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Real exchange rate and productivity in a specific-factor model with skilled and unskilled labour

Thi Hong Thinh Doan, Karine Gente *

Aix-Marseille University, Aix-Marseille School of Economics, CNRS & EHESS, France

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ABSTRACT

The present study develops a two-sector specific factor model in which capital is mobile between sectors. We assume that the traded (non-traded) sector uses skilled (unskilled) labour for production. The theoretical model reveals that the real exchange rate (RER) response to a productivity shock depends on the countries' relative abundance of skilled labour: a rise in traded productivity leads to a higher RER appreciation in a country whose relative skilled labour rate is high. Using panel data, structural break tests confirm that the skilled versus unskilled labour ratio may be a significant splitting variable. In the long run, the relationship between productivity and RER may be positive or negative, as suggested by the theoretical model, depending on the country's relative abundance of skilled labour.

1. Introduction

Real exchange rate (RER) is a key variable in economic development, especially for export-led growth countries. The question of RER fundamentals remains crucial but still controversial. The traditional analysis based on Balassa (1964) and Samuelson (1964) predicts that a rise in traded productivity leads to an appreciation in RER. Choudhri and Khan (2004) show that this theory is empirically relevant especially in developing countries, and Egert et al. (2003, 2006) show that the Balassa–Samuelson effect holds for transition economies. Canzoneri et al. (1999) find a significant and positive relationship for OECD countries, whereas Bergin et al. (2006) prove that although this relationship does exist, it varies over time and has become more pronounced over the recent period. On the basis of this empirical literature, productivity is now understood to be an RER determinant.

However, Ito et al. (1999) show that a productivity shock may generate a depreciation in RER, especially in emerging Asian countries. Christopoulos et al. (2012) show that the BS effect holds only for countries that have perfect access to the international capital markets. Doan and Gente (2013) show that the relationship between RER and productivity may also depend on the time preference and the population growth rate. Rodrik (2007) deals with the reverse causality, showing that in developing countries the RER depreciation is generally followed by a period of acceleration in growth.

* Corresponding author. Address: Aix-Marseille University, Aix-Marseille School of Economics, 14 Avenue Jules Ferry, 13621 Aix-en-Provence, France. Tel.: +33 4 42 93 59 66; fax: +33 4 42 38 95 85.
E-mail address: karine.gente@univ-amu.fr (K. Gente).

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The aim of this paper is to study the BS effect in a different context. We develop a two-sector specific factor model where only capital is mobile between sectors. We analyse the effect of a productivity shock in such a framework. This specific factor model can be considered as the limiting case of a three-factor two-sector model with a huge labour mobility cost. Indeed, in such a model, production would be obtained using skilled labour, unskilled labour and capital, the traded (non-traded) sector would be skilled (unskilled) labour intensive, and mobility cost would be so high that skilled (unskilled) labour would only be used by the traded (non-traded) sector. Recently, some papers have analysed the unskilled/skilled labour factor in a macroeconomic context. Using both theory and empirical evidence, Mollick (2009) examines the impact of fluctuations in RER of the Mexican Peso on skilled and unskilled employment. The main finding is that the RER depreciation contributes to a fall in the employment of unskilled labour and suggests that unskilled labour workers are more strongly affected than skilled workers by a depreciation in the RER of the Peso.

Using data on Chilean manufacturing plants for the period 1990–1999, Alvarez and Lopez Ricardo (2009) investigate the impact of exchange rate fluctuations on skill upgrading and wage inequality between exporters and non-exporters. They show that depreciations or, more generally, increases in export profitability, may lead exporters to adopt more skill-intensive technologies and upgrade product quality.

To summarise, all of these studies consider the RER to be a potential explicative variable of the skilled versus unskilled labour ratio. Conversely, in the present study we focus on the influence the skilled versus unskilled labour ratio may have on the RER. More precisely, we investigate whether RERs react differently to a productivity shock in skilled labour abundant countries, when compared to unskilled labour abundant countries. Using panel data on 25 countries between 1965 and 2010, in a first step we estimate the relationship between productivity and RER using two global datasets, and then using several restricted datasets. For the purposes of robustness, one global dataset uses the bilateral RER, while the other uses the real effective exchange rate. We split them with respect to the ratio of skilled versus unskilled labour, and estimate the productivity-RER relationship using Chow structural break tests. With both datasets, by using different splitting variables, we conclude that the RER reaction to a productivity shock depends on the ratio of skilled versus unskilled labour.

In a second step, we estimate the long-run relationship between productivity and RER in the sample pairs, which have been split according to the value of their skilled to unskilled labour ratio. There is a strong cointegration between productivity and RER. The Balassa–Samuelson theory is valid for the whole sample in the BIR dataset, whereas for some subsamples an increase in productivity depreciates the RER.

The remaining sections in this paper are organised as follows: Section 2 deals with the theoretical model highlighting the relationship between RER and productivity, Section 3 presents our empirical investigation, and our conclusions are presented in Section 4.

2. The model

We develop a two-sector overlapping generations model (OLG) in which capital is the unique mobile factor between sectors. We assume that the traded sector uses skilled labour and capital to produce, while the non-traded sector uses unskilled labour and capital. In this setting, the RER, P_N, denotes the relative price of non tradable to tradable goods. The production side of this model can be considered as an extreme case of a 3×2 model in which the traded sector is skilled labour intensive and labour mobility between sectors is so costly that skilled (unskilled) labour is specific to the traded (non-traded) sector. To justify this assumption, we proxy wages earned respectively in traded and non-traded sectors by gross value-added, divided by the number of persons involved.[1] Using two different datasets – one with 13 countries in common with this study (dataset 1), the second with 28 countries corresponding to all of countries for which the relevant data is available (dataset 2) between 1965 and 2005 – we find that the wages earned in the non-traded sector represent only 20% (12.2%) of the wages earned in the traded sector in dataset 1 (dataset 2).

2.1. Individuals

The economy consists of a sequence of individuals who live for two periods, and have identical preferences, but can be either skilled (superscript s) or unskilled (superscript u). Each type-i agent works during the first period of his life and contributes to the birth of $1 + n_i$ others, $i = u, s$, so that the per period rate type-i-population growth is n_i. At time t, each type-i-generation consists of N_t identical individuals who make decisions concerning their consumption and savings.

The intertemporal preferences of an individual belonging to generation t are represented by

$$U(c_t, d_{t+1}) = \beta \ln c_t + (1 - \beta) \ln d_{t+1} \tag{1}$$

where c_t and d_{t+1} are, respectively, the composite consumption when the individual is young, and the composite consumption when he is old; $\beta \in (0, 1)$ denotes the individuals' thrift.

[1] We use the 10-sector dataset provided by the Groningen Growth and Development Center (GGDC) (see Timmer and de Vries, 2009), and follow De Gregorio et al. (1994) and Ricci et al. (2008) to classify the sectors into two categories. We thus consider Agriculture, Mining, Manufacturing and Transport, Storage and Communication to be traded sectors; Public Utilities, Construction, Wholesale and Retail Trade, Finance, Insurance, and Real Estate, Community, Social and Personal Services, and Government Services to be non-traded sectors (see Christopoulos et al., 2012, p. 18).