

# FDI Liberalization in China: Impacts on Structural Transformation, Marriage, and Fertility \*

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## Abstract

How does foreign direct investment (FDI) liberalization shape structural change and demographic transition in developing countries? We use five waves of Chinese census data over 1990–2015, and exploit exogenous variation in FDI liberalization induced by relaxation of FDI regulations for identification. We find that counties more exposed to liberalization experience a relative shift out of agricultural employment into manufacturing and services, with no significant differences between male and female shares of employment. We show that exposure to the policy reduces the probability of marriage and induce a decline in the birth rate and the share of women with children.

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# 1 Introduction

Over the last thirty years, China has experienced a dramatic expansion of foreign direct investment (FDI) inflows as its economy has increasingly integrated with global markets. Annual inflows of FDI, concentrated in export-oriented manufacturing, tripling by 2015 (\$120 billion) as shown in Figure A1 (Hu et al. 2002; Hsu et al. 2019). This corresponds to approximately 10% of global FDI flows and a third of FDI inflows to developing economies during this period (Poncet 2010). 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). The share of labor in agriculture plummeted from slightly over 60% to approximately 20% from 1990 to 2015, and though fertility was already falling given the earlier implementation of the One-Child Policy, this period also coincided with a continued, and substantial, drop in the total fertility rate from over two in 1990 to roughly one in 2015 (Yang et al. 2022).

While there is a growing consensus that positive shocks linked to international economic integration contribute to structural transformation in developing countries (McCaig and Pavcnik 2013; Erten and Leight 2021; Dinkelman et al. 2017), this literature to date has largely not examined the effects of FDI liberalization on structural change. At the same time, a substantial body of theoretical and empirical work has shown that the industrialization process in developing countries broadly defined is related to substantial declines in fertility (Galor and Weil 1996, 2000; Doepke 2004; Greenwood and Seshadri 2002), and trade shocks that lead to expansion in female-oriented sectors can also lead to reduced fertility (Do et al. 2016; Li 2021). Yet, little is known about the impact of FDI liberalization on structural change or fertility patterns in developing countries.

In this paper, we exploit cross-industry and cross-local labor market variation in FDI liberalization stemming from China's market reforms to foreign investment to identify labor-demand shocks that are concentrated on tradable sectors. We investigate the impacts of these shocks on structural change focusing on margins of local labor market adjustment, and link them to marriage formation and fertility outcomes across local labor markets in China. 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 Chinese 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, which may reduce employment by domestic firms in affected sectors (Aitken and Harrison 1999). If relaxation of FDI regulations does shift workers out of agriculture into manufacturing and services in more affected regions, 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 the number of children they have, investing more per child (Becker and Lewis 1973). Such changes may reduce marriage formation and fertility rates over time.

The main empirical challenge in estimating the impact of FDI liberalization on structural change within counties is that more dynamic counties may be more likely to attract FDI and structurally transform from agriculture to industry for other reasons, potentially leading to a spurious positive correlation. We surmount this challenge by using plausibly exogenous variation in exposure to relaxation of FDI regulations linked to initial industry composition at the county level. Using public regulatory documents, we construct an index of FDI regulation by characterizing each tradable sector as experiencing either liberalization, de-liberalization, or no policy change during each of five wave 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 from the 1990 census in conjunction with these industry-level shocks. Our primary specification focuses on estimating the effects of the county-level FDI regulation index on outcomes of interest as measured in the census for individuals who are of prime working and reproductive age at the beginning of the liberalization period, conditional on county and year fixed effects, and controlling for a wide range of FDI policy determinants, initial county

characteristics, and other policy shocks. We provide three 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. However, these local labor demand shocks did not significantly change total employment share, or the share of nonparticipation in the labor market. Second, gender-specific employment effects of FDI liberalization were broadly similar, with both men and women responding by shifting from agriculture towards manufacturing and service employment.

Third, FDI policy 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 women 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; Tang and Zhang 2021) 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.<sup>1</sup>

Apart from providing evidence that FDI liberalization fosters structural transformation at the local level, our analysis indicates that these local labor demand shocks have important implications for reducing marriage formation and fertility rates. 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

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<sup>1</sup>We also contribute to the literature on the effects of trade liberalization more broadly in the Chinese context, although the majority of this literature focuses on firm-level outcomes (Brandt and Morrow 2017; Brandt et al. 2017; Bai et al. 2017; Khandelwal et al. 2013; Liu and Ma 2020; Feng et al. 2017). There is some evidence of trade liberalization shocks on household outcomes (Dai et al. 2020, 2021). 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).

gaps in the labor market (Connolly 2022; Gaddis and Pieters 2017; Juhn et al. 2013, 2014; Kis-Katos et al. 2018; Mansour et al. 2022; Molina and Tanaka 2020). Our paper also relates to the effects of other globalization-related shocks and trade shocks on fertility (Gries and Grundmann 2014; Zhu et al. 2017; Anukriti and Kumler 2019); recent studies in this literature find adverse effects of import competition shocks on family formation and fertility that are largely driven by the falling economic fortunes of men (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 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 on FDI were introduced in order to facilitate the entry of foreign (Lu et al. 2017; Hsu et al. 2019).<sup>2</sup> Appendix Figure A1 illustrates that consistent with this policy goal, China did experience extremely rapid growth in FDI inflows starting in the early 1990s, accelerating further after its WTO entry 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 served as the major set of guidelines regulating FDI inflows. Specifically, the Catalogue classified products or sub-industries into four categories in which (i) FDI was supported, (ii) FDI was

<sup>2</sup>In 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 "Law on Sino-Foreign Contractual Joint Ventures" was enacted in April 1988, and the "Detailed Rules for the Implementation of the Law on Wholly Foreign-Owned Enterprises" were issued in October 1990.

permitted, (iii) FDI was restricted, or (iv) FDI was prohibited (Lu et al. 2017; Hsu et al. 2019). As we explain in Section 2.4, 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. The changes in the 2007 and 2011 Catalogues reflect the government's policy preference for FDI in more technologically advanced and environmentally friendly industries.

## 2.2 Measuring Exposure to FDI Regulation

Our measure of FDI regulation is based on the Catalogue following the mapping and industry classification proposed by Lu et al. (2017). First, products in the Catalogue were classified into three groups: (i) the supported category, i.e., products where FDI was supported; (ii) the permitted category (not explicitly listed), i.e., products where FDI was permitted; (iii) the restricted/prohibited category, i.e., products where FDI was restricted or prohibited. We then map products in each version of the Catalogue to 4-digit Chinese industries classification using the Industrial Product Catalogue from the National Bureau of Statistics (NBS) of China.<sup>3</sup>

Next, we compare the changes across each two consecutive versions of the Catalogue and classify the 4-digit industries into three groups, which allows us to create an FDI regulation index,  $FDI RegIndex_{it}$ :<sup>4</sup>

- Liberalized industries: These are industries in which FDI regulations were reduced and more FDI into these industries were encouraged as of year  $t$  for at least one product or sub-industry linked to the industry. For these industries,  $FDI RegIndex_{it} = 1$ .
- No-change industries: These are industries in which FDI regulations did not experience a change as of year  $t$  for any product or sub-industry linked to this industry. For these industries,  $FDI RegIndex_{it} = 0$ .

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<sup>3</sup>The Industrial Product Catalogue lists each 4-digit industry and its sub-categories at the 8-digit product level.

<sup>4</sup>There is another case where for an industry, some of its products or sub-industries became more welcome between two consecutive Catalogue versions, while some other products or sub-industries had worsening FDI regulations. We do not consider such case as it is rare in our data.

- De-liberalized industries: These are industries in which FDI became more restricted and regulations for FDI inflows increased for at least one product or sub-industry linked to the industry. For these industries,  $FDI RegIndex_{it} = -1$ .

Examples of industries that were identified in each of the above categories can be found in Appendix A. As a final step, we manually map the 4-digit industry code to the 3-digit industry classification in the 1990 census data.

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 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. There are 35 industries that experienced a cumulative pattern of de-liberalization during this period, and 68 which experienced no net changes in FDI regulations. However, the majority (113 industries, or 52%) experienced net liberalization during this period: 50 reported one liberalization episode, 41 reported two liberalization episodes, and 22 reported three or four liberalization episodes. Table A1 summarizes the identity of industries subject to high levels of de-liberalization or liberalization over this period, and 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:

$$FDI RegIndex_{ct} = \sum_i \frac{L_{ic}^{1990}}{L_c^{1990}} FDI RegIndex_{it},$$

where  $c$  indexes counties,  $i$  indexes 3-digit industries, and  $L$  represents employment in a tradable subsector.<sup>5</sup> We use employment shares from the 1990 census. As defined above,

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

$FDIRegIndex_{it}$  is an industry-level FDI regulation index that takes a value of 1 if industry  $i$  becomes more liberalized, 0 if the industry experiences no changes in regulations, and  $-1$  if the industry becomes de-liberalized (or less welcome) for receiving foreign investment between  $t$  and  $t - 1$ .<sup>6</sup> In the baseline year of 1990, the FDI regulation index takes the value of 0 for all industries. Across counties, the unweighted county-level FDI regulation index averages 0.006 and has a standard deviation of 0.54, ranging from a minimum of -1 to a maximum of 1 (Panel D in Appendix Table A2).

### 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 that was evident even by 1990, when the total fertility rate was between two and two and a half; it then continued to drop to around one in 2015 (Yang et al. 2022). In early 1990s, a “1.5 child policy” began to be enforced 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). More recent policy shifts that allowed for two children (introduced in October 2015) or three children (introduced in 2021) for all households fall outside the time frame of this analysis.

Throughout our sample period from 1990 to 2015, there has also been substantial cross-sectional variation in the intensity of OCP enforcement, with some localities and provinces characterized by much more intensive enforcement (higher fines or penalties) and others by weaker enforcement and thus higher excess fertility (Li et al. 2011; Huang et al. 2021). This local variation in fertility policies has persisted even as national policy guidelines have continued to evolve. In Section 3.6, we document that our results are robust to controlling for the local enforcement intensity of OCP across counties.

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<sup>6</sup>The 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 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.



## 2.4 Census Data

Our primary analysis draws on data from the China population census, generated 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, migration, and educational attainment.

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 1981). We also report some findings for the working age population of those aged 18–60 in 1997. Individual-level data is then collapsed to county-level means, using a set of 2491 counties that are observed consistently across the census waves. All outcome variables are calculated as employment shares relative to the total population observed in that county and census wave in the target cohorts.

Appendix Table A2 provides an overview of summary statistics for variables of interest at the county level, for both the dependent variables and the shocks, and Figure 2 reports trends over time for these key variables.<sup>7</sup> Figure 2a suggests there is no evidence of a pronounced trend in overall employment rates; however, this masks a substantial shift of labor out of agriculture and into non-agricultural employment, as captured in Figure 2b. Marriage rates are roughly stagnant over time as observed in Figure 2c, but fertility as captured by births per 1000 women is declining, with a particularly large decline in the first decade of analysis and slight declines thereafter (Figure 2d). Clearly, the increase in FDI inflows is coinciding with these periods of substantial economic and social change.

## 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

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<sup>7</sup>In 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.

results using the firm census from 1995, 2004 and 2008.<sup>8</sup> 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 various financial and accounting statements such as employment and sales.<sup>9</sup> 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 A2 provides an overview of summary statistics. We observe using ASIE data that an average county has three times as many domestic firms as foreign firms.

### 3 Effects of China's FDI Liberalization

#### 3.1 Identification Strategy

Our baseline difference-in-differences (DID) specification examines whether counties with greater exposure to FDI liberalization experience differential changes in outcomes of interest over this period of repeated shifts in FDI regulation. We estimate the following specification using Ordinary Least Squares (OLS):

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

where  $c$  denotes county and  $t$  the survey year.  $Y_{ct}$  represents county-level outcomes described in Section 2.4.  $FDI RegIndex_{ct}$  is the county-level FDI regulation index, and the DID coefficient  $\beta$  is the coefficient of interest. The terms  $\delta_c$  and  $\delta_t$  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 1990 county population, and cluster standard errors at the county level to account for serial correlation in outcomes within counties; the sample period is 1990 to 2015.

Our baseline specification also controls for a rich set of controls, denoted  $\mathbf{X}'_{ct}$ . This includes

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<sup>8</sup>The 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.

<sup>9</sup>We 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.

four determinants of FDI that were 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.<sup>10</sup> We also control for several other policy changes whose timing overlap 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.

Finally, we control for the initial values of several county characteristics measured in 1990 again interacted with year fixed effects. This includes the share of rural Hukou in county population, to account for rural locations that may be less desirable for foreign firms; the share of Han ethnic group in county population, as a control for ethnic diversity; the share of employment in manufacturing sector, to account for characteristics of industrial counties that might differ from less industrial ones; county’s average years of education, as a control for county’s education level; and the distance to the nearest port, as a proxy for transaction costs involving international trade. Appendix B provides descriptions and sources of data for these variables.

### 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.

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

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<sup>10</sup>The 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.

impact of exposure to FDI liberalization on firm-level employment and sales, as well as the number of firms, in more affected regions. In terms of magnitudes, 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.<sup>11</sup> 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 A4 corroborate these findings using data from the firm census.

### 3.3 FDI Liberalization and Labor Market Adjustment

We now proceed by testing the effects of FDI liberalization on different margins of labor market adjustment. The first four columns present estimates for the total employment share, and shares of population for different age groups 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 of Table 2 estimates the impact of rising FDI liberalization on the employment shares of prime working age population aged 18–60 in 1997, the year in which the first wave of FDI

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<sup>11</sup>From 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% ( $0.40/(8.435-6.347)$ ).

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, leading to a small and imprecisely estimated decline in total employment. In turn, the estimates in columns 5 and 6 indicate that the policy change induces small and imprecise increases in unemployment and nonparticipation in labor force.

Panel B of Table 2 reports estimates for the population that is identified as within prime reproductive age years (aged 18–39) at the point of the initial (1997) FDI liberalization wave. The magnitudes of the estimates 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 4 percentage-point increase. Column 3 implies that one standard deviation increase in FDI regulation index predicts a 1.2 percentage point ( $0.54 \times 0.022$ ) increase in manufacturing employment share. Thus, a back-of-the-envelope calculation suggests that FDI liberalization accounts for 30 percent of the overall shift in manufacturing employment. Similarly, the estimates in columns 2 and 4 indicate that 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 percent and 5 percent of the changes in outcome means from 1990 to 2015.<sup>12</sup>

Panels C and D of Table 2 report parallel effects for men and women, again focusing on the prime reproductive ages of 18–39. The estimates indicate that the patterns of substitution across sectors are largely similar, with one notable exception: substitution into services is large and statistically significant for men, while the corresponding estimate for women is small and imprecisely estimated; however, these estimates are not statistically different from each other (Panel E). We find no evidence of a significant impact on unemployment or labor force participation; and the tests of coefficient equality between men and women consistently fail to reject that the estimated effects are different by gender.

In the Appendix, Tables A5 and A6 further examine potential patterns of heterogeneity with respect to education levels and age groups. Estimates in Table A5 indicate that the estimated

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<sup>12</sup>Note that the relative magnitudes are smaller for agriculture and service employment shares since the changes in outcome means are much greater. The share of agriculture declined from 67% to 28% while that of service employment increased from 12% to 40% from 1990 to 2015.

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 the fact that highly-educated workers have a lower likelihood of working in agriculture. Estimates in Table A6 show that there is limited heterogeneity in treatment effects with respect to age groups.

Overall, these estimates imply that exposure to greater FDI liberalization at the county level induces a significant substitution of labor away from agriculture and a substitution of labor into both manufacturing and services, enhancing structural transformation of the economy. Moreover, gender-specific employment effects of FDI liberalization were broadly similar, with both men and women responding by shifting from agriculture towards manufacturing and service employment in response to the policy change.

### **3.4 FDI Liberalization, Marriage Status and Fertility Outcomes**

In this section, we evaluate whether exposure to FDI liberalization policy had an impact on 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 about a 1.4 percentage point decline in the probability of being currently married 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. The estimates in columns 4–5 in Panel A of Table 3 show that FDI policy changes significantly reduce the number of births and the percent of women with children.

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 ( $0.54 \times 0.027$ ) decline in the share of women with children. Hence, a back-of-the-envelope calculation suggests that FDI liberalization accounts for 30% of the overall decline in this fertility measure. Note that we cannot attribute this shift in fertility over the full period 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.

Panel C of Table 3 reports a placebo test focusing on women who were already aged 50–60 in 1997. Given the predominant age of marriage in China at this time, these women are plausibly too old for their marital behavior to respond to any FDI-related shocks: they are likely already married, and in the unlikely case they are not, they are beyond the plausible age for marriage or fertility. Consistent with this hypothesis, we observe no evidence of a significant effect for this subsample: the coefficients are small in magnitude and sometimes in the opposite direction vis-a-vis the main effects reported in Panel A.

### 3.5 Migration

We also 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). In both cases, migration is defined as any move across county lines. The results reported in Table A7 suggest that generally the effects on migration are weak and not statistically significant; however, there is some evidence of a positive effect on rural-urban migration. Though noisily estimated, this effect is proportionally large: a one standard deviation increase in FDI liberalization would be associated with around a .005 increase in the immigration rate, relative to a mean of .04, for a proportional effect of about 13%.

### 3.6 Robustness Checks

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 are consistent in all three panels with our primary results in Table 2. Additional robustness checks 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. These estimates are also consistent with the primary estimates presented in Table 3.

In addition, we 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 then convert the industry-level measure to county-level exposure to false FDI regulation as:  $FDI RegIndex_{ct}^{false} = \sum_i \frac{L_{ic}^{1990}}{L_c^{1990}} FDI RegIndex_{it}^{false}$ .

The permutation ensures that  $FDI RegIndex_{ct}^{false}$  should not have any effect on labor market, marital status and fertility outcomes, provided that our DID estimation is correctly specified. If our estimated DID results are mostly explained by confounding factors, other than FDI liberalization, we should expect similar statistically significant effects for the randomized sample. 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 Table A8 for labor market outcomes and Tables A10 and A11 for marital status and fertility outcomes for men and women, respectively. The average of estimates for  $FDI RegIndex_{ct}^{false}$  is found to be close to zero and highly insignificant, suggesting that our estimates are not driven by other confounding factors.<sup>13</sup>

Moreover, we present the findings for an alternate specification constructed using a sample defined consistently by age over time, rather than by year of birth: more specifically, individuals aged 18–39 in each census wave. These findings are reported in Appendix Table A12 for the labor market, marital status, and fertility outcomes, and are again consistent with the primary results.

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

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<sup>13</sup>The 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.



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 liberalization, a variable that is 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 [A13](#) and [A14](#) are entirely consistent with our primary results. Hence, we conclude that local variation in the OCP enforcement is not driving the observed empirical patterns.

## 4 Conclusion

In this paper, we study the effects of China’s FDI liberalization on its structural transformation and demographic transition. 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. These FDI policy-induced employment shifts were similar for men and women. Linking these shifts to marriage and fertility, we observe that the exposure to FDI liberalization deters marital formation and reduces birth rate as well as the share of women with children in more affected counties. These effects are concentrated among women 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 have broader implications for the demographic consequences of globalization-related policies. To the extent that exposure to such shocks brings about sectoral shifts in employment of men and women, these employment shifts are likely to have significant effects on pace of demographic transition in developing countries. Even in contexts where the fertility rates are kept artificially low relying on severe fertility penalties, policies that move women and men towards higher productivity sectors have the potential to reduce birth rates further by

reducing formation of marriages and increasing the opportunity cost of having children.

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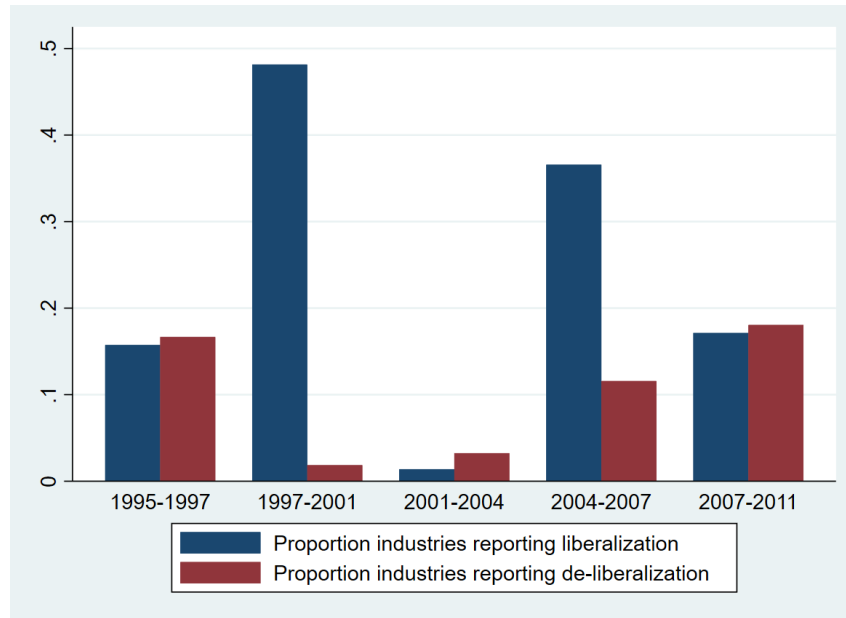
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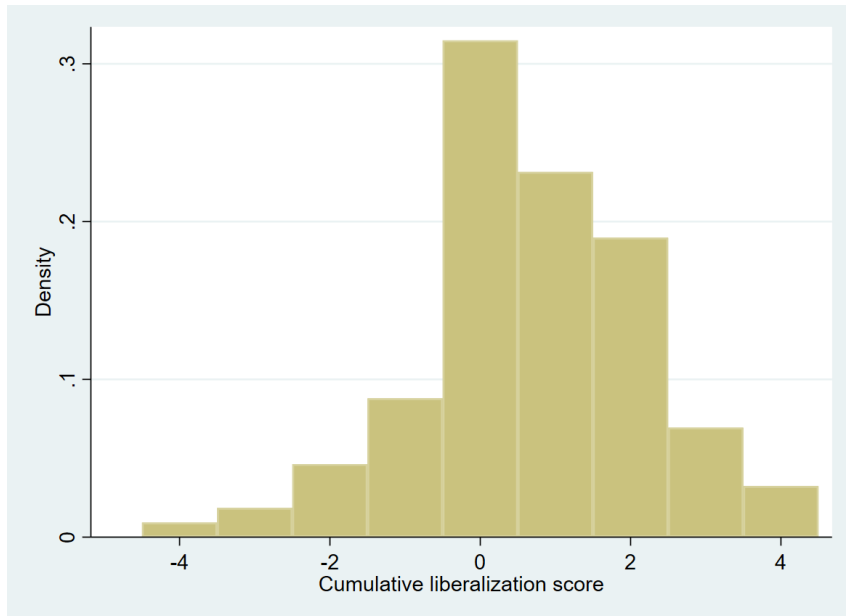
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FIGURE 1: FDI LIBERALIZATION SHOCKS AT INDUSTRY LEVEL

(A) FDI regulation measures by wave



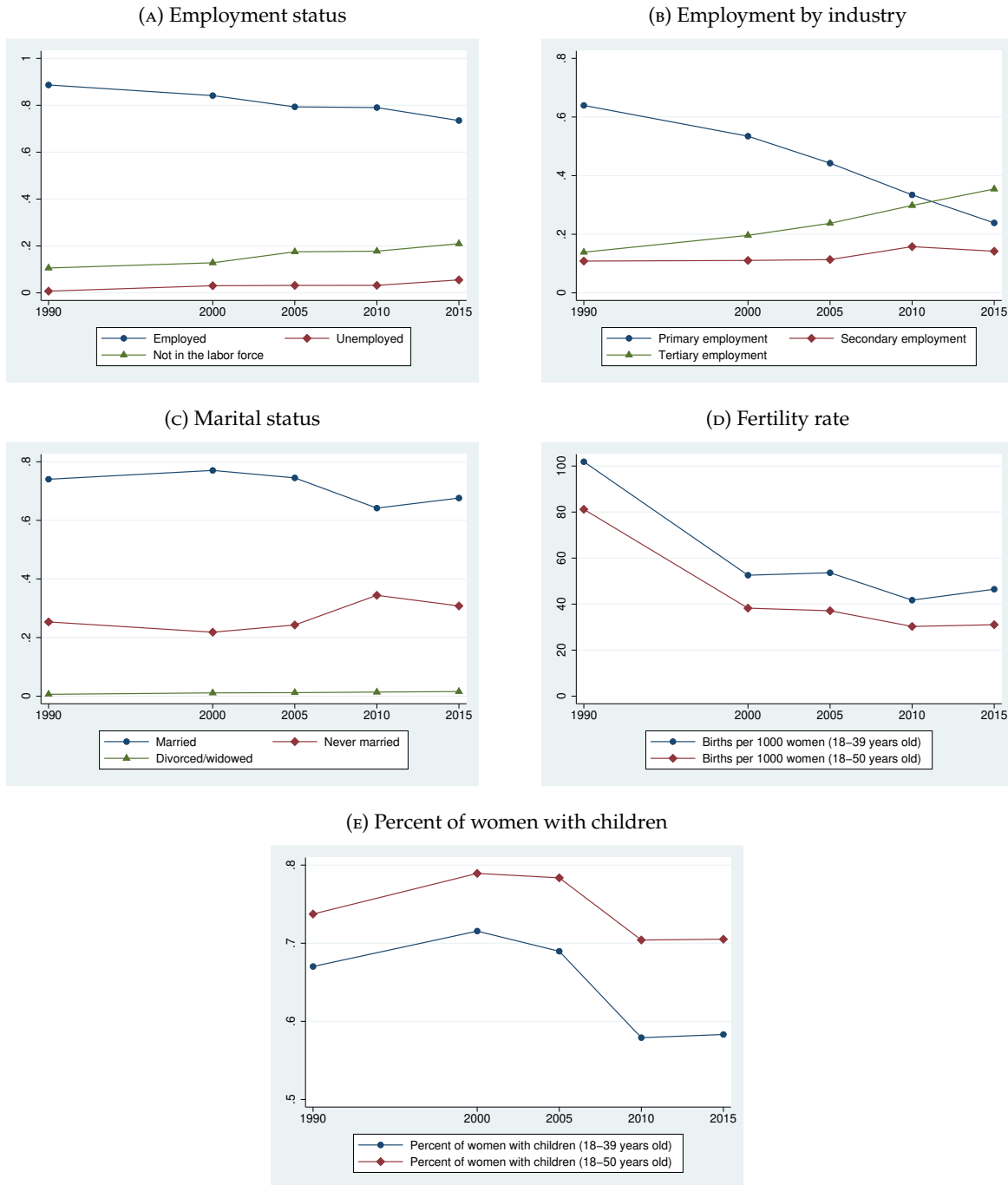
(B) Distribution of cumulative FDI regulation measures



*Note:* The data comes from the Catalogue for the Guidance of Foreign Investment Industries from 1995 to 2011 for 216 tradable industries, including agricultural subsectors. Panel A plots the proportion of industries for which the Catalogue reports increased FDI liberalization and de-liberalization measures by waves of the Catalogue. Panel B reports the cumulative sum of FDI regulation measures experienced at the industry level, with 4 representing an industry that was liberalized 4 consecutive times and -4 representing an industry that was de-liberalized 4 consecutive times with respect to FDI inflows.



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. 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 fertility rate (births per 1000 women ages 18–39 years old and women ages 18–50 years old) from 1990–2015. Figure 2e 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)
<b>Panel A: All firms</b>			
FDI Liberalization	0.752*** (0.254)	1.223*** (0.397)	0.402*** (0.147)
Observations	39856	39856	39856
Outcome mean	7.37	10.88	3.98
<b>Panel B: Foreign firms</b>			
FDI Liberalization	0.537*** (0.191)	0.919*** (0.337)	0.132** (0.062)
Observations	39856	39855	39856
Outcome mean	4.52	8.01	1.28
<b>Panel C: Domestic firms</b>			
FDI Liberalization	0.795*** (0.268)	1.269*** (0.411)	0.447*** (0.159)
Observations	39856	39856	39856
Outcome mean	7.08	10.58	3.69
County fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Year fixed effects			
× FDI determinants	Yes	Yes	Yes
× Initial county characteristics	Yes	Yes	Yes
× Other trade policies	Yes	Yes	Yes

*Notes:* Data are from ASIF 1998–2013. 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 share of population with rural Hukou, share of employment in manufacturing sector, and distance to its nearest port. 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)
<b>Panel A: Population ages 18-60 in year 1997</b>						
FDI Liberalization	-0.004 (0.009)	-0.052*** (0.012)	0.013** (0.005)	0.034*** (0.010)	0.000 (0.003)	0.004 (0.008)
Observations	12455	12455	12455	12455	12455	12455
Outcome mean	0.86	0.51	0.10	0.25	0.03	0.11
<b>Panel B: Population ages 18-39 in year 1997</b>						
FDI Liberalization	-0.004 (0.011)	-0.055*** (0.013)	0.022*** (0.007)	0.028** (0.014)	-0.003 (0.005)	0.008 (0.009)
Observations	12454	12454	12454	12454	12454	12454
Outcome mean	0.87	0.49	0.11	0.27	0.03	0.10
<b>Panel C: Male ages 18-39 in year 1997</b>						
FDI Liberalization	0.004 (0.010)	-0.056*** (0.016)	0.017* (0.009)	0.043*** (0.016)	-0.001 (0.006)	-0.003 (0.007)
Observations	12453	12453	12453	12453	12453	12453
Outcome mean	0.93	0.49	0.12	0.32	0.03	0.04
<b>Panel D: Female ages 18-39 in year 1997</b>						
FDI Liberalization	-0.012 (0.015)	-0.057*** (0.015)	0.026*** (0.008)	0.019 (0.013)	-0.005 (0.007)	0.017 (0.014)
Observations	12450	12450	12450	12450	12450	12450
Outcome mean	0.81	0.48	0.10	0.22	0.04	0.16
<b>Panel E: Test of coefficient equality between male and female</b>						
p-value	0.283	0.930	0.273	0.168	0.606	0.126
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects						
× FDI determinants	Yes	Yes	Yes	Yes	Yes	Yes
× Initial county characteristics	Yes	Yes	Yes	Yes	Yes	Yes
× Other trade policies	Yes	Yes	Yes	Yes	Yes	Yes

Notes: 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 share of population with rural Hukou, share of employment in manufacturing sector, and distance to its nearest port. 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)
<b>Panel A: Female ages 18-39 in year 1997</b>					
FDI Liberalization	-0.014** (0.006)	0.019*** (0.005)	-0.006 (0.005)	-3.851** (1.962)	-0.027*** (0.008)
Observations	12453	12453	12453	12453	12453
Outcome mean	0.88	0.10	0.03	48.15	0.80
<b>Panel B: Male ages 18-39 in year 1997</b>					
FDI Liberalization	-0.013** (0.006)	0.016*** (0.006)	-0.004 (0.003)		
Observations	12455	12455	12455		
Outcome mean	0.80	0.18	0.03		
<b>Panel C: Placebo for female ages 50-60 in year 1997</b>					
FDI Liberalization	-0.006 (0.014)	0.002 (0.002)	0.003 (0.014)	0.103 (0.095)	-0.013 (0.009)
Observations	12433	12433	12433	12433	12433
Outcome mean	0.77	0.00	0.23	0.50	0.38
<b>Panel D: Placebo for male ages 50-60 in year 1997</b>					
FDI Liberalization	0.006 (0.015)	-0.009 (0.010)	0.003 (0.010)		
Observations	12437	12437	12437		
Outcome mean	0.86	0.03	0.11		
County fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects					
× FDI determinants	Yes	Yes	Yes	Yes	Yes
× Initial county characteristics	Yes	Yes	Yes	Yes	Yes
× Other trade policies	Yes	Yes	Yes	Yes	Yes

*Notes:* 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 share of population with rural Hukou, share of employment in manufacturing sector, and distance to its nearest port. 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, we characterize industries as liberalized industries, no-change industries, and deliberalized industries. In this section, we provide some examples of each type of industry.

- 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 or sub-industries remained unchanged in both 2007 and 2011 Catalogues. Such industries were designated as liberalized industries.
- 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. Such industries were designated as no-change 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.

Note that an industry that experiences, for example, four separate liberalization episodes must have been characterized by more than one specific product in the industry shifting steadily toward liberalization in this period, as the product-specific score cannot exceed two, if an industry moves from restricted / prohibited to supported.

Table A1 provides an overview of industries characterized by high and low liberalization scores. The former are primarily industries corresponding to the processing of raw materials (chemicals, petroleum, gas and oil). The latter are manufacturing industries in higher-technology products, consistent with China's increasing shift into higher value-added manufacturing over time. Interestingly, the major subsectors of primary production — agriculture, forestry, fishing, and mining — are not observed on the list of high or low level liberalization industries, as they are characterized by a more intermediate level of regulatory change.<sup>14</sup>

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<sup>14</sup>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 -1.

## **Appendix B   Definition and Data Sources of Variables**

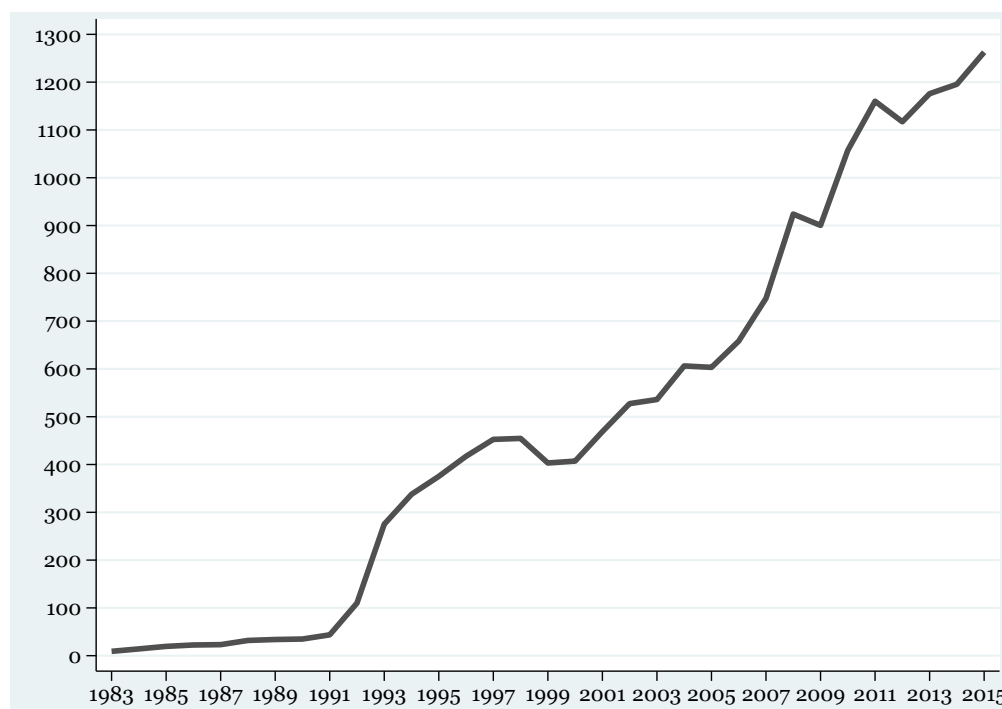
The county level characteristics employed as controls in the regressions are listed as below. The following three variables are constructed using the 1990 China Population Census:

- Rural Hukou share: ratio of population holding local household registration (Hukou) to total population;
- Han ethnic group share: ratio of Han population to total population;
- Manufacturing employment share: ratio of population employed in manufacturing to total working-age population.
- Years of education: county's average years of education of population aged above six.

The following variable comes from China City Statistical Yearbook:

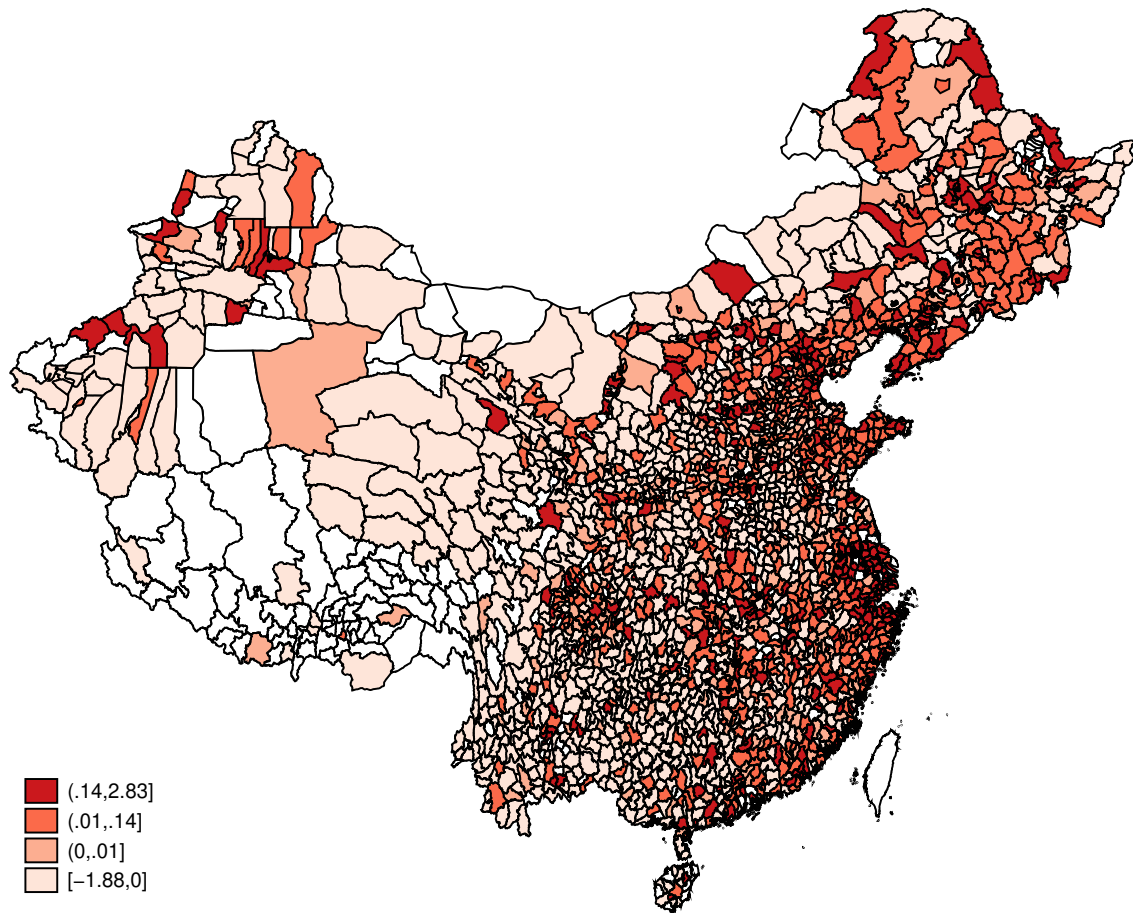
- Distance to the nearest port: county's distance to its nearest port.

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



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

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 A1: INDUSTRIES CHARACTERIZED BY LOW AND HIGH LIBERALIZATION SCORES

Industry	Liberalization score
Organic chemical industry (I)	-4
Artificial petroleum production	-3
Gas supply	-3
Crude oil processing	-3
Ferroalloy smelting	-3
Special geological equipment	3
Home appliances manufacturing	3
Machinery for agriculture, forestry, animal husbandry and fishery	3
Measuring tools and instruments manufacturing (III)	3
General equipment	3
Other kinds of special equipment machinery	3
Electronic commodity manufacturing	3
Motor manufacturing	3
Brick, tile and stone for construction	3
Construction machinery	3
Computer manufacturing	3
Electric instruments	3
Machinery of articles for daily use	3
Metal products for construction	3
Measuring tools and instruments manufacturing (I)	4
General instruments production (I)	4
Electronic and wireless measuring instruments	4
Measuring apparatus manufacturing	4
Weighing apparatus manufacturing	4

*Notes:* The data comes from the Catalogue for the Guidance of Foreign Investment Industries from 1995 to 2011 for 216 tradable industries. The table reports the cumulative sum of FDI regulation measures experienced at the industry level, with 4 representing an industry that was liberalized 4 consecutive times and -4 representing an industry that was de-liberalized 4 consecutive times with respect to FDI inflows. Intermediate scores represent industries that were subject to a mix of liberalization and de-liberalization measures.

TABLE A2: SUMMARY STATISTICS

	Obs (1)	Mean (2)	S.D. (3)	Min (4)	Max (5)
<b>Panel A. Employment (as percentage of population ages 18-39 in year 1997)</b>					
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
<b>Panel B. Marriage and fertility (as percentage of women ages 18-39 in year 1997)</b>					
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
<b>Panel C. Marriage (as percentage of men ages 18-39 in year 1997)</b>					
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
<b>Panel E. FDI Regulation</b>					
FDI Regulation Index	12,455	.006	.54	-1	1

*Notes:* Panel A presents the summary statistics of share of margins of labor market adjustment to population ages 18-39 in year 1997. Panel B presents the summary statistics of share of marriage and fertility to female ages 18-39 in year 1997. Panel C presents the summary statistics of share of marriage to male ages 18-39 in year 1997. Panel DE 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 EMPLOYMENT

	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 the summary statistics of employment of all manufacturing firms, foreign and domestic manufacturing firms from the Annual Survey of Industrial Firms 1998–2013.

TABLE A4: EFFECTS OF FDI LIBERALIZATION ON EMPLOYMENT, SALES AND NUMBER OF FIRMS (CENSUS DATA)

	Log employment (1)	Log sales (2)	Log # firms (3)
<b>Panel A: All firms</b>			
FDI Liberalization	1.770** (0.721)	2.340** (1.079)	0.986** (0.451)
Observations	7473	7473	7473
Outcome mean	8.32	11.72	5.48
<b>Panel B: Foreign firms</b>			
FDI Liberalization	0.902* (0.489)	1.640** (0.823)	0.345** (0.157)
Observations	7473	7473	7473
Outcome mean	4.68	7.94	1.59
<b>Panel C: Domestic firms</b>			
FDI Liberalization	1.872** (0.766)	2.445** (1.126)	1.089** (0.494)
Observations	7473	7473	7473
Outcome mean	8.09	11.47	5.25
County fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Year fixed effects			
× FDI determinants	Yes	Yes	Yes
× Initial county characteristics	Yes	Yes	Yes
× Other trade policies	Yes	Yes	Yes

*Notes:* Data are from firm censuses 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 share of population with rural Hukou, share of employment in manufacturing sector, and distance to its nearest port. 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 A5: FDI AND MARGINS OF LABOR MARKET ADJUSTMENT (AGES 18-39 IN YEAR 1997): BY EDUCATION LEVEL

	All sectors (1)	Agri (2)	Manu (3)	Service (4)	Unemployed (5)	NILF (6)
<b>Panel A: Years of education 0-6 years</b>						
FDI Liberalization	-0.016 (0.016)	-0.054*** (0.018)	0.010 (0.009)	0.029** (0.013)	0.013** (0.005)	0.003 (0.014)
Observations	12441	12441	12441	12441	12441	12441
Outcome mean	0.84	0.63	0.07	0.14	0.02	0.14
<b>Panel B: Years of education 7-12 years</b>						
FDI Liberalization	0.007 (0.009)	-0.055*** (0.013)	0.014** (0.007)	0.048*** (0.012)	-0.002 (0.004)	-0.005 (0.008)
Observations	12424	12424	12424	12424	12424	12424
Outcome mean	0.85	0.46	0.12	0.27	0.04	0.11
<b>Panel C: Years of education 12 years or above</b>						
FDI Liberalization	0.016 (0.011)	-0.016** (0.008)	-0.000 (0.014)	0.033* (0.018)	-0.004 (0.005)	-0.012 (0.011)
Observations	11304	11304	11304	11304	11304	11304
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						
× FDI determinants	Yes	Yes	Yes	Yes	Yes	Yes
× Initial county characteristics	Yes	Yes	Yes	Yes	Yes	Yes
× Other trade policies	Yes	Yes	Yes	Yes	Yes	Yes

Notes: 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 share of population with rural Hukou, share of employment in manufacturing sector, and distance to its nearest port. 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: BY AGE

	All sectors (1)	Agri (2)	Manu (3)	Service (4)	Unemployed (5)	NILF (6)
<b>Panel A: Age 18-25 in year 1997</b>						
FDI Liberalization	-0.001 (0.009)	-0.057*** (0.013)	0.018*** (0.006)	0.038*** (0.011)	-0.002 (0.004)	0.003 (0.008)
Observations	12455	12455	12455	12455	12455	12455
Outcome mean	0.86	0.49	0.11	0.26	0.03	0.11
<b>Panel B: Age 26-35 in year 1997</b>						
FDI Liberalization	-0.002 (0.011)	-0.044*** (0.013)	0.007 (0.006)	0.034*** (0.010)	0.000 (0.004)	0.002 (0.010)
Observations	12455	12455	12455	12455	12455	12455
Outcome mean	0.85	0.54	0.09	0.23	0.03	0.12
<b>Panel C: Age 36-45 in year 1997</b>						
FDI Liberalization	0.013 (0.016)	-0.028* (0.016)	0.006 (0.005)	0.036*** (0.011)	-0.008 (0.005)	-0.005 (0.016)
Observations	12442	12442	12442	12442	12442	12442
Outcome mean	0.75	0.55	0.06	0.15	0.02	0.23
<b>Panel D: Age 46-60 in year 1997</b>						
FDI Liberalization	0.009 (0.028)	-0.023 (0.030)	0.016* (0.010)	0.016 (0.014)	0.010** (0.005)	-0.019 (0.028)
Observations	7458	7458	7458	7458	7458	7458
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						
× FDI determinants	Yes	Yes	Yes	Yes	Yes	Yes
× Initial county characteristics	Yes	Yes	Yes	Yes	Yes	Yes
× Other trade policies	Yes	Yes	Yes	Yes	Yes	Yes

Notes: 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 share of population with rural Hukou, share of employment in manufacturing sector, and distance to its nearest port. 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: EFFECTS OF FDI LIBERALIZATION ON MIGRATION

	Total population (1)	Male (2)	Female (3)	Rural-urban migration (4)
<b>Panel A: Immigration rate in destination county</b>				
FDI Liberalization	0.013 (0.016)	0.005 (0.005)	0.000 (0.003)	0.010* (0.006)
Observations	9964	9964	9964	9964
Outcome mean	0.07	0.03	0.02	0.04
<b>Panel B: Emigration rate from origin county</b>				
FDI Liberalization	0.009 (0.010)	0.006 (0.006)	0.003 (0.004)	0.005 (0.008)
Observations	9964	9964	9964	9964
Outcome mean	0.11	0.07	0.04	0.08

*Notes:* 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 share of population with rural Hukou, share of employment in manufacturing sector, and distance to its nearest port. 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)
<b>Panel A: FDI liberalization measured including nontradable sectors</b>						
FDI Liberalization	0.001 (0.015)	-0.055*** (0.018)	0.025** (0.010)	0.031* (0.017)	-0.007 (0.007)	0.005 (0.012)
Observations	12454	12454	12454	12454	12454	12454
Outcome mean	0.87	0.49	0.11	0.27	0.03	0.10
<b>Panel B: FDI liberalization measured excluding industries with the lowest value of FDI index</b>						
FDI Liberalization	-0.007 (0.011)	-0.056*** (0.013)	0.022*** (0.007)	0.028** (0.014)	-0.003 (0.005)	0.009 (0.009)
Observations	12454	12454	12454	12454	12454	12454
Outcome mean	0.87	0.49	0.11	0.27	0.03	0.10
<b>Panel C: FDI liberalization measured excluding industries with the highest value of FDI index</b>						
FDI Liberalization	-0.003 (0.011)	-0.053*** (0.013)	0.022*** (0.007)	0.029** (0.013)	-0.004 (0.005)	0.007 (0.009)
Observations	12454	12454	12454	12454	12454	12454
Outcome mean	0.87	0.49	0.11	0.27	0.03	0.10
<b>Panel D: Permutation test</b>						
False FDI Liberalization	0.0005 (0.0110)	0.0004 (0.0171)	0.0012 (0.0096)	-0.0011 (0.0135)	0.0000 (0.0040)	-0.0006 (0.0102)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects						
× FDI determinants	Yes	Yes	Yes	Yes	Yes	Yes
× Initial county characteristics	Yes	Yes	Yes	Yes	Yes	Yes
× Other trade policies	Yes	Yes	Yes	Yes	Yes	Yes

Notes: 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 share of population with rural Hukou, share of employment in manufacturing sector, and distance to its nearest port. 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 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)
<b>Panel A: FDI liberalization measured including nontradable sectors</b>						
FDI Liberalization	-0.003 (0.011)	-0.051*** (0.016)	0.015* (0.008)	0.034*** (0.012)	-0.002 (0.004)	0.005 (0.010)
Observations	12455	12455	12455	12455	12455	12455
Outcome mean	0.86	0.51	0.10	0.25	0.03	0.11
<b>Panel B: FDI liberalization measured excluding industries with the lowest value of FDI index</b>						
FDI Liberalization	-0.007 (0.009)	-0.053*** (0.012)	0.012** (0.006)	0.034*** (0.010)	0.000 (0.003)	0.007 (0.008)
Observations	12455	12455	12455	12455	12455	12455
Outcome mean	0.86	0.51	0.10	0.25	0.03	0.11
<b>Panel C: FDI liberalization measured excluding industries with the highest value of FDI index</b>						
FDI Liberalization	-0.003 (0.009)	-0.051*** (0.012)	0.013** (0.005)	0.035*** (0.010)	0.000 (0.003)	0.003 (0.008)
Observations	12455	12455	12455	12455	12455	12455
Outcome mean	0.86	0.51	0.10	0.25	0.03	0.11
<b>Panel D: Permutation test</b>						
False FDI Liberalization	0.0004 (0.0117)	0.0007 (0.0178)	0.0014 (0.0110)	-0.0018 (0.0145)	0.0002 (0.0048)	-0.0006 (0.0105)
County fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects						
× FDI determinants	Yes	Yes	Yes	Yes	Yes	Yes
× Initial county characteristics	Yes	Yes	Yes	Yes	Yes	Yes
× Other trade policies	Yes	Yes	Yes	Yes	Yes	Yes

Notes: 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 share of population with rural Hukou, share of employment in manufacturing sector, and distance to its nearest port. 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)
<b>Panel A: FDI liberalization measured including nontradable sectors</b>					
FDI Liberalization	-0.016* (0.008)	0.026*** (0.007)	-0.010 (0.006)	-6.195** (2.659)	-0.032*** (0.010)
Observations	12453	12453	12453	12453	12453
Outcome mean	0.88	0.10	0.03	48.15	0.80
<b>Panel B: FDI liberalization measured excluding industries with the lowest value of FDI index</b>					
FDI Liberalization	-0.015** (0.006)	0.020*** (0.005)	-0.005 (0.005)	-3.767* (1.957)	-0.027*** (0.008)
Observations	12453	12453	12453	12453	12453
Outcome mean	0.88	0.10	0.03	48.15	0.80
<b>Panel C: FDI liberalization measured excluding industries with the highest value of FDI index</b>					
FDI Liberalization	-0.012* (0.006)	0.018*** (0.005)	-0.006 (0.005)	-3.730* (1.934)	-0.025*** (0.008)
Observations	12453	12453	12453	12453	12453
Outcome mean	0.88	0.10	0.03	48.15	0.80
<b>Panel D: Permutation test</b>					
False FDI Liberalization	0.0003 (0.0092)	-0.0004 (0.0087)	0.0001 (0.0031)	0.0311 (2.6844)	-0.0002 (0.0105)
County fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects					
× FDI determinants	Yes	Yes	Yes	Yes	Yes
× Initial county characteristics	Yes	Yes	Yes	Yes	Yes
× Other trade policies	Yes	Yes	Yes	Yes	Yes

*Notes:* 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 share of population with rural Hukou, share of employment in manufacturing sector, and distance to its nearest port. 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)
<b>Panel A: FDI liberalization measured including nontradable sectors</b>			
FDI Liberalization	-0.014* (0.008)	0.018** (0.008)	-0.004 (0.004)
Observations	12455	12455	12455
Outcome mean	0.80	0.18	0.03
<b>Panel B: FDI liberalization measured excluding industries with the lowest value of FDI index</b>			
FDI Liberalization	-0.014** (0.006)	0.017*** (0.006)	-0.004 (0.003)
Observations	12455	12455	12455
Outcome mean	0.80	0.18	0.03
<b>Panel C: FDI liberalization measured excluding industries with the highest value of FDI index</b>			
FDI Liberalization	-0.012* (0.006)	0.015*** (0.006)	-0.004 (0.003)
Observations	12455	12455	12455
Outcome mean	0.80	0.18	0.03
<b>Panel D: Permutation test</b>			
False FDI Liberalization	-0.0006 (0.0090)	-0.0006 (0.0086)	0.0000 (0.0024)
County fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Year fixed effects			
× FDI determinants	Yes	Yes	Yes
× Initial county characteristics	Yes	Yes	Yes
× Other trade policies	Yes	Yes	Yes

*Notes:* 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 share of population with rural Hukou, share of employment in manufacturing sector, and distance to its nearest port. 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: 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	-0.023** (0.011)	-0.062*** (0.013)	0.019*** (0.007)	0.021** (0.010)	0.002 (0.004)	0.020** (0.010)
Observations	12455	12455	12455	12455	12455	12455
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	-0.024** (0.009)	0.027*** (0.009)	-0.003 (0.002)	0.610 (2.410)	-0.026*** (0.009)	
Observations	12453	12453	12453	12453	12453	
Outcome mean	0.74	0.25	0.01	63.40	0.68	
Panel C: Male ages 18-39 in each wave						
	Married	Never married	Widowed divorced			
FDI Liberalization	-0.021*** (0.008)	0.021** (0.008)	0.000 (0.002)			
Observations	12455	12455	12455			
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						
× FDI determinants	Yes	Yes	Yes	Yes	Yes	Yes
× Initial county characteristics	Yes	Yes	Yes	Yes	Yes	Yes
× Other trade policies	Yes	Yes	Yes	Yes	Yes	Yes

Notes: 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 share of population with rural Hukou, share of employment in manufacturing sector, and distance to its nearest port. 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 A13: 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)
<b>Panel A: Female ages 18-39 in year 1997</b>					
FDI Liberalization	-0.014** (0.006)	0.019*** (0.005)	-0.006 (0.005)	-3.851** (1.962)	-0.027*** (0.008)
Observations	12453	12453	12453	12453	12453
Outcome mean	0.88	0.10	0.03	48.15	0.80
<b>Panel B: Male ages 18-39 in year 1997</b>					
FDI Liberalization	-0.013** (0.006)	0.016*** (0.006)	-0.004 (0.003)		
Observations	12455	12455	12455		
Outcome mean	0.80	0.18	0.03		
<b>Panel C: Placebo for female ages 50-60 in year 1997</b>					
FDI Liberalization	-0.006 (0.014)	0.002 (0.002)	0.003 (0.014)	0.103 (0.095)	-0.013 (0.009)
Observations	12433	12433	12433	12433	12433
Outcome mean	0.77	0.00	0.23	0.50	0.38
<b>Panel D: Placebo for male ages 50-60 in year 1997</b>					
FDI Liberalization	0.006 (0.015)	-0.009 (0.010)	0.003 (0.010)		
Observations	12437	12437	12437		
Outcome mean	0.86	0.03	0.11		

TABLE A14: 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)
<b>Panel A: Female ages 18-39 in year 1997</b>					
FDI Liberalization	-0.014** (0.006)	0.019*** (0.005)	-0.006 (0.005)	-3.851** (1.962)	-0.027*** (0.008)
Observations	12453	12453	12453	12453	12453
Outcome mean	0.88	0.10	0.03	48.15	0.80
<b>Panel B: Male ages 18-39 in year 1997</b>					
FDI Liberalization	-0.013** (0.006)	0.016*** (0.006)	-0.004 (0.003)		
Observations	12455	12455	12455		
Outcome mean	0.80	0.18	0.03		
<b>Panel C: Placebo for female ages 50-60 in year 1997</b>					
FDI Liberalization	-0.006 (0.014)	0.002 (0.002)	0.003 (0.014)	0.103 (0.095)	-0.013 (0.009)
Observations	12433	12433	12433	12433	12433
Outcome mean	0.77	0.00	0.23	0.50	0.38
<b>Panel D: Placebo for male ages 50-60 in year 1997</b>					
FDI Liberalization	0.006 (0.015)	-0.009 (0.010)	0.003 (0.010)		
Observations	12437	12437	12437		
Outcome mean	0.86	0.03	0.11		