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A simple accounting framework for the effect of resource misallocation on aggregate productivity ☆

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ABSTRACT

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This paper develops a simple accounting framework that measures the effect of resource misallocation on aggregate productivity. This framework is based on a multi-sector equilibrium model with sector-specific frictions in the form of taxes on sectoral factor inputs. Our framework is flexible for the assumption on preferences or aggregate production functions. Moreover, this framework is consistent with that commonly used in productivity analysis. I apply this framework to measure the extent to which resource misallocation explains the difference in aggregate productivity across developed countries. I find that around 9 percentage points of the difference in the measured aggregate productivity between Japan and the US can be accounted for by resource misallocation. Using the framework, I also decompose the causes of the misallocation effect. *J. Japanese Int. Economies* **26** (4) (2012) 473–494. Faculty of Economics, Hitotsubashi University, 2-1, Naka, Kunitachi-shi, Tokyo 186-8601, Japan.

1. Introduction

There are large disparities in incomes even across developed countries. Prescott (2002) reports that there is approximately a 30–40% difference in per capita income among highly developed countries.

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He argues that the most important factor in this disparity is the difference in the level of aggregate total factor productivity (TFP).[1] From this standpoint, many theoretical models have been proposed that try to explain the difference in aggregate TFP. Restuccia and Rogerson (2008) point out that many of these models can be characterized as following the theory of resource misallocation. This theory states that frictions due to various reasons prevent the efficient use of resources, resulting in a low aggregate TFP. Then, to what extent does resource misallocation actually affect aggregate TFP and explain the difference in aggregate TFP across countries?

To answer these problems, this paper proposes a simple accounting framework that measures the effect of resource misallocation on aggregate TFP from data. This framework is based on a multi-sector equilibrium model with sector-specific frictions in the form of taxes on sectoral factor inputs (capital and labor). As in Chari et al. (2002) and Restuccia and Rogerson (2008), the sector-specific frictions in the form of taxes for each firm or sector reflect the various kinds of frictions the firm or sector faces. As in Chari et al. (2002), I measure these sector-specific frictions using the model from data (which are measured from the difference in factor input returns between sectors) and assess the effect of these frictions on aggregate TFP. A characteristic of their tax (or wedge) approach is that this approach can deal with the various types of frictions that distort resource allocation all together.

Compared with the other papers (cited below) that measure the effect of resource misallocation on aggregate TFP, there are two distinct characteristics in this paper's framework. First, our framework is flexible for the assumption on preferences or aggregate production functions. In particular, when we measure the contribution of resource misallocation to the difference in measured aggregate TFP, we do not need to assume a specific form of preferences or aggregate production functions.[2] Second, this paper's framework is consistent with that commonly used in productivity analysis.

I apply the framework presented here to the sectoral data of countries that are included in the EU KLEMS database (Timmer et al., 2008).[3] For example, I find that around 9 percentage points of the difference in the measured aggregate TFP between Japan and the US can be accounted for by sector-level resource misallocation. The transport and financial sectors are the primary sources of capital misallocation, while the agricultural and financial sectors are the primary sources of labor misallocation. I also find that the differences in sectoral shares between countries, which may be due to structural transformations, magnify the effect of sector-level resource misallocation on the difference in the measured aggregate TFP.

Several papers measure resource misallocation from cross-sectional differences in factor input returns and calculate the resource misallocation effect on aggregate TFP using the equilibrium framework. This paper fits into this literature. To the best of my knowledge, the earliest work in this field is de Melo (1977). A computable multi-sector general equilibrium model is applied to the Colombian economy by de Melo (1977) to calculate the effect of the removal of distortions on sector-level resource allocation. Recently, Restuccia et al. (2008) and Vollrath (2009) used a two-sector model to measure the magnitude of barriers to resource allocation between the agricultural and non-agricultural sectors. Using a standard model of monopolistic competition with heterogeneous firms and manufacturing plant-level data from China, India, and the US., Hsieh and Klenow (2007) estimated how resource misallocation affects aggregate TFP. As mentioned above, compared with these papers, our framework is flexible for the assumption on preferences or aggregate production functions.[4] Moreover, our framework is compatible with the framework commonly used in productivity analysis. Finally, using this paper's framework (to be precise, the framework of the previous version of this paper, Aoki, 2006), Miyagawa et al. (2008) used the Japanese Industrial Productivity (JIP) Database to measure the effect of sector-level resource misallocation on aggregate TFP.

This paper's framework is, in two respects, closely related to the literature on productivity analysis using index number theory. First, this paper's decomposition is a generalization of previous studies in

[1] Parente and Prescott (2000) argue that the most important factor in the income disparities between developed and developing countries is also the difference in aggregate TFP.

[2] When conducting a counterfactual exercise, our framework implicitly or explicitly needs assumptions on preferences or aggregate production functions to know how sectoral shares change.

[3] The countries are Australia, Austria, the Czech Republic, Denmark, Finland, Germany, Italy, Japan, the Netherlands, Portugal, Sweden, the UK, and the US.

[4] On the other hand, for example, Restuccia et al. (2008) assume the Stone-Geary utility function and Vollrath (2009) assumes a small open economy, which is equivalent to assuming that goods are a perfect substitute.