages 18-39 in year 1997					
FDI Liberalization	-0.020*** (0.007)	0.024*** (0.007)	-0.004 (0.003)		
Observations	12445	12445	12445		
Outcome mean	0.80	0.18	0.03		
County fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects					
× County initial characteristics	Yes	Yes	Yes	Yes	Yes
× FDI determinants	Yes	Yes	Yes	Yes	Yes
× Other policies	Yes	Yes	Yes	Yes	Yes

Notes: County initial characteristics controls include county's manufacturing employment share, rural hukou share, fertility rate, average years of education, and distance to its nearest port. FDI determinants controls include county's exposure to export intensity, industry average age, new product intensity, and total number of firms. Other policies include changes in China's import tariffs, changes in non-trade barriers, changes in production subsidies, changes in share of number of state-owned enterprises, NTR gap, contract intensity, and time-varying MFA exposure and NTR tariff rates. Regressions are weighted by 1990 county population. Standard errors are clustered at the county level and shown in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels.