HOW DOES REAL EXCHANGE RATE INFLUENCE INCOME INEQUALITY BETWEEN URBAN AND RURAL AREAS IN CHINA ?

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Abstract

The channels through which the real exchange rate influences urban/rural per capita real income inequality are analyzed using yearly data for 28 Chinese provinces. Due to the higher share of tradable goods produced in urban than rural areas, the real depreciation of the Chinese currency raised the urban bias, contrary to the effect usually expected. This rise was, however, mitigated because of the impact of the exchange rate on the urban/rural consumer price ratio, real public wages, and the ratio of industrial/agricultural protection rates. It disappeared for coastal provinces due to the strong development of outward-oriented rural industrial activities.

JEL: F31, O15, O53, P21

Keywords: real exchange rate, income inequality, China.

Résumé

Les canaux par lesquels le taux de change réel influence l'inégalité des revenus réels per tête entre les villes et la campagne sont analysés à partir des données annuelles de 28 provinces chinoises. A cause de la part plus importante de la production de biens échangeables internationalement en ville qu'à la campagne, la dépréciation réelle de la monnaie chinoise a accru le biais urbain, contrairement à ce qui est habituellement attendu. Cette hausse du biais urbain a cependant été atténuée par l'impact du taux de change sur le ratio des prix à la consommation en ville et à la campagne, sur les salaires de la fonction publique et sur le ratio des taux de protection des biens industriels et agricoles. Elle n'existe pas dans les provinces côtières à cause du développement de l'industrie rurale.

Mots clés : taux de change réel, inégalité des revenus et Chine

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1- Introduction

It has often been argued that overvaluation of domestic currencies in developing countries tends to penalize farmers, and that real depreciation should therefore be beneficial to the latter[1]. The devaluation which accompanied stabilization and liberalization programs pursued by developing countries since the beginning of the 1980s, aimed primarily at restoring the balance of payments equilibrium. A complementary motive for devaluation has sometimes been to reduce the "urban bias" inherent to development strategies of many developing countries.

Studies on the effects of the exchange rate policy of developing countries principally focus on the general price level, production or the balance of payments, or consider only a particular aspect of income distribution, such as the evolution of real wages or profit-wage sharing[2]. However, only a few studies have investigated the issue of the relationship between the evolution of the exchange rate and the distribution of urban and rural incomes.

Since the beginning of the 1980s, the exchange rate policy of China has been very active, which has resulted in a substantial real depreciation of the Chinese currency (Guillaumont Jeanneney S. and Hua P., 1996). The fact that China publishes annual series of urban and rural incomes at provincial level provides an especially relevant case for assessing the relationship between the real exchange rate and the geographical distribution of incomes. This study is all the more interesting as both urban/rural and provincial income disparities are the main source of China's income inequality (World Bank, 1997).

This paper comprises two sections. The following section examines the different phases of the exchange rate policy of China and the corresponding evolution of the ratio of urban/rural incomes per capita. It appears that the income inequality between urban and rural areas does not move identically in the two geographical zones, namely inland and coastal areas, and therefore that the real depreciation of the Chinese currency might have raised the urban bias more in the former than in the latter. This

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[1] See, for instance, the World Bank analysis on the reasons for agricultural stagnation in Africa in the early 1980s (World Bank, 1981), and more generally the contributions of Morrisson (1991), Bourguignon and Morrisson (1992), Guillaumont P. (1993) and Minot (1998).

[2] See for instance Alejandro (1963), Twomey (1983), Edwards (1989), Agenor & Montiel (1996). See also the contributions of Knight (1976) and Morrisson (1991) which are closer to our analysis.

divergence is in keeping with the ambiguous theoretical predictions of the impact of exchange rate variation on income distribution. Several assumptions are then presented to analyze certain channels through which exchange rate variations may have influenced urban/rural per capita income inequality in China, and so to explain the divergence between inland and coastal provinces. The last section presents the econometric results obtained from a panel analysis.

2. Relationship between the real exchange rate and the geographical distribution of income: stylized facts and main assumptions

2.1. The various phases of China's exchange rate policy

The exchange rate policy pursued by China since the beginning of the liberalization program has been quite complex, as, from 1981 to 1993, it involved a double exchange rate regime, whose nature has, moreover, changed over time. Since 1979, planned imports have been supported by priority foreign exchange allowances, while some non-planned imports have been financed either by foreign capital or through a system of foreign exchange retention. The latter, which has been progressively expanded, allows enterprises to use a part of foreign exchange earnings derived from exports to finance their own imports or to sell them at an internal settlement rate, which as of 1981 was higher than the commercial rate applied to planned imports. Previously, foreign exchange earnings had to be entirely remitted to the central government. In 1985, the internal rate became a market price, whereas the commercial rate was replaced by an official rate.

Until their unification in January 1994, the differential between the two rates (namely, between the commercial rate and the internal rate for the 1981-1984 period, and then between the official rate and the free market rate for the 1985-1993 period) has fluctuated between 10% and 70%. Both rates have strongly depreciated. In contrast, the unified exchange rate, now subject to a controlled floating regime, only slightly depreciated (compared to the dollar) in 1994 and then slightly appreciated in 1995 and 1996. These various changes explain the highly contrasted evolution of China's real exchange rate over time.

The size of the variation in the real value of the Chinese currency (the Renminbi) can be inferred from the evolution of a real effective exchange rate, being calculated as the weighted geometric average of real exchange rate indexes of the Renminbi relative to the currencies of China's main trading partners. Weights are modified each year (Paasche index) so as to allow for the rapid change in the geographical structure of Chinese foreign trade over the period. To calculate the real exchange rate, consumer prices are used for each province of China as well as for its trading partners; exchange rates are computed as the weighted average of the two exchange rates simultaneously used in China; the weighting of the two rates being based on the retention rate of exports. An increase in the effective exchange rate index corresponds to a depreciation.

After a strong rise of 106 % in 1981 due to the introduction of the internal rate, the real effective exchange rates declined (so appreciated) by 11% from 1981 to 1985. The depreciation of the currency appeared again from 1985 to 1993, since the real effective exchange rates increased by 127%. Furthermore, this depreciation, pertaining to exports of industrial products, was stronger since, during the double exchange rate regime, the retention rate of foreign exchange was higher for industrial goods than for agricultural goods. From 1993 to 1996, with the unification of exchange rates, the real effective exchange rate appreciated for the second time by 29% (Figure 1).

2.2. The evolution of geographical income distribution

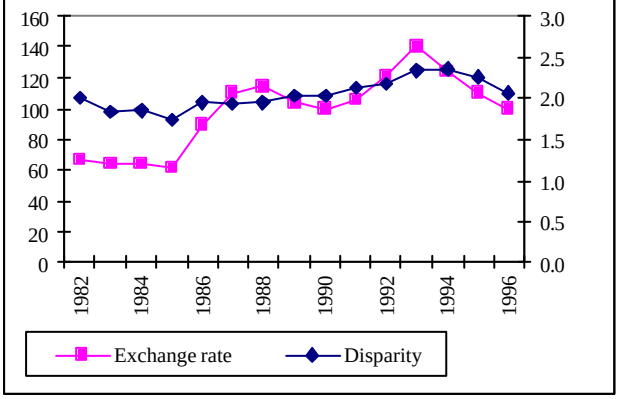
Urban income refers here to the disposable income of urban households which can be used for daily expenses, i.e. total income minus income tax, property tax and other current transfers. Rural income, defined as the net income of rural households, refers to the total income of the rural households net of expenses for productive operations, taxes and payments to collective units[3]. Real incomes are obtained by deflating the consumer prices in urban areas and rural areas respectively (base

[3] We may recall that the relative evolution of urban and rural incomes does not reflect the relative evolution of living standards, since the calculation of incomes does not include the indirect (in kind) incomes derived from public services (education, health and housing), and because the evaluation of the auto-consumption of the peasants is questionable (Cai, 1998).

1990=100)[4]. One specificity of China during the 1982-1996 period is that the rural revenue composition changed from dominantly agricultural revenue to a revenue deriving both from agriculture and industry, as the contribution of the latter to per capita rural revenues passed from 12 % in 1982 to 31 % in 1996. This change is much more marked in coastal than inland provinces due to the uneven distribution of outward-oriented rural industry activities.

Figure 1 permits us to compare the evolution of the real effective exchange rate with the evolution of the ratio of urban to rural real per capita incomes. It shows that during the first phase of reforms from 1982 to 1985, when prices of goods were still largely administered and the real exchange rate registered only a slight appreciation, the discrepancy between urban and rural incomes, both expressed in 1990 prices, slightly declined. On the contrary, from 1985 to 1993, while the Chinese economy shifted towards a market economy and the real effective exchange rate strongly depreciated, the inequality between urban and rural incomes widened again, as a result of a drastic slowdown in the growth rate of rural income, with the latter falling to 1.8% per year whereas the growth rate of urban income remained stable (5.7% per year). Hence, the ratio of urban to rural incomes, measured at

Figure 1 Evolution of the real effective exchange rate index and of urban/rural real per capita income inequality in China



constant prices, reached 2.36 in 1994, compared to 1.76 in 1985. After 1993, in a context of exchange

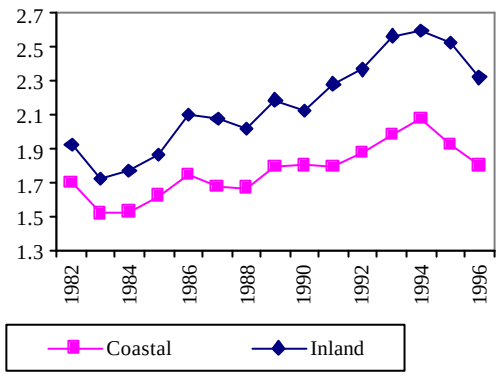
[4] Retail prices for rural areas are used for the 1982-1984 period, since consumer price indexes were not available for this period.

rate unification, the real effective exchange rate appreciated, and income inequality again began to lessen, subsequent to the high growth rate of rural incomes (10.1% compared to 5.6% in urban areas).

Sources :Quanguo Gesheng Zizhiqu Zhixiashi Lishi Tongji Ziliao Huibian 1949-1989 (China's Provincial Statistics, 1949-1989), China regional Economy, A Profile of 17 years of Reform and Opening Up and China Statistical Yearbook 1997, p.293.

If we now consider the evolution of the ratio of urban to rural real per capita incomes, no longer for the whole country, but for eleven coastal provinces and seventeen inland provinces respectively[5], it appears that there are some differences in urban/rural income inequality between inland and coastal provinces (Figure 2). The rise in the ratio of urban to rural incomes is indeed more pronounced for inland provinces than for coastal provinces. This result could not be expected *a priori*.

Figure 2 Evolution of urban/rural real income per capita inequalities in Chinese coastal and inland provinces



Indeed, the share of foreign direct investments in total investment is higher in coastal provinces compared to inland provinces, and these investments are also more concentrated in industry, which should *a priori* be of benefit to urban areas. This result suggests that the specialization differential between coastal and inland provinces, with activities of the former being more largely outward-oriented, is more salient in rural areas than in urban areas.

[5] Ratios of urban to rural real incomes for coastal and inland provinces are calculated as the arithmetic average of the ratio of urban to rural real incomes per capita of each province in coastal and inland areas. The independent region of Tibet and the Hainan province (formed in 1988), are excluded due to statistical limitations. Data pertaining to Guangdong were corrected by excluding the data relative to Hainan before 1988.

2.3. Main assumptions about the relationship between the real effective exchange rate and urban/rural income inequality

The real effective exchange rate, of which the evolution has already been presented, may be considered as a proxy for the relative price of internationally tradable goods. A rise in the latter (or a real depreciation) exerts an effect on per capita income which is all the more favorable as agents produce a larger share and consume a smaller share of tradable goods. It will therefore be translated as a change in urban/rural income inequality, since urban and rural households do not produce and consume the same proportion of tradable goods.

In China, as in other developing countries, the urban zones produce chiefly industrial goods and services whereas rural zones produce agricultural goods. Although services are essentially non-tradable, it seems reasonable in the case of China to assume that urban zones produce a higher proportion of tradable goods compared to the rural zones. Indeed, due to the auto-sufficiency policy pursued by Chinese authorities, the major part of agricultural production is devoted to auto-consumption and to the protected domestic market. The share of auto-consumption in the daily consumption expenditure was 59 % in 1978 and still 34 % in 1995[6]. Agricultural products bought by the government are mainly for the consumption of urban zones. Farmers have been progressively allowed to sell the residual production (i.e. the production after compulsory deliveries and auto-consumption) on the domestic market. Exports and imports of agricultural products are still largely controlled by the government.

A specific feature of China has been the development of rural industry. The weak industrial activities in the rural zones of inland provinces actually appear mainly oriented towards the domestic market. The assumption relative to a lower ratio of tradable to non-tradable goods in rural than in urban productions may, however, be mitigated for coastal provinces. In fact, rural industrial activities have been considerably concentrated in coastal areas, due to low per capita land ratios, dense populations, better infrastructure and the potential for rural enterprises to build profitable links with existing

industries (Findlay, *et al*. 1992). The difference in the development of rural enterprises is also due to the different economic structure which originated from the strategy of heavy industry development. The part of the state economy, dominated by heavy industries and located in urban zones, is much more important in inland provinces than in coastal provinces. The latter have good light industry bases which are much more easily transferred to rural zones which already have some industrial activities. This transfer is facilitated by their greater proximity to urban centers than in inland zones. The rural enterprises in coastal provinces are furthermore highly export-oriented, since they enjoy natural advantages due to the proximity of foreign markets. The impact of such advantages on growth has been strengthened by the opening-up policy, with the latter itself being supported by the depreciation of the real exchange rate. On the contrary, the inland provinces have been defavored by the policy of the central government which restricted direct foreign investment in strategic sectors using key raw materials in which the inland provinces had a comparative advantage (Huang, 1996). In addition, coastal rural areas have benefited from preferential measures with respect to credit policy as well as to pilot reforms in the field of economic and trade liberalization. Industrial production and exports of rural enterprises derived from coastal provinces represent 60 % and 88 % respectively. Simultaneously, the strong economic growth in coastal provinces, as well as the experimental reforms in the service sector in urban coastal provinces, stimulates the development of service activities (non-tradable goods, chiefly in urban areas), faster than in inland provinces. Thus, in coastal provinces, rural agents may produce roughly the same proportion of internationally tradable goods as urban agents.

It is also likely that the households of rural zones consume a larger proportion of non-tradable goods (partly because of auto-consumption) compared to urban households, and that the depreciation of the real exchange rate will entail a smaller rise in consumer prices in the rural zone compared to consumer prices in the urban zone. This assumption seems relevant in the case of China in view of the evolution of the ratio of prices in the two zones. Indeed, over the whole period analyzed here, and except for the years 1989 and 1990, consumer prices rose faster in urban areas than in rural areas. The

[6] China Economic Systems Reform Yearbook 1996, p260.

ratio of consumer prices in urban areas to consumer prices in rural areas increased by 20% between 1982 and 1996. This diverging evolution of prices contributed to the reduction of the inequality between real incomes in urban and rural areas.

An other factor to consider is the nature of incomes in each zone. In urban zones, workers are mainly civil servants or wage-earners in state owned and collective units, or to a smaller extent, in private firms. On the contrary, with the general adoption of the household responsibility system[7], most farmers were paid according to their production. That is why wage policy may have been an important factor of urban/rural income inequality. Prior to the reforms, the Chinese government pursued a low-wage policy in the public sector in order to have a cheap labor force. It has, since then, tried to introduce a wage system linking wage levels to productivity. Thus, bonuses and complementary wages have been introduced; fixed wages were replaced by floating wages. However, this bonus system has actually worked as a means to compensate for inflation and poor labor standards rather than as an effective means to reward individual performance. The pressure of allocating bonuses on an equal basis has strongly contributed to the increase in wages in urban areas (Howell, 1997). A relevant question is thus to know if the depreciation of the real exchange rate has been accompanied by a decline in real wages or has not, due to wage resistance relative to an implicit inflation indexed mechanism.

On the other hand, with the development of rural industry, some of the rural workers became wage-earners in township and village enterprises, but also in private firms. The number of these wage-earners passed from 9 % in 1982 to 30 % in 1996, and they are much more important in coastal (13% in 1982 and 43 % in 1996) than inland provinces (6% in 1982 and 23 % in 1996). In many developing countries, there was a tendency for real agricultural wages to decline after devaluation more than real manufacturing wages (Edwards, 1989). Does China follow the same tendency for rural manufacturing

[7] The agricultural household responsibility system was initiated in 1978 by farmers in the Anhui province. The system directly linked agricultural household compensation to production. Previously, farmers were compensated on an equable basis, depending on the time spent on the farm. Owing to the strong incentives provided by the responsibility system, farmers have experienced very good performances. The system has been rapidly adopted in many other provinces, though it was only acknowledged by the government as a national policy in 1983.

wages vis-à-vis urban wages, and which would be detrimental to the relative rural incomes? How does the uneven distribution of the employees in township and villages enterprises influence the geographical urban/rural incomes ?

Finally, we may recall that in many developing countries exchange rate depreciation has given an opportunity to the government to decrease the protection of domestic activities against foreign competitors. Given that in China, prior to the reforms, the prices of agricultural products were fixed at a low level to finance industrialization which was highly subsidized (Guo et al., 1993; Sheng, 1996), we may expect that, with the depreciation of the exchange rate, the protection of industry declined faster than the protection of agriculture, contributing to a reduction in urban/rural inequality. This decline in the ratio of industry/agriculture protection rates may be stronger in coastal provinces than in inland provinces, because the former work in a better market environment (Li, 1999); on the contrary, during this reform period where the role of the market was expanding, the inland provinces suffered from the remaining low state price controls of the key raw materials which they supplied to producers in other provicnes (Hare et al., 1999).

3. Econometric analysis

The model is estimated, using a non-balanced yearly panel data of 28 provinces for the 1982-1996 period during which China practiced a very active exchange rate policy[8]. Some regressions for the 1985-1996 period are estimated due to the unavailability of several independent control variables before 1985. All Chinese annual statistics are from *Quanguo Gesheng Zizhiqu Zhixiashi Lishi Tongji Ziliao Huibian 1949-1989 (China's Provincial Statistics, 1949-1989), China Regional Economy, A profile of 17 Years of Reform and Opening Up, Rural Statistical Yearbook of China and Zhongguo Xiangzhen Qiye Nianjian (Township and Village enterprises Yearbook of China).* The official exchange rate and the importance of trade between China and its main trade partners are

[8] The stationarity of the variables was tested at the national level in a more extended paper. The results show that the urban/rural per capita income inequality and the real effective exchange rate turned out stationary in levels; and furthermore the model is balanced.

provided by the IMF *International Financial Statistics*, and *Direction of Trade* respectively. The internal settlement rate is calculated in Guillaumont Jeanneney S. and Hua P. (1996), as well as the retention rate of exports; while the free market rates of Renminbi are *from World Bank (1994) and China Monthly Statistics*. All variables are converted into indexes (100=1990) and expressed in logarithms.

The panel procedure has the advantage of allowing the impact of real exchange rate variation on urban/rural inequality to be different according to the location (coastal and inland) of the provinces according to our assumption. In order to capture the specificity of coastal provinces, the real effective exchange rate is multiplied by a dummy variable (μ) which takes the value 1 for coastal provinces and 0 for inland provinces. This enables us to shed light on the differential impact of the real exchange rate, with respect to province location. The expected sign of the dummy (μ) is negative.

3.1. The choice and calculation of control variables

In order to estimate the impact of the real exchange rate on the ratio of real per capita incomes in urban and rural zones (I), we introduce three kinds of control variables in the regressions.

First, to asses the direction of the relationship between the real effective exchange rate and urban/rural income inequality, some indicators are introduced into the model, reflecting the policy measures which specifically or differently affected rural or urban incomes, such as the gradual adoption of the household responsibility system for the farmers[9] (r) which concerns only the rural sector, and wage policy in the public sector which concerns mainly the urban sector (w_u). As the public real wages themselves appear to be affected by the exchange rate policy, they are first purged of the impact of real exchange rate, and then introduced as an independent variable in the regressions. The purged value explains the part of the real public wages not influenced by the real exchange rate variations. It thus represents the exogenous government wage policy in the public sector. On the other

[9] The data for the 1978-1987 period are provided by Lin, 1988; those for the 1988-1996 are supposed to be the same as those for 1987.

hand, the ratio of urban wages compared to rural wages in township and village enterprises[10] (w) is introduced to capture the impact of the different wage policies in urban and rural areas after having verified that this ratio is not influenced by the real exchange rate.

Second, we already previously mentioned that the real exchange rate has an impact on urban/rural income inequality because it is an indicator of the relative price of tradable goods. Thus, assessing the effect of the variation in the real effective exchange rate on the inequality of incomes per capita between urban and rural areas requires the introduction of variables used to control for the relative evolution of the international price of industrial and agricultural goods which are mainly produced in each zone respectively (z)[11], as well as for the protection policy pertaining to them[12] (p) (Guillaumont and Guillaumont Jeanneney, 1991). Protection policy itself is often influenced by exchange rate policy. As this relationship is confirmed, the relative protection variable is purged of the impact of real exchange rate. The purged variable represents the relative protection policies in industrial and agricultural sectors independent of the exchange rate.

Third, there are variables which are usually very important in explaining income inequality, such as the education level and the demographic characteristics of households. In China, there is a strong inequality of the average education level between urban and rural areas which should contribute to explaining the inequality of per capita incomes between the two areas. The education variable used here is the ratio of urban/rural population receiving only primary education (e). The *permanent inventor method* is applied to estimate the population receiving only primary education, thanks to the 1982 census (Démurger, 1998). The availability of education data for each province since 1988 indicating the rural population receiving only primary education allows us then to calculate the urban

[10] The data for agricultural wages does exist in China.

[11] Prices of industrial goods correspond to the unit export value of manufactured products (in dollars) for developing countries, obtained from the *International Trade Statistics Yearbook and Monthly Bulletin of Statistics of the United Nations.* Prices of agricultural goods are given by the unit export value of China's agricultural products provided by the *FAO.*

[12] The protection rate of industrial goods is measured by the ratio of the price of China's industrial products (expressed in yuans) to the unit export value of manufactured products for developing countries, converted into yuans. The protection rate of agricultural products is measured by the ratio of the purchasing price of agricultural products in yuans to the unit export value of China's agricultural products, expressed in dollars and converted

population receiving only primary education since the same date. Finally, the evolution of the ratio of urban/rural population receiving only primary education from 1982 to 1988 is obtained by supposing that it follows the same evolution as the national level in each province. Moreover, China has experienced tremendous changes in demographic dynamics, due to the single-child-per-household policy, which was applied differently in urban and rural areas. A divergent evolution of family size (f) in the two zones may have affected the relative per capita income.

Finally, as many structural changes occurred during the period, we introduce a trend in the regression to capture them (t)[13].

The income inequality model can be described as follows:

$I_{it} = f(\rho_{it}, \mu_{*}\rho_{it}, r_{it}, w_{uit}, w_{it}, z_{it}, p_{it}, e_{it}, f_{it}, t_i, u_i, \varepsilon_{it})$

u_i = individual effect

ε_{it} = error term

3.2. The main results

We first tested whether our model entailed specific effects with respect to the individual dimension (within with individual effects). The LM-test statistic of Breusch-Pagan is highly significant at the 1% level for all regressions. The LR-test, which enables us to test the OLS specification (without specific effects) against the specification with individual effects, also turns out significant. The results suggest the presence of specific effects, which leads us to reject the OLS specification without specific effects. Then, the results of the Hausman-test do not allow us to reject a specification with fixed effects. The robustness of the model is examined by a *Chow* test in both the regional and temporal dimensions, which allows us to detect the eventual structural changes not taken into account by the model. As the results are not statistically significant, we accept, thus, the hypothesis of coefficient constancy.

Table 1 presents the results of the regressions relative to the channels of the impact of exchange rate. First, in order to evaluate whether or not the positive impact of the real depreciation on income

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into Chinese currency. The exchange rate is the average of the two dollar exchange rates of Renminbi (during the periods of dual exchange rates) weighted according to the retention rate of exports.

inequality, due to the higher share of tradable goods produced in urban than in rural zones, may be tempered by a higher share of tradable goods in household consumption, we regress the ratio of urban/rural consumer prices on the real exchange rate, its dummy variable and a trend. The results show that a real depreciation actually leads to a more rapid rise in consumer prices in urban than in rural areas, in both coastal as well as in inland provinces (equations 1 and 2).

In order to evaluate the effects of the exchange rate on wages, we regress public real wages and the ratio of urban/rural real per capita wages respectively on the real exchange rate, its dummy variable and a trend, to see if there is more or less a mechanism of price index pegging. As expected, the real depreciation has a negative effect on real public wages for inland provinces, but this effect proves to be positive for coastal provinces (equations 3 and 4). In fact, the wage policies in inland provinces are much more rigid than in coastal provinces, due to their dominant heavy industry sector and inward-oriented environment. Moreover, in coastal provinces, where growth is very high, there might be a contagious effect of the rapid increase rise in private firms' wages upon civil servants' wages. Finally, the real exchange rate does not exert a significant effect on urban/rural real per capita wages (equations 5 and 6).

Then, we regress the ratio of industrial and agricultural protection rates on the relative international price of these goods, the real exchange rate, its dummy variable and a trend. As expected, real depreciation has a negative effect on relative protection rates (equations 7 and 8). In other words, with real depreciation, industrial protection decreases faster than agricultural protection. This phenomenon is much more pronounced in coastal provinces, due to their more market-oriented economy.

The econometric results of the income inequality model are presented in Table 2. Several control variables, which are in some cases only proxies for theoretical variables, appear to have the expected signs (equation 9). The agricultural household responsibility system exerts a negative effect because of its favorable impact on rural incomes, as previously evidenced by Lin (1988), Mcmillan et al. (1989)

[13] As the exchange rate has a trend for most of the period, it could capture an omitted trend.

and Johnson (1996), who estimated that the shift in the incentive structure induced by the system has entailed a rise in agricultural productivity ranging from 30% to 50%. The public sector wages, purged of the impact of exchange rate, as well as the ratio of urban/rural real per capita wages, prove to have positive signs and thereby contribute to the increase in urban/rural income inequality. The ratio of international prices (in dollars) of industrial and agricultural goods and the ratio of related protection coefficients purged of the impact of exchange rate, have the same impact. Education and family size are surprisingly insignificant (equations 9 and 11). This may be explained by the fact that the evolution of education inequality between rural and urban zones has not significantly changed over time (World Bank, 1997, p33), a fact which also applies to the relative urban/rural family size. The significant effect of the trend means that it effectively captures the structural changes which occurred during this period.

In inland provinces, the real depreciation (appreciation) of the Renminbi contributes to an increase (decrease) in urban/rural income inequality through a positive effect of the real exchange rate on the ratio of urban/rural real per capita incomes, while this effect disappears for coastal provinces, as expected (equation 9). A 10% increase in the real effective exchange rate induces a 0.6% increase in the income in equality ratio for inland provinces. This implies that the 127% increase in the real effective exchange rate between 1985 and 1993 led to a 7.6 % increase in the ratio of urban to rural real per capita income. In other words, according to the estimated Beta coefficients, a 1 standard deviation change in real exchange rate led to a 0.44 standard deviation change in urban/rural income inequality over the 1982-1996 period.

Finally, we can measure the relative impact of the various effects of exchange rate variations on urban/rural real per capita income inequality for the 1982-1996 period. The rise in the urban/rural consumer price ratio due to real depreciation reduced the positive impact of the real exchange rate on urban bias by 25 % in inland provinces[14]. The impact of the exchange rate on income inequality through its action on real public wages is estimated to be -0.017 and 0.014 for inland and coastal provinces respectively, whereas the impact through the ratio of industry/agriculture protection rates is - 0.007 and

-0.027[15]. The regression (12) in Table 2 where the real public wages and the ratio of industrial/agricultural protection are no longer purged of the impact of real exchange rate variations confirms that these aggregate secondary effects of exchange rate variations are substantial, since the elasticity of urban/rural inequality to the real exchange rate changes from 0.06 (equation 9) to 0.09 in inland provinces and from zero to 0.02 for coastal provinces.

4. Conclusion

The real depreciation of the Chinese currency until 1993 played a crucial role in the opening-up policy, but it also contributed to the increase in income inequality between urban and rural areas in inland provinces. So long as income inequality can be considered as detrimental to growth (notably because inequality generates social frustrations), the appreciation of the exchange rate since 1994 can be seen as a favorable factor. Of course, this assertion totally overlooks the issue of the relationship between the real exchange rate, external trade development and economic growth.

[14] If we regress the ratio of nominal (instead of real) urban and rural income on the real exchange rate, the coefficient of this last variable is equal to 0.08 (0.06+0.02).

[15] We multiply the elasticity of public wages (or the ratio of industry/agriculture rates) to real exchange rate and the elasticity of urban/rural income inequality to the purged public wages (or the purged ratio of industry/agriculture rates).

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Table 1 Channels of the impact of exchange rate on income inequality

	Ratio of urban/rural consumer price		Real public wages		Urban/rural real per capita wages		Ratio of industry/agriculture protection rates	
	1982-96	1985-96	1982-96	1985-96	1982-96	1985-96	1982-96	1985-96
	1	2	3	4	5	6	7	8
Explanatory variables								
Real effective exchange rate of Renminbi (ρ)	0.02***	0.02***	-0.06***	-0.05***	0.05	0.06	-0.07*	-0.06*
Dummy variable ($m * r$)	0.02	0.01	0.11***	0.11***	-0.05	-0.01	-0.20***	-0.19***
International terms of trade industry/agriculture (z)							-0.74***	-0.66***
Trend	0.01***	0.01***	0.03***	0.03***	-0.02***	-0.01***	-0.01*	-0.01***
Number of observations	353	317	353	317	353	317	353	317
Adjusted R^2	0.66	0.65	0.74	0.72	0.24	0.24	0.69	0.57

Table 2 The determinants of urban/rural per capita real income of China

Ratio of Urban/rural per capita income	1982-96	1985-96	1985-96	1982-96
	9	10	11	12
Explanatory variables				
Real effective exchange rate of the Renminbi (ρ)	0.06***	0.07***	0.06***	0.09***
Dummy variable (μ*ρ)	-0.06***	-0.07***	-0.07***	-0.07***
Purged real public per capita wages (w_{up})	0.28***	0.29***	0.29***	
Real public per capita wages (w_u)				0.28***
Ratio of urban/rural real per capita wages (w)	0.14***	0.13***	0.13***	0.14***
Percentage of agricultural households adopting the responsibility system (r)	-0.24***			-0.24***
International industry/agriculture terms of trade (z)	0.23***	0.22***	0.22***	0.23***
Purged ratio of industry/agriculture protection rates (p_p)	0.10***	0.08**	0.09***	
Ratio of industry/agriculture protection rates (p)				0.10***
Ratio of urban/rural population only receiving primary education (e)	-0.03	-0.02	-0.01	-0.03
Rural/ urban family size (f)			0.03	
Trend	0.01***	0.01***	0.01***	0.01***
Number of observations	353	317	317	353
Adjusted R^2	0.64	0.61	0.61	0.64