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Unbalanced distribution of income and Unbalanced Chinese Growth: Single Equation Estimations Based on Bhaduri/Marglin Model

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ABSTRACT

The primary motivation of this paper is to analyse the relationship between the functional income distribution and the Chinese economic growth for the period 1978-2010. We employ a demand-driven Kaleckian macroeconomic framework to evaluate the total effects of changes in the labour and profit income shares on components of final demand. It is one of the first applications of such a model to the Chinese economy. We use the theoretical model of Stockhammer, Onaran and Ederer (2009) one of the Bhaduri and Marglin (1990) seminal paper variants. This model shows that in a growth model driven by effective demand, long-run growth may be led either by wage or profit under some conditions. It then engenders an empirical problem to determine the characteristics of an accumulation regime in a given country. We utilise single equations to estimate the effects of the labour and profit income shares on the demand aggregates of China, namely consumption, investment, and net exports. One of our contributions is reconstructing the statistical series for the period 1978-2010 to check the data, correct inconsistencies and be sure of their meaning as far as possible. The increase of labour income turns out to have a low impact on consumption for the whole period. As expected, an increment in the profit share promotes investment. However, changes in the labour income share turn out to have no impact on net exports. The total effect suggests that the accumulation regime in China is profit-led.

Keywords: China, distribution of income shares, Post Keynesian economics, growth, development

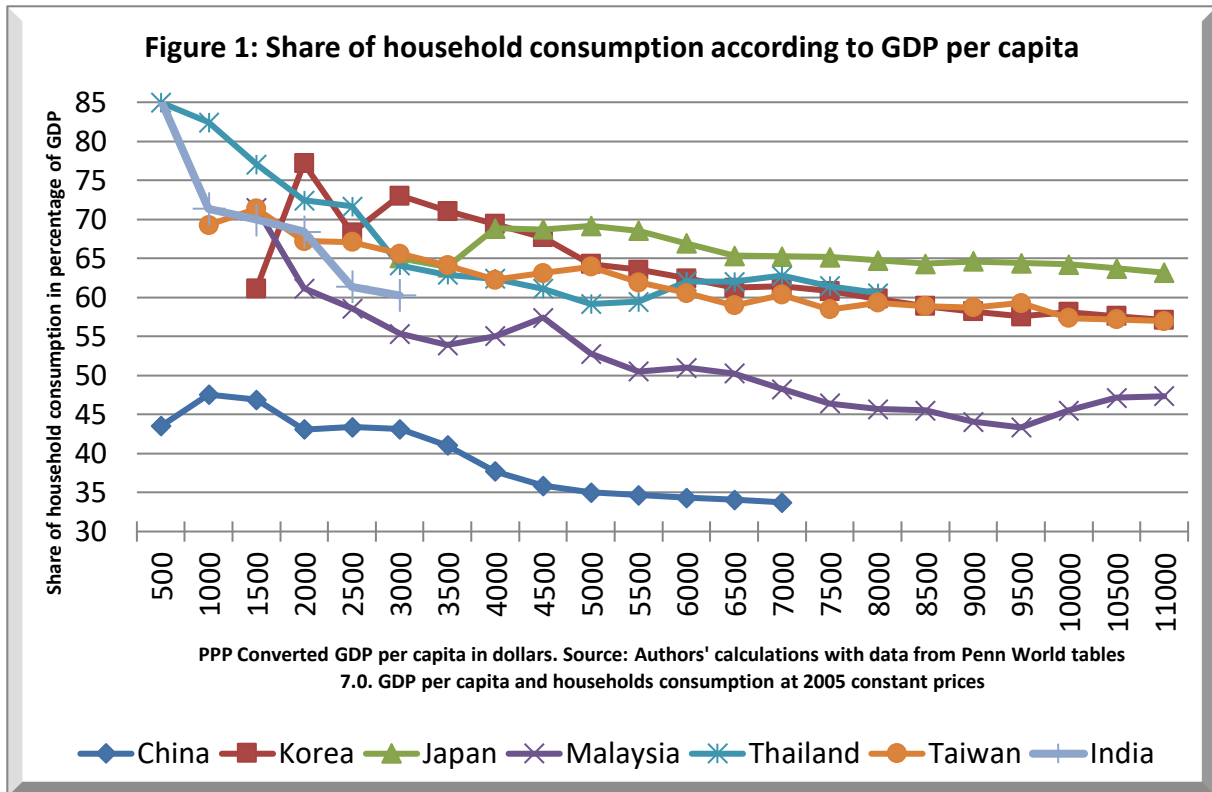
JEL: O11, B5, E12, E25, F43

Introduction

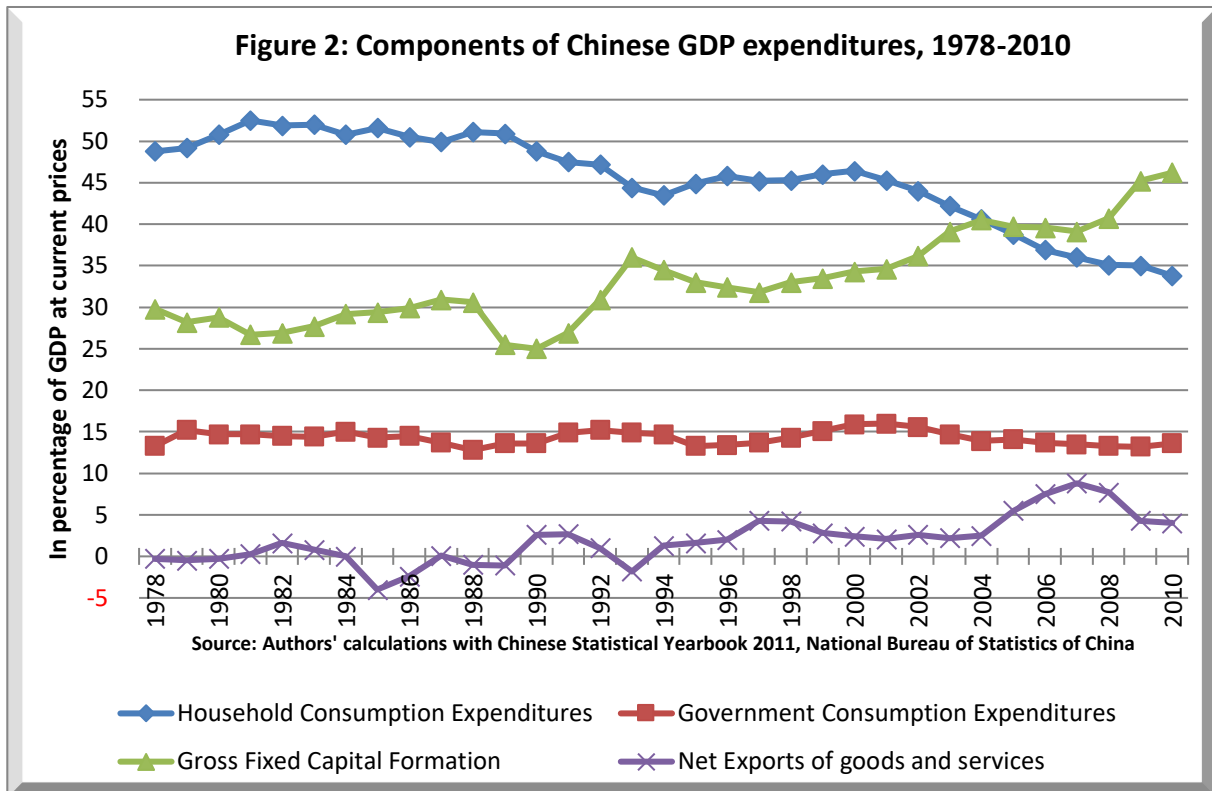
China has burgeoned with a very high growth rate, averaging 9.8 per cent per year from 1978 to 2007. Meanwhile, its unbalanced pattern of growth was also acknowledged by economists from various theoretical traditions (Huang and Tao 2011) (Hart-Landsberg 2010). Household consumption accounts for a declining share of GDP while Investment and net exports are on a growing path. It is not in

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itself an abnormal pattern. As a general rule, all countries entering a period of accelerated growth have a high consumption share of GDP expenditures at the start. Then the consumption share declines at a later stage when investment and exports take the lead (Perkins 2010). What calls attention in the Chinese case is that the share of household consumption in GDP is historically low by international standard. It is showed in Figure 1, which compares the share of household consumption of selected Asian countries for the same GDP per capita at constant 2005 prices.



Not only China has a much lower consumption share at the start (1978), but its share fell to the unprecedented low level of 33% in 2010. It means that China is too dependent on other components of demand, particularly investment and foreign demand, which is not sustainable in the long run. Once again, it has not always been the case, as illustrated in Figure 2.

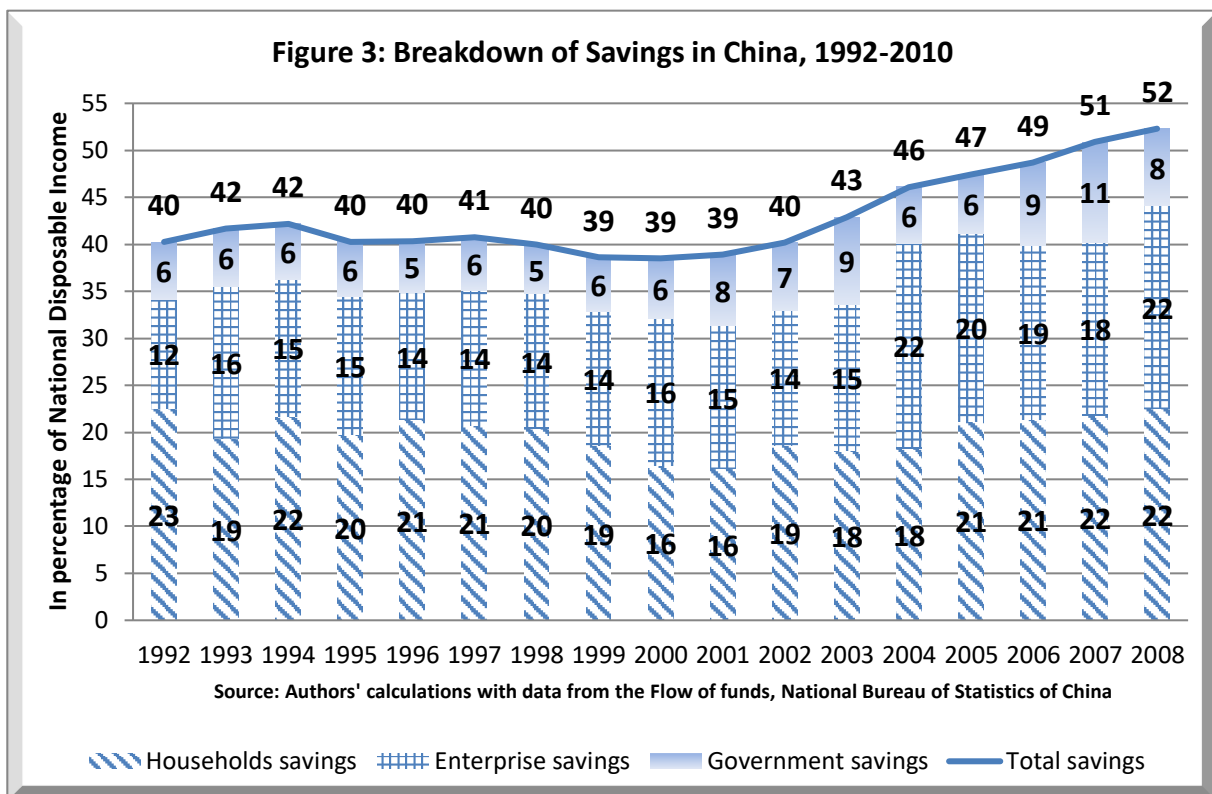


According to Zhu and Kotz (2011) China experienced a balanced, domestic market-led growth during 1978-1988. During this decade, China reintroduced the market economy for country reconstruction after the Cultural Reform. It carried out salary reform, developed township and village enterprises and improved investment of infrastructure. On the one hand, rural and urban household income was boosted, enabling consumption to play a leading role with over half of GDP growth. On the other hand, the quantity of the currency issued expanded quickly to satisfy Investment demand and help rural firms solve the problem of lack of money. Then the price index of 1988 increased above 34% and this first period ended with rapid inflation. To curb inflation, the government cut investment, and growth slowed down (1988-91). Then the Chinese government proposed the so-called "socialist market economy" and shifted to an investment-led growth during the years 1991-2001 when the investment was the first contributor with 39.3 per cent of GDP growth. Finally, an export and investment growth opened during the last period 2001-2007 with foreign demand contributing close to one third and investment to 46.5% of growth (Zhu and Kotz 2011). The international crisis, which started in the USA in 2007 but hit China in the last quarter of 2008 until spring 2009, made things worse. To offset the fall of exports, the government launched a massive stimulus plan based on investment spending rather than promoting consumption. This further distorted the relative share of investment which peaked at 46.2% in 2010, while the consumption share reached a historic trough of 33.8% (see figure 2). The trade surplus receded from its very high peak (8.8% in 2007) for such a big economy as China. Still, it stayed at a high level (4% in 2010), which means that international reserves continued to expand. Globally,

China's dependence on exports and investment was not balanced but increased by the crisis.

1. What are the reasons for this unbalanced growth pattern?

The most often cited reason is the high saving rate, the so-called "saving glut" (Bernanke 2011) characterising China and other Asian countries. The ratio of total savings to GDP reached 52% in 2008, high by historical records (see figure 3). Household savings are often considered the main factor behind this high saving rate.

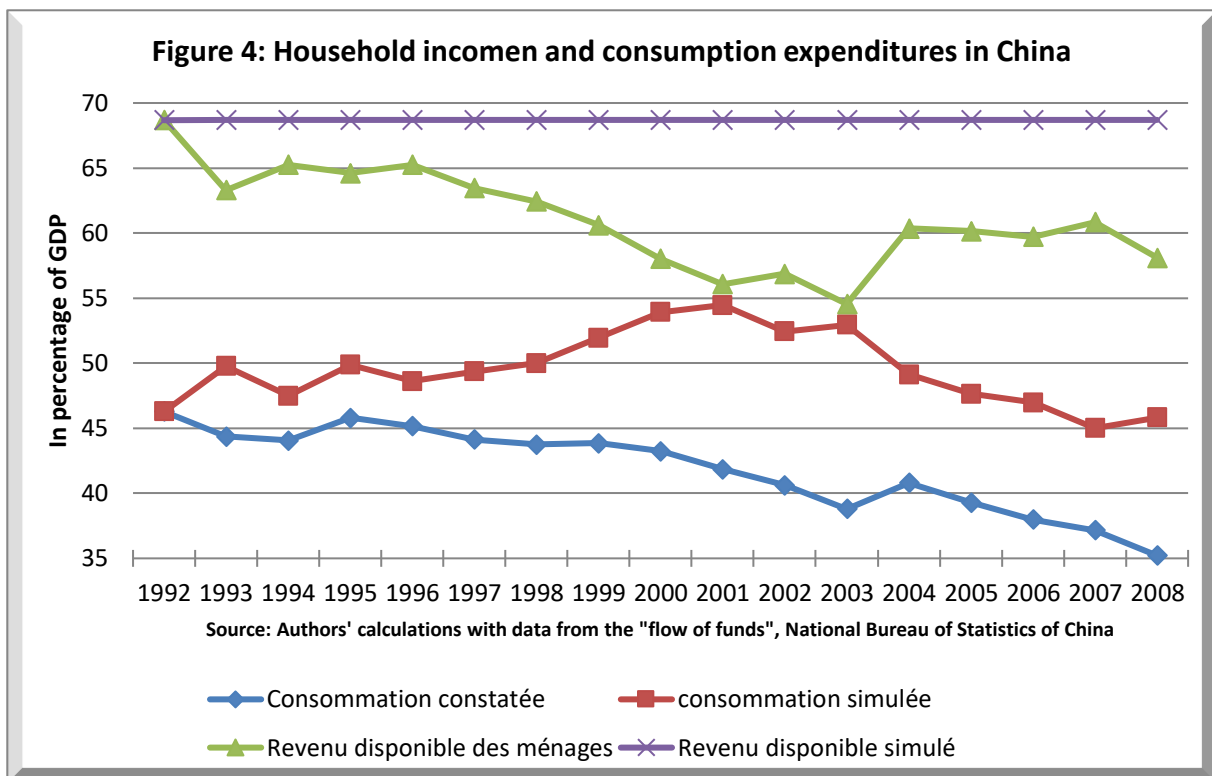


Indeed, the absence or shortfall of pensions, the necessity to cope with health and education costs, the desire to buy cars and housing in a context of rising property prices explain why Chinese households have a high propensity to save (Baldacci et al. 2010). But Chinese households have not always saved a lot. According to Modigliani and Shi (2004), the household saving ratio stayed around 5% of household income from 1953 to 1978. It soared during the eighties after the reintroduction of the market economy. From then, it remained stable at around 20% of disposable income while corporate savings doubled their share with approximately 22% in 2008, up from 11% in 1992. Corporate savings are, in fact, retained earnings. There are some proposals to redistribute these high retained earnings under dividends to reach a better-balanced distribution of income and stimulate growth. This would entail reform of corporate laws since SOE are not allowed to distribute dividends. A more efficient way to promote consumption

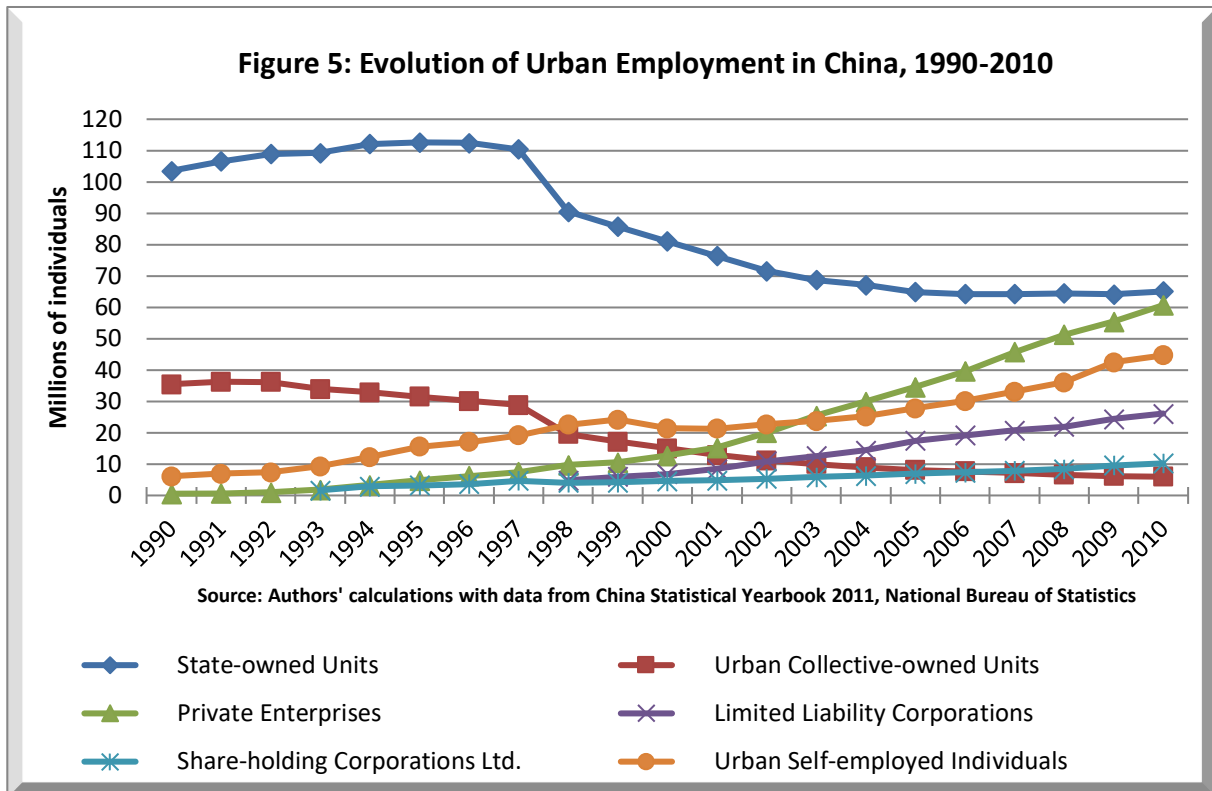
would be to reduce corporate savings by simply increasing wages. Government savings have also increased their share but more modestly.

To sum up, it should be mentioned that although household savings are high, it is not the only factor behind the low consumption share. Consequently, even if the development of a welfare state would help households consume more, it is not the only solution. Another issue is the increase in households' income.

Aziz and Li (2007) give a first hint about the relation between the high household saving rate (or the low household consumption rate) and the evolution of the labour income share. Had the labour income share stayed at its 1992 level, i.e. 68.7% of GDP, the consumption rate would have stayed at around 45% of GDP until 2006 even with the same rising trend of the saving rate as observed in reality. We have updated their rationale and reproduced the results in Figure 4.

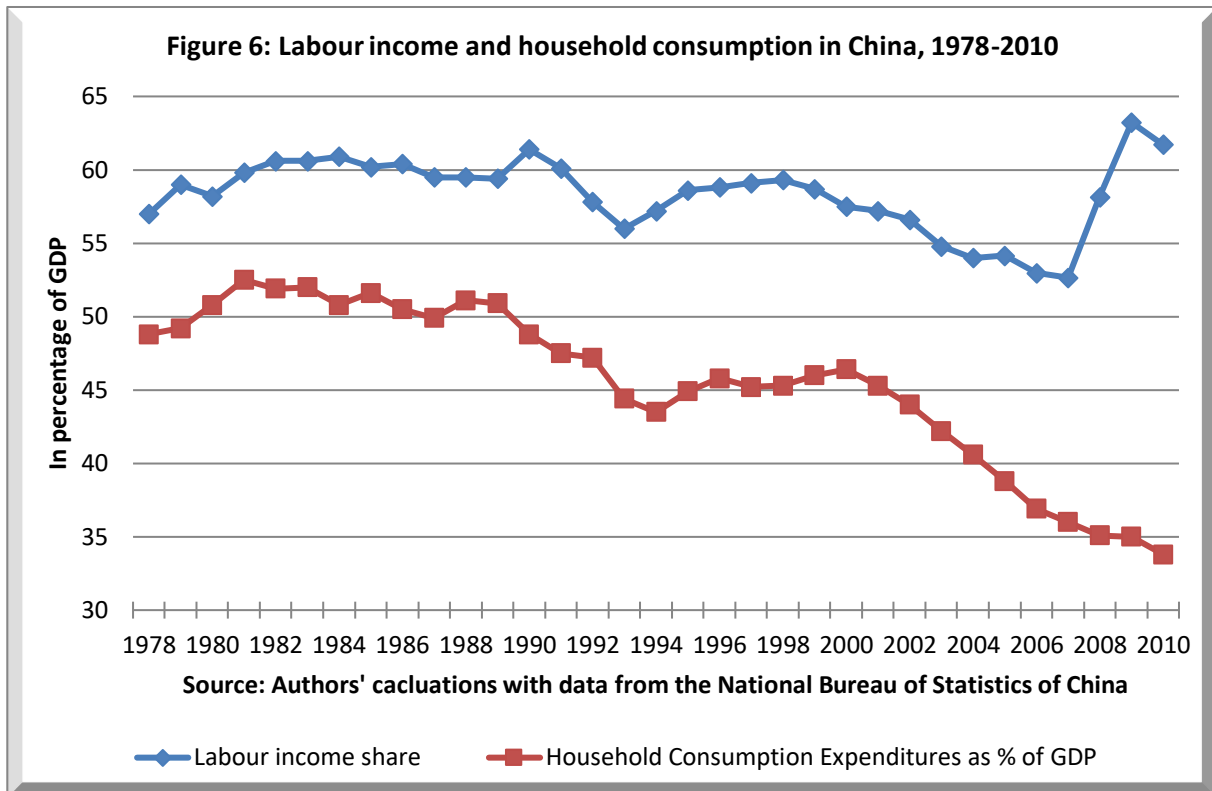


Everything being equal, one can see that if the household income had stayed at its 1992 level, the household consumption ratio would have been about 45% of GDP in 2008, i.e. 10% above its proper level and much closer to the pattern of other Asian countries. It shows that the fall of households' income in conjunction with the suppression of the traditional welfare system (the so-called "iron rice ball") is the main culprit of the fall of the consumption rate and soaring precautionary savings. One can conceive of the violence of the structural change which occurred during the nineties with the observation of employment evolution. Figure 5 shows that between 1997 and 1998, employment in State-Owned Enterprises (SOEs) lost 20 million jobs.



Thirty million more people became jobless in the following years before it stabilised around 60 million in 2010. Overall, 50 million workers lost their jobs and the social benefits (pension, health and education) attached to their status. Employment in urban collective-owned units almost disappeared. This was largely compensated by the soaring employment in the new private sector and, to a lesser extent, by the boom of urban self-employed workers and other forms of private employment. These figures do not consider the massive inflows of tens of millions of rural migrant workers in urban labour markets, which are not registered at all in official statistics. Nor are the millions of urban self-employed workers who are not officially registered (see below). If we had had comprehensive data on employment, the structural change would have been even more brutal than official figures say. More, the gap between rural and urban households has widened essentially because rural incomes have stagnated.

This dramatic change in employment brought by the reintroduction of market economy in China has led to growing social inequalities (Chen et al. 2010) and a growing unbalanced distribution of national income between labour and capital (Xu and Zou 2000) with negative consequences on households consumption and growth (Qin et al. 2009). One reason is that affluent households have a lower propensity to spend and a higher propensity to save, contrary to what China needs. Our contribution highlights the link between the unbalanced character of China's growth and that of the unbalanced nature of the functional distribution of income. This link becomes clear when one compares the evolution of the labour income share and the ratio of household consumption to GDP (see Figure 6).



The figure shows that until 2007, the labour income share and consumption ratio to GDP have evolved in parallel. The only exception appears throughout the international subprime crisis, which hit China and Asia in the last quarter of 2008 until spring 2009. The profit fell in absolute and relative terms more quickly than labour income, so that the labour income share increased sharply throughout the crisis. This pattern is observed each time a sharp downturn occurs. For this reason, we will focus our empirical analysis on the period 1980 to 2007. But before turning to the empirical investigation, we now turn to present the theoretical model that we use.

2. Theoretical background,

The theoretical model employed for the analysis of the growth regime in China is the one by Stockhammer et al. (2009), based on the model of Bhaduri and Marglin (1990). The model used by Stockhammer et al. (2011) is almost identical to the model by Stockhammer et al. (2009) except for the modification in international trade components. Those models allow for profit-led and wage-led demand regimes through the opposite effects of income distribution between profits and wages on aggregate demand components.

The theoretical and empirical model by Stockhammer et al. (2009) aims to find the effect of varying income distribution through time on consumption (C), investment (I), government expenditure (G), and net exports (NX) and thus the total effect on aggregate demand (Y). The open economy aspects are considered in the model.

Those demand components are in function of income, wage share (Ω) and other exogenous control variables (denoted b, y, z) which are assumed to be exogenous. Government expenditures are supposed to be dependent on only income. The aggregate demand can be written as:

$$Y = C(Y, \Omega) + I(Y, \Omega, zI) + NX(Y, P, zNX) + G(Y, zG) \quad (1)$$

Here P is the price level in function of wage share and other control variables. It contains domestic price (P), export price (P_x) and import price (P_m).

It should be mentioned that the model can be reduced to a standard Keynesian if partial effects of wage share on consumption and investment are assumed to be zero (Stockhammer et al., 2009). However, the necessity of inclusion of income share in consumption function stems from the fact that workers and capitalists have different propensities to consume. The important Kaleckian assumption is that marginal propensity to consume is higher-1 in some models-for wage (W) earners and much less-0 in some models- for profit (R) earners.

The investment depends positively on output and negatively on the real interest rate and wage share. Rising interest rates and increasing wage share-hence decreasing profit share-are expected to decrease investments.

Net exports are in a positive function of foreign demand and a negative function of domestic demand and domestic prices, which are dependent on unit labour costs (ULC) and import prices. The nominal unit labour cost is the multiplication of real unit labour cost (RULC) with domestic price (P). Therefore net exports are indirectly affected by RULC, which is equivalent to wage share.

Stockhammer et al. (2011) have mentioned the limitations of the model presented above. Firstly, public sector and fiscal policy are not treated. A probable response of government expenditures to income distribution is ignored. The interactions between income distribution and economic growth demand are not taken into account that is wage share is assumed exogenous.

Differentiation of equation (1) with respect to Ω and goods market equilibrium condition ($Y^* = AD$) gives:

$$dY^*/d\Omega = h_2/(1 - h_1) \quad (2)$$

where $h_1 = (\partial C/\partial Y + \partial I/\partial Y + \partial NX/\partial Y + \partial G/\partial Y)$ and $h_2 = (\partial C/\partial \Omega + \partial I/\partial \Omega + \partial NX/\partial \Omega)$

For stability of the model, the multiplier $1/(1 - h_1)$ should be positive. Then sign of h_2 , which is called private excess demand by Stockhammer et al. (2009), will

determine the sign of the total derivative. Private excess demand gives the change in demand due to a change in income distribution at a fixed level of income. Its sign cannot be determined without an empirical investigation since the partial derivatives have different signs, and the model does not give any information about their magnitudes. It is hypothesised that $\partial C/\partial Y$ is positive, while $\partial I/\partial Y$ and $\partial NX/\partial Y$ are negative. The government sector is excluded from the model. If $dY^*/d\Omega$ turns out positive, then the demand regime is wage-led; otherwise, it is profit-led.

In this framework, an important distinction is between the domestic sector and the open economy Stockhammer et al. (2009). Consumption and investment are the two components of the domestic sector. If the changes in income distribution affect consumption more than investment, then the economy is wage-led, holding the net export share constant. In this case, the effect of income distribution on exports determines the character of the open economy. However, if the domestic sector is profit-led, the whole economy is expected to be profit-led as well.

3. Empirical Literature

The literature on testing the Bhaduri-Marglin type of models starts with Bowles and Boyer (1995). Stockhammer, Hein and Grafl (2011) group the estimation methodologies into two types. The first estimates the entire model, and the second kind examine the goods market in isolation through single equations. The literature on developed countries is fertile, however, that on developing countries relatively lean.

The first type of papers estimates the goods market equilibrium and considers the interactions among the variables. However, identification of the effects of individual variables is not easy. Gordon (1995a) (1995b) tests such a model on the USA using vectorial autoregression (VAR). He concludes that the US economy is profit-led. Stockhammer and Özlem (2004) apply a structural VAR model to the USA, the UK and France. It is concluded that employment is led by demand, and the effect of income distribution on demand and employment is weak. Onaran and Engelbert (2005) use a similar approach for South Korea and Turkey. Some evidence for wage-led regimes is found in the paper.

The second type of papers analyses consumption, investment and net exports separately through single equations. Bowles and Boyer (1995) are the first to apply such a methodology to France, Germany, Japan, the UK and the USA. There are several papers on developed countries in the literature in this fashion. However, the theoretical framework and equations vary. Moreover, in terms of econometrics methods, there is a significant improvement. Among those, Naastepad (2006) analyses the case of the Netherlands and concludes that the real wage growth is not very effective on aggregate demand. Naastepad and Storm (2007) examine eight OECD countries and conclude that the demand is

wage-led in France, Germany, Italy, the Netherlands, Spain, and the United Kingdom, whereas profit-led in Japan and the USA. Ederer and Stockhammer (2007) apply the single equation approach to France and find that the French domestic aggregate demand is wage-led. Still, the overall economy is profit-led when net exports are taken into account. A similar approach is employed by Hein and Vogel (2008), who analyse Austria, France, Germany, the Netherlands, the UK and the USA. They find that France, the UK and the USA are wage-led.

While there is substantial empirical research on developed countries, the research on developing countries is limited (e.g. Onaran and Stockhammer (2005) on Turkey). Only recently did Simarro (2011) investigated the case of China, referring explicitly to Bhaduri and Marglin (1990) for the theoretical model and Stockhammer, Onaran and Ederer (2009) for the empirical applications. His preliminary results indicate that a profit-led regime seems to characterise Chinese economic growth. The results are only preliminary because the author calculates the elasticities between consumption and compensation for employees and operating profit on the one hand, and between investment and GDP, operating surplus on the other hand. Although he finds significant relations, he does not calculate the marginal effect at sample means or other sub-periods. Nor does he include estimations for net exports. One contribution of our paper is to extend further the econometric investigation. However, we have not resolved all the problems and have not succeeded in finding a significant result for the effect of net exports.

4. Measuring the Labour share in China: Data and methodological issues.

Measuring the distribution of income in China is a difficult task. Some difficulties are common to many developing countries. Rural workers still account for a significant part of the workforce, so do the self-employed workers (rural and urban). Most of these two employment segments are part of the informal economy since their activities are not registered officially. On top of that, wage earners are sometimes still a minority of the workforce, and many of them, if not the majority, are also "informal workers". In China, the reintroduction of the market economy and the dramatic change in the workforce have introduced structural breaks in the data. Besides, the Chinese statistical system has difficulty coping with these changes and publishing reliable historical data on essential variables such as a GDP by expenditure consistent with the GDP by the income approach. Let us remind the differences between the two approaches, which in China may differ significantly. The expenditure approach calculates GDP by a sum of 1) final consumption expenditures including household consumption and government expenditures, 2) gross capital formation including gross fixed capital formation and change in inventories, 3) net export meaning export minus import. As for the

income approach, components of GDP are 1) compensation of employees including wages and salaries and employers' social contributions 2) net taxes on production including taxes and subsidies 3) Depreciation of fixed assets 4) operating surplus. The GDP by income approach minus net taxes on production equals the GDP at factor cost. The depreciation of fixed assets plus operating surplus is the gross operating surplus, also called capital income or profit.

Another difficulty comes from the data sources. Generally, this study refers to China's National Bureau of Statistics (NBS) and the United Nations Statistical division data. First, among the data provided by the NBS, there are three different calculations of the GDP by income approach: The flow of funds table, the input-output table and the GDP by region table. The latter has been retained because it provides the most recent data and is consistent with the historic data constructed by Hsueh and Li (Hsueh and Li 1999). Second, the Chinese data series are updated every four years with sometimes essential revisions in calculating the GDP by expenditure or income approach not only for the recent years but also for oldest ones (Holz 2004), (Holz 2007).

Another problem is that the differences between the data sources, for instance, provincial and national, are not always stable and may change with time (Qi 2011). However, this does not mean that Chinese data lack essential reliability to the extent that they could not be used for applied research but have not the accuracy that one expects (Qi 2011). We have tried to deal with these problems by taking the most recent revisions available and taking the GDP by expenditure approach as the reference for all variables.

We first define the dependent variables by expenditure approach that we used.

For estimating the consumption equation, we use household consumption instead of final consumption expenditures. Household consumption is closely linked with income distribution. In contrast, government consumption expenditure has an ambiguous relation with income due to government officials behaviour called "BaoXiao" to use public resources for personal spending. We utilise gross fixed capital formation for the investment equation but not gross capital formation, which contains stock changes. Regarding the net export equation regression, we apply directly export and import values. Our analysis covers the period 1980-2010, and all the data comes from the China statistical yearbook of the NBS, and the unit is the national currency, the "Yuan". We are therefore able to evaluate China's evolution since the open-up reform starting in 1978.

We then turn to the variables by the income approach.

Among the problems regarding the calculation of the income variables, one major problem is calculating a comprehensive measure of labour income. It is complex because labour income encompasses income from workers from very

different nature and magnitude, namely workers from urban or rural areas, employees or self-employed, registered or unregistered self-employed. One significant difficulty is that following the first National Economic Census in 2004, China has changed how it computes the labour share, which led to an abrupt drop between 2003 and 2004 and introduced a structural break in the data series (Bai and Qian 2010). Before 2004, operating surplus in agriculture included profits of the state-owned and collective farms. After 2004, the NBS decided to count all income excluding depreciation and net production tax in those farms as "labour compensation", which led to a sharp increase in labour income in many provinces. In urban areas, the NBS decided to count as operating surplus, the mixed-income of the owners of small firms, to the exclusion of the income of their employees, which is correctly counted as wages. Because there has been a sharp increase in the number of self-employed (with or without employees), the labour income share has decline abruptly in the urban areas. Due to the sharp increase of the non-agriculture sectors, the overall effect is a fall of 5.3% of the aggregated labour share between 2003 and 2004. Any attempt to calculate the Chinese labour income share must correct for these changes, usually by continuing to calculate the labour income as it was before 2004. This implies other methodological choices. For instance, depreciation of fixed asset is excluded to capture the relation between net profit and investment as closely as possible. Other authors like (Simarro 2011),(Bai and Qian 2010) and (Zhou, Xiao and Yao 2010) have made the same choice.

On this basis, we have recalculated the labour income with the same methodology as Zhou Xiao Yao (2010) did. It means adjusting labour compensation firstly by the number of self-employed (urban plus rural) and secondly by gross operating surplus, then averaging these two adjustments. As they pointed, for 2004, the number of self-employed in China Economic Census was 94.2 million, but that in China Statistical Yearbook was only 45.8 million. Thus there were 48.4 million unregistered self-employed that cannot be ignored. We attempt to get this number from the China Economic Census of 2008, but we only found the number of registered ones (82 million). Therefore, we assume that the growth rate of unregistered self-employed was identical with the registered. We apply this growth rate to the overall self-employed number for 2004 (94.2 million) and obtain numbers for other years. Finally, we adjust the labour income including employee and self-employed with and without business licenses during 1978-2010.

It must be noted that the income approach computes the referenced labour income, gross operating surplus and net taxes on production from NBS. To confirm the consistency of the previous calculation by expenditure approach, we divide them by the GDP of the income approach and then multiply the ratio by GDP of expenditure approach. Indices then become all harmonious. Besides, net taxes on production are the wedge attributed to neither labour income nor capital

income. We exclude it from GDP when analysing income distribution between labour and capital. In other words, the wage share also named the real unit labour cost, is a ratio of labour income relative to GDP at factor cost.

The index of GDP deflator comes from United Nations Data. It utilises NBS statistics; thus, these two datasets are compatible with each other. We divide nominal GDP, labour income and capital income by GDP deflator and convert them into real term in constant price of 2005. The real effective exchange rate, export and import price deflator are taken from the OECD Economic Outlook. They are available throughout 1982-2007 only, restricting the period for which tests can be conducted.

5. Results.

The theoretical model and the empirical methodology for testing is the restricted version of the one applied by Stockhammer et al. (2009). Consumption, investment, net exports (exports and imports) are tested by single equations. In this analysis, consumption and investment equations are tested, and trade equations will be estimated in the further version of this work.

There are essential points to be considered in the framework of the analysis. The model assumes that income distribution is exogenous. However, it might be affected through mark-ups. Unemployment might also decrease the wage share. It is also important to note that the single-equation approach ignores the interaction among the components of the goods market.

In the empirical analysis, firstly, the series used are tested by unit root tests, and it turned out that all the series considered are $I(1)$. Therefore, firstly, cointegration is tested among the related variables. However, the results showed that there was no sign of cointegration for the different specifications. In the second step, difference equations are used to find the elasticity coefficients and marginal effects. In those equations, the error terms are tested in terms of autocorrelation, normality and heteroscedasticity (Breusch-Pagan-Godfrey and White) tests and in case of a violation of the usual assumptions on ordinary least squares (OLS) estimations, alternative specifications are tried. ARIMA terms are added to correct for autocorrelation.

As discussed in the previous part, we have updated the data series so that the period under analysis starts in 1978 and finish in 2010. But after the econometric test and adjustment, our estimations are restricted to the period 1980-2007 for all the equations for coherence and consistency reasons. Detailed explanations are given below on a case-by-case basis.

Consumption

The consumption equation is estimated as a function of wages (W) and profits (R). Cointegration tests show that there is weak or no sign of cointegration. Hence

difference equations are employed. Table 1 shows the results of the best difference specification we found.

Table 1 Regression results for consumption equation (1980-2007)

Dependent variable:		$\Delta \ln C$	
Variable	Coefficient	t-stat.	
Constant	0.023	1.074	
$\Delta \ln W$	0.469**	2.354	
$\Delta \ln R$	0.199***	2.048	
MA(1)	0.486**	2.579	
Adjusted R-Square	0.375		
DW Statistic	2.051		
Marginal effects(sample means)			
$\partial C/\partial W$	0.407		
$\partial C/\partial R$	0.383		
$\partial C/\partial \Omega$	0.024		
Marginal effects(1980-1998)			
$\partial C/\partial W$	0.425		
$\partial C/\partial R$	0.412		
$\partial C/\partial \Omega$	0.013		
Marginal effects(1999-2007)			
$\partial C/\partial W$	0.394		
$\partial C/\partial R$	0.364		
$\partial C/\partial \Omega$	0.030		

Note:*, ** and *** indicate statistical significance at 1%, 5% and 10% levels, respectively

In the consumption equation, the elasticity of wages and profits are found to be 0.47 and 0.20, respectively². If the elasticity of consumption out of wage belongs to the low range estimates, the elasticity of consumption out of profit is among the highest (see table 2). Using those two coefficients and the period averages of consumption profits and wages, the marginal effect of wage share on consumption is calculated as 0.02, which is called the consumption differential (Stockhammer et al., 2011).

Country	e_{CR}	e_{CW}	Period
Austria	0.113	0.460	1960-2005
France	0.113	0.552	1960-2005
Germany	0.117	0.527	1960-2005
The Netherlands	0.212	0.774	1960-2005

² Indeed, these results are observed in the estimation of 1980-2007. They are similar for the years 1978-2010. See Appendix 2. In order to be consistent with the following part of investment equation, we introduce the results of 1980-2007 here.

UK	0.180	0.631	1970-2005
USA	0.170	0.472	1960-2005
Thailand	0.173	0.425	1971-2009
Source: All countries except Thailand: Hein and Vogel, 2008, p 491. For Thailand, Jetin and Kurt, 2011			

That means a redistribution of 1 percentage point of GDP from profits to wages would induce additional consumption expenditures of 0.02 percentage points of GDP for the sample period. This means that in the present conditions, a redistribution of revenue favouring workers has almost no effect on growth. The reason is simple. The marginal propensity to consume out wages ($\frac{\partial C}{\partial W} = 0.407$) is practically equal to the marginal propensity to consume out of profit ($\frac{\partial C}{\partial R} = 0.383$). It is not so much the latter which is too high but the former which is too low. Compared to other countries, $\frac{\partial C}{\partial R}$ in China is comparable to the one in the USA and lower than the one in the UK and the Netherlands (see table 3).

	C/W	C/R	$\frac{\partial C}{\partial W} = e_{CW} \times \frac{C}{W}$	$\frac{\partial C}{\partial R} = e_{CR} \times \frac{C}{R}$	$\frac{\partial C}{\partial \Omega}$
Austria	1.118	2.441	0.276	0.514	0.238
France	1.112	2.338	0.264	0.614	0.350
Germany	1.062	2.075	0.243	0.560	0.317
The Netherlands	0.984	1.764	0.457	0.675	0.218
UK	1.089	2.781	0.501	0.687	0.186
USA	1.124	2.292	0.390	0.531	0.141
China	0.866	1.928	0.384	0.407	0.023
Thailand	1.031	2.468	0.438	0.428	0.01

Source: All countries except Thailand: Hein and Vogel, 2008, p 491. For Thailand, Jetin and Kurt, 2011

But the marginal propensity to consume out wages ($\frac{\partial C}{\partial W}$) is much lower than in the USA, not to say the other OECD countries. A subsample analysis helps to understand why. The year 1998 is taken as a reference because massive layoffs occurred, and the structural change of the Chinese economy deepened. We can rearrange the expression of $\frac{\partial C}{\partial W}$ to show that it can be expressed as the multiplication of the elasticity of consumption out of wages multiplied by the ratio of the share of consumption in GDP to the wage share:

$$\left(\frac{\partial C}{\partial W}\right) = e_{CW} \times \frac{C}{W} = e_{CW} \times \frac{C/Y}{W/Y}$$

e_{CW} remains constant during the two periods so that the change in $\left(\frac{\partial C}{\partial W}\right)$ can only come from $\frac{C/Y}{W/Y}$. Table 4 shows that $\frac{C/Y}{W/Y}$ decreased from 91 to 84 because the consumption to GDP ratio lost 6 points which is two times the decrease of the wage share. It confirms that the consumption share in China is too low not only because of the wage share but also due to other factors such as the necessity to save for precautionary motives.

In percentage	1980-1998	1999-2007
C/Y	47	41
W/Y	52	49
(C/Y) / (W/Y)	91	84

If the growth pattern is to be rebalanced, then not only wages have to be improved, but social security must be re-established and must benefit the population comprehensively.

Overall, the results presented in table 1 a slight improvement of the effect of a redistribution of income in favour of labour. For the period between 1980 and 1998, the consumption differential turns out to be 0.01 whereas that of 1999-2007 is 0.03. The positive effect of distribution towards wages on consumption increases modestly at the second sub-period but remains too small to have a significant macroeconomic effect

Investment

The investment is estimated as a function of GDP (Y) and profits (R) in difference of logarithm form. In investment equations, (real) interest rates are also utilised as explanatory variables. However, the data is not available for China for the whole sample period. As the cointegration tests and regressions do not give plausible results for IY and R ., a difference specification is used instead (see Table 5).

Table 5 Regression results for investment equation (1980-2007)

Dependent variable:	$\Delta \ln I$	
Variable	Coefficient	t-stat.
Constant	-0.061	-1.482
$\Delta \ln Y$	1.259**	2.144
$\Delta \ln R$	0.517***	2.005
Adjusted R-Square	0.576	
DW Statistic	1.398	
Marginal effects(sample means)		
$\partial I / \partial R$	0.810	
$\partial I / \partial \Omega$	-0.810	
Marginal effects(1980-1998)		
$\partial I / \partial R$	0.703	
$\partial I / \partial \Omega$	-0.703	
Marginal effects(1999-2007)		
$\partial I / \partial R$	0.880	
$\partial I / \partial \Omega$	-0.880	

Note:*, ** and *** indicate statistical significance at 1%, 5% and 10% levels respectively.

We first estimate the investment equation for the whole period 1978-2010, as shown in Appendix 3. The coefficient of profit (R) has no significant impact on investment, which does not accord with the fact. Besides, the White test reveals that the estimation is not satisfactory (0,089). The reason is illustrated in Figure 6. Since the labour share increased abruptly, i.e. the profit share decreased at full pelt, a bias of estimation is introduced. We thus limit the analysis to 1980-2007.

The study of the consumption equation is also limited to 1980-2007 to be consistent with the investment equation.

The estimation of the investment equation gives meaningful results, which is not always the case at the macroeconomic level (Hein and Vogel 2008) and (Stockhammer et al. 2011). The results show that the demand elasticity of investment is 1.26, more than double the elasticity of profit on investment (0.517), which is in line with the literature. At the sample mean, the marginal effect of profits on investment is 0.81. A one per cent increase in profit increases investment by 0.81 per cent, which is a high value. The subsample analysis demonstrates the significantly increasing marginal effects of profits on investment. In the first subsample period, the marginal effect of profits is 0.703, whereas, in the second period, it is 0.880. That is, there is almost 0.2 per cent increase in the effects of profits on investment. The reason is a substantial increase of the investment to GDP ratio from 31% to 38% between the two periods while the net profit share stayed constant at around 22%³. The substantial value of the marginal propensity to invest out of profit is coherent with the known facts: many Chinese firms reinvest their profits into the investment to sustain their high development growth.

Total Effects for the Closed Economy

This part combines the partial effects of the wage share on consumption and investment. Table 6 presents the private excess demand at the sample mean. The domestic sector of the Chinese economy has a profit-led character during the period 1980-2007 when the effect of wage share on consumption and investment are combined. A 1 percentage point increase in wage share induces a decrease of domestic demand by 2.95% at the sample mean. This means that the domestic economy of China is clearly profit-led. The subsample analysis does not depict a different picture, except showing the varying strength of the profit-led characteristic of the domestic economy in China. The negative effect of increased wage shares on consumption and investment rises more than 1 per cent at the second sub-period of the analysis.

³ The fact that the wage share decreases while the profit share stayed constant is not contradictory as it may seem because we use the net profit and the not gross profit. The explanation is that the ratio of depreciation to GDP increased during the whole sample period (1980-2007).

Table 6 Private excess demand and equilibrium demand (in percentage points of GDP) caused by a 1%-point increase of the wage share

	1980-2007	1980-1998	1999-2007
Consumption	0,02	0,01	0,03
Investment	-0,81	-0,70	-0,88
Domestic private excess demand	-0,79	-0,69	-0,85
Domestic total private demand effects ($h_2/(1-h_1)$)	-2,95	-2,35	-3,41

Exports and Imports

Stockhammer et al. (2009) employ two methodologies to estimate the effects of real wages on exports and imports. The first methodology regresses the net exports to GDP ratio on real unit labour costs. However, this methodology cannot be used in our case since net exports, exchange rate, GDP and foreign GDP have different orders of stationarity. So, we apply their second methodology, the so-called "multi-step approach". However, the results obtained do not give significant results.

The multi-step approach constructs a relation between export and imports and wage shares in an indirect way. At the first step, exports are estimated as a function of relative prices of exports and imports, a weighted foreign demand Y_{wf} , and the exchange rate. Imports are assumed to be a function of domestic aggregate demand, exchange rate and relative prices of domestic goods concerning import goods. At the second step, prices are estimated where domestic prices are assumed to be a function of import prices and ULC (Unit Labour Costs), and export prices are a function of import prices and domestic prices.

Since the cointegration tests and regressions did not give any plausible results, difference specifications are used for the equations. The data of prices begin with 1982. Thus, relative price variation ($\Delta \ln P_x/P_m$) and the regression results begin with 1983 until 2010. We also estimate the equation of 1983-2007, and the results are similar to Table 7.

In the exports equation, no significant relations between exports and the independent variables are found except for the exchange rate (see table 7). This is surprising since foreign demand and relative prices are essential determinants at the theoretical level.

The foreign demand (Y_{wf}) is calculated as the GDP of 80 countries/zones⁴ weighted by their share of Chinese export. Indeed, the trade pattern between China and them is extremely different. Some countries' imports from China depend on their demand, while some do not. When all these 80 partners are taken into account, the result (0,205) becomes fragile and cannot apply to each country. In Appendix 5, we use only 13 countries for estimation. It contains France, Germany, Italy, Japan, Korea, Hong Kong, Singapore, Taiwan, Malaysia, Philippines, Thailand, Indonesia, and India to represent Chinese main trade partners. The relative price is assumed to be the same. The export is the sum of Chinese export to these 13 countries. It is found that Chinese exports to these countries rely on their demand. A 10% increase in foreign demand will conduce to a more than 40% increase in Chinese exports. The exchange rate seems to have no significant effect. (Thorbecke 2010) pointed out that the suppliers' real exchange rate also influences export. We use the same method to compute the 13 suppliers' real exchange rate⁵ in column 3. It still does not affect.

As for the relative price, the data series are known to be very sensitive to the sources used and the weight given to the trading partners (Silver 2007). In addition, it fluctuates considerably across sectors. The "BACI" dataset, for instance, evaluates prices of export and import for about 5000 sectors between China the rest of the world. We cannot estimate for each branch because of the lack of data. However, we know the price's fluctuation across sectors and partners. For this reason, the relative price of the overall economy does not affect Chinese export.

Table 7: Regression results for exports equation (1983-2010)

Dependent variable:
 $\Delta \ln X$

	1		2	
Variable	Coefficient	t-stat.	Coefficient	t-stat.
Constant	0,113***	4,438	0,109***	3,916
$\Delta \ln Y_{wf}$	0,205	0,501	0,173	0,410
$\Delta \ln E$	-0,369**	-1,973	-0,297	-1,059
$\Delta \ln P_x/P_m$	-0,496	-1,075		
$\Delta \ln P_x$			0,104	0,355
Adjusted R-Square	0,089		0,050	
DW Statistic	1,576		1,751	
White Test Probability	0,171		0,279	

Note:***. ** and * indicate statistical significance at 1%. 5% and 10% levels. respectively

⁴ We divide the world into 80 countries and zones. The sum of their GDP equals the world GDP excluding China.

⁵ Weighted sum of each country's real exchange rate, weighted by value added of Chinese trade.

In the import equation, the only significant relation is between imports and aggregate demand except for the domestic demand (see table 8).

Table 8: Regression results for imports equation (1984-2010)

Dependent variable: $\Delta \ln M$				
	1		2	
Variable	Coefficient	t-stat.	Coefficient	t-stat.
Constant	-0,234**	-2,328	-0,246**	-2,398
$\Delta \ln Y$	3,881***	4,125	3,855***	3,984
$\Delta \ln E$	0,384	1,546	0,314	1,342
$\Delta \ln P/P_m$	-0,356	-1,327		
$\Delta \ln P_m$			0,242	1,018
AR(1)	0,495**	2,681	0,515**	2,813
Adjusted R-Square	0,381		0,361	
DW Statistic	1,861		1,840	
White Test Probability	0,229		0,246	

Note:***, ** and * indicate statistical significance at 1%, 5% and 10% levels, respectively.

However, price equations give significant results for the concerned variables. A one per cent increase in the import prices increases domestic prices by 0.08 per cent, while a rise in unit labour cost increases domestic prices by 0.65%, which is a strong effect (see table 9).

Table 9: Regression results for domestic price equation (1983-2010)

Dependent variable: $\Delta \ln P$				
	1		2	
Variable	Coefficient	t-stat.	Coefficient	t-stat.
Constant	0,015**	2,497	0,024**	2,231
$\Delta \ln P_m$	0,080*	1,924	0,039	1,142
$\Delta \ln ULC$	0,644***	8,459	0,541***	5,695
AR(1)			0,561***	2,810
Adjusted R-Square	0,785		0,819	
DW Statistic	1,298		1,719	
White Test Probability	0,036		0,006	

Note ***, ** and * indicate statistical significance at 1%, 5% and 10% levels, respectively

As for the export price equation, the results are also meaningful and robust (see table 10). A one per cent increase in the import price and domestic prices increase the export price by 0.8 and 0.6 per cent, respectively. The high adjusted R^2 shows that the two variables have high explanatory power.

Table 10: Regression results for export price equation (1983-2010)

Dependent variable:
 $\Delta \ln P_x$

Variable	Coefficient	t-stat.
Constant	-0,019	-1,596
$\Delta \ln P_m$	0,802***	10,123
$\Delta \ln P$	0,593***	3,251
Adjusted R-Square	0,873	
DW Statistic	2,133	
White Test Probability	0,009	

On balance, as export or import prices don't have significant effects on exports and imports, the full impact of the real wages on exports boils down to zero, which is disappointing.

As an alternative estimation strategy, we regressed exports on real unit labour costs assuming that real wages have no direct or indirect effects on imports. The results show that *rulc* and REER have negative significant effects on exports (see table 11). For the whole period, the effect of *rulc* (wage shares) on exports can be translated into the marginal effects by

$$\partial X / \partial \Omega = e_{XRULC} * (X/RULC) / Y$$

which gives -0.90. That is, a 1 per cent increase of real wage share causes almost 1 per cent decrease in exports for the period 1980-2007. A subsample analysis gives -0.58 for the period 1980-1998 and -1.15 for the period 1999-2007. This shows that the effect of the wage share on exports has significantly increased in the second period.

Table 11 Exports Regression

Dependent variable:
 $\Delta \ln X$

Variable	Coefficient	t-stat.
Constant	0,122***	5,903
$\Delta \ln RULC$	-1,799*	1,940
$\Delta \ln E$	-0,359**	2,217
Adjusted R-Square	0,170	
DW Statistic	1,998	
White Test Probability	0,304	

Note:***, ** and * indicate statistical significance at 1%, 5% and 10% levels, respectively

The results obtained from exports regression reinforce the profit-led character of the Chinese economy. However, the methodology used is debatable. Direct estimation of real unit labour cost on exports is problematic since prices and relative unit labour costs are not considered.

Conclusion: The necessity to rebalance Chinese growth

This paper is among the first to analyse comprehensively the relationship between functional income distribution and economic growth in China, based on a post-Keynesian demand-driven model for an open economy that allows for wage or profit-led growth. We found that China is a profit-led growth country that runs contrary to what is usually found for large economies. China is a profit-led economy at the domestic level, even without taking external trade into account. This fits well with the known facts about Chinese growth. The decreasing labour income share and the demise of the social security following the introduction of market reforms have turned China dependant on a high level of investment and a high level of exports. The main problem is that this growth pattern is not sustainable. The high investment level has already led to overcapacity in several industrial sectors such as heavy industry, affecting profitability negatively. One way or another, these excess capacities must be eliminated, or domestic demand must increase to be able to absorb the goods and services that they are supposed to produce. The high level of exports is also a reason of concern in the new context opened by the crisis in the USA and Europe. There are no more possibilities to maintain a high growth rate and reduce idle capacities by exporting more. Therefore, the only solution is to combine a significant increase of urban wages and rural income and improve really the social security system so that savings can be gradually reduced. This will lead to a radical shift of growth from a profit-led to a wage-led pattern. The recent increases in real wages, including of migrant workers, the reduction of the gap between rural and urban incomes and the decision of the Chinese government to reform the social security system pave the way to such a change. But it remains to be seen if these changes are pursued consistently in the coming years to the point that the shift in growth regime happens.

Appendix 1

<i>Definitions of Variables</i>		
Notation	Description	Source
C	Household consumption	NBS
E	Real effective exchange rate	OECD Economic Outlook
I		NBS
M	Imports	NBS
P	GDP Deflator	United Nations
P _m	Import Prices	OECD Economic Outlook
P _x	Export Prices	OECD Economic Outlook
R	Gross Operating Surplus	NBS
RULC	Real unit labour costs	Authors' Calculations from NBS and China Economic Census
ULC	Unit labour costs	Authors' Calculations from NBS and China Economic Census
W	Labour Compensation	Authors' Calculations from NBS and China Economic Census
X	Real Exports	NBS
Y	Real GDP	NBS
Y _{wf}	Real trade-weighted GDP of main trade partners	Authors' Calculations from CHELEM

Appendix 2 regression results for consumption equation (1978-2010)

Dependent variable: $\Delta \ln C$	1		2	
Variable	Coefficient	t-stat.	Coefficient	t-stat.
Constant	0,023	1,315	0,025	1,246
$\Delta \ln W$	0,492***	3,322	0,438**	2,600
$\Delta \ln R$	0,171**	2,691	0,202***	2,937
MA(1)			0,396**	2,211
AR				
Adjusted R-Square	0,285		0,339	
DW Statistic	1,475		2,032	
White Test Probability	0,682		0,507	

Note:***, ** and * indicate statistical significance at 1%, 5% and 10% levels, respectively.

Appendix 3 regression results for investment equation (1978-2010)

Dependent variable: $\Delta \ln I$	1		2		3	
Variable	Coefficient	t-stat.	Coefficient	t-stat.	Coefficient	t-stat.
Constant	-0,099**	-2,367	-0,066	-1,549	-0,096*	-1,984
$\Delta \ln Y$	2,218***	4,370	1,870***	3,688	2,202***	3,778
$\Delta \ln R$	-0,018	-0,110	-0,015	-0,094	-0,031	-0,181
AR(3)			-0,470**	-2,539		
AR(4)					-0,477**	-2,410
Adjusted R-Square	0,478		0,513		0,508	
DW Statistic	1,388		1,766		1,441	
White Test Probability	0,089		0,430		0,332	

Note:***, ** and * indicate statistical significance at 1%, 5% and 10% levels, respectively.

Appendix4 result of unit root test

Appendix 5 regression results for export equation of 13 countries (1978-2010)

Dependent: $\Delta \ln X$	1		2		3	
Variable	Coefficient	t-stat.	Coefficient	t-stat.	Coefficient	t-stat.
Constant	-0,01	-0,216	-0,02	-0,332	-0,01	-0,287
$\Delta \ln Y_{wf}$	4,46***	3,036	4,26***	2,808	4,64***	3,144
$\Delta \ln E$	-0,003	-0,019	0,19	0,827		
$\Delta \ln P_x/P_m$	0,50	1,083			0,52	1,129
$\Delta \ln P_x$			0,29	1,116		
$\Delta \ln REER_{13suppliers}$					-0,09	-0,463
Adjusted R-Square	0,287		0,290		0,294	
DW Statistic	1,358		1,202		1,318	
White Test Prob.	0,563		0,957		0,455	

Note:***, ** and * indicate statistical significance at 1%, 5% and 10% levels, respectively.

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