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Sectoral technological progress, migration barriers, and structural change in China

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ABSTRACT

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We introduce a novel accounting method to infer sectoral technology and migration barriers among Chinese provinces, using data on structural change and migration from 1990 to 2010. The method is based on a multi-sector Eaton–Kortum model, embodying labor mobility friction across provinces. We find that the implied migration barriers are high and asymmetric. This asymmetry of migration barriers contributes to the expansion of provincial manufacturing labor share among all the provinces. Moreover, in a country with structural change, rich provinces gain less from inter-provincial trade than poor provinces. *Journal of Comparative Economics* **xxx** (xx) (2015) xxx–xxx. China Academy of Public Finance and Public Policy, Central University of Finance and Economics, 39 South College Rd., Beijing 100081, China; School of Economics, Renmin University of China, 59 Zhongguancun St., Beijing 100872, China.

1. Introduction

Economic growth is usually accompanied by structural change in terms of labor reallocation across sectors. This pattern is true for Chinese provinces. Three decades ago, the agricultural sector was the primary sector for almost all provinces. Since then, its labor share has been declining. Meanwhile, the labor shares of manufacturing and service sectors have been increasing. These structural changes do not take place uniformly across all provinces. As shown in Fig. 1, in 2010, provinces with higher income had lower labor shares in the agricultural sector but had higher labor shares in the manufacturing and service sectors. Ngai and Pissarides (2007) argue that differences in sectoral technological progress drive structural change. In particular, when one sector undergoes faster technological progress than the others, labor is pushed out of this sector as long as the elasticity of substitution across sectoral goods is less than one. Thus, the patterns of structural change can provide useful information about sectoral technological progress.

However, the negative relationship between sectoral technological progress and labor reallocation in Ngai and Pissarides (2007) does not readily apply to Chinese provinces. Two open economy features, the inter-provincial trade and migration, can substantially distort this relationship. On the one hand, under conventionally adopted assumptions, faster technological

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progress causes a decline in sectoral labor share. This negative relationship holds true only if the sectoral technological progress does not greatly increase the demand for goods in this sector by reducing prices. In an open economy environment, where the countries are interdependent due to international trade, Matsuyama (2009) shows that this is not true. If we apply the insights of Matsuyama (2009) to the context of Chinese provinces, the implication is that faster technological progress in a sector in one province strengthens its comparative advantage and induces more demand for its goods from other provinces. As a result, the negative effect of sectoral technological progress on sectoral labor share is weakened. On the other hand, the newly released Sixth National Population Census data of China shows that there is substantial migration across provinces. Such migration affects the relationship between sectoral technological progress and structural change. In particular, with migration, the advantage of advanced technology in one province is strengthened, since more labor can be attracted there by higher real wages.

In other words, if we ignore these two open economy features and simply infer the sectoral technological progress from labor reallocation, the results could be substantially biased. Therefore, we construct a general equilibrium open economy model to take both features into account. It is essentially a multi-sector Eaton–Kortum model, embodying labor mobility friction across provinces. Unlike other models used in empirical studies, our model has a very simple yet favorable feature, which enables us to infer the unknown sectoral technological progress and migration barriers from the data. To the best of our knowledge, our paper is the first empirical study to extract information on technological progress and migration barriers in an open economy environment while also featuring inter-provincial trade and migration.

Based on the model, we find that among Chinese provinces from 1990 to 2010, the annual growth rate of total factor productivity (TFP) ranged from -0.38% to 4.75% for the agricultural sector, from 2.0% to 7.25% for the manufacturing sector, and from -5.41% to 0.63% for the service sector. In addition, the migration barriers are very high and asymmetric. The barrier for people migrating from a rich province to a poor province is smaller than the barrier for people migrating in the opposite direction. While it may not be surprising that there are high migration barriers in China, this paper is the first one to document and quantify its asymmetrical nature. This result suggests that the conventional symmetric proxies of migration barriers, such as distance or transportation costs, cannot capture the essence of the migration barriers in China. We are able to assess the implications of the migration barrier as well as the inter-provincial trade. The counterfactual experiments show that, first, the migration barriers actually contribute to the expansion of the provincial manufacturing labor share among the provinces, and, second, rich provinces gain less from trade than poor provinces in an environment experiencing structural change.

This paper is part of the broad research on structural change. First, many researchers, such as Kongsamut et al. (2001), Ngai and Pissarides (2007), and Acemoglu and Guerrieri (2008), recently revisited the phenomenon of structural change in economic development. Generally, there are two theoretical ways to model structural change from the preference side

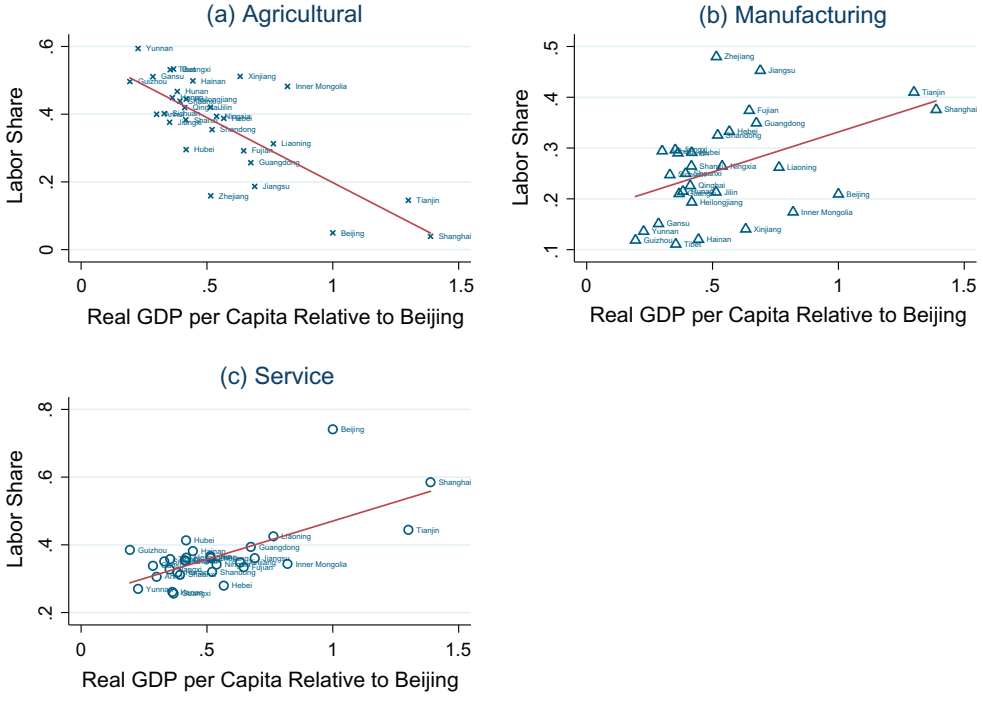

Fig. 1. Correlation between sectoral labor shares and real GDP per capita among the provinces of China, 2010. The real GDP per capita is normalized by the one of Beijing.

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