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Editorial

Introduction: *Insights from US-China trade and technological change*

The United States and China currently dominate world trade. While this has implications for trade between other nations, it also has implications for other aspects of the global economy like the labor market and product innovation. In fact, recent advances in information technology and artificial intelligence have profound implications on employment, productivity, wages, and other labor market outcomes in both advanced and emerging economies. By affecting the demand and supply of different goods and services, US-China trade plays an important role here. This special issue brings together a number of papers that explore the impact of trade and technological change on, among other things, labor markets both at the economy wide and local level in China and the US. Another set of papers explores what happens to innovation and its implications for China's future trade capabilities.

The Chinese workforce is among the largest in the world. Ge, Sun and Zhao take a macro level view to study employment structure in China, documenting several profound changes that have occurred over the recent decades and the potential importance of demographic and technological changes in "*Employment Structures in China from 1990 to 2015*." During a period of rapid economic growth between 1990 and 2015, the share of routine manual jobs in China decreased from 57% to 32%, while the share of routine cognitive jobs increased from 8% to 19% and the share of non-employment rose from 16% to 31%. To understand the driving forces behind these employment structure changes, they decompose the changes into (*i*) a demographic composition effect, (*ii*) a work propensity effect, and (*iii*) an interaction effect between the two. The authors find that the decrease in the share of routine manual jobs is driven by both the composition effect and the propensity effect, whereas the rises in the employment shares in routine cognitive jobs and non-employment are mainly driven by the propensity effect. These patterns provide suggestive evidence that both demographic and technological changes play important roles in employment dynamics in China's labor market.

A set of papers in this issue explores different factors that have consequences for the local labor market. Zhang and Zhou, for instance, focus on the importance of export destinations during trade liberalization. In particular, they study the impact of China's export growth to rich countries on both its export quality as well as internal migration in "*Trade Normalization, Export Quality, and Inmigration of Skilled Workers: Evidence from China*." They exploit the variations in Chinese exports to the US market after the US granted China the Permanent Normal Trade Relationship (PNTR) status in October 2000. This helped Chinese exporters by significantly lowering policy uncertainty in US tariffs. Using firm-level survey data matched with product-level export from China's General Administration of Customs, the paper shows that export expansions to rich countries increase the employment of skilled workers by Chinese firms. Moreover, city-level export growth to rich markets also attracts the inflow of skilled migrants, which is likely driven by the higher education premium in regions with larger exports to rich markets.

The paper by Dai, Huang and Zhang studies the local labor market adjustment in China by focusing on another aspect of trade. They study the response to import tariff reduction after China's World Trade Organization (WTO) accession in the paper "*Persistent Effects of Initial Labor Market Conditions: The Case of China's Tariff Liberalization After WTO Accession*," with a particular focus on new labor market entrants. They construct a Bartik-style import tariff reduction measure based on industry-level tariff reduction and city-level pre-WTO industry composition to investigate how wages of new entrants in the job market are related to the city-specific import tariff using data on urban households across Chinese cities. They find a negative wage effect of import tariff reduction on the labor market for new entrants, that is also persistent over a long period. Moreover, the adverse effect is stronger among workers who are in the tradable sector and for those who have lower education.

The next paper examines the gender gap as a consequence of trade between US and China. Local labor market adjustment in the US following trade liberalization is at the heart of "*Trade Liberalization and Gender Gap in Local Labor Market Outcomes: Dimensions of Adjustment in the United States*." Here Besedes, Lee and Yang are interested in measuring the impact of US granting China the PNTR status on wage and employment outcomes by gender in local US labor markets. Not surprisingly, conferral of PNTR status to China encouraged the growth of Chinese exports and US offshoring/outsourcing. Interestingly, this paper finds that US regions with higher PNTR exposure experienced decreases in gender gaps in both wage and labor force participation after trade liberalization with China,

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as the trade shocks affected manufacturing industries more which tend to have higher male employment. More women, especially those with at least college education, entered the labor force after trade liberalization, with the opposite results for men, especially less educated men.

Ge and Zhou also examine labor market outcomes in US local labor markets but focus on the effects of two skill-biased automation technologies: industrial robots and computing equipment, on the gender wage gap in "*Robots, Computers, and the Gender Wage Gap*." They construct measures of robot adoption and computerization across US commuting zones using industry-specific stocks of industrial robots and computer equipment along with local industrial employment shares. They show that male and female workers cluster into occupations that require different skills and have different complementarity with robots and computers. Robots displace jobs requiring brawn skills, and to the extent that brawn skills is a more male trait than a female one, robot adoption decreases the gender wage gap. By contrast, computers displace jobs requiring brain skills, which is a more female trait, and as such the gender gap worsens with computerization.

The last paper in this issue that examines labor markets by Lin and Long, titled "*The Impact of Globalization on Youth Education: Empirical Evidence from China's WTO Accession*," looks at the human capital adjustment in response to China's 2001 World Trade Organization (WTO) accession. It is well known that this led to substantial export growth and significant upgrading in export sophistication. By exploiting differences in exposure to trade liberalization across regions and in cohort-specific education decisions influenced by the WTO entry, this paper shows that the WTO accession reduced Chinese youths' average schooling by two months. However, individual responses to trade liberalization were not uniform. While younger students at the age of middle school graduation dropped out of school earlier in response to China's WTO entry, older students at the age of high school graduation continued to invest more in their education. In fact, those with at least a high school education increased average schooling by two months after trade liberalization. This kind of education response to trade liberalization offers interesting insights for other labor abundant countries planning to open up their economies.

All these local labor market observations and education responses cast a doubt on whether China can maintain its comparative advantage on its labor-intensive export in the 21st century relying on its low-cost labor. The question is particularly important given that labor cost in China has been increasing evidently. In the article entitled "*How Did Rising Labor Cost Erode China's Global Advantage?*" Huang, Sheng, and Wang document this change and aim to evaluate the effects of rising labor costs on China's attractiveness to multinationals and its export competitiveness. Certainly, an obvious identification challenge is the endogenous labor cost. To address this problem, the authors use regional variations in minimum wage distortion as possibly exogenous shocks to identify unskilled labor costs. They also set up a two-sector model by introducing the minimum wage into a general equilibrium model that integrates trade and production in a multi-regional setting. Guided by the theoretical framework, they find that rising minimum wage distortion reduces more of the exports in unskilled-labor intensive industries. Further, exports by non-Chinese firms are more sensitive to changes in minimum wage distortion than exports by domestic Chinese firms.

The second part of this issue mostly focuses on the nexus between trade and innovation. Yang, Li, and Kueng explore whether intensifying emerging market competition fosters or hampers firm innovation. In the article entitled "*The Impact of Emerging Market Competition on Innovation and Business Strategy*", they carefully estimate how Canadian firms adjust innovation activities, business strategies, and even exit in response to tougher Chinese import competition. Briefly, the answer depends on the type of innovation: product innovation or process innovation. They find that, overall, tougher import competition fosters product innovation incentives but hampers process innovation incentives. Consistent with theoretical predictions, their empirical research shows that Canadian firms that initially pursue process innovation and survive have higher profits ex-post but are ex-ante more likely to exit. In contrast, firms that initially pursue product innovation have higher profits if they survive, without significant impact on exit.

Implementing product innovation is tricky and an important research question related to product innovation is how to actually produce the goods once the idea of new products is clear. In their paper "*What's the Big Idea? Multi-Function Products, Firm Scope and Firm Boundaries*" Liu and Trefler provide a very nice answer to this question. As we know, complicated machines often bundle many different functions together. Liu and Trefler argue that a firm develops the big idea (which functions to bundle) and then chooses one supplier per function. Consequently, a holdup problem can occur and the firm's bargaining power declines in the number of intermediate suppliers. Greater scope as measured by the number of suppliers exacerbates holdup, but this can be partially offset by the appropriate choice of vertical integration or outsourcing. Their rich empirical investigation shows that the number of functions varies across products within an industry. Then the authors creatively introduce the notion of an 'ideas-oriented' industry as one in which more productive firms have higher marginal returns to introducing a new function. This leads to two testable predictions. More productive firms will not only have more suppliers but are also more likely to integrate those suppliers. Liu and Trefler take this to the data by training a multilayer perceptron to predict whether or not each of 29 million PATSTAT patent applications involves improved or new functions. They show that in industries where patents are skewed towards new or improved functions, more productive firms have more suppliers and are more likely to integrate these suppliers.

Similarly, another perspective of understanding innovation is how firm's product scope responses to foreign and domestic demand shock in the era of globalization. Qiu and Yu in their contribution titled "*Export Scope, Managerial Efficiency, and Trade Liberalization: Evidence from Chinese Firms*" provide an answer to this question. They first develop a theoretical framework to analyze the effects of market competition and market expansion on firms' product line decisions. Their theoretical model explicitly incorporates cost of management and firm heterogeneity in terms of managerial efficiency. Because of this, they are able to disentangle "managerial efficiency" and the conventional "production efficiency" known as firm's total factor productivity (TFP). They show that the home country's final-goods tariff cut, which captures domestic market competition, reduces all home firms' export product lines. However, when a foreign country cuts tariff, which represents incremental foreign demand, those firms with high managerial efficiency expand their

export product lines, while firms with low managerial efficiency cut their export product lines. Using a very rich micro-level Chinese firms dataset and a mostly disaggregated trade dataset, their empirical analysis finds evidence to support their theoretical predictions.

In addition to export scope, export quality is another important aspect to understand a country's export pattern and its implications for innovations. The paper "*Does Property Rights Protection Affect Export Quality? Evidence from a property law enactment*" contributed by Li, Li, Zheng, and Egger explicitly examines the effect of property rights protection on export quality, using the 2007 property law enactment in China as a natural experiment. They find that a firm's export quality increases with the enactment of the law, and the positive effect is more pronounced for non-state-owned private firms and non-Chinese firms with foreign-investment, and for firms located in regions with better legal and other institutional environment, as well as for firms specializing in trade with middle- and low-income countries. Overall, these results suggest that property-rights protection strengthens a country's international competitiveness through improving its export quality.

One final paper that is more on the institutions side examines how political conflict affects international trade. The paper titled "*How Political Conflicts Distort Bilateral Trade: Firm-Level Evidence from China*" contributed by Li, Jian, Tian, and Zhao enriches our understanding of the role of political conflict on bilateral trade. They examine how political conflicts affect trade, using both the Goldstein score that scales all political conflicts daily worldwide and the firm-country-product level data of Chinese imports. The authors find that, overall, political conflicts reduce Chinese imports. More interestingly, the effect is more pronounced for SOEs, and for imported intermediate imports. By contrast, foreign-invested enterprises (FIEs) are less negatively affected, because they are engaged more intensively in the processing trade where the impact of political conflicts is still negative, but the magnitude is lower.

This special issue contains a dozen papers that provide very interesting insights on trade and technological change – how they matter for the labor market and what is the relationship between innovation and trade broadly speaking. At the macro level we learn that the expansion in China trade has affected its domestic employment structure. We learn that these changes can be decomposed into (*i*) a demographic composition effect, (*ii*) a work propensity effect, and (*iii*) an interaction effect between the two. We also learn that international conflict does have a negative impact on Chinese exports. Moving to the labor market, we learn that export expansions to rich countries increased employment of skilled workers leading to migration of such workers into cities that specialize in the production of export-oriented products. This clearly has lessons for other countries looking to expand their trade footprint, but it also tells us that they need to be planning for migration to such production centers. We also learn that import tariff reductions and minimum wages do have an impact on wages and trade but in a predictable manner. Interestingly, data from local labor markets in the US shows that growth in Chinese exports reduces the gender gap because these goods affect employment in the male dominated manufacturing sector. In addition, different types of technological changes have different substitutability with different types of skills and therefore have different impact on gender wage gap. We also learn that Chinese youth are forward looking and trade by offering different types of employment opportunities affects schooling decisions. Again, this is an important insight for countries that wish to expand their manufacturing goods trade.

A number of interesting insights also emerge from the papers that focus on the nexus between trade and innovation. There is strong evidence to support the fact that property rights matter for the quality of products. Similarly, import competition fosters product innovation which offers a competitive product but hampers process innovation which mostly helps in reducing the costs of existing products. Moreover, within product innovation, the type of firms affects the market microstructure. Productive firms in more creative industries will have more suppliers and are also more likely to integrate them. Finally, we learn that domestic competition reduces the product lines of all firms while when foreign demand increases, firms with higher managerial efficiency expand their product lines while those that are relatively inefficient cut their product lines.

Happy reading!

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