



# How does real exchange rate influence labour productivity in China? <sup>☆</sup>

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## ABSTRACT

Since China's transition to a market economy, the labour productivity growth has been dramatically rapid, in particular since 1994. This speeding up has been accompanied by the reverse of the exchange rate policy of China, which has strongly depreciated its currency before 1994, and then either appreciated or stabilized it. The theoretical arguments suggesting several kinds of real exchange rate impact on labour productivity are developed. An econometric model is then proposed and estimated, using panel data for the twenty-nine Chinese provinces and for the period from 1986 to 2007. The econometric results show that the appreciation of the real exchange rate had a favourable effect on the labour productivity growth, leading to a kind of virtuous circle: the real appreciation of the currency boosts the growth of labour productivity while, according to the Balassa–Samuelson effect, productivity growth tends to push up the real appreciation. Moreover, this favourable effect is stronger in inland provinces than in coastal provinces, contributing to a minimizing of the gap between inland and coastal provinces.

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## 1. Introduction

Labour productivity has increased very rapidly in China since the beginning of its transition towards a market economy. Its annual growth rate was on average 7.9% from 1979 to 2008.<sup>1</sup> The rise has been higher starting from 1994; it has passed from 6.7% per year over the 1979–1993 period to 8.3% over the 1994–2008 period, leading to a higher growth of labour productivity in China than in the other countries, developing or in transition. In 2007, it reached 11% relative to 5.9% in India, 6.7% in Russia and 1.9% in Brazil (Conference board, 2008).

The speeding up of labour productivity growth since 1994 has been accompanied by a reversal of the exchange rate policy of China. After a long period during which the Chinese government has systematically devalued the renminbi *vis-à-vis* the dollar, in 1994 it decided to stabilize and in 2005 to progressively revalue it. This policy led to a depreciation of real effective exchange rate of the Chinese currency against the currencies of its trade partners during the first period, especially strong from 1990 to 1993, and an appreciation from 1994 to 1998, in 2001 and 2008.<sup>2</sup>

The real depreciation of the renminbi was an active tool of China's export promotion strategy adopted since 1978. Actually it boosted exports and economic growth. The very success of this strategy implied the above reversal of the exchange rate policy. Indeed, according to the Balassa–Samuelson effect, the equality of general price levels expressed in the same currency unit, called purchasing power parity, does not hold between countries with differing levels of development so that countries with a rate of

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<sup>1</sup> Authors' calculation (cf. Section 2.2).

<sup>2</sup> See Fig. 2 in Section 2.1.

growth higher than the rest of the world experience a real appreciation of their exchange rate (Balassa, 1964; Samuelson, 1964).<sup>3</sup> Guillaumont Jeanneney and Hua (2002) have shown in this same review that the real exchange rate of each Chinese province depends on the ratio of its per capita product to that of its trade partners and therefore concluded that the Balassa–Samuelson effect actually holds in China.

Here we focus on the reverse causation from real exchange rate to productivity growth.<sup>4</sup> A plethora of literature has explained the rapid growth of labour productivity in China,<sup>5</sup> but the role of the exchange rate policy has not yet been considered. Many suggested factors come from the Chinese strategy of development, based on rapid expansion of industry (Lin & Liu, 2008). Indeed industry growth has contributed to 60% to the growth of labour productivity since 1994 (Bosworth & Collins, 2008).<sup>6</sup> The labour productivity was boosted by a rapid growth of investment and then of capital intensity, particularly marked in the industrial sector. It was also favoured by external openness, with the development of manufactured exports (Fu & Balasubramanyam, 2005; Kraay, 2006; Hua, 2007) and foreign direct investments,<sup>7</sup> and by the promotion of the private sector in disfavour of the sector of state-owned enterprises (SOEs) (Jefferson & Su, 2006; Dougherty, Herd, & He, 2007). Finally, the role of human capital is generally recognised as a positive factor of productivity growth (Fleisher & Chen, 1997; Zhu, 1998; Wang & Yao, 2003). Exchange rate policy acts on labour productivity by acting on these traditional determinants of labour productivity. But we must also analyse if the real exchange rate, as it modifies the real remuneration of workers and exacerbates competition, may exert a direct action on efficiency of workers and managers.<sup>8</sup>

The issue of the possible impact of the real exchange rate on the labour productivity is an important one at this time where the Chinese government is under strong pressure from the international community to revalue the renminbi. Indeed, if a real appreciation exerts a positive impact on the labour productivity, a kind of virtuous circle might be present in China: the real appreciation of the currency boosts the growth of labour productivity while, according to the Balassa–Samuelson effect, productivity growth tends to increase the real appreciation. It would be the inverse if the impact was negative. Moreover we observe that productivity growth is slower in inland provinces than in coastal provinces. Have real exchange rate variations (in one or other direction) exerted a different effect in both kinds of provinces, contributing to exacerbate or diminish the gap of labour productivity growth between them?

This article is organized as follows: first, we present China's exchange rate policy and the evolution of real exchange rate during the last thirty years. We compare this evolution to that of the labour productivity in China as a whole and in the various provinces. Second, we explain how theoretically real exchange rate variations may affect (positively or negatively) labour productivity, either directly or through its traditional factors considered in the literature. We conclude that the sign of the total effect of real exchange rate on labour productivity is theoretically ambiguous and only an empirical analysis can reveal it. From this theoretical analysis we draw our estimating strategy. We define a function of labour productivity growth which includes real exchange rate beside more traditional factors which are themselves supposed to depend on the real exchange rate. Third, we estimate these functions by using a panel data which combine the temporal dimension represented by annual data 1986–2007 and the spatial data represented by the 29 Chinese provinces.<sup>9</sup> In conclusion we draw some policy implications.

The results show that before 1994 the real depreciation has exerted a net negative effect on the labour productivity growth, while after 1994 the real appreciation has exerted the inverse effect. The main action was through the variation of the capital/labour ratio. Simultaneously the depreciation has contributed to increase (and the appreciation to reduce) the gap between the rates of labour productivity growth in the coastal and inland provinces.

## 2. Evolution of real exchange rate compared to labour productivity in China

A descriptive approach of the evolution of China's exchange rate and of its labour productivity growth suggests that the reversal of the exchange rate policy from currency depreciation to appreciation was accompanied by an acceleration of labour productivity growth, more sensible in inland than in coastal provinces.

<sup>3</sup> When growth of labour productivity is higher in a developing country than in the rest of the world, a real appreciation occurs. Indeed the relative rise of prices in the sector of non-tradable goods and tradable ones depends on the gap between the rates of growth of their labour productivity, all the more important than the domestic economic growth is high. This explanation implies the existence of a genuine labour market with some movement of workers between sectors and workers' remuneration based at least partially on their productivity.

<sup>4</sup> Some authors also studied this reverse causality from real exchange rate to labour productivity (Krugman, 1989; Porter, 1990; Guillaumont & Guillaumont Jeanneney, 1992; Lu & Qiao, 1999; Harris, 2001); but none of them studied the case of China.

<sup>5</sup> The majority of the studies do not focus exclusively on labour productivity. The papers exclusively on labour productivity have emerged only recently (see Liu, Parker, Vaidya, & Wei, 2001; Zhu & Tan, 2000; Kraay, 2006; Herreras & Orts, 2008; Yueh, 2008; He & Zhu., 2009, etc.). Besides, there is another strand of the literature which compares China's labour productivity to that of other countries, in particular of the United States (Wu, 2001; Jefferson et al., 2006).

<sup>6</sup> He and Zhu (2009) have shown that a positive relationship has existed between industrial concentration and labour productivity since 1980. Li and Haynes (2008) have provided evidence that the regional disparity of labour productivity depends on the industrial structure.

<sup>7</sup> Studies which underline the role of foreign direct investments are particularly numerous (see Qi et al., 2009 for a review).

<sup>8</sup> See note 4 for the literature, and Section 3.1 for the theoretical arguments.

<sup>9</sup> China is composed of 22 provinces (Hebei, Liaoning, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, Hainan, Shanxi, Jilin, Heilongjiang, Henan, Anhui, Hubei, Hunan, Jiangxi, Gansu, Shaanxi, Sichuan, Guizhou, Yunnan and Qinghai), four autonomous municipalities under the direct control of central government (Beijing, Tianjin, Shanghai and Chongqing) and five autonomous regions (Guangxi, Inner Mongolia, Ningxia, Xinjiang and Tibet). In our econometric analysis, the autonomous region of Tibet is absent short of statistics, the statistics of Chongqing, created in 1997, are included into those of Sichuan, which lead to restrain 29 provinces in a large conception in terms of "province".

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