How does globalization affect educational attainment? Evidence from China

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August 4, 2019

August 4, 2019 F16, F61, J24, J61 Human Capital; Globalization; Skill Premium; WTO

Abstract

This paper investigates how changes in trade policy, both by China and its trading partners, affect rates of high school education in Chinese prefectures between 1990 and 2004. Exploiting variations across 15 age cohorts in 324 Chinese prefectures, I employ a difference-in-difference empirical specification. Robust empirical findings suggest that increases in high school education were more pronounced in prefectures with larger reductions in Chinese tariffs on unskilled-labor-intensive inputs and foreign capital goods. At the same time, increases in high school education were attenuated in prefectures facing larger reductions in trade barriers abroad on unskilled-labor-intensive goods.

As many developing countries phased out import-substitution and opened up to trade, their relative demand for skilled workers has changed.[1] The

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[1]Increased wage inequality across skill types has been consistently documented for many countries. For Mexico, see Feenstra and Hanson (1996), Feenstra and Hanson (1997), Revenga (1997), and Harrison and Hanson (1999). See Attanasio, Goldberg, and Pavcnik (2004) for Colombia, Pavcnik (2003) for Chile, Bustos (2005) for Argentina, Bustos (2011) for Brazil, and Topalova (2007) for India. See Goldberg and Pavcnik (2007) and Pavcnik (2017) for survey.

associated impact on educational attainment bears lasting influence on economic development and poverty reduction. What is the long-run impact of trade policy changes on the educational attainment of young people in developing countries?

This question has been examined in a few recent empirical works that study endogenous skill acquisition in response to trade shocks through two main channels. First, trade shocks change returns to education, affecting the incentive to acquire education. Atkin (2016) finds that the arrival of low-skill export jobs increased opportunity cost of schooling, and consequently increased school dropout rates in Mexico. Second, trade shocks change real income, affecting the affordability of education. Edmonds, Pavcnik, and Topalova (2010) associate attenuation in schooling attendance trends with unskilled workers' income loss due to trade liberalization in India. Mixed results from these studies indicate that the investigation is far from conclusive. More importantly, globalization in developing countries is often multi-faceted, yet the existing studies each focus on a few limited aspects of globalization, and thus paint incomplete pictures of the potential impact on educational attainment. A full understanding of the overall educational impact of globalization requires evaluating a comprehensive set of trade policy changes – China offers one such ideal context.

In this paper, I empirically examine the educational impacts of globalization on schooling-age cohorts in Chinese prefectures. From 1990 to 2004, China went through several major trade reforms, both internally and externally: China began unilaterally lowering its tariff rates in 1992, the Uruguay Round concluded in 1995, and the Unites States granted China permanent normal trade relations (PNTR) in 2000, followed by China's accession to the World Trade organization (WTO) in 2001. Figure 1a offers a timeline of these events. During the same time period, in the average Chinese prefecture, high school completion rates of graduating classes have doubled from 23% to 45% (Table 1). However, the changes in educational attainment were uneven across regions, where almost two thirds of the prefectures had increased shares of high-school educated young people, while the other third had decreased shares (Figure 2a).

The schooling-age cohorts' educational decisions are sensitive to local and contemporaneous labor market conditions, such as skill premium. As a result, their educational attainment is likely influenced by their timing and degree of exposure to local trade shocks. The changes in trade policies during this time period affected sectors with various levels of skill-intensity, giving rise to offsetting impacts on skill acquisition.[2] Therefore, the goal of this paper is to decompose the trade policy changes, empirically test their isolated impact on educational attainment, and identify the trade policy changes that encourage skill acquisition from the ones that suppress it. To this end, I decompose the trade barrier reductions for both skilled and unskilled sectors into: 1) reductions in tariffs and trade policy uncertainty abroad; and 2) lower Chinese tariffs on intermediate, final, and capital goods.

I follow the "differential exposure approach" developed by Bartik (1991) and Topalova (2007), and examine, between 1990 and 2004, whether cohorts in prefectures exposed to bigger trade barrier reductions experienced more pronounced changes in high school completion rates compared with cohorts in prefectures less exposed.[3]

The empirical analysis uses prefecture-level data that cover 324 Chinese prefectures across 15 age cohorts. The data link local average educational attainment to the contemporaneous local trade policies. I construct this dataset from various sources including census data, firm-level custom and production data, and product-level trade policy data. To associate changes in educational attainment with local exposure to changes in trade policy, I use the constructed pseudo-panel data in a difference-in-differences (DID) specification, where the prefecture-level high school completion rates of age cohorts are regressed on time-varying local exposures to trade policy changes. The empirical design examines whether changes in educational attainment across cohorts differ in prefectures with large changes in trade policy from prefectures with little changes in trade policy.

The source of identification comes from both spatial and time variations in trade policy changes, which affected Chinese prefectures over the time span of 1990 to 2004. Prefectures had different industrial compositions before the trade shocks, and trade barriers faced by these industries were reduced by varying levels at varying times. Therefore, I measure each prefecture's local exposure to trade shocks as a weighted average of the industry-level changes in trade barriers, with weights based on the initial prefecture industry mix. The causal interpretation of the estimated effect

[2] For example, *ceteris paribus*, export expansion in skilled sectors increases skill premium and consequently, skill acquisition, while export expansion in unskilled sectors has the opposite effect. The combined effect on educational attainment could mask the underlying competing forces resulted from different trade policy changes.

[3] Prefectures are the suitable labor market units in China because of stable administrative boundaries and low rates of permanent inter-prefecture mobility. According the author's calculation in Table 11, permanent inter-prefecture migration rate in 2000 were 4.4% among skilled male workers and 0.7% among unskilled ones.

on education hinges on the exogeneity of trade policy changes to unobserved local economic factors (which could concurrently influence educational attainment). To the extent that the industry-level trade policy changes by both China and its trading partners were unlikely to be correlated with local political economy interests, the weighted average of industry-level trade policy changes – my measure of local exposure to trade shocks – is arguably exogenous. Furthermore, by using pre-existing industry mix as fixed weights, the changes in prefecture trade policy only reflect industry-level statutory changes over time, eliminating confounding factors from production and employment composition shifts due to trade shocks.

Robust empirical results show that trade policy changes that increased skill premium also increased education, while the trade policy changes that decreased skill premium also decreased education. Specifically, I find that increases in high school completion were more pronounced in prefectures exposed to larger reductions in (1) Chinese tariffs on unskilled-labor-intensive inputs, (2) Chinese tariffs on foreign capital goods, and (3) tariffs abroad on skilled-labor-intensive goods. At the same time, increases in high school completion rates were attenuated (smaller increase) in prefectures facing larger reductions in trade policy uncertainty abroad regarding unskilled-labor-intensive goods. Compared to the national trend, one percentage point decrease in tariff rates translates to 0.17 percentage point increase in high school completion rate. Keeping everything else equal, compared to prefectures at the 25th percentile of Chinese unskilled tariff decline, the increase in high school education is 1.92 percentage points higher in prefectures at the 75th percentile. Similarly, compared to prefectures at the 25th percentile of declining Chinese tariff on capital goods, the increase in high school education is 3.5 percentage points higher in the prefectures at the 75th percentile. On the other hand, the elimination of U.S. tariff uncertainty on unskilled goods translates to 1.132 percentage points *less* increase in high school completion rates in the 75th percentile prefectures than the 25th percentile prefectures. Interestingly, I do not find that globalization has contributed to increases in college education in Chinese prefectures, possibly due to the limited number of seats in tertiary institutions and biased college admission policies during the time period examined.

The contribution of this paper is threefold. First, this paper contributes to the growing literature on the regional economic impacts of trade-induced shocks.[4] While this literature has emphasized the distributional impacts of

[4]For example, for poverty, see Topalova (2010) and McCaig (2011); for internal migration, see Fan (2015) and Facchini, Liu, Mayda, and Zhou (2017); for other labor market

globalization, it overlooks how globalization affects skill acquisition, which bears important long-run implications for economic growth in developing economies. This paper adds educational attainment as a new dimension, and brings new evidence from China – one of the most multi-faceted globalization experiences.

Second, this paper is related to a small but growing literature that closely examines the educational impact of globalization. Findlay and Kierzkowski (1983) pioneered this literature by incorporating the formation of human capital into the two-factor, two-good general equilibrium model. More recently, Edmonds, Pavcnik, and Topalova (2010), Hickman and Olney (2011), Li (2016), Atkin (2016), Blanchard and Olney (2017) have examined this question in India, U.S., Mexico, China, and a cross-country setting, respectively. They each focus on a limited aspect of trade policy changes and arrived at different conclusions.[5] To my knowledge, this paper is the first to fully account for an extensive array of trade policy changes, and to test their separate medium-run impacts.

Finally, this paper sheds more light on how globalization affects skill acquisition by identifying the underlying channels. I explain the main findings by exploring three underlying mechanisms through which trade policy changes had affected educational attainment: (1) changes in skill premium affects returns to education, (2) the arrival of low-skill manufacturing jobs affects the opportunity cost of education, and (3) the increased education resources affects the supply of education. Using a simple conceptual framework, I translate the educational impact of trade shocks through these three channels, and support the findings with more empirical evidence.

The paper proceeds as follows. I describe the data and context in

outcomes, see Hasan, Mitra, Ranjan, and Ahsan (2012), Goldberg and Pavcnik (2005), and Kovak (2013).

[5]Edmonds, Pavcnik and Topalova (2010) find that, in India, districts with concentrated employment in industries losing tariff protection saw a relative rise in poverty, and families in these districts reduced schooling to cope with poverty. Their findings suggest a strong link between schooling and poverty, which is exacerbated by the adjustment costs due to loss of tariff protections. Hickman and Olney (2011) find skill upgrading among U.S. unskilled workers facing import competition. Li (2016) applied the general equilibrium framework to China's trade liberalization found that high-skill export shocks raise both high school and college enrollments, while low-skill export shocks depress both. Atkin (2016) finds that the trade-induced increase in manufacturing job openings led to more school dropouts in Mexico, which suggests a link between employment exposure to trade liberalization and opportunity cost of education. Blanchard and Olney (2017) identifies skilled exports as a key macro determinant of demand for education, and conclude that trade liberalization could exacerbate initial differences in factor endowments across countries.

Section 1, and present the empirical specification in Section 2. Section 3 presents the main empirical results on the relationship between various trade policy changes and educational attainment, and Section 4 validates the main findings through a variety of robustness checks. Finally, in Section 5, I outline a simple model, and explore the mechanisms through which trade policy changes affect educational attainment. Section 6 concludes.

1 Data and Context

In this section, I describe the data sources used to create the prefecture-level panel dataset. I also provide relevant context for China's education system, and the trade policy changes that affected China between 1990-2004.

1.1 Data

To examine the effect of trade policy changes on educational attainment, I rely on China's considerable temporal and geographic variations in exposure to globalization, which are linked to the average education outcomes of the young cohorts in each prefecture.

To this end, I compile a prefecture-level panel dataset from several sources. First, I draw prefecture-level educational attainment measures from China's 2005 "mini" population census, conducted by the National Bureau of Statistics (NBS). It is an individual-level survey dataset that cover 0.1% of the entire Chinese population in 2005, and I use a 20% random sample in this paper. It covers 27 provinces, 4 provincial municipalities, and 344 prefecture-level units.[6] The population census of China documents age, education level, employment status, migration history, as well as other demographic and geographic information. I aggregate the individual-level data to prefecture-by-cohort cells using age and locality information. For example, high school completion rate of age cohort t in prefecture j calculates the share of individuals with high school degrees or above. College completion rate is defined similarly. To tease out the changes in local skill endowment from internal migration, I limit the samples to include only the non-migrants and out-migrants of each prefecture.

Next, to calculate the local exposure to trade barriers, I aggregate industry-level trade barriers to the prefecture-level using each prefecture's pre-existing industrial composition as weights. The trade policy changes considered in

[6] The final sample used consists of 324 prefectures, because I exclude 20 prefectures due to missing data and extreme outliers.

the empirical analysis are reductions in Chinese tariff rates, as well as reductions in tariff levels and tariff-uncertainty with the United States. I follow Handley and Limao (2013) and Pierce and Schott (2016), and measure China's export tariff uncertainty at the U.S market using Normal-Trade-Relations Gap (NTR Gap).[7] Tariff rates at the product level come from the WITS-TRAINS database. Specifically, I gather the product-level (HS 6-digit) import tariff rates in China, as well as in China's 10 major export destinations during 1990-2004.[8] I use nominal ad valorem tariff rates from 1990-2004 for about 6000 traded products.

Finally, the prefecture-level local industry mix comes from the 1997-1999 Chinese Custom Data (CCD) and the 1998-2007 Chinese Annual Survey of Industrial Firms (CASIF). CCD documents product-level import and export transactions, where each transaction can be traced to a specific prefecture through the firm-identifier. CASIF documents firm-level employment and production information. Using geo-referenced firm identification, I measure the aggregate industrial mix of each prefecture in two ways: 1) the employment distribution over industries, and 2) the import/export distribution over products. The local industry mix serves as a crosswalk that weights the product-level trade policy changes to the prefecture-level.

This location-year specific measures of trade barriers allow me to match cohorts' educational outcomes with the local trade environment they faced in their schooling years. The constructed pseudo-panel covers 324 prefectures across 15 age cohorts – aged 18 to 32 – who represent graduating classes from 1990 to 2004. Each observation – an age cohort in a prefecture – links contemporaneous local exposure to trade barriers with educational outcomes.

1.2 Education in China

In China, primary education take 6 years to complete, followed by 3 years of junior secondary education, and 3 years of senior secondary education provided by academic high schools or secondary vocational schools. Tertiary education is provided by 4-year colleges and universities, as well as 3-year vocational schools. China's education is largely state-run. Prefecture-level

[7] I thank Justin Pierce for kindly providing this measure since the early stages of this paper.

[8] Between 1997 and 1999 – before China's accession to the WTO, China's top export destinations included Hong Kong, Japan, US, EU, Korea, Singapore, Taiwan, Russia, Canada and Australia. Chinese exports to these 10 destinations account for about 80% of total export during that time.

and county-level governments are responsible for the delivery of primary and secondary education, whereas tertiary education falls under the jurisdiction of provincial and central authorities (OECD 2016).

I focus on the effect of trade policy changes on schooling at the high school and collegiate levels for the following reason: in China, students must complete 9 years of compulsory schooling (Compulsory Education Law of the People's Republic of China, 1986). This means all children at eligible school ages (7 to 15 years old) have the right to, and must complete primary education and junior secondary education. After finishing compulsory education, students can decide whether to pursue high school education. In other words, during 1990-2004, primary and junior secondary education are unlikely to be directly affected by local trade-related factors, whereas attending high school and college remained a choice.

The trade policy changes considered in this paper took place from early the 1990s through the early 2000s, which was a time with arguably universal and effective implementation of 9-year compulsory education. Despite regional disparity in enforcement rates and government spending per student, the 9-year compulsory schooling law was successfully implemented over time. By 1999, the gross enrollment ratio for primary education was 99.1% (compared to 97.2% in 1987), and the primary to junior secondary transition rate was 94.1% (compared to 69.1% in 1987).[9] For the 1990 cohort and onwards, most schooling age children had completed junior high school by requirement, and they could move onto high school by choice, the cost of which is publicly subsidized and low.

Even though the gradual implementation of 9-year compulsory education has attributed to a larger base of junior high graduates who are eligible for high school education, high school education remained a personal choice. According to the National Bureau of Statistics of China, in 1999, only around 50% of junior secondary graduates attended senior secondary schools (compared to 39.1% in 1987). Tabulation from the 2005 census confirms this trend. Table 1 shows that from 1990 to 2004, there has been a steady increase in national average high school enrollment plus completion rates among schooling age cohorts.[10] On average, the nationwide high school

[9]National Bureau of Statistics of China (2000), Table 20-11: Proportion of students Entering into Schools of Higher Grade and Enrollment Rate of School-age Children.

[10]Due to variations in school starting age across different regions, a substantial share of 18-19 year-olds were still enrolled in high school when surveyed. To fully account for the potential educational effect on younger cohorts who had yet to complete high school by the time of the 2005 census, I calculate rates of completion plus enrollment for all age cohorts.

enrollment plus completion rates among natives increased from 24.9 percent in 1990 to 47.4 percent in 2004, and that of college education increased from 8.5 percent in 1990 to 14.1 percent in 2004.

Figure 2a demonstrates the regional variation in educational attainment increases from 2000 to 2005. Each polygon on the map stands for a prefecture, and the bold lines outline the provincial boundaries. I calculate for each prefecture the increase in the share of the high school educated among 18-27 year-old natives (non-migrants and out-migrants). I geo-reference the changes in high school enrollment plus completion rates with prefecture locations, and the color gradients on the map indicate how much high school education has changed in each prefecture during this time period. Prefectures that saw an increase in educational attainment among the 18-27 year-old cohorts are marked by red, and the ones that saw a decrease are marked by blue. Increases in human capital accumulation are concentrated in the economically advanced regions: Yangtze River Delta region (Shanghai included), Pearl River Delta region in the southeast (Shenzhen included), and Bohai Economic Rim (Beijing included). These regions concurrently saw higher increases in trade volumes and larger reductions in trade barriers, as shown in Figure 2b and 2d. Certain regions even experienced a decrease in educational attainment, suggesting opposing influences exerted by changes in different trade policies.

1.3 Trade Policy Changes

From 1990 to 2004, China experienced several trade policy changes, both internal and external, affecting both skilled and unskilled sectors: 1) average Chinese import tariff rates decreased from 38 percent to 8 percent for unskilled-labor-intensive goods, and from 27 percent to 7 percent for skilled-labor-intensive goods; 2) the tariffs rates Chinese exporters faced with major trading partners decreased from 7.6 percent to 4.3 percent for unskilled-labor-intensive goods, and from 4.9 percent to 3 percent for skilled-labor-intensive goods; 3) foreign technology was adopted through imports of capital goods, and the tariff rates on capital goods dropped from 24 percent to 7 percent; and 4) tariff uncertainty with the U.S. was eliminated when the U.S. granted China permanent NTR status in 2000, which improved the Chinese exporters' market access to the U.S market. I present background and descriptive statistics on these trade policy changes below, and outline the process to aggregate them to the prefecture-level.

Tariff Rates in China (CHN) Since the early 1990s, in an effort to gain credibility with its negotiating partners, the Chinese government lowered the levels and dispersion of tariffs across industries to more uniform levels with the aim of matching tariff levels in the General Agreement on Tariffs and Trade (GATT) (Figure 3a). This was a unilateral liberalization on China's behalf as part of economic reforms to facilitate conditions for WTO accession (Branstetter and Lardy 2006). As shown by Figure 1a, each major trade policy change is accompanied by a dramatic decrease in Chinese import tariff rates. In fact, the average statutory tariff rates fell steadily from an average of 42 percent in 1992 to 11 percent in 2004.

Tariff Rates in Rest of the World (ROW) Externally, China's access to export markets also significantly improved due to reductions in tariff rates by its trading partners. Most of China's major trading partners had granted China the Most-Favored-Nation (MFN) status by early 1990s.[11] Even though China was not part of the GATT, China nevertheless benefited from the agreements of the Uruguay Round in 1995. In November 1995, China formally requested to accede to the World Trade Organization (WTO). After years of negotiations, China became a member of the WTO in December 2001. This granted China permanent MFN status with member countries, and further reductions in tariff rates worldwide gave China even bigger access to foreign markets. The average tariff rates imposed by China's top 10 export destinations declined from 9% in 1990 to 5.4% in 2004.[12]

Tariff Uncertainty in the U.S. A concurrent event closely leading up to China's WTO accession was the U.S. granting China permanent Normal-Trade-Relations (NTR) at the end of 2000. Prior to that, U.S. granted China *conditional* MFN status, which was subject to congressional appeal every year. It was a contentious political process which created substantial uncertainty in the tariff rates Chinese exporters faced in the US market. If China's MFN status was revoked by Congress, Chinese exporters would have faced the Smoot Hawley tariffs.[13] While China's normal trade relations with the US had never been revoked, and Chinese imports had enjoyed MFN tariff rates in the US between 1980 and 2000, the uncertainty imposed by China's conditional MFN status with the US was sizable.

[11] Japan granted China permanent normal trade relations in the 1970s; EU granted China permanent MFN status in the 1980s; at the same time, US granted China MFN status subject to yearly renewal.

[12] China's top 10 export destinations include Hong Kong, Japan, US, EU, Korea, Singapore, Taiwan, Russia, Canada and Australia. Chinese exports to these 10 destinations account for about 80% of total export before WTO accession.

[13] See more details and historical background in Handley and Limao (2013) and Pierce and Schott (2016).

This tariff uncertainty was eliminated when the U.S. granted China *permanent* Normal-Trade-Relations (PNTR) in November 2000. Recent studies (Handley and Limao 2013, Pierce and Schott 2016, and Facchini et al. 2017) have shown that the reduction of tariff uncertainty not only created sizable impacts on the U.S. employment, but also affected the demand for Chinese labor.

To capture this particular trade policy, I measure trade policy uncertainty, faced by Chinese exporters to the U.S., using the product-specific Normal-Trade-Relations (NTR) gap measure developed by Handley and Limao (2013) and Pierce and Schott (2016). This measure calculates the gap between the MFN tariffs applied by the United States to WTO members and the threat tariffs that would have been implemented if MFN status was not renewed to China by the U.S. Congress (the so called column 2 tariffs of the Smoot-Hawley Trade Act). It measures the uncertainty faced by the Chinese exporters to the US, which was non-trivial – 41 percentage points for unskilled-labor-intensive goods and 30 percentage points for skilled-labor-intensive goods.

Non-Tariff Barriers (NTB) Finally, non-tariff barriers (NTB) imposed by China and other countries were also dramatically cut during the sample period. While I do not control for all possible NTBs due to lack of available data, I consider two important aspects of NTB reductions: Investment Barriers and MFA Quota.

China is a major destination of foreign direct investment, and several studies have emphasized the role that Foreign Direct Investment (FDI) has had in promoting local development (Chen, Chang, and Zhang 1995). I proxy barriers to investment using the *Contract Intensity* measure proposed by Nunn (2007). *Contract Intensity* describes the share of intermediate inputs used by a firm that require relationship-specific investments by the supplier. The higher the contract intensity of a firm, the more pervasive the effect of the presence of investment barriers in a prefecture. Upon China's accession to the WTO, barriers to investment were eliminated, and as a result, prefectures with more high-contract-intensity firms benefited more from the trade liberalization. Similar to NTR gaps, contract intensity captures the size of the reduction in investment barriers due to China's WTO accession.

From 1990 to 2004, an additional potential driver of increased labor demand was represented by the phasing out of quota restrictions on U.S. apparel and textile imports under the Multi-Fiber Agreement (MFA) and the Agreement on Textile and Clothing (ATC). Upon joining the WTO at the end of 2000, China became eligible for the elimination of these quotas.

Following Brambilla, Khandelwal, and Schott (2010), I calculate the share of China's clothing and textile exports which faced binding MFA quotas in the U.S. at the prefecture-level. Specifically, to measure the extent to which each Chinese prefecture was affected by the relaxation of MFA quotas, I aggregate the HS-level MFA Quota Bound to the prefecture level using each prefecture's export basket. The resulting prefecture-level variable *MFA Quota Bound* measures the share of textile exports that would have faced binding MFA quotas after 2001, were not for China's WTO accession.

1.4 Exogeneity of Trade Policy Changes

The causal interpretation of the local educational effect of globalization requires the above trade policy changes to vary exogenously across industries. That is, the trade policy changes experienced by industries in China must not have been endogenous to domestic political economy forces – such as industries' lobby for more protection. Several features of the trade policy changes, by both China and its trading partners, mitigate the usual concern of endogenous trade liberalization (Grossman and Helpman 1994; 2002).

First, trade policy changes by China's trading partners were exogenous to the performance and distribution of industries in China. The reduction in trade barriers by China's trading partners – first in 1995 due to the Uruguay Round, and later in 2001 due to China's accession to the WTO – came from international multilateral negotiations that China was not a part of. These external trade policy changes were unlikely the outcome of political processes influenced by China.

One exception remains: the U.S. granting China permanent Normal-Trade-Relations (PNTR) in 2000 was the final result of bilateral negotiations between the U.S. and China. However, the size of the trade barrier reduction measured by NTR gaps (Handley and Limao 2013; Pierce and Schott 2016) – the difference between Smoot-Hawley tariff rates and U.S. MFN tariff rates– was not influenced by contemporaneous economic conditions in China. In other words, NTR gaps are a function of past and present U.S. policy, which is unlikely to be endogenous to Chinese political-economy drivers.

Moreover, I provide evidence that supports the exogeneity of reductions in Chinese tariff rates. Specifically, I show that Chinese tariff liberalization was aimed to reduce the overall level *and* variation of existing tariffs, and thus was unlikely a product of local economic and political considerations.

Previous studies on the regional labor market effects of liberalization have dispelled this endogeneity of trade liberalization by showing an almost perfect correlation between pre-liberalization tariff levels and the ensuing tariff declines, suggesting that policy makers reduced tariffs across the board to eliminate cross-industry variation in tariffs. Goldberg and Pavcnik (2005) establish the exogeneity of tariff changes in the context of Colombian trade reform by showing that the industries with higher protection also experienced larger tariff cuts. Topalova (2010) demonstrates that industry tariff declines during India's 1991 trade reform were not correlated with baseline industry characteristics such as productivity, skill intensity, and capital intensity. In the case of Brazil, Kovak (2013) argues that the driving force for trade liberalization came from the government rather than from the private sectors, and he dissuades the tariff reduction endogeneity concern following the approach by Goldberg and Pavcnik (2005).

I follow previous studies and show an almost perfect correlation between industry-level tariff reductions and initial tariff levels in Figure 3b. Industries with higher tariffs before trade liberalization experienced bigger tariff reductions. This suggests that, in the case of Chinese import tariff rates, the trade policy changes mostly reflect the pre-existing tariff protection structure, which was determined in the 1980s. Thus the size of Chinese import tariff reductions is unlikely to be correlated with the potential effort of local interest groups trying to secure tariff protection during 1990-2004.

2 Empirical Analysis

2.1 Measuring trade barriers

To quantify time-varying trade policies for each Chinese prefecture, I follow the local exposure approach, which evaluates trade policy changes at subnational levels (Bartik 1991; Topalova 2007; Kovak 2013). These studies commonly use a weighted average of changes in trade policy, with weights based on the industrial or factor distributions in each (subnational) region, and explore the spatial variation in trade policy changes.

To this end, I correlate industry trade policy measures with prefecture-specific local trade/employment compositions, constructing a weighted local exposure of trade policy changes. I carry out this construction with two approaches: with import and export trade baskets, and with industrial employment concentrations. In Section 4, I show the main findings are consistent across alternative weighting methods.

Weighting Trade Barriers with Local Industrial Composition: I first measure a prefecture's exposure to trade policy changes with its import and export baskets. These trade baskets are constructed from 1997-1999 Chinese Custom Data (CCD). The immediate advantage of using transaction-level trade data comes from the richness in details regarding traded goods type, trade regime, trading partners, and firm information. Each transaction in the data is tagged with the location of the importer/exporter in China, which I use to aggregate total import and export baskets to the prefecture level. The trading regime of each transaction allows me to differentiate ordinary trade from processing trade. Since processing trade is not subject to import tariffs, I follow Fan, Li, and Yeaple (2015), and exclude processing trade imports. In addition, I classify imports of equipments and capital goods as a separate category to measure the degree of foreign technology adoption by Chinese firms.

Alternatively, I use the prefecture-specific sectoral employment distribution as weights to calculate local exposure to trade policy changes. Specifically, I use the 1998-2000 Chinese Annual Survey of Industrial Firms (CASIF), where each firm falls into an industry according to its main products.[14] CASIF also reports the number of workers employed by each firm, which allows me to calculate the local employment distribution across industries. Using the crosswalk between industries (Chinese Industry Code 2002 or ISIC- Rev3) and products (HS6), I calculate the prefecture-level trade barriers as an interaction of employment distribution across various industries and industry-level trade policy changes.

B: Prefectures-Specific Trade Barriers

With the trade and employment based weights, the average trade policy each prefecture j faces at year t is aggregated as

$$TradePolicy_{jt} = \sum_i w_{ij} \cdot TradePolicy_{it}$$

where w_{ij} is the initial time-invariant weight that measures the importance of industry i in prefecture j, and $TradePolicy_{it}$ measures the industry-level time-varying trade policy of industry i at time t. When using employment weights, $w_{ij} = Emp_{ij}/\sum_i Emp_{ij}$, where Emp_{ij} is the number of employed workers in industry i at prefecture j during a fixed time period, 1998-2000. When using trade basket weights, $w_{ij} = XM_{ij}/\sum_i XM_{ij}$, where XM is the value of imports/exports of product i in prefecture j during a fixed time period, 1997-1999.

[14] The ideal employment information should come from pre-treatment time periods, but due to data limitation, 1998-2000 is the earliest data on industrial employment I have access to. I normalize various variables in the production data following Brandt, Van Biesebroeck, and Zhang (2014) and Yu (2015).

Note that the weights used in constructing prefecture-level tariff rates come from employment or trade structures determined before China's WTO accession. This eliminates endogeneity concerns caused by production and employment composition shifts in response to tariff changes. As a result, the temporal variation in the weighted average prefecture-level trade policy only reflects the variation in industry-level statutory changes over time. The unlikely correlation between pre-liberalization local industry mix and industry-level tariff reductions makes the prefecture weighted average an exogenous measure of local exposure to trade policy changes, as discussed in Section 1.3.

Moreover, products are classified as skilled-labor-intensive or unskilled-labor-intensive, depending on the share of skilled labor used in the production process. I use L and H to denote unskilled- (low-skill) and skilled- (high-skill) labor-intensive products, respectively. At the prefecture-level, the skilled sector produces goods that are skilled-labor-intensive, and the unskilled sector produces goods that are unskilled-labor-intensive. Using the weighting approach described above, I calculate both import tariff rates and tariffs abroad faced by prefecture j at time t:

- Import tariff rates for unskilled (L) and skilled (H) goods: $tariff^L_{CHN}$; $tariff^H_{CHN}$
- Import tariff rates on capital goods: $tariff_{CHN-Tech}$
- Tariff rates abroad for unskilled (L) and skilled (H) goods: $tariff^L_{ROW}$; $tariff^H_{ROW}$

Table 2 shows the summary statistics of the prefecture-level tariff rates for each cohort. Since each age cohort spends three years in high school, they were susceptible to trade policy changes during the three-year period. Therefore, I take a simple average of the tariffs rates in three consecutive years to approximate the average trade policy change each cohort faced while attending high school. For example, the class of 1994's average tariff is the mean of tariff rates in 1992, 1993, and 1994. The first 5 rows report the calculation based on trade basket weights, and the bottom 4 rows are based on employment weights. To illustrate visually the size of the tariff changes, Figure 4 plots the skill-specific tariff rates faced by each cohort at their schooling age. It similarly shows that both import tariffs and tariffs abroad faced by Chinese prefectures had declined, with a more drastic decline in unskilled sectors.

Moreover, since the prefecture-specific local exposure to trade policy changes reflects local industrial composition, the nationwide trend in declining trade barriers also varies by regions in China. As an example, Figure 2c and Figure 2d visualize the substantial geographic variation in tariff cuts of foreign capital goods and in trade policy uncertainty levels in low-skilled products, respectively.

Non-tariff barriers (NTB) that likely affect the overall trade environment in Chinese prefectures, including U.S. tariff uncertainty measured by *NTR gaps*, investment barriers measured by *contract intensity*, and export restrictions on textile products measured by *MFA quota bound*, are constructed in the same way. Table 3 gives a summary statistics of these measures.

2.2 Empirical Specification

Using the constructed variables described above, I link the prefecture-by-cohort education outcomes with the contemporaneous local trade policy changes experienced by schooling-age cohorts in their home prefecture. The resulting panel data consist of trade conditions and education outcomes of 15 age cohorts in 324 Chines prefectures.

I estimate the educational effects of trade barrier reductions using an OLS difference-in-difference (DID) specification. The intuition of this empirical approach is the following: the geographic distribution of sectors were initially uneven across Chinese prefectures – as tariffs and non-tariff barriers were reduced at the sectoral level by varying degrees at varying times, prefectures ended up with differential exposure to these changes. The DID specification tests whether cohorts in prefectures exposed to bigger trade barrier reductions experienced more pronounced changes in educational attainment than cohorts in less-exposed prefectures. The specification exploits the spatial variation across Chinese prefectures in their *degree* of exposure to trade policy changes, and the temporal variation across age cohorts in their *timing* of exposure to trade policy changes. In other words, the source of identification comes from the variation across Chinese prefectures in their degree of local exposure to the declining trade barriers over time.

This empirical design is a variation of the standard DID design (Autor 2003; Bertrand, Duflo, and Mullainathan 2004). Instead of having dichotomous treatment and control groups, the size of trade policy changes can be interpreted as a continuous treatment. That is, prefectures with bigger changes in trade policies were *more* treated, while prefectures with smaller trade policy changes were *less* treated. Correspondingly, age-cohorts mimic pre- and post-treatment time periods, since younger cohorts' schooling years overlapped with the trade barrier reductions, while older age cohorts had completed schooling prior to any changes in trade policies. Thus, for any given prefecture, the variation among younger and older cohorts in their timing of exposure to trade policy changes is analogous to the pre- and post- treatment periods of the said prefecture.[15]

The DID specification can be summarized in the following equation: $\overline{E_{jt}} = \beta_1 \mathbf{tariff}_{jt}^{CHN} + \beta_2 \mathbf{tariff}_{jt}^{ROW} + \beta_3 PostWTO_t \cdot \mathbf{NTR}_j + \gamma \mathbf{X}_{jt} + \delta(D_j \cdot t) + \lambda_t + \lambda_j + \epsilon_{jt}$

$\overline{E_{jt}}$ is the share of natives among age cohort t in prefecture j who have completed or enrolled in high school. $\mathbf{tariff}_{jt}^{CHN}$ is a vector of the Chinese import tariff rates, including local import barriers on unskilled goods ($tariff_{CHN}^{L}$), skilled goods ($tariff_{CHN}^{H}$), and access to foreign capital goods ($tariff_{CHN}^{Tech}$). Similarly, $\mathbf{tariff}_{jt}^{ROW}$ is a vector of the prefecture-level tariff rates Chinese exporters faced abroad (ad valorem equivalent nominal rates), consisting of export barriers on unskilled goods ($tariff_{ROW}^{L}$), and skilled goods ($tariff_{ROW}^{H}$). $\mathbf{NTR}_j$ is a vector of time-invariant measures of the reduction in tariff uncertainty on unskilled- and skilled-labor intensive products (NTR^L and NTR^H). To capture the discrete changes in U.S. tariff uncertainty experienced by cohorts, I interact $\mathbf{NTR}_j$ with a time dummy, $PostWTO_t$, to indicate whether cohorts' schooling years postdated the U.S. conferral of China's permanent Normal-Trade-Relations and China's WTO accession. Finally, $\mathbf{X}_{jt}$ includes other non-tariff barriers, such as *Contract Intensity* and *MFA Quota Bound*. Cohort fixed effect, λ_t, controls for the time-varying national-wide factors that affected cohort educational outcomes. Prefecture fixed effect, λ_j, captures the time-invariant local features that affect educational outcomes of different cohorts equally. I also include prefecture-specific time trends $D_j * t$ to account for pre-existing trends in schooling in each prefecture.

The causal impacts of trade policy changes on educational attainment are embodied in the β's. Negative β_1 and β_2 would indicate that, compared to the national trend, a reduction in tariff rate is associated with higher educational attainment of the affected cohorts in exposed prefectures. The interpretation of β_3 is the opposite. A higher NTR gap means a bigger reduction in trade policy uncertainty over time, and the interaction term, $PostWTO_t \cdot \mathbf{NTR}_j$, measures the size of this uncertainty reduction (treatment). Thus a negative sign in β_3 means a reduction in trade policy un-

[15]To interpret the cohort-prefecture DID specification in light of the standard DID design, one can think of each prefecture as the decision maker, choosing the skill composition of the schooling age cohort at each time period, and the choice of how many kids will grow up to be skilled labor is intrinsically a supply of skill response to the concurrent factor prices. As reduced trade barriers change the skill premium, prefectures change the share of skilled labor to supply.

certainty is associated with lower educational attainment, compared to the national trend.

Assuming no income effects, Table 4 summarizes the likely educational effect of trade policy changes as predicted by the Stolper-Samulemson Theorem.[16] For example, when the import tariff on unskilled-labor-intensive goods ($tariff_{CHN}^{L}$) decreases, the relative price of unskilled-labor-intensive goods decreases. The Stolper-Samuelson Theorem predicts that the skill premium will increase as a result. Therefore, a reduction in import tariff on unskilled-labor intensive goods can lead to rising returns to education, and consequently higher average educational attainment in the long run.[17] The opposite holds true for import tariffs on skilled-labor-intensive goods ($tariff_{CHN}^{H}$). When tariffs abroad on skilled-labor-intensive goods ($tariff_{ROW}^{H}$) decrease, the demand for Chinese skilled labor increases, despite some offsetting impacts from term of trade effects. This creates an increased demand for education. The removal of trade policy uncertainty – measured by NTR gaps – has similar impacts as reductions in tariffs abroad because uncertainty in U.S. tariff rates on Chinese exported goods can be interpreted as higher expected tariff rates abroad.

3 Results

3.1 Results of High School Education

Table 5 presents the baseline findings on the effect of trade policy changes on average high school completion (and enrollment) among native male cohorts. The outcome variable is the share (in percentage points) of high school educated (and enrolled) among the native male cohort, which includes (born, educated and live there) and out-migrants (born, educated and moved away). For members of each cohort that are out of school and in the labor force, I count the ones with a high school degree or higher as "completed high school". However, due to wide variations in school start-

[16] Edmonds, Pavcnik, and Topalova (2010) find that, in India, the loss in parental income due to the loss of protection after trade liberalization had contributed to children's reduced education. However, in the case of China, high school and college are subsidized, and the basic tuition and fees that do not take up big shares in the average household's income. Thus, I expect the poverty-schooling link (Edmonds, Pavcnik, and Topalova 2010) will not likely play an important role in the context of China. Section 5.1 has more discussion on the income effects.

[17] In this example, term of trade effect increases the relative return to the unskilled-labor-intensive sectors, causing the skill premium in China to increase. But the term of trade effect will never offset the effect of tariff reduction.

ing age among different regions, some members of the said cohort are still enrolled in high school when surveyed by the 2005 census. To address this concern, I also include the enrolled students in each cohort and count them as "enrolled in high school". In other words, high school completion and enrollment rate is calculated as (completed high school + enrolled in high school)/total count in cohort.

It shows that, during 1990-2004, high school education increased more in prefectures that experienced larger import tariff declines in unskilled-labor-intensive goods. The reverse is true for prefectures that saw larger declines in tariffs abroad and U.S. tariff uncertainty on unskilled-labor-intensive exports.

Column (1) includes only prefecture-specific tariff rates on goods imported by Chinese prefectures (CHN), and tariff rates abroad on exported goods from Chinese prefectures (ROW), where L and H denote low-skill and high-skill labor intensive industries respectively. Column (2) includes only prefecture-specific reductions in trade policy uncertainty, measured by NTR gaps. Column (3) includes both changes in tariff levels and uncertainty, and column (4) adds additional control variables, including relaxations in investment barriers measured by *Contract Intensity*, and relaxation on textile export quotas measured by *MFA Quota Bound*. In columns (5) and (6), I restrict the sample to prefectures with non-zero in-migrants. These prefectures are arguably more impacted by trade policy changes, since they sought to adjust to the increase in labor demand by bringing migrant labors (Facchini et al. (2017)). In all specifications, robust standard errors are clustered by prefecture, and prefecture fixed effect, cohort fixed effect, as well as prefecture-specific time trends are included.

All estimates show that, relative to the national trends, larger declines in China's import tariff on unskilled goods are associated with higher high school completion and enrollment rates of the natives, suggesting that increased access to import competition in the unskilled sectors decreased the relative demand for Chinese unskilled labor. Specifically, everything else equal, for each percentage point decrease in $tariff^L_{CHN}$, the high school completion and enrollment rate among the appropriate schooling aged cohort is higher by 0.27% relative to the national trend.

On the other hand, two other trade policy changes related to expansion in unskilled-labor-intensive manufacturing sectors have attenuated the upward trend in high school education. Reduction in tariff uncertainty of the unskilled goods (measured by NTR^L) and decrease in tariff rates on exported unskilled goods (measured by $tariff^L_{ROW}$) are both associated with sizable negative impact on schooling. Everything else equal, one percentage point decrease in $tariff^L_{ROW}$ and NTR^L are respectively associated with a 0.17 percentage point a 0.11 percentage point decrease in high school completion and enrollment rate, relative to the national trend. These results suggest that as the unskilled sectors enjoyed improved market access to the rest of the world, the expanded employment opportunity in the unskilled sectors increased the opportunity cost of schooling, and consequently reduced the incentive of schooling. These findings are similar, but bigger in magnitude, in prefectures with in-migration flows, as seen in columns (4) – (7).

The proceeding results presented in Table 5 treat all imports the same, and do not differentiate between imported inputs for ordinary trade, processing trade, or imported capital goods.[18] In Table 6, I disaggregate the import basket into imports of intermediate goods used for ordinary trade and imports of capital goods, measuring them separately using $tariff^L_{CHN-o}$, $tariff^H_{CHN-o}$, and $tariff_{CHN-Tech}$.

The main results are presented in Table 6. Among various reductions in trade barriers, declines in the Chinese import tariffs on unskilled-labor-intensive intermediate goods are associated with higher high school completion and enrollment rates relative to the national trend. For each percentage point decrease in $tariff^L_{CHN}$, about 0.17% more high-school aged children receive high school education. Keeping everything else equal, compared to prefectures at the 25th percentile of Chinese unskilled tariff decline, the increase in high school education is 1.92 percentage points higher in prefectures at the 75th percentile.

Comparing Column (1) and (2), when the Chinese tariffs on capital goods are controlled for, the estimated effect of import tariff rates on education becomes much smaller. Adopting foreign technology through importing capital goods has an even bigger positive impact on education – one percentage point decrease in $tariff_{CHN-Tech}$ leads to 0.48 percentage point increase in high school completion and enrollment rates. Compared to prefectures at the 25th percentile of declining Chinese tariff on capital goods, the increase in high school education is 3.5 percentage points higher in the prefectures at the 75th percentile. One possible explanation for this finding is that the imported foreign technology complements skill and increases the skill premium and human capital accumulation. This empirical finding for

[18] Processing trade is not subject to tariffs on inputs. Foreign firms and joint ventures are exempt from import tariffs on these capital goods, as a result $tariff_{CHN-Tech}$ may correlate with FDI activities, which also demanded relatively more skilled labor. On the other hand, domestic firms are subject to paying import tariffs on capital goods, and the decline in these tariff rates may provide domestic firms an improved access to foreign technology. Not accounting for various types of imports may bias the results.

the Chinese labor market is consistent with the increased relative demand for skill in Mexico and other Latin America countries, as documented in relevant studies (Pavcnik 2003, Bustos 2011).

Similar to results in Table 5, two other trade policy changes related to expansion in unskilled labor intensive manufacturing sectors suppressed high school education: reduction in tariff uncertainty of the unskilled goods, measured by NTR^L, and decrease in tariff rates on exported unskilled goods, measured by $tariff^L_{ROW}$ (although the latter is only significant at the 10% significance level). Everything else equal, the one percentage point decrease in NTR^L is associated with a 0.11 percentage point decrease in high school completion, relative to the national trend. The elimination of U.S. tariff uncertainty on unskilled goods translates to 1.132 percentage points *less* increase in high school completion rates in the 75th percentile prefectures than the 25th percentile prefectures. These effects are stronger for prefectures with non-zero in-migrant flows.

3.2 Semiparametric Evidence

The above results from a linear regression approach focus on how trade policy changes affect the *mean* of the educational attainment, and cannot speak to the changes along the entire *distribution* of educational outcomes. In this subsection, I follow DiNardo, Fortin, and Lemieux (1996) and use a semiparametric approach to compare the *distribution* of educational attainment in more exposed prefectures to that in less exposed ones.[19]

Specifically, I test whether an improved access to foreign technology adoption has led to a higher distribution of educational attainment. In Figure 5A, I plot the actual densities and show a simple comparison between the prefecture that had adopted foreign technology (in dashed maroon line) and those that had not (in dotted green line) – the tech-adopting prefecture did seem to have a higher share of high-school educated natives. Note, however, that the observed raw difference in educational attainment across prefectures could be attributed to differential exposure to trade policy changes,

[19]DiNardo, Fortin, and Lemieux (1996) pioneered semi-parametric procedure to analyze changes in the distribution of wages. Pavcnik (2003) applied this methodology to Chilean plant-level data, and observed difference in the density of wagebill share of skilled workers between plants that adopted technology and plants that did not. Chiquiar and Hanson (2005) applied this method to test the negative selection hypothesis of Mexican migrants in the U.S. By comparing the wage distribution of Mexican natives and of emigrants, they show that Mexican immigrants in the U.S are more educated than non-migrants in Mexico.

such as technology adoption, as well as other confounders, such as underlying prefecture characteristics that also influence the average skill endowment.

To tease out the difference in educational attainment attributable to observable prefecture characteristics, I first predict the probability that a prefecture adopts foreign technology based on observable characteristics, such as labor market condition, geographic location, age composition etc. I then use the predicted probability to reweigh the education distribution of the tech-adopting prefectures, giving more weights to those that are observationally more similar to the non-tech-adopting prefectures. The result (red solid line in Figure 5b) is the *counterfactual* education distribution of tech-adopting prefectures if they had not adopted foreign technology. Hence, the remaining difference between the observed and the counterfactual education distribution of prefectures that adopted foreign technology is not driven by selection on observables, and can be attributed to the adoption of foreign technology. For the tech-adopting prefectures, they would have ended up with a lower skill endowment if they had not had reductions in Chinese tariffs on imported capital goods.

I repeat the same exercise for improved access to imported low-skill intermediate goods in Figure 6. There is a visible difference between the actual and counterfactual education densities of prefectures with large decreases in unskilled intermediate goods, suggesting decreases in import tariffs on unskilled products lead to higher average schooling. These results from semi-parametric analysis further complement the point estimates from linear regression results, and confirm that improved access to cheaper imports of low-skill intermediate goods decreased the relative demand for Chinese unskilled labor.

3.3 Results of College Education

I then turn to college completion and enrollment rates, and examine whether trade policy changes have had similar effects at the college level in Table 7. Even though college completion and enrollment rates have increased from 8.5 % in 1990 to 14 % in 2004, these increases seem to be unrelated to trade policy changes. A few possible reasons may explain this finding. First, most tertiary institutions have limited seats. Each year a "National College Entrance Examination" (*gaokao*) is held in early June, when high school seniors are ranked by their test performance. This determines their eligibility to move on to college. Second, most tertiary institutions rely on provincial and federal funding, and adopt "affirmative action" style college admission policies that aim to increase the education equity among regions. As a result, the big demand for college education is unmatched by a strictly limited supply. Consequently, the share of college education of each cohort reflects the equilibrium outcome of demand and supply of college education. Trade policy changes may have affected the demand for college education, but this increased incentive may not translate perfectly in the presence of inelastic supply of college education and distortive admission policies.

4 Robustness Checks

4.1 Placebo Tests

In Table 8, I run a Granger test on older cohorts to make sure the results were not driven by reverse causality. Reverse causality arises if prefectures' initial skill endowment predicated future trade shocks before China experienced any trade policy changes. That is, the pre-liberalization education disparity determined the subsequent size of trade policy changes in each region. To rule out reverse causality, I test the effects of trade policy changes during 1990 - 2004 on cohorts who finished high school prior to the trade policy changes. They are the classes of 1980 to 1994, and their high school years did not overlap with the upcoming trade events in China. All specifications in Table 8 report insignificant results on all coefficients, confirming that individuals between 28 years old (class of 1994) and 42 years old (class of 1980) didn't exhibit anticipatory responses to the later trade liberalizations that took place after these older cohorts had finished high school education.

Due to the 9-year compulsory education law, the skill-specific trade policy changes should affect only the skill premia at the high school and college levels, and leave the schooling incentive at lower grades unchanged. On the other hand, trade-related factors could contribute to increased local fiscal spending on education and enhanced quality of public schools, both of which could improve the implementation of the 9-year compulsory education and create a larger pool of prospective high-school students. To show that this is not the mechanism through which trade affects high-school educational attainment, I run a placebo test in Table 9, which confirms that educational attainment at the junior level were not correlated with trade policy changes.

4.2 Employment Distribution as Weights

Most studies that evaluate the impact of trade shocks on labor market outcomes focus on the impact through employment. To quantify the local trade shocks, they interact industry-level measures of trade policy with the geographic concentration of industries (Topalova 2007, Autor, Dorn, and Hanson 2013, and Kovak 2013). The empirical analyses presented in Section 3 instead use trade baskets as the local industry mix, allowing for a more granular decomposition of trade policy changes that affect skill acquisition deferentially. To check if my main findings are robust to using local employment compositions as weights, I weigh the local exposure to trade policy changes using prefecture-level employment distribution, and present the regression results in Table 10.

Columns (1)-(2) in Table 10 report results using prefecture tariffs weighted at the ISIC-Rev3 level, and columns (3)-(4) report results weighted at the CIC 2002 level. Under the employment-weighted specification, reduction in Chinese import tariffs on unskilled goods, measured by $tariff_{CHN}^{L}$, has positive impacts on schooling, while expanded export market of unskilled labor intensive goods ($tariff_{ROW}^{L}$, NTR^{L}) has negative impacts on schooling. Surprisingly, decrease in tariff rates on exported skilled goods, measured by $tariff_{ROW}^{H}$, seem to discourage schooling, which contradicts the Stolper-Samuelson prediction.

4.3 Migration

The local labor market adjustments to skill price changes may take place through relocation of skills in the short run (i.e., internal migration), and acquisition of skill in the medium-to-long run (i.e., educational attainment). In this section, I address the possible confounding effects of internal migration by providing institutional background and robustness checks.

Mobility across prefecture can bias the empirical results in two important ways. First, relocation of skills attenuates the local exposure to trade shocks if the relocation was caused by trade shocks. Facchini et al. (2017) show that, when the trade policy uncertainty with the U.S. was eliminated as China joined the WTO, skilled labor responded to the increased demand of labor by migrating towards the job opportunities. Their results suggest that the estimated educational impact I find in this paper should be interpreted as a lower bound of the true impact of trade policy changes were mobility fulled prohibited. The dampening effect of internal migration, however, does not completely mitigate the trade-induced changes in skill prices, as China's *Hukou* system remains fairly protective of local residents and restrictive to labor mobility even to this day.[20] The labor mobility friction preserves the

[20]Internal migration in China has been tightly controlled by the *hukou* (Household Registration) System. *Hukou* is a resident permit issued by a prefecture on a family basis, and one of the most important features of the system is that *hukou* entitles its holder

geographic difference between prefectures in their exposure to trade shocks, justifying treating prefectures as individual labor markets.

Second, relocation of skills changes a prefecture's skill endowment through compositional shifts. Thus, merely observing the changes in skill endowment of all observed residents could overstate the impacts of trade policy changes on education acquisition. I tease out the skill relocation response from the skill acquisition response by considering the educational outcomes of only prefecture *natives*. Specifically, I focus on residents of a prefecture who are either non-migrants (born, educated and live there) or out-migrants (born, educated and moved away). This approach is justified by the fact that most schooling age children in China receive their primary and secondary education in their hometowns, as entitlement to public education is predicated by the *hukou* system.[21] Assuming schooling age children do not make migration and schooling decisions simultaneously, the hometown exposure to trade policy changes, rather than the trade policy changes at potential migration destinations, is what would have affected their educational attainment.

To fully address possible confounding effects from increased internal migration, I carry out robustness checks with alternative samples in Table 12. Column (2) replicates the results in the main specification where the native sample of each prefecture includes non-migrants and out-migrants. Column (1) uses the entire population observed at prefectures, i.e., non-migrants and in-migrants. Column (3) restricts to only non-migrants. Results are similar across these three alternative samples. Interestingly, all the significant coefficients have larger magnitudes in the regression in column (1) than in column (3), which suggests that trade policy changes had altered the relative demand for skill, and part of the adjustment took place through internal migration.

5 Mechanisms

There are three main channels through which trade policy changes can influence educational attainment. First, changes in return to education affect the incentive to acquire education. Second, changes in real income affect

to local social welfare programs, such as public education and public health. For this reason, it limits internal migration since it precludes access to public services to those migrants who cannot acquire a local *hukou*. Since the late 1990s, *hukou* policy has been relaxed to facilitate temporary labor mobility as well as to help address urban prefectures' increased demand for labor. Nevertheless, restrictions on long-term migration remain, and permanent migration between prefectures remain very low, as shown in Table 11.

[21] This restriction wasn't relaxed in selected regions of China until 2016 (OECD 2016).

the affordability of education. Third, changes in unskilled wages affect the opportunity cost of schooling. I outline the intuition of these channels in a simple model of education decision in subsection 5.1, and substantiate the model prediction with supplementary empirical evidence in the remainder of this section.

In the first channel, trade of both final and intermediate goods changes the skill premium through Stolper-Samuelson effects (Findlay and Kierzkowski 1983, Blanchard and Olney 2017). Freer trade influences the relative demand for factors of production, and consequently shifts the payouts to skilled and unskilled workers. Increases (decreases) in skilled wages translate directly into increases (decreases) in return to education, while increases in unskilled wages have an additional effect on the opportunity cost of education. Moreover, trade-induced technology upgrading also affects returns to education.[22] Globalization has accelerated the speed at which developing countries acquired access to skill-biased technologies (Pavcnik 2003; Bustos 2011). As a result, the increased wage gap across skill levels in developing countries can also be partially attributed to skill-biased technological change.

In the second channel, trade changes the affordability of education through income effects. Trade policy changes can decrease (increase) household real income for workers in the import-competing (export-oriented) sectors, and hence decrease (increase) their ability to pay for education. In many developing countries, unskilled-labor-intensive sectors were more protected prior to liberalization, contrary to the trade protection patterns assumed in classical trade models (Attanasio, Goldberg, and Pavcnik 2004; Topalova 2004; Goldberg and Pavcnik 2005; Goldberg and Pavcnik 2007). Not surprisingly, the costs of globalization were often borne by unskilled workers in developing countries. Edmonds, Pavcnik, and Topalova (2010) find that Indian districts with concentrated employment in industries losing tariff protection saw a relative rise in poverty. Families facing this negative income effect demanded more child labor, resulting in reduced schooling of their children.

In the third channel, trade affects the intertemporal cost of schooling by changing the unskilled wages. Atkin (2016) shows in the case of Mexico, the arrival of low-skill export-manufacturing jobs raised the opportunity cost of schooling and increased drop-out rates.

[22]Acemoglu (1998, 2003) have shown that the technological advancement since the 1970's complements skilled labor.

5.1 Conceptual Framework

Consider an individual making a schooling decision at the beginning of entering the labor market. Schooling takes 1 period of time, and tuition costs c. Denote w^0 and w^s as the real income of unskilled and skilled workers, respectively.

The value function for unskilled workers is:

$$V^0 = \sum_{t=0}^{\infty} \beta^t w^0 = \frac{w^0}{1-\beta}$$

The value function for for skilled workers is:

$$V^s = -c + \sum_{t=1}^{\infty} \beta^t w^s = -c + \frac{\beta}{1-\beta} w^s$$

Individuals acquires education if the expected utility of going to school is higher:

$$V^s + e^s > V^0 + e^0$$

Thus, the probability that we observe an individual as a skilled worker is:

$$Pr(s=1) = Pr(e^0 - e^s < \frac{\beta}{1-\beta}[w^s - w^0] - w^0 - c) \tag{1}$$

The first term, $\frac{\beta}{1-\beta}[w^s - w^0]$, embodies the skill premium channel.As skill premium increases, either due to rising w^s or falling w^0, educational attainment also increases. The second term, w^0, represents the opportunity cost of going to school, and the third term, c, for the tuition cost.[23]

Define $u = e^0 - e^s$, which is mean zero with *cdf* $F(u)$ and strictly positive density $f(u)$. To analyze the determinants of changes in schooling, I differentiate Equation 1 with respect to tariff changes, $d\tau$.

$$dPr(s=1) = f(u) \cdot [\frac{\beta}{1-\beta} \cdot \frac{\partial w^s}{\partial \tau} d\tau - \frac{1}{1-\beta} \cdot \frac{\partial w^0}{\partial \tau} d\tau - \frac{\partial c}{\partial \tau} d\tau] \tag{2}$$

From Equation 2, trade policy changes ($d\tau$) can affect individual education decisions through (1) changing the skill premium, i.e. the substitution

[23] In this paper, I ignore the tariff's effect on the real income through the consumption channel. There are two justifications. As long as consumption bundles are not correlated with sectoral composition of employment across prefectures, the omission of the consumption exposure to trade policy changes will not bias the effects from the income channels. In addition, if there is no significant variation in consumption bundles across areas in China, the impact through consumption is captured in the time trends.

effect, and (2) changing the relative cost of education (i.e. the income effect). The interaction between the type of trade policy change and the skill-intensity of the sector it affects determines how skill acquisition is impacted.[24]

In some cases, these two channels can interact with each other. For example, when import tariffs on unskilled-labor-intensive goods decline, imports of foreign low-skilled goods replace domestic unskilled labor and increase the relative demand for skilled labor. As a result, higher return to education will increase the incentive for skill upgrading. However, unskilled workers may suffer income declines due to the loss of tariff protection, and may not be able to afford to invest in education. In fact, the combined effect of trade policy changes on education depends on which channel dominates. This explains why existing studies that examine aggregate educational outcomes have found mixed results despite overwhelming evidence of increases of skill premium in many countries. [25] The converse holds true for decreases in tariffs abroad on unskilled-labor-intensive goods. The rise in relative demand for domestic unskilled labor not only decreases the skill premium, but also increases the opportunity cost of schooling. At the same time, however, education becomes more affordable as unskilled workers' income rises. As a result, some individuals may respond more to the skill-premium channel, while other budget-constrained individuals may respond more to the income effects.

The conceptual motivation outlined above offers three possible explanations for the main empirical findings in this paper: 1) returns to education increased in response to trade policy changes; 2) arrival of low-skill jobs increased the opportunity cost of education; 3) cost of education decreased in high school but not in college. I explore each of these channels in the following subsections and present empirical evidence supporting each claim.

[24]Note that none of the terms in Equation 2 explain the income effects directly. In an individual decision's problem, without specifying parents' income, the income channel can only be indirectly modeled through the real cost of education, c. For example, let the local economy as a whole be the provider of credit for education expense, and the nominal tuition expense is set at the national level. Depending on the industry mix of this local economy, a trade shock could increase or decrease its overall GDP relative to the national standard. This affects the local economy's ability to provide education credit to its resident students, regardless of how skill premium changes.

[25]For example, both facing increased skill premium brought by globalization, unskilled workers in the U.S. responded by upgrading their skills (Hickman and Olney 2011), while unskilled workers in India responded by downgrading their children's education to cope with trade-induced poverty (Edmonds, Pavcnik, and Topalova 2010).

5.2 Return to Education

The main results imply that trade policy changes increase the relative demand for skill. Given that the unemployment rate in China stayed at a very low level for both skill types (Facchini et al. 2017), increased demand for labor should exhibit more through higher wages. In other words, the positive effects on education from foreign technology adoption and imports of unskilled-labor-intensive products should also have positive impacts on the skill premium. Consequently, the higher return to education prompts stronger incentives to acquire schooling. For this mechanism to be valid, skill premium and education should both increase.

Ge and Yang (2014) document significant increases in average wage as well as schooling premia between 1992 and 2007 in China. They find that capital accumulation and skill-biased technological change are among the main explanations for higher returns to education. I replicate the schooling premium trend in Ge and Yang (2014) with firm-level manufacturing census data from 1998-2007. According to the skill intensity of industries and firm ownership types, I consider four average wage points: 1) domestic and 2) foreign firms in the unskilled-labor-intensive industries, and 3) domestic and 4) foreign firms in the skilled-labor-intensive industries. I plot the annual average wages of these 4 groups between 1998 and 2007 in Figure 7. The skilled sectors are in diamonds, and the unskilled sectors are in circles. I denote domestic firms with red and solid markers, and foreign firms with blue hollow markers. Several patterns emerge from Figure 7. First, foreign firms pay higher wages than domestic firms. Second, skilled sectors pay higher wages than unskilled sectors, and the gap between them increases over time, for both domestic and foreign firms. This confirms the increasing trend in skill premium.

I next check whether the increases in demand for skill are caused by trade policy changes. I relate the share of skilled employees to the local trade policies at the prefecture level, and carry out a standard DID regression using firm-level employment data in 1995 and 2004.[26] The regression results are presented in the coefficient plot in Figure 8. Consistent with the changes in educational attainment, the average wages increased more in prefectures with more imports of unskilled products. However, the effect from imports of capital goods is not significant.

[26]Due to data limitation, I cannot measure skill premium form the firm-level data. Thus, I use the prefecture-level average wages.

5.3 Arrival of Low-skill Manufacturing Jobs

To check whether the second channel – that the arrival of low-skill jobs increased the opportunity cost of education – may have been at work in driving the main findings, I document the increase in low-skill manufacturing employment using firm-level employment data from 1998 to 2007 in Figure 9. It shows that the overall number of jobs in unskilled sectors increased over time, but the job growth in foreign firms was much faster. This suggests faster job creation associated with better integration with foreign markets as China acceded to WTO.

I then relate NTR gaps to the increase of unskilled jobs using an industry panel dataset I constructed from CASIF 1998-2007, with which I estimate the impact of trade policy uncertainty reduction on unskilled job growth. The results are reported in Table 13. U.S. granting China PNTR is positively associated with job growth in the unskilled sectors. Both domestic and foreign firms expanded and hired unskilled workers. However, if these new jobs are taken by internal migrants, then internal migration will attenuate the increased demand for unskilled labor, leaving little change in opportunity cost of schooling for local youth. I address this concern in Table 14, which shows that increased internal migration (Table 11) was not sufficient to satiate the increased demand for unskilled labor, leaving native unskilled workers working longer hours.

The negative impact on educational attainment from the elimination of U.S. tariff uncertainty in unskilled sectors came from the increased availability of jobs that do not acquire skills. It follows that the unskilled job expansion beginning in 2000 likely created opportunities outside of school, and increased the opportunity cost of acquiring education.

5.4 Provision of Public Education

Finally, the increase in schooling among younger Chinese cohorts would not have been possible without the third channel – expansion in education facilities. To confirm the increasing availability of education resources during 1990-2004, I plot the total number of teachers and student-teacher ratios in Figure 10. Overall, the number of teachers in all education levels increased since 1990. However, the student-teacher ratios in primary and secondary schools increased much faster than that in colleges. In fact, the increase in number of teachers in primary and secondary schools kept the student-teacher ratio almost steady, while the sharp increase in college student-teacher ratios suggests insufficient education resources at the tertiary education level. This may help explain the contrasting results I find – high school education increased in response to trade policy changes while college education did not.

To test whether the local governments at prefectures that experience more skill-increasing trade shocks expanded education facilities accordingly, I run a DID regression similar to the main specification for number of teachers and number of teachers per school in Table 15. Local education resources did respond to trade policy changes, responding in the same direction as children's incentive for schooling. For high school education, which is funded by prefecture-level local governments, imports of capital goods and unskilled products increased the number of teachers. For college education, which is funded by provincial and central governments, I find mixed results.

6 Conclusion

Recent empirical research has emphasized the distributional impacts of globalization, as many developing countries have forgone the import-substitution policy and opened up to trade in the past few decades (Goldberg and Pavcnik, 2004; 2007). Whether the inequality in *income* will translate to inequality in *education* in the long run requires careful and comprehensive assessment of the possible channels through which trade can affect educational attainment. I examine this question in the context of China's trade liberalization since early 1990, culminating in its WTO accession in 2001. I assess a wide range of trade policy changes, and decompose the differential impact of each component. My findings can be summarized in four points.

First, despite the fact that internal migration responded to increased demand for labor caused by trade policy changes (Facchini et al. 2017), skill reallocation was not sufficient to arbitrage away the skill price changes. Therefore, the overall low endowment of skill left remaining incentive for skill acquisition.

Second, I find that completion and enrollment rates of high school education have increased in China since the early 1990s. These trends are more pronounced in prefectures where industries benefited more from falling tariff on foreign technology, and in prefectures where industries substituted imported unskilled-labor-intensive goods for domestic unskilled labor due to falling tariff protection on these goods. On the other hand, expansion of export opportunities in unskilled sectors, due to the elimination of U.S. trade policy uncertainty (i.e., US granting China permanent Normal-Trade-Relations), increased the opportunity cost of schooling and decreased high school education completion. From 1990 to 2004, in the average Chinese prefecture, high school completion and enrollment rates among male 16-19 year-olds have increased 20 percentage points – from 26.3% to 46.5%. Positive changes associated with Chinese tariff reductions increased the share of high school educated individuals among the native cohorts by about 10-13%, while PNTR and China's accession to WTO decreased high school educational attainment by 3.5% since 2001. The combined effects of globalization translates to approximately half of the total increase in high school completion since China's trade reform. Furthermore, these findings are robust to a variety of alternative methods to account for potential endogeneity of the baseline specification.

Third, trade policy changes seem to have no effect on college education, possibly due to the limited seats in tertiary institutions. The distortive college admission policies that aim to even out the education inequality among regions may have also contributed to this finding.

Lastly, I provide evidence for three channels through which changes in trade policy affect educational attainment: returns to education, opportunity cost of schooling, and supply of education resources. More detailed examinations suggest that increased schooling premium and local government's increased provision of public education may have facilitated increased schooling. At the same time, export expansion of manufacturing goods due to better access to foreign markets has increased the demand for unskilled labor and resulted in reduced schooling.

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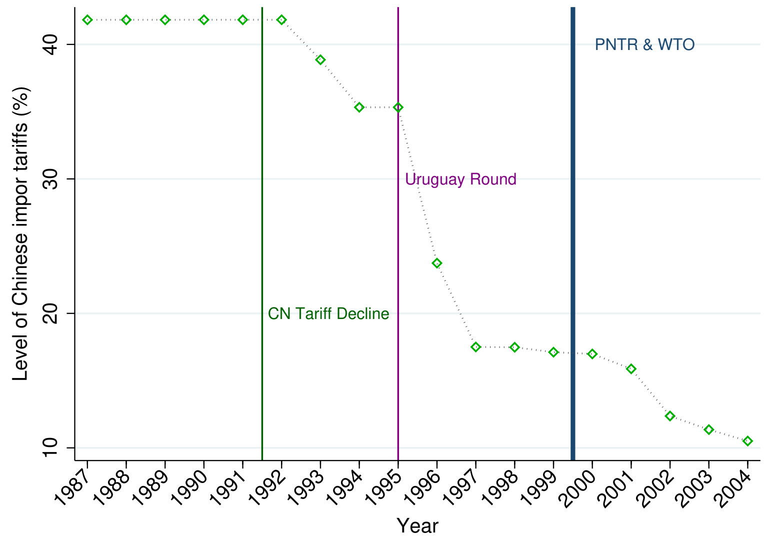
(a) Average Chinese import tariff rates, annually



(b) Share of high school educated residents

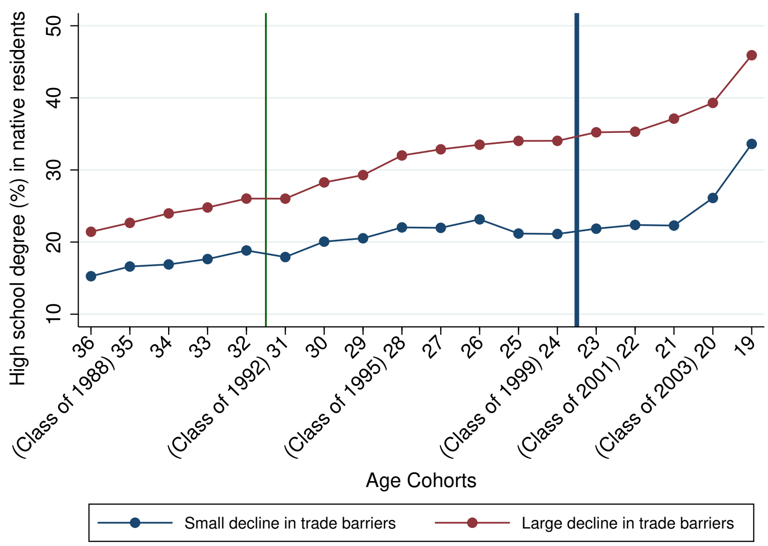
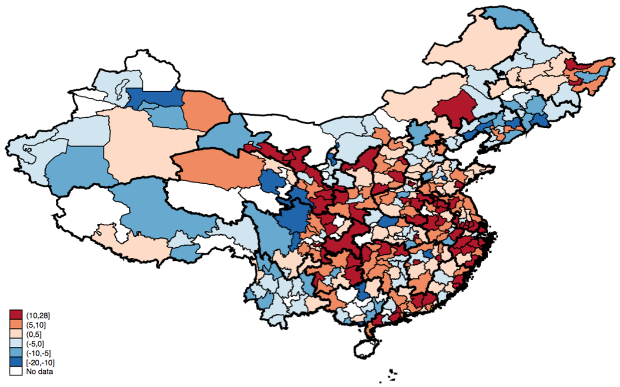


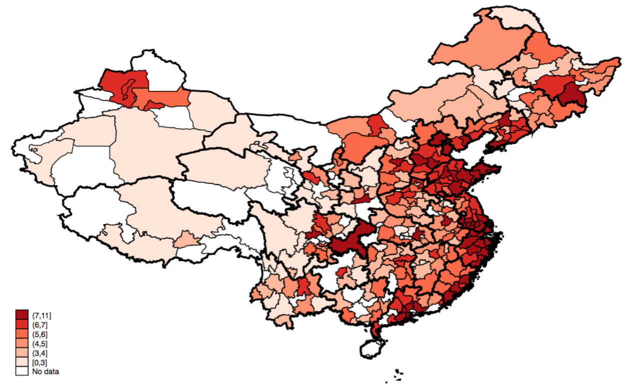
Figure 1: Trade policy changes and educational attainment

Notes: (a) plots the average Chinese import tariffs against the timeline of major trade policy changes China experienced: China's beginning of lowering import tariff in 1992; conclusion of the Uruguay Round in 1995, and China's accession to the WTO in 2001. Age cohorts around these lines were most exposed to globalization. (b) plots, from older cohorts to younger cohorts, the share of high school educated individuals among the native population (non-migrants and out-migrants). The blue line denotes cities that were "less-treated" (that is, exposed to smaller changes in trade policy), and the red line denotes cities that were "more-treated" (that is, exposed to bigger changes in trade policy). The vertical lines corresponds to the major trade policy changes timeline in (a).

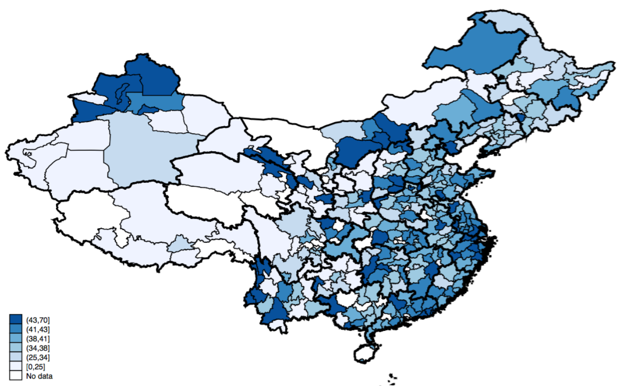
Figure 2: Geographic Variation Among Chinese Prefectures



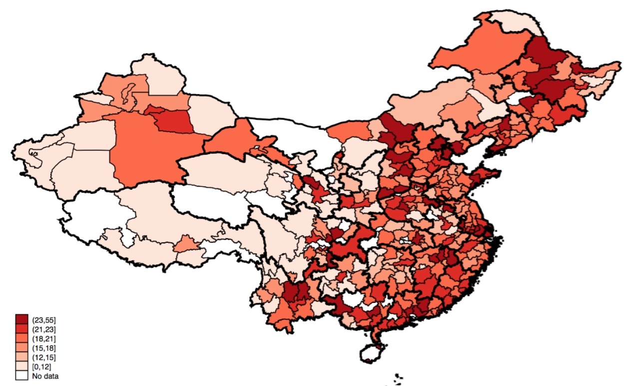
(a) Changes from 2000 to 2005 in High School Educated (%) among 18-27 Year-old Natives



(b) Log of Changes in Export Values from 2000 to 2005



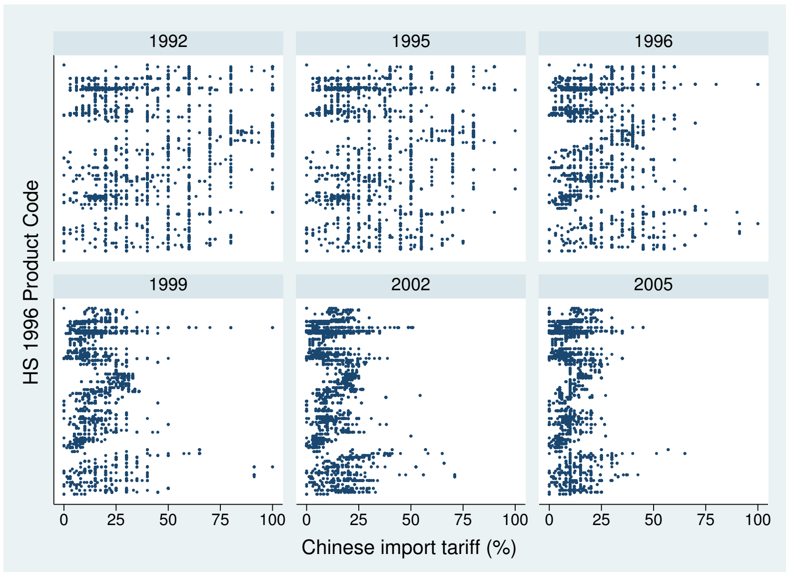
(c) Trade Uncertainty Levels (NTR Gaps) in Low-skill Products



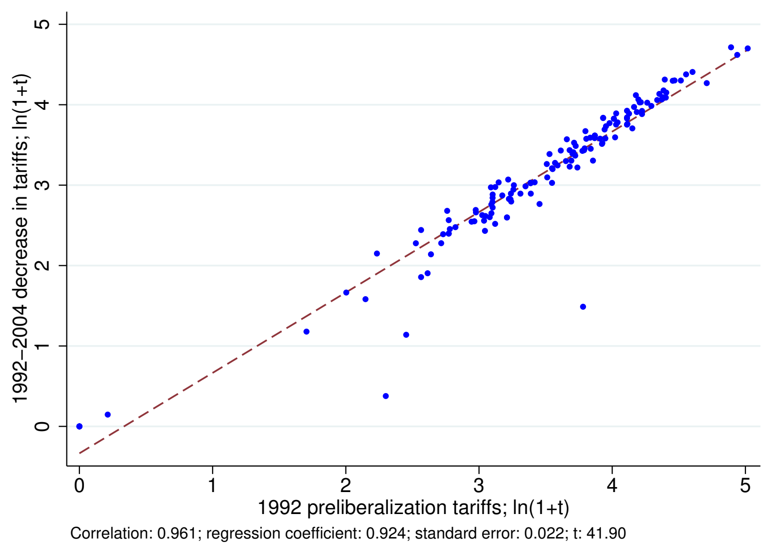
(d) Change in Tariff Rates on Capital Goods from 1992 to 2004

Notes: The geographic boundaries outline administrative division at the prefecture level. Bold lines mark provincial boundaries. (a) shows the increase in share of at least high school educated among the native 18-27 year-olds. (b) plots the geographic variation in prefecture-level increase in export values. (c) plots the geographic variation in prefecture-level NTR gaps of low-skilled exports. (d) plots the geographic variation in prefecture-level import tariff rates on capital goods.

Figure 3: Exogeneity of Chinese tariff reductions



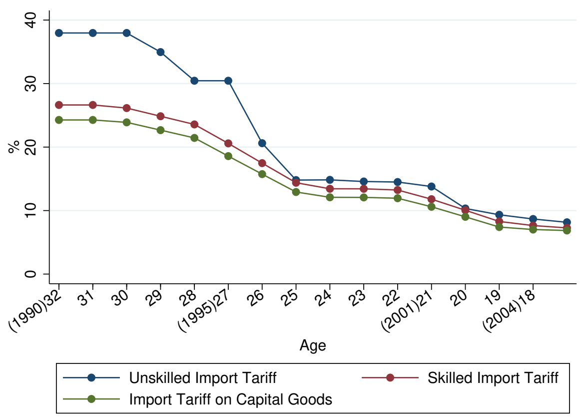
(a) Chinese import tariff rates at product level



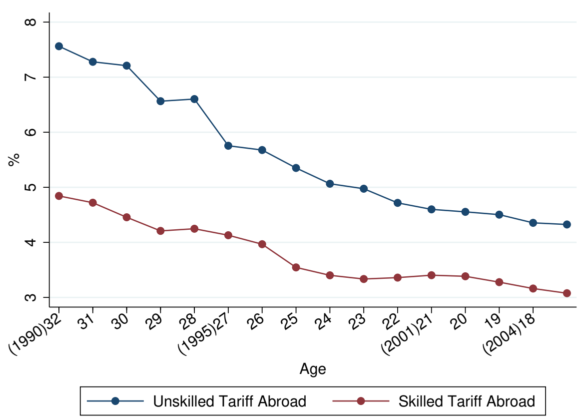
(b) Relationship between tariff reductions and pre-liberalization tariff levels at industry level

Notes: (a) This figures plots the distributions of Chinese import tariff rates at the HS 6-digit product level at various years. The leftward shift in the density over time shows gradual overall import tariff reductions. (b) Industry tariff rates are aggregated from HS 6-digit level to ISIC 4-digit level by taking unweighted averages.

Figure 4: Tariff rates across years and cohorts



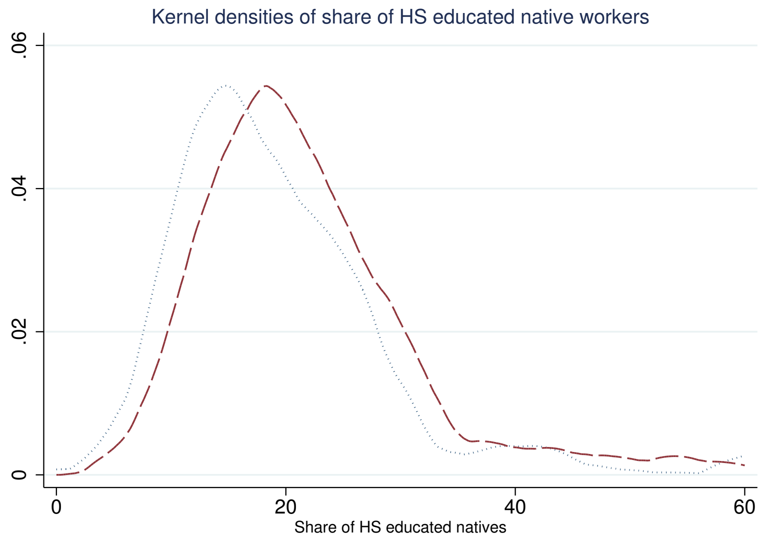
(a) Import Tariff



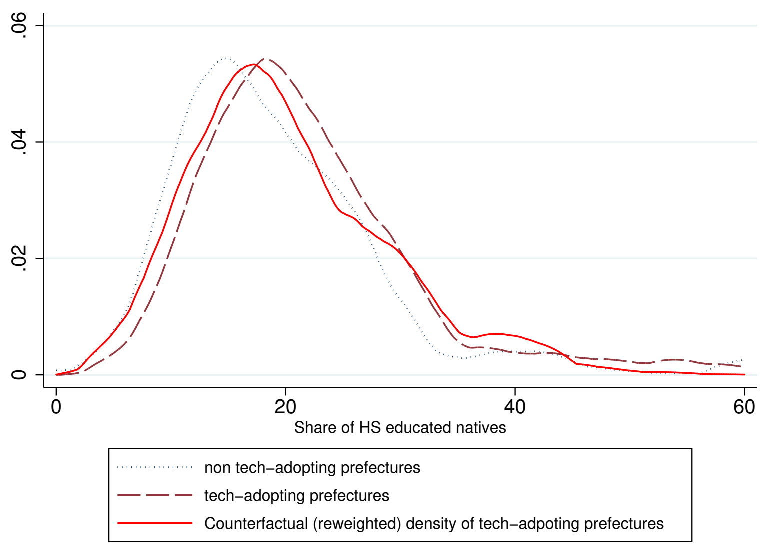
(b) Tariff Abroad

Notes: This figure plots the progression of prefecture-level tariff rates across time/cohorts. HS 6-digit product level tariff rates from the WTIS-TRAINS database are aggregated to prefecture level tariff rates by taking simple averages using import and export baskets of each prefecture. The Chinese import tariff rates use are MFN rates, not including VAT or general duty. Prefecture-level tariff rates are aggregated by taking simple averages of the tariff rates associated with the local trade basket.

Figure 5: Kernel densities of share of HS educated native workers



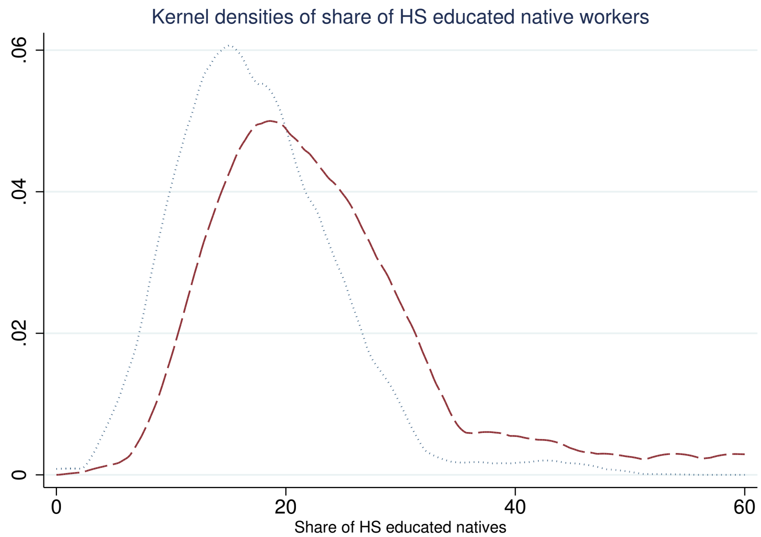
(a)



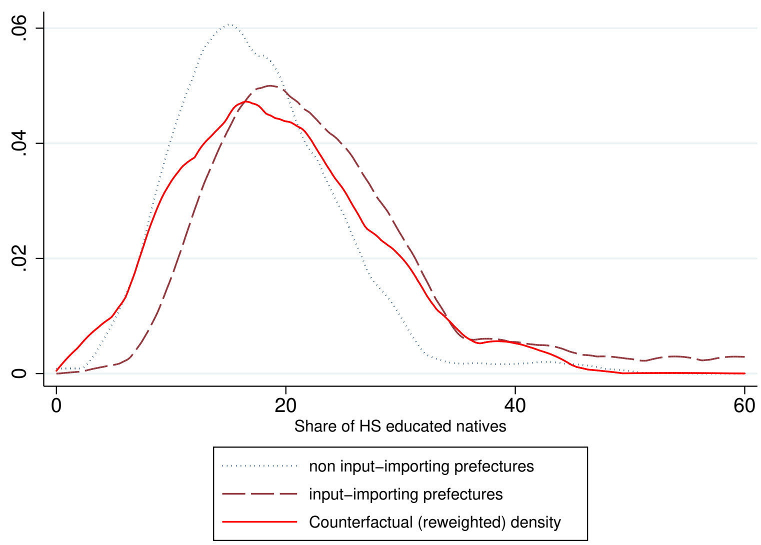
(b)

Notes: (a) plots the actual densities of education for prefectures that did not adopt technology (in dashed green line) and prefectures that did (in maroon line). In (b), I match prefectures that did adopt foreign technology to ones that did not by their characteristics such as labor market condition, geographic location, age composition etc, and plot the counterfactual skill density if they did not adopt foreign technology (red solid line).

Figure 6: Kernel densities of share of HS educated native workers



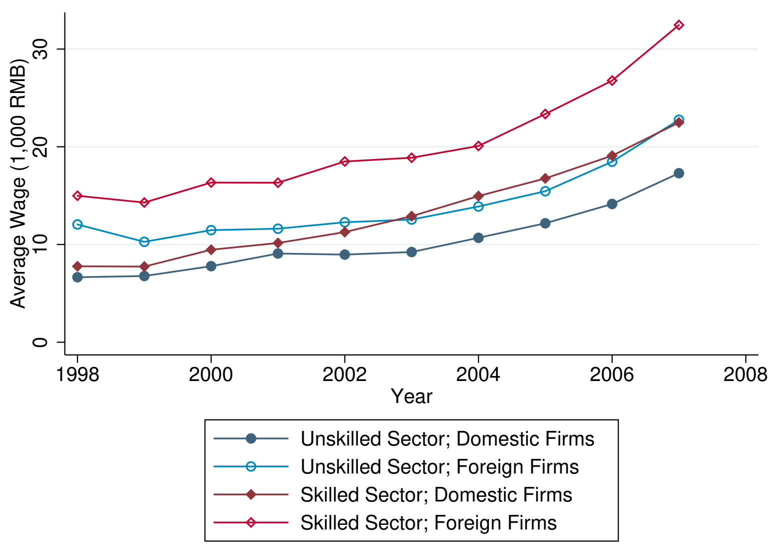
(a)



(b)

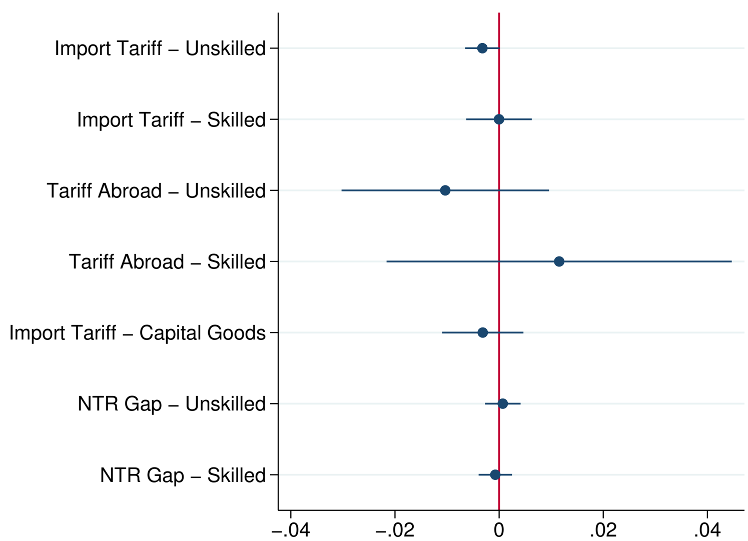
Notes: (a) plots the actual densities of education for prefectures that did not import low-skill intermediate goods (in dashed green line) and prefectures that did (in maroon line). In (b), I match prefectures that did import low-skill intermediate goods to ones that did not by their characteristics such as labor market condition, geographic location, age composition etc, and plot the counterfactual skill density if they did not import low-skill intermediate goods (red solid line).

Figure 7: Average wage in skilled and unskilled sectors



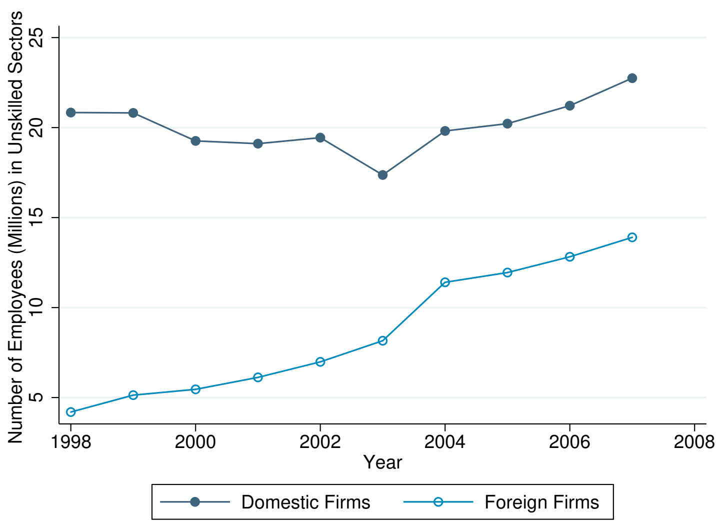
Notes: Average wages are calculated from 1998–2007 Chinese Annual Survey Industrial Firms, which is an annual survey conducted by the Chinese National Bureau of Statistics to collect information on all large-scale firms (annual sales over 5 million RMB). By skill intensity of industries and firm ownership types, 4 types of average wages are calculated for each year in the sample. I denote domestic firms with red and solid markers, and foreign firms with blue hollow markers. The skilled sectors are in diamonds, and the unskilled sectors are in circles.

Figure 8: Estimated Effects of Tariff Rates on Mean Log Wages



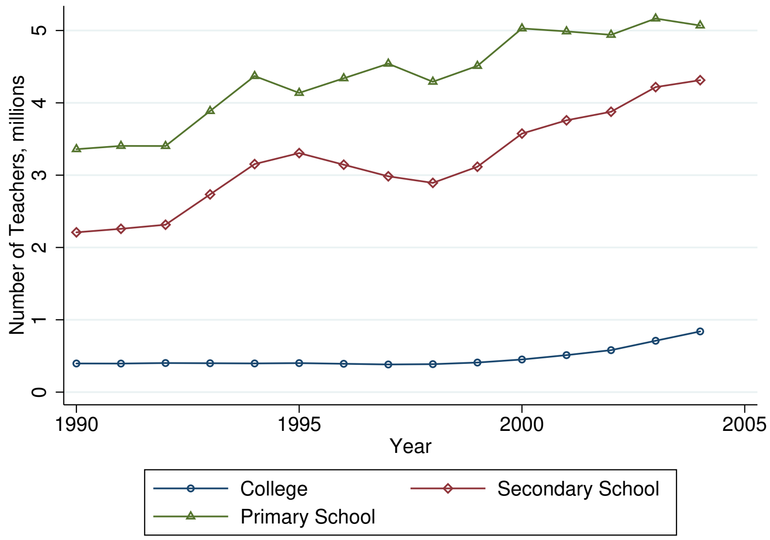
Notes: This figure plots the DID regression coefficients of trade policy changes. The dependent variable is mean log wage in a prefecture during a year. Measures of trade policy changes follow the main empirical analysis in Section 2. 95% confidence internal is plotted around the point estimates using robust standard errors. Prefecture and year fixed effects are included in the regression.

Figure 9: Level of Employment in Unskilled Sectors

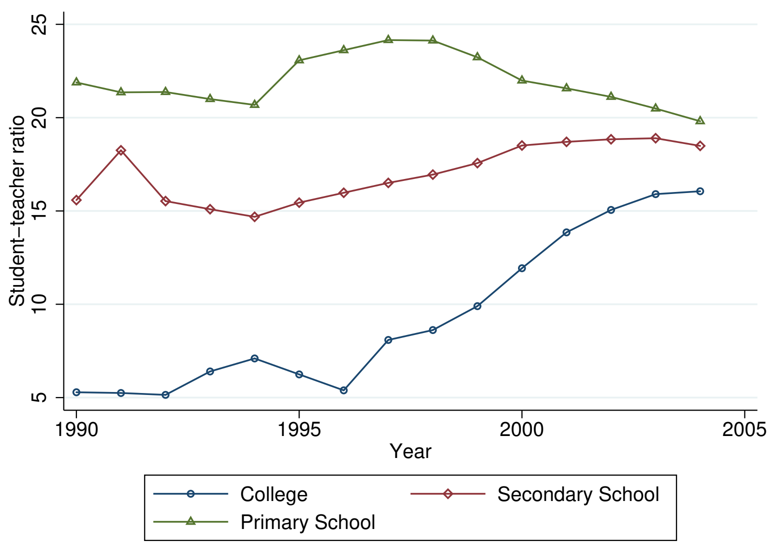


Notes: This figure plots the total number of jobs in the unskilled sectors from 1998 to 2007. Two lines each indicate domestic and foreign forms.

Figure 10: Education Resources, 1990-2004



(a) Total number of teachers



(b) Average student teacher rations

Notes: For three education levels, primary school (grade 1 to 6), secondary school (grade 7 to 12), and tertiary education, (a) plots the national total number of full-time teachers in China from 1990 to 2004, and (b) plots the student teacher ratios.

Table 1: National Average Education Levels by Year

High School Class	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Age in 2005	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18
Natives (million)	9.266	8.704	7.947	7.402	6.436	6.730	6.708	6.080	6.251	6.816	5.801	5.640	5.996	7.170	9.422
High School Educated Natives (million)	2.304	2.109	2.109	1.994	1.858	1.954	1.979	1.765	1.872	2.093	1.815	1.860	2.192	3.116	4.462
Share of High School Educated in Natives (%)	24.87	24.23	26.54	26.95	28.87	29.04	29.50	29.03	29.94	30.71	31.30	32.98	36.55	43.45	47.36

College Class	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Age in 2005	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22
Natives (million)	10.72	11.49	10.44	9.686	9.266	8.704	7.947	7.402	6.436	6.730	6.708	6.080	6.251	6.816	5.801
College Educated Natives (million)	0.911	1.047	1.015	0.967	0.985	0.926	0.907	0.857	0.780	0.804	0.776	0.718	0.780	0.918	0.817
Share of College Educated in Natives (%)	8.503	9.112	9.718	9.979	10.63	10.64	11.41	11.58	12.11	11.95	11.57	11.81	12.47	13.48	14.08

Notes: This table summarizes the nation-wide school completion (enrollment included) rates of the cohorts representing graduating classes from 1990 to 2004. Sample include males aged 18-36. "Natives" refers to non-migrants. Each cohorts' age in 2005 was listed below their class years for reference.

Table 2: Summary Statistics of Trade Barriers (3 year average matched to each cohort)

Trade Basket Weighted	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
$tariff^L_{CHN-O}$	37.97	37.97	37.97	34.96	30.45	30.45	20.61	14.80	14.84	14.58	14.50	13.79	10.33	9.339	8.672	8.153
	(14.46)	(14.46)	(14.46)	(13.20)	(12.06)	(12.06)	(7.881)	(5.299)	(5.298)	(5.213)	(5.202)	(4.935)	(3.752)	(3.384)	(3.141)	(2.669)
$tariff^H_{CHN-O}$	26.63	26.63	26.63	25.17	22.76	22.76	16.21	13.44	13.51	13.35	13.42	12.95	9.019	8.180	7.656	7.082
	(9.161)	(9.161)	(9.161)	(8.904)	(8.904)	(8.904)	(5.408)	(4.563)	(4.585)	(4.577)	(4.594)	(4.359)	(4.228)	(4.040)	(3.891)	(2.700)
$tariff_{CHN-Tech}$	24.27	24.27	24.27	23.13	20.59	20.59	14.53	12.09	12.15	12.03	12.04	11.77	7.994	7.282	6.940	6.825
	(10.49)	(10.49)	(10.49)	(9.923)	(8.981)	(8.981)	(5.999)	(4.921)	(4.939)	(4.901)	(4.901)	(4.745)	(3.282)	(3.019)	(2.883)	(2.820)
$tariff^L_{ROW}$	7.562	7.279	7.209	6.564	6.602	5.754	5.677	5.351	5.065	4.974	4.717	4.599	4.554	4.503	4.355	4.325
	(5.232)	(5.306)	(5.865)	(5.085)	(5.412)	(2.790)	(3.246)	(2.809)	(2.660)	(3.024)	(2.654)	(2.635)	(2.536)	(2.638)	(2.483)	(2.492)
$tariff^H_{ROW}$	4.859	4.811	4.491	4.065	4.069	4.608	3.712	3.580	3.344	3.281	3.379	3.420	3.412	3.320	3.100	3.065
	(4.784)	(4.773)	(4.765)	(2.525)	(2.527)	(6.218)	(3.139)	(3.006)	(2.891)	(3.790)	(5.543)	(5.417)	(5.091)	(3.473)	(3.097)	(3.562)
Employment Weighted	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
$tariff^L_{CHN}$	49.84	49.81	48.25	45.60	42.73	36.73	29.49	22.34	19.69	19.71	19.43	18.02	15.85	13.61	12.16	11.44
	(11.57)	(11.58)	(11.14)	(10.31)	(9.423)	(7.867)	(6.136)	(4.592)	(3.916)	(3.989)	(4.401)	(4.686)	(4.067)	(3.457)	(2.894)	(2.764)
$tariff^H_{CHN}$	36.72	36.82	36.20	35.06	33.73	29.60	24.67	19.82	18.39	18.39	17.83	15.68	12.99	10.47	9.341	8.614
	(15.22)	(15.35)	(15.28)	(15.24)	(15.04)	(12.57)	(9.922)	(7.529)	(7.235)	(7.228)	(6.902)	(5.815)	(4.488)	(3.293)	(2.643)	(2.306)
$tariff^L_{ROW}$	9.355	9.370	8.967	8.609	8.003	7.580	7.040	6.602	6.382	6.261	6.226	6.306	6.435	6.501	6.208	4.016
	(4.745)	(4.734)	(3.628)	(2.690)	(1.997)	(1.911)	(1.849)	(1.626)	(1.592)	(1.605)	(1.737)	(2.065)	(2.316)	(2.450)	(2.045)	(1.276)
$tariff^H_{ROW}$	24.51	24.38	20.04	15.73	10.58	9.436	8.330	7.889	9.234	9.238	8.199	5.404	4.092	3.803	4.443	3.001
	(27.45)	(27.42)	(21.62)	(15.85)	(8.548)	(7.008)	(5.853)	(5.545)	(7.387)	(7.495)	(6.501)	(3.318)	(2.341)	(2.274)	(2.821)	(2.072)

Notes: This table summarizes the prefecture-level tariff rates across time/cohorts. HS 6-digit product level tariff rates from the WTIS-TRAINS database are aggregated to prefecture level tariff rates by using trade basket weights (first 5 rows) and industrial employment weights (last 4 rows). Each yeah corresponds to an age cohort.

Table 3: Summary tatistics of non-tariff barriers

%	mean	sd	min	max
NTR_L	32.66	14.846	0	70
NTR_H	24.95	14.089	0	80.97
Contract Intensity	41.74	10.518	0	85.62
MFA Quota Bound	9.845	11.920	0	100

Notes: This table summarized the prefecture-level non-tariff trade barriers, including unskilled and skilled U.S. tariff uncertainty measured by NTR gaps, investment barriers measure by contract intensity, and MFA quota. See Facchini et al. (2017) for a detailed description of these measures

Table 4: Stolper-Samuelson Theorem Predictions: Impact of Trade Barrier Reductions on Education

	Import tariffs			Tariffs abroad		NTR gaps	
	$tariff_{Tech}$	$tariff^H_{CHN}$	$tariff^L_{CHN}$	$tariff^H_{ROW}$	$tariff^L_{ROW}$	NTR^H	NTR^L
$\partial(w^s - w^0)/\partial\tau;\ \beta$	< 0	> 0	< 0	< 0	> 0	> 0	< 0
Skill Premium	$\uparrow$	$\downarrow$	$\uparrow$	$\uparrow$	$\downarrow$	$\uparrow$	$\downarrow$
Education	$E\uparrow$	$E\downarrow$	$E\uparrow$	$E\uparrow$	$E\downarrow$	$E\uparrow$	$E\downarrow$

Notes: For brevity, I do not differentiate import tariffs on consumption goods from intermediate goods. The economic intuition for the tariff changes are the same, i.e. they change the demand for the domestic factor used, thus the theoretical prediction in educational outcomes are the same. I ignore the income effect from trade policy changes on education for now.

Table 5: High School Completion and Enrollment of Native (non-migrant plus out-migrants) Males

	All prefectures				Prefectures with in-migrants	
	(1)	(2)	(3)	(4)	(5)	(6)
$tariff^L_{CHN}$	-0.305		-0.271	-0.271	-0.461	-0.473
	(0.108)***		(0.103)***	(0.103)***	(0.144)***	(0.140)***
$tariff^H_{CHN}$	-0.127		-0.089	-0.108	-0.059	-0.081
	(0.146)		(0.129)	(0.127)	(0.156)	(0.144)
$tariff^L_{ROW}$	0.169		0.178	0.174	0.190	0.186
	(0.085)**		(0.085)**	(0.085)**	(0.088)**	(0.086)**
$tariff^H_{ROW}$	-0.108		-0.115	-0.105	-0.018	-0.010
	(0.073)		(0.075)	(0.074)	(0.059)	(0.063)
$PostWTO * NTR^L$		-0.120	-0.116	-0.114	-0.150	-0.141
		(0.046)**	(0.046)**	(0.047)**	(0.059)**	(0.060)**
$PostWTO * NTR^H$		-0.033	-0.017	-0.015	0.011	0.014
		(0.055)	(0.055)	(0.056)	(0.064)	(0.061)
R^2	0.81	0.81	0.81	0.81	0.84	0.84
N	4,860	4,860	4,860	4,860	3,390	3,390
Other Controls	No	No	No	Yes	No	Yes
Pref FE; Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes
Pref x cohort trend	Yes	Yes	Yes	Yes	Yes	Yes

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Notes: The table shows the regression DID results of the baseline specification. Outcome is the share (in percentage points) of high school educated workers in the native male cohorts. Unit of observation is by prefecture and age cohort, where 324 prefecture and 15 cohorts (18 to 32 years old) are included in the 2005 Census. The native sample consists of non-migrants and out-migrants of a prefecture. Columns (1)-(4) covers all 324 prefectures, while columns (5)-(6) include only 226 prefectures with non-zero in-migrants. Huber-White robust SEs in parentheses are clustered at the prefecture level to correct for serial correlation. Prefecture-specific cohort trends are added to all specification. Trade policies are weighted with skill-specific trade baskets (during 1997-1999) of each prefecture, where L and H denotes below-high-school and high-school-educated labor intensive industries respectively. $tariff^L_{CHN}$ and $tariff^H_{CHN}$ are aggregated tariff rates on imported goods by a prefecture at each cohort's schooling years, and these include inputs for both ordinary and processing trade, and capital goods such as equipments and machineries. $tariff^L_{ROW}$ and $tariff^H_{ROW}$ are levels of tariff rates charged by Rest of the World on exported goods from a prefecture during the each cohort's schooling years. Trade policy uncertainty is measure by NTR gaps, $PostWTO*NTR^L$ and $PostWTO*NTR^H$, which are interactions of time-invariant NTR gaps with a time dummy indicating cohorts' schooling years were after China's WTO accession. Other controls include skill composition of in-migrants, relaxations in investment barriers measured by *Contract Intensity* and *MFA Quota bound*.

Table 6: High School Completion and Enrollment of Native (non-migrant plus out-migrants) Males

	All prefectures				Prefectures with in-migrants		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$tariff^L_{CHN-O}$	-0.233	-0.185		-0.170	-0.235		-0.237
	(0.084)***	(0.078)**		(0.075)**	(0.107)**		(0.094)**
$tariff^H_{CHN-O}$	-0.218	-0.163		-0.148	-0.118		-0.095
	(0.152)	(0.133)		(0.120)	(0.194)		(0.177)
$tariff^L_{ROW}$	0.153	0.144		0.151	0.159		0.161
	(0.088)*	(0.092)		(0.091)*	(0.100)		(0.097)*
$tariff^H_{ROW}$	-0.113	-0.092		-0.093	0.003		0.004
	(0.074)	(0.070)		(0.073)	(0.060)		(0.069)
$tariff_{CHN-Tech}$		-0.548		-0.478	-0.676		-0.620
		(0.211)***		(0.202)**	(0.295)**		(0.281)**
$PostWTO * NTR^L$			-0.120	-0.109		-0.152	-0.131
			(0.046)**	(0.046)**		(0.061)**	(0.058)**
$PostWTO * NTR^H$			-0.033	-0.001		-0.022	0.025
			(0.055)	(0.056)		(0.066)	(0.061)
R^2	0.81	0.81	0.81	0.81	0.84	0.84	0.84
N	4,860	4,860	4,860	4,860	3,390	3,390	3,390
Other Controls	No	No	No	Yes	No	No	Yes
Pref FE; Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pref x cohort trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Notes: The table shows the regression results of the main specification with disaggregated import tariffs. Outcome is the share (in percentage points) of high school educated (and enrolled) workers in the native male cohorts. Unit of observation is by prefecture and age cohort, where 324 prefecture and 15 cohorts (18 to 32 years old) are included in the 2005 Census. The native sample consists of non-migrants and out-migrants of a prefecture. Columns (1)-(4) covers all 324 prefectures, while columns (5)-(7) include only 226 prefectures with non-zero in-migrants. Huber-White robust SEs in parentheses are clustered at the prefecture level to correct for serial correlation. Prefecture-specific cohort trends are added to all specification. Trade policies are weighted with skill-specific trade baskets (during 1997-1999) of each prefecture, where L and H denotes below-high-school and high-school-educated labor intensive industries respectively. $tariff^L_{CHN-O}$ and $tariff^H_{CHN-O}$ are aggregated tariff rates on imported inputs for ordinary trade by a prefecture at each cohort's schooling years. $tariff_{CHN-Tech}$ is the average tariff rates on the machinery and equipments imported by manufacturing firms in a prefecture. $tariff^L_{ROW}$ and $tariff^H_{ROW}$ are levels of tariff rates charged by Rest of the World on exported goods from a prefecture during the each cohort's schooling years. Trade policy uncertainty is measure by NTR gaps, $PostWTO*NTR^L$ and $PostWTO*NTR^H$, which are interactions of time-invariant NTR gaps with a time dummy indicating cohorts' schooling years were after China's WTO accession. Other controls include skill composition of in-migrants, relaxations in investment barriers measured by *Contract Intensity* and *MFA Quota bound*.

Table 7: College Completion of Native Males

	NM+EM	NM+EM	NM+EM	NM	NM+IM	ALL NM+IM (isic)	ALL NM+IM (cic)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$tariff^L_{CHN}$	-0.082		-0.091	-0.091	-0.098	-0.048	-0.034
	(0.067)		(0.068)	(0.068)	(0.064)	(0.053)	(0.043)
$tariff^H_{CHN}$	-0.113		-0.112	-0.113	-0.112	0.093	0.010
	(0.091)		(0.092)	(0.092)	(0.079)	(0.049)*	(0.046)
$tariff^L_{ROW}$	-0.006		-0.006	-0.006	-0.005	-0.006	0.006
	(0.058)		(0.059)	(0.059)	(0.050)	(0.023)	(0.018)
$tariff^H_{ROW}$	0.063		0.061	0.062	0.090	0.004	-0.013
	(0.074)		(0.076)	(0.076)	(0.073)	(0.027)	(0.028)
$PostWTO * NTR^L$		0.020	0.021	0.021	0.029	-0.037	-0.044
		(0.023)	(0.022)	(0.022)	(0.022)	(0.044)	(0.039)
$PostWTO * NTR^H$		-0.013	-0.011	-0.010	0.001	0.091	0.106
		(0.029)	(0.028)	(0.028)	(0.029)	(0.071)	(0.060)*
R^2	0.73	0.73	0.73	0.73	0.73	0.85	0.85
N	4,860	4,860	4,860	4,860	4,860	4,860	4,860
Other Controls	No	No	Yes	Yes	Yes	No	No
Pref FE; Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pref x cohort trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Notes: Outcome is the share (in percentage points) of college educated (and enrolled) workers in the native male cohorts. Unit of observation is by prefecture and age cohort, where 324 prefecture and 15 cohorts (22 to 36 years old) are included in the 2005 Census. Samples include, in columns (1)-(3): male non-migrants and out-migrants in a prefecture; in column (4): male non-migrants; in (5): male non-migrants and in-migrants; and in columns (6)-(7): male plus female non-migrants and in-migrants. Huber-White robust SEs in parentheses are clustered at the prefecture level to correct for serial correlation. Prefecture-specific cohort trends are added to all specification. Trade policies are weighted with skill-specific trade baskets (during 1997-1999) in columns (1)-(5), and with skill-specific industrial employment (during 1998-2000) in columns (6)-(7), where L and H denotes non-college-education and college-education labor intensive industries respectively. $tariff^L_{CHN}$ and $tariff^H_{CHN}$ are aggregated tariff rates on imported goods by a prefecture at each cohort's schooling years, and these include inputs for both ordinary and processing trade, and capital goods such as equipments and machineries. $tariff^L_{ROW}$ and $tariff^H_{ROW}$ are levels of tariff rates charged by Rest of the World on exported goods from a prefecture during the each cohort's schooling years. Trade policy uncertainty is measure by NTR gaps, $PostWTO*NTR^L$ and $PostWTO*NTR^H$, which are interactions of time-invariant NTR gaps with a time dummy indicating cohorts' schooling years were after China's WTO accession. Other controls include skill composition of in-migrants, relaxations in investment barriers measured by *Contract Intensity* and *MFA Quota bound*.

Table 8: Granger Test: High School completion of older cohorts (Class of 1980 - Class of 1994)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$tariff^{L}_{CHN-O}$	0.014	0.025		0.020	0.042		0.038
	(0.048)	(0.050)		(0.051)	(0.064)		(0.063)
$tariff^{H}_{CHN-O}$	0.038	0.052		0.041	-0.005		-0.021
	(0.095)	(0.092)		(0.090)	(0.116)		(0.115)
$tariff^{L}_{ROW}$	0.039	0.037		0.038	0.029		0.031
	(0.089)	(0.089)		(0.089)	(0.092)		(0.094)
$tariff^{H}_{ROW}$	-0.093	-0.090		-0.083	-0.120		-0.114
	(0.084)	(0.085)		(0.088)	(0.086)		(0.088)
$tariff_{CHN-Tech}$		-0.118		-0.130	0.030		0.031
		(0.147)		(0.146)	(0.184)		(0.182)
$PostWTO * NTR^{L}$			0.049	0.052		0.039	0.037
			(0.041)	(0.043)		(0.054)	(0.056)
$PostWTO * NTR^{H}$			-0.019	-0.014		-0.010	-0.006
			(0.045)	(0.046)		(0.062)	(0.063)
R^2	0.79	0.79	0.79	0.79	0.82	0.81	0.82
N	4,212	4,212	4,212	4,212	3,352	3,352	3,352
Other Controls	No	No	No	Yes	No	No	Yes
Pref FE; Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pref x cohort trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Notes: This table shows the granger test of the main specification by using older cohorts that shouldn't have anticipated the trade policy changes. The cohorts used in this regression are 28 to 42 years old when surveyed in 2005, and they are Classes of 1980 to 1994, whose high school years were not overlapped with China's trade liberalization. Outcome is the share (in percentage points) of high school educated (and enrolled) workers in the male cohorts. Unit of observation is by prefecture and age cohort. Samples include, in columns (1)-(4): all prefecture, and in columns (5)-(7): prefectures with nonzero in-migrants in 2005. Huber-White robust SEs in parentheses are clustered at the prefecture level to correct for serial correlation. Prefecture-specific cohort trends are added to all specification. The right-hand-side trade policy variables are the same as in Table 6.

Table 9: Placebo Test: Junior High School completion

	All prefectures				Prefectures with in-migrants		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$tariff^{L}_{CHN-O}$	0.007	0.008		0.017	-0.034		-0.012
	(0.070)	(0.076)		(0.076)	(0.103)		(0.106)
$tariff^{H}_{CHN-O}$	-0.131	-0.131		-0.129	-0.107		-0.094
	(0.149)	(0.143)		(0.141)	(0.278)		(0.283)
$tariff^{L}_{ROW}$	0.051	0.051		0.057	0.015		0.020
	(0.110)	(0.110)		(0.110)	(0.155)		(0.156)
$tariff^{H}_{ROW}$	-0.247	-0.247		-0.242	-0.263		-0.261
	(0.145)*	(0.144)*		(0.146)*	(0.159)*		(0.154)*
$tariff_{CHN-Tech}$		-0.002		0.012	-0.001		-0.008
		(0.205)		(0.207)	(0.268)		(0.273)
$PostWTO * NTR^{L}$			0.026	0.019		0.024	0.013
			(0.042)	(0.042)		(0.058)	(0.058)
$PostWTO * NTR^{H}$			-0.056	-0.054		-0.071	-0.056
			(0.053)	(0.052)		(0.080)	(0.081)
R^2	0.87	0.87	0.87	0.87	0.90	0.89	0.90
N	4,799	4,799	4,799	4,799	3,116	3,116	3,116
Other Controls	No	No	No	Yes	No	No	Yes
Pref FE; Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pref x cohort trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Notes: The table shows the placebo test of the main specification using junior high school completion rates. The cohorts used in this regression are 15 to 29 years old in 2005 – Classes of 1990 to 2004 of junior high school. Outcome is the share (in percentage points) of junior high school educated workers in the native males. Unit of observation is by prefecture and age cohort. Samples include, in columns (1)-(4): all prefecture, and in columns (5)-(7): prefectures with nonzero in-migrants in 2005. Huber-White robust SEs in parentheses are clustered at the prefecture level to correct for serial correlation. Prefecture-specific cohort trends are added to all specification. The right-hand-side trade policy variables are the same as in Table 6.

Table 10: Robustness Checks: High School Completion of Native Cohorts (Male plus Female), with sectoral employment weights

	ISIC Rev3		CIC 2002	
	(1)	(2)	(3)	(4)
$tariff^L_{CHN}$	-0.316	-0.331	-0.241	-0.247
	(0.125)**	(0.121)***	(0.098)**	(0.095)**
$tariff^H_{CHN}$	0.181	0.204	-0.011	-0.000
	(0.098)*	(0.093)**	(0.073)	(0.073)
$tariff^L_{ROW}$	0.519	0.458	0.145	0.120
	(0.307)*	(0.305)	(0.068)**	(0.065)*
$tariff^H_{ROW}$	0.173	0.169	0.116	0.115
	(0.033)***	(0.033)***	(0.025)***	(0.026)***
$PostWTO * NTR^L$	-0.433	-0.414	-0.265	-0.252
	(0.091)***	(0.089)***	(0.077)***	(0.077)***
$PostWTO * NTR^H$	-0.111	-0.123	-0.166	-0.175
	(0.152)	(0.153)	(0.119)	(0.119)
R^2	0.87	0.88	0.87	0.88
N	5,085	5,085	5,085	5,085
Other Controls	No	Yes	No	Yes
Pref FE; Cohort FE	Yes	Yes	Yes	Yes
Pref x cohort trend	Yes	Yes	Yes	Yes

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Notes: This table shows the robustness check of using sectoral employments as weights. Outcome is the share (in percentage points) of high school educated (and enrolled) workers in the observed native cohorts (non-migrants and in-migrants). Unit of observation is by prefecture and age cohort, where 339 prefecture and 15 cohorts (18 to 32 years old) are included in the 2005 Census. Huber-White robust SEs in parentheses are clustered at the prefecture level to correct for serial correlation. Prefecture-specific cohort trends are added to all specification. Columns (1)-(2) in Table 10 report results using prefecture tariffs weighted at the ISIC-Rev3 level, and columns (3)-(4) report results using prefecture tariffs weighted at the CIC 2002 level. Definitions of trade policy follows Table 5. See text for more description of the construction of trade policy changes.

Table 11: Internal migration in China (employed workers), 2000

	Temporary Migration		Permanent Migration	
Males	Skilled	Unskilled	Skilled	Unskilled
Flow (in millions)	6.07	21.46	3.08	2.18
Share (%)	8.6	7.6	4.4	0.7
Females	Skilled	Unskilled	Skilled	Unskilled
Flow (in millions)	5.02	24.24	3.59	5.36
Share (%)	8.6	7.6	7.8	2.0

Notes: Based on author's calculation using Chinese Census 2000. The sample use is 16-65 year-old employed workers in China during 2000.

Table 12: Robustness Checks: High School Completion of Native Cohorts

	NM + IM (1)	NM + EM (2)	NM (3)
$tariff^{L}_{CHN-O}$	-0.195	-0.176	-0.183
	(0.068)***	(0.074)**	(0.073)**
$tariff^{H}_{CHN-O}$	-0.239	-0.151	-0.185
	(0.124)*	(0.122)	(0.115)
$tariff^{L}_{ROW}$	0.117	0.154	0.158
	(0.097)	(0.091)*	(0.092)*
$tariff^{H}_{ROW}$	-0.106	-0.096	-0.095
	(0.080)	(0.072)	(0.072)
$tariff_{CHN-Tech}$	-0.789	-0.467	-0.460
	(0.267)***	(0.200)**	(0.202)**
$PostWTO * NTR^{L}$	-0.125	-0.110	-0.109
	(0.051)**	(0.045)**	(0.047)**
$PostWTO * NTR^{H}$	-0.047	-0.003	-0.032
	(0.056)	(0.056)	(0.056)
R^2	0.80	0.81	0.81
N	4,856	4,856	4,856
Other Controls	Yes	Yes	Yes
Pref FE; Cohort FE	Yes	Yes	Yes
Pref x cohort trend	Yes	Yes	Yes

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Notes: The table shows the robustness check of the main specification by using alternative samples of "natives". Outcome is the share (in percentage points) of high school educated (and enrolled) workers in the male cohorts. Unit of observation is by prefecture and age cohort, where 324 prefecture and 15 cohorts (18 to 32 years old) are included in the 2005 Census. Samples include, in column (1): non-migrants and in-migrants in a prefecture; in column (2): non-migrants and out-migrants; in column (3): only non-migrants. Huber-White robust SEs in parentheses are clustered at the prefecture level to correct for serial correlation. Prefecture-specific cohort trends are added to all specification. The right-hand-side trade policy variables are the same as in Table 6.

Table 13: Estimated effect of PNTR on low-skill job growth

	Unskilled Industries			Skilled Industries
	All firms	Chinese Firms	Foreign Firms	All Firms
Post x NTR Gap	0.872	0.584	0.303	-0.023
	(0.312)***	(0.239)**	(0.141)**	(0.331)
R^2	0.85	0.83	0.86	0.68
N	2,081	2,018	1,960	2,128
Other Controls	Yes	Yes	Yes	Yes
Industry FE; Year FE	Yes	Yes	Yes	Yes

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Notes: The table shows the estimated effect of reduction in trade policy uncertainty on the job growth. The first heading indicates unskilled and skilled sectors, and the second heading indicates firm types. Trade policy uncertainty is measured by NTR gaps, $PostWTO*NTR$, which is the interaction of time-invariant NTR gaps with a time dummy indicating years after China's WTO accession. Other controls include tariff changes, relaxations in investment barriers measured by *Contract Intensity* and *MFA Quota bounds*. See text for more details. Huber-White robust SEs in parentheses are clustered at the prefecture level to correct for serial correlation. Prefecture-specific cohort trends are added to all specification.

Table 14: Increase in Labor Demand in Chinese Prefectures, 2000–2005

	Migration		Native Working Hours	
	Unskilled	Skilled	Unskilled	Skilled
Post x NTR Gap	0.032	0.093	0.56	-0.000
	(0.019)*	(0.032)**	(0.015)***	(0.012)
R^2	0.96	0.88	0.72	0.73
N	666	666	666	666
Other Controls	Yes	Yes	Yes	Yes
Prefecture FE; Year FE	Yes	Yes	Yes	Yes

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Notes: The table shows the estimated effect of reduction in trade policy uncertainty on demand for skill, through internal migration flows and working hours. The first heading indicates measure of labor supply, and the second heading indicates skill types. Trade policy uncertainty is measured by NTR gaps, $PostWTO * NTR$, which is the interaction of time-invariant NTR gaps with a time dummy indicating years after China's WTO accession. Other controls include tariff changes, relaxations in investment barriers measured by *Contract Intensity* and *MFA Quota bounds*. See text for more details. Huber-White robust SEs in parentheses are clustered at the prefecture level to correct for serial correlation. Prefecture-specific cohort trends are added to all specification.

Table 15: Trade and Education Resources at Secondary School and Colleges

	Secondary Schools		Colleges	
	No. teacher	teachers per school	No. teacher	teachers per school
$tariff^L_{CHN-O}$	-0.018	-0.016	-0.073	-0.069
	(0.006)***	(0.009)*	(0.028)***	(0.029)**
$tariff^H_{CHN-O}$	0.002	-0.001	-0.021	-0.027
	(0.007)	(0.007)	(0.040)	(0.041)
$tariff^L_{ROW}$	-0.012	-0.017	0.021	0.012
	(0.007)*	(0.010)*	(0.024)	(0.021)
$tariff^H_{ROW}$	-0.002	0.002	0.011	0.012
	(0.009)	(0.022)	(0.020)	(0.023)
$tariff_{CHN-Tech}$	-0.034	-0.067	-0.090	-0.120
	(0.013)**	(0.023)***	(0.070)	(0.075)
$PostWTO * NTR^L$	-0.002	-0.021	-0.010	-0.017
	(0.004)	(0.007)***	(0.019)	(0.018)
$PostWTO * NTR^H$	-0.005	-0.014	-0.046	-0.047
	(0.004)	(0.007)**	(0.017)***	(0.017)***
R^2	0.97	0.97	0.87	0.81
N	4,045	4,045	3,175	3,175
Other Controls	No	No	No	No
Pref FE; Cohort FE	Yes	Yes	Yes	Yes
Pref x cohort trend	Yes	Yes	Yes	Yes

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Notes: The table shows the estimated results of trade policy changes on education resources at both the secondary and college levels. I use two measures of teaching resources: 1) number of teachers, and 2) number of teachers per school. Unit of observation is by prefecture and year, with 324 prefecture and 15 years covering 1990 to 2004. Huber-White robust SEs in parentheses are clustered at the prefecture level to correct for serial correlation. Prefecture-specific cohort trends are added to all specification. Trade policies are weighted with skill-specific trade baskets (during 1997-1999) of each prefecture, where L and H denotes low-skill and high-skill labor intensive industries respectively. $tariff^L_{CHN-O}$ and $tariff^H_{CHN-O}$ are aggregated tariff rates on imported inputs for ordinary trade by a prefecture at each year. $tariff_{CHN-Tech}$ is the average tariff rates on the machinery and equipments imported by manufacturing firms in a prefecture. $tariff^L_{ROW}$ and $tariff^H_{ROW}$ are levels of tariff rates charged by Rest of the World on exported goods from a prefecture during each year. Trade policy uncertainty is measure by NTR gaps, $PostWTO*NTR^L$ and $PostWTO*NTR^H$, which are interactions of time-invariant NTR gaps with a time dummy indicating post WTO accession years.