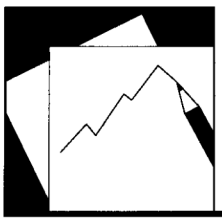
WP/10/93



IMF Working Paper

Determinants of China's Private Consumption: An International Perspective

Kai Guo and Papa N'Diaye

INTERNATIONAL MONETARY FUND

 WP/10/93

IMF Working Paper

Asia and Pacific Department

Determinants of China's Private Consumption: An International Perspective

Prepared by Kai Guo and Papa N'Diaye

Authorized for distribution by Nigel Chalk

April 2010

Abstract

This paper gauges the key determinants of China's private consumption in relation to GDP using data on the Chinese economy and evidence from other countries' experiences. The results suggest there is nothing "special" about consumption in China. Rather, the challenge is to explain why the conditioning variables—notably a low level of service sector employment, the level of financial sector development, and low real interest rates—are so different in China relative to other countries' historical experience. The results suggest, in particular, that efforts to further raise household income and the share of employment in the services sector, as well as to develop capital markets, including liberalizing interest rates and creating alternative savings instruments are likely to have the biggest impact on consumption. Other mechanisms to raise household income and mitigate household-specific risk (such as by improving the healthcare and pension systems) also have a role to play.

JEL Classification Numbers: E21, E25, H3

Keywords: China, savings rate, private consumption, household income, and GMM.

Author's E-Mail Address: kguo@imf.org; pndiaye@imf.org

Contents Page

I. INTRODUCTION

China's private consumption as a share of GDP has declined from around 55 percent in the early 1980s to around 37 percent in 2008. The decline in a country's share of private consumption during the early development stages is not in itself a surprise—savings naturally rise at early stages of development as households move away from subsistence levels of income and greater capital accumulation is needed to finance investment and growth. However, the size of the fall in China's private consumption share certainly stands out.

Reasons put forward to explain this downward trend in private consumption relate both to households' savings rates and income as well as purely statistical. Studies by Blanchard and Giavazzi (2005), Kujis (2005), and Modigliani and Cao (2004), attribute the decline in private consumption to a rise in households' savings rate, reflecting precautionary savings, particularly by elderly households, in the face of limited healthcare, pensions, and education benefits. Indeed, Chamon and Prasad (2008) find that it is the elderly that save the most in China, contrary to typical lifecycle patterns. Wei and Zhang (2009), on the other hand, attribute about half the increase in households' savings rate during 1990–2007 to growing gender imbalances as the shrinking number of females relative to men fosters a more competitive marriage environment that requires higher and higher savings in households where the unique child is a male. Aziz and Cui (2007) find that, rather than a higher savings *rate*, the fall in the share of private consumption is due to a decline in households' income as a share of GDP and that this decline is broad-based, affecting income from wages, savings, and government transfers. In this connection, Bai and Qian (2009) explain the decline in the labor share of income as mainly a statistical artifact resulting from changes in the way labor income is compiled.[1]

This paper gauges the key determinants of China's private consumption in relation to GDP using data on the Chinese economy and evidence from other countries' experiences. The empirical framework used in the paper relates the share of private consumption to that of household income as well as other factors that could influence the household savings rate (these include the old-age dependency ratio, the level of financial development, per capita GDP, the share of employment in the service sector, changes in the real exchange rate, and the real interest rate).

The model fits the historical profile of China's private consumption quite well and explains most of its evolution over the selected sample. The results show that around one-third of the fall in private consumption from 2000 to 2007 can be directly attributed to a fall in household income, while the remaining two-thirds are due to other factors that may affect directly or

[1]The authors indicate that after 2004 the categorization of individual businesses owners' income shifted to capital income, from labor income. This change in the definition of labor income explains 58 percent of the decline in the labor share of income that occurred during 1995-2004.

indirectly household savings rate and income. In addition, we find that the fit of the model is not enhanced by including a China-specific dummy variable.

The results suggest that efforts to further raise household income, the share of employment in the services sector, and to develop capital markets including liberalizing interest rates and creating alternative savings instruments are likely to have the biggest impact on consumption. There is, however, also a role for other mechanisms to raise household income and mitigate household-specific risk (such as by improving the healthcare and pension systems). In addition, the lack of any China-specific factor suggests that a small set of economic and social variables can adequately explain the behavior of Chinese consumers. In this sense, there is nothing "special" about China. Rather, the challenge is to explain why the conditioning variables—notably a low level of service sector employment, the level of financial sector development, and low real interest rates—are so different in China relative to other countries' historical experience.

The paper is organized as follows. Section II provides an overview of the empirical framework. Section III explores the role of the income share in explaining China's share of private consumption. Section IV explores the role of savings rate in explaining China's share of private consumption. Section V concludes.

II. EMPIRICAL FRAMEWORK

To explain the dynamics in private consumption in China we use cross-country data and regress the private consumption as a share of GDP on household income and public consumption (both as a share of GDP), the level of per capita GDP (to capture the level of development), real GDP growth, real interest rates, CPI inflation, the change in the terms of trade, the old-age dependency ratio, the change in the real effective exchange rate, the share of employment in the services sector, a measure of past foreign financing, and a measure of financial development. The goal is to use this panel data framework to assess the relative contribution of changes in income and other factors that affect the savings rate to the dynamics of private consumption in China and relate those factors to the broader international experience.

To capture the potential for a nonlinear relationship between the regressors and private consumption, the reduced form of the consumption equation can be written as follows:

$$\frac{C}{Y} = 1 - \exp\left[\alpha_1\left(\frac{Y}{N}\right)^{\alpha_2} + \alpha_3\left(\frac{G}{Y}\right) + \alpha_4\frac{\dot{Y}}{Y} + \alpha_5 r + \alpha_6\pi + \alpha_7\tau + \alpha_8 D + \alpha_9 s^* + \alpha_{10} f + \alpha_{11}\frac{L^s}{L} + \alpha_{12}\dot{e} + \alpha_{13}\frac{Y^h}{Y}\right] + \varepsilon^C \quad (1)$$

Where Y^h is household income, Y is GDP. Per capita GDP ($\frac{Y}{N}$) and real GDP growth ($\frac{\dot{Y}}{Y}$) capture savings behaviors at different stages of development (Modigliani, 1966), the real

interest rate (r) reflects the substitution or income effect from higher interest rates, inflation (π) may increase consumption through the Pigou effect or lower it through its impact on interest rates and measured household income; changes in the terms of trade (τ) through their impact on income could lower consumption if they are temporary, while the impact of permanent terms of trade shocks on private consumption is ambiguous. The old-age dependency ratio (D) captures the effects of demographics, with private consumption generally increasing as the dependency ratio rises. Public consumption (G) embeds Barro's (1981) idea that what matters to consumers is their effective consumption which includes both public and private spending, and that consumers take into account public spending when they make their spending decisions. Public spending could hence substitute for or complement private spending. Public consumption could also capture some crowding-out effects, with higher deficit-financed expenditure dampening private spending. Changes in the real effective exchange rate (e) affect households' income and purchasing power and hence influence their spending decisions. A higher share of employment in the service sector (L^s) raises both labor income and the availability of services which can raise private consumption. Foreign savings (s^*) capture the possibility that the availability of foreign financing could affect households' spending decision. Financial development could increase private consumption by increasing the availability financing sources and providing alternative instruments for savings with higher returns.

The model is estimated using the Generalized Method of Moments estimator with an unbalanced panel of 39 economies for a total of 515 observations.[2] To handle simultaneity, lagged values of the regressors are used as instruments. The real interest rates, changes in the terms of trade, the old-age dependency ratio and the share of employment in the services sector are considered as exogenous variables. The instrument set also includes country dummies, but no country dummies are included in the regression itself.

Table 1 shows the estimation result for the share of private consumption with positive (negative) coefficients indicating a negative (positive) impact of the associated explanatory variable. The results indicate that all the main regressors—except for inflation—have a significant impact on private consumption.

[2] Selected economies include Argentina, Australia, Austria, Belgium, Brazil, Canada, Hong Kong SAR, Chile, Colombia, Denmark, Egypt, Finland, France, Germany, Greece, Iceland, India, Indonesia, Ireland, Israel, Italy, Japan, South Korea, Malaysia, Netherlands, New Zealand, Norway, Peru, Philippines, Portugal, Singapore, South Africa, Spain, Sweden, Switzerland, Taiwan Province of China, United Kingdom, United States, and China. The longest sample in the unbalanced panel starts in 1980 and ends in 2008.

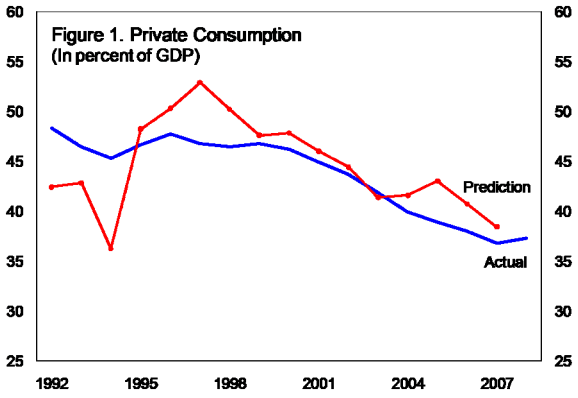
Table 1: Determinants of Private Consumption
(in percent of GDP)

Explanatory variables 1/	Coefficients 2/	
GDP per capita 3/		
Intercept (b1)	0.1972	[.001] ***
Curvature (b2)	0.2372	[.000] ***
Public consumption/GDP	0.0093	[.000] ***
Real GDP growth	0.0067	[.001] ***
Real interest rate	-0.0023	[.088] *
Inflation	0.0031	[.138]
Change in terms of trade	0.0027	[.002] ***
Old-age dependency ratio	-0.0031	[.003] ***
Financial development 4/	-0.0106	[.034] **
Share of employment in service sector	-0.0094	[.000] ***
Change in real effective exchange rate	-0.0055	[.000] ***
External financing	0.0125	[.000] ***
Household disposable income/GDP	-0.0126	[.000] ***

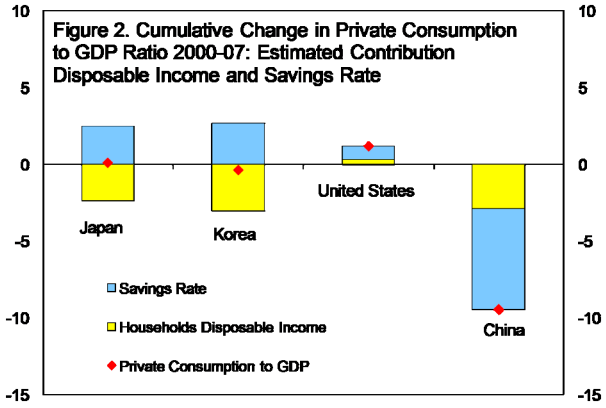
Source: Fund staff estimates.

1/ In percentage point unless otherwise specified.
2/ Figures in brackets are p-values. *,**,*** denote the 10 percent, 5 percent, and 1 percent significance levels, respectively.
3/ In thousands of US dollar (ppp).
4/ Measured by stock market total value traded/GDP.

Figure 1 shows that, even without accounting for China-specific factors beyond those captured by the various regressors, the trend decline in Chinese consumption can be reasonably estimated by the model (although the fit in the early years of the sample is not that good). This does not necessarily need to be the case given that the model is fitted on a cross-section of 39 economies (and so there is no guarantee there will be a good fit in any particular country). This suggests that there is a relatively small unexplained component behind China's declining consumption share. As such, rather than search for alternative explanations related to culture or history a larger part of the explanation lies in more conventional economic forces such as China's rapid economic growth, declining labor share of income, the relatively low level of financial development, the relatively capital-intensive means of production, and a low level of service employment.



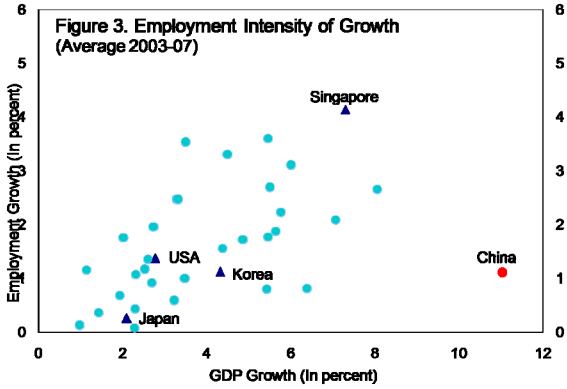
One can decompose the estimate into how much of the change in consumption over a particular period has been due to changes in household income versus other factors that may affect the savings rate. For China, around one-third of the change in consumption behavior from 2000-2007 can be directly attributed to a decline in household income.[3] This contrasts with developments in other countries in the region (e.g. Japan and Korea) where falling household income (as a share of GDP) was largely offset by a fall in the savings rate. In contrast, in the United States, the increase in private consumption can largely be attributed to a lower saving rate (with household income changing little as a share of GDP).



III. The Role of The Household Share of Income

China's household share of income has declined markedly in recent years from about 59 percent in 1992 to 53 percent in 2007. Not only is China's share of disposable income low relative to international comparators, but it seems also to have fallen faster than that of other economies. The decline in China's disposable income share reflects falling real wages, investment income, and transfers (Aziz and Cui, 2007). Looking at each of these factors in turn:

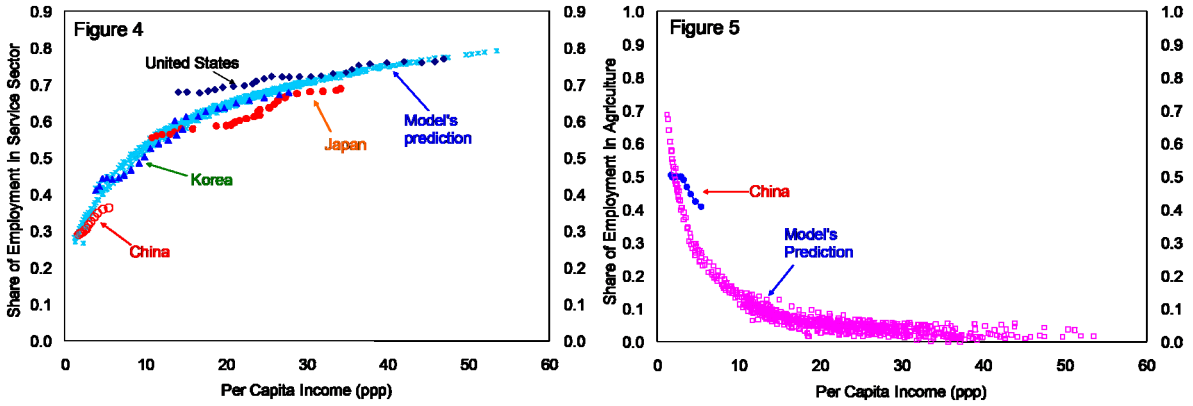
- *Labor income.* The labor share of income fell to 48¾ percent in 2008, from around 54 percent in 1997 (based on flow of funds data). The fall is twice as large when provincial data are used (from 51 percent to 40 percent) This reflects mostly sluggish employment growth, while wages have in general outpaced productivity over the past 10 years. China's rapid GDP growth has failed to generate as much employment compared with other countries and this, in turn, has suppressed household income.



[3] A similar calculation during 1992-2007 would raise the contribution of households' income to the decline in private consumption to around 45 percent, a figure consistent with findings by Aziz and Cui (2007).

This low employment intensity of growth results from China's export-oriented growth—which, when combined with a low cost of capital—favors more capital-intensive means of production. An analysis based on sectoral employment data across a wide panel of economies indicates that China has a far lower share of employment in the service sector than what one would expect from other economies' experience and China's fundamentals (Guo and N'Diaye, 2009). On a sectoral basis, the primary, secondary and tertiary sector account for 40¾ percent, 26¾ percent, and 32⅓ percent of employment, respectively.[4] With the services sector typically being more labor intensive, China's export-oriented growth has naturally translated into relatively low employment growth compared with other economies.

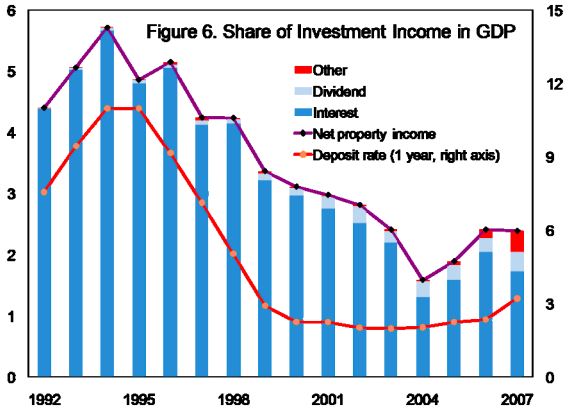
As a corollary to the lower share of employment in the service sector, China has a larger share of employment in agriculture than one would expect from international comparators. This feature implies that shifting labor out of agriculture toward services with increased productivity and reliance on labor intensive services could raise the aggregate labor share.

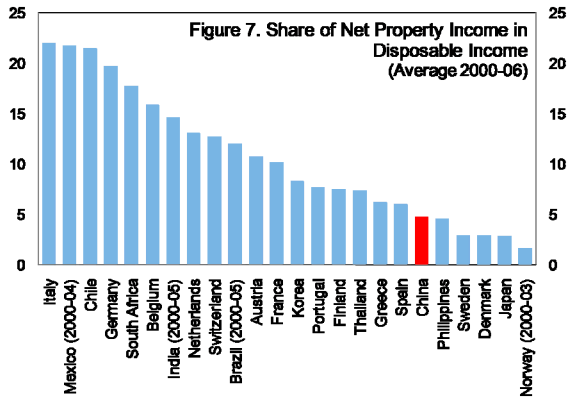


In summary, the arguments above suggest that greater employment creation, especially in the service sector could raise the households' share of income and hence boost private consumption. Other Asian economies, such as Japan and Korea, that have had a similar reliance on exports, experienced a significant transfer of labor to the services sector during their development path, which is not being seen in China. For example in Japan, the share of employment in the service sector rose around 60 percent by the end of Japan's longest expansion period (in 1987) from around 38 percent in 1955. In Korea, the amount of resources transferred to the services sector was even larger with the share of employment in services rising to around 65 percent in 1995, from around 30 percent in 1961.

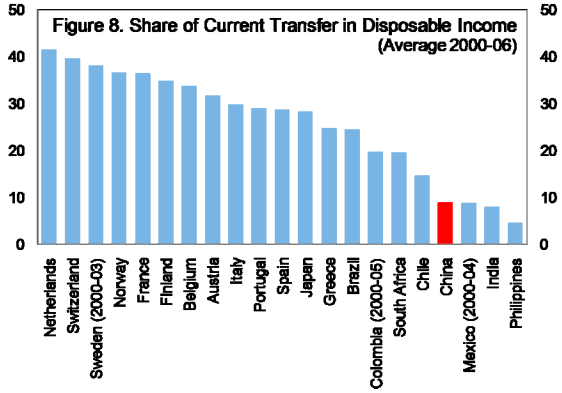
[4] Preliminary estimates from the second economic census indicate that the size of service sector was underestimated. Nevertheless, it is unlikely to change the fact that the share of employment in the service sector in China is far lower than international experiences and China's fundamentals would suggest.

- *Investment Income.* Households' investment income has also fallen as a share of GDP since the early 1990s. It now represents 2⅓ percent of GDP, down from about 5 percent in the early 1990s. Households' investment income is mainly constituted of interest income, which account for around 80 percent of investment income. Dividends and other sources of property income play a minor role as the underdeveloped financial system has limited alternative investment instruments. The decline in interest income seems to have been mostly driven by the fall in deposit rates. Deposit rates, like lending rates, are administered: deposit rates are subject to a ceiling, while lending rates are subject to a floor. Lending and deposit rates are kept low, while ensuring that banks benefit from comfortable interest margins. This favors investment (particularly in relatively capital-intensive sectors) at the expense of consumption, with households effectively subsidizing borrowers. China's low share of property income in GDP by international standards suggests some room for further expansion, which could be achieved by providing alternative instruments for savings and raising deposit rates. This objective could be best achieved within the context of a broader strategy of interest rates liberalization. Indeed, Porter and others (2009) show that interest rate liberalization in China will likely result in higher interest rates, which will discourage marginal investment, improve the effectiveness of intermediation and monetary transmission, and enhance access to financial services by underserved sectors.



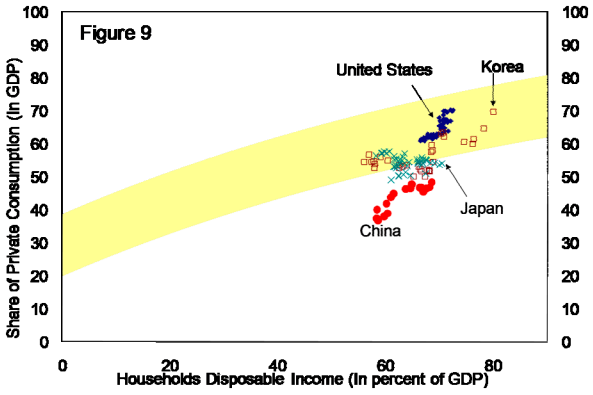


- *Transfers.* Net transfers to households have fallen to ⅓ percent of GDP, down from 2½ percent of GDP in 1992. Looking at gross transfers, China also stands well below international comparators. This results in large part from the SOE reform of the late 1990s, which created a void in social safety nets that the government



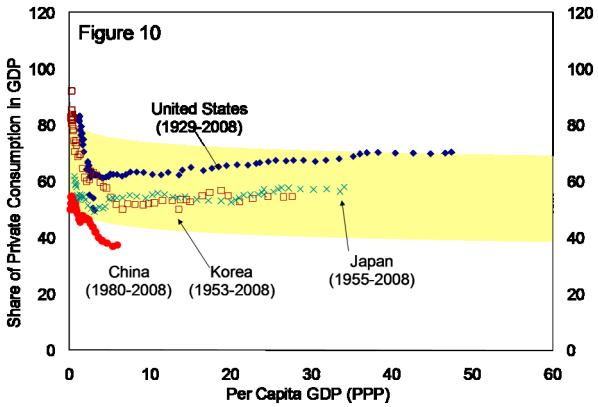
is filling gradually.

In summary, the falling share of labor income, investment income, and transfers have held back households' disposable income, and private consumption. However, this decline in the share of households' income does not explain fully why China's share of private consumption is smaller than international comparators. China's share of private consumption falls outside the range of estimates based on equation (1) (highlighted area in figure 9) and the gap has been widening over time, indicating that a rise in households saving rate.



IV. The Role of The Savings Rate

A stylized fact from the behavior of other countries is that consumption falls as per capita GDP rises at the lowerst levels of per capita income. This is in part because, at lower levels of income, households largely have subsistence levels of income, limiting their ability to save. In this, China is no different. A large part of the decline in China's private consumption has been a natural result of China's rapid pace of economic development. Indeed, on average across countries, the consumption share declines steadily as countries get richer, and eventually stabilizes when per capita GDP is around US$2,500–US$3,000 on a PPP basis. Looking back to 1980, China's level of private consumption was on the low side but, nevertheless, broadly consistent with other international comparators that were at similar levels of development. However, consumption in China then fell at a faster pace than would be suggested by the cross-country model. This led today to China's consumption being well below other countries by 2007. However, this rate of decline of consumption was not unprecedented. Indeed, Korea, Japan, and the United States saw similar rapid reductions in consumption as a share of GDP as their income per capita rose, although their starting point was at an initial level of consumption that was much higher than China's was in 1980.



What are the main factors then, after controlling for the level of per capita income, that have led to this rapid fall in consumption?

- *Employment in services.* The empirical results suggest that the consumption share could increase by 3½ percentage points for every 10 percentage point increase in the share of employment in the services sector. Employment in the services sector

increases the labor share of income since the services sector is, in general, more labor intensive than other industries. The higher share of income raises aggregate consumption. The effect on the labor share of income of a rise in the employment share of services, is even larger when the increase in the share of employment in the services sector is accompanied with higher wages brought about by structural reforms that raise productivity. In addition to this demand effect, the employment in services variable captures supply side effects related to the increased availability of services, with households increasing their consumption as new and better services are offered. Overall, structural reforms that level the playing field between the tradable and non-tradable sector, increase contestatbility in markets, and improve access to financing could raise productivity in the service sector and at the same time enhance the quality of services.

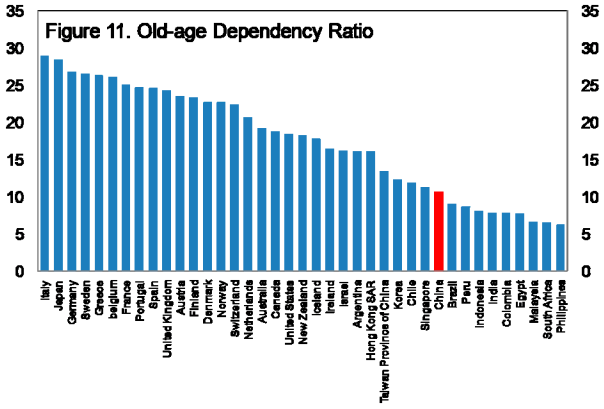
- *Real exchange rate.* An appreciating exchange rate increases the share of private consumption even after controlling for the effect a more appreciated exchange rate would have on household income. The independent effect of the exchange rate is economically significant with the share of consumption increasing by around 2 percentage points for every 10 percent appreciation in the real effective exchange rate. This effect appears large, especially given that the effect a stronger currency has on other variables such as the level of household incomes or the share of employment in services.

- *Financial development and real interest rates.* Greater financial development tends to increase consumption, perhaps highlighting the impact that alternative investment instruments have on precautionary savings or access to financing can have on consumption itself (i.e., for those that are credit constrained). China's financial system is large but not very developed, and mostly dominated by banks. The dominance of state-owned banks suggest that savings are not efficiently used (Feyzioglu, 2009), with the banking sector assets lent primarily to SOEs. Efforts have been made toward liberalization (for example interbank repo lending rates and bond market yields were liberalized in the late 1990s). Despite the stock markets in China having a large market capitalization ($3½ trillion on average in 2008), only one company for every million persons was listed, this compares to around 40 on average for the sampled economies. Bond markets also remain relatively underdeveloped. Developing capital markets through corporate bond markets, mutual funds, broader equity ownership could broaden the range of savings instruments for households' savings and offer a variety of insurance products to help pool risks. This, in turn, would help facilitate higher consumption. Moreover, since the real interest rate is estimated to have a positive impact on the share of private consumption, a liberalization of interest rates would further promote private consumption given that it is expected to lead to higher deposit rates (Porter and others, 2009).

- *Public consumption.* When public consumption is considered as capturing the substitutability between public and private consumption, public consumption is found

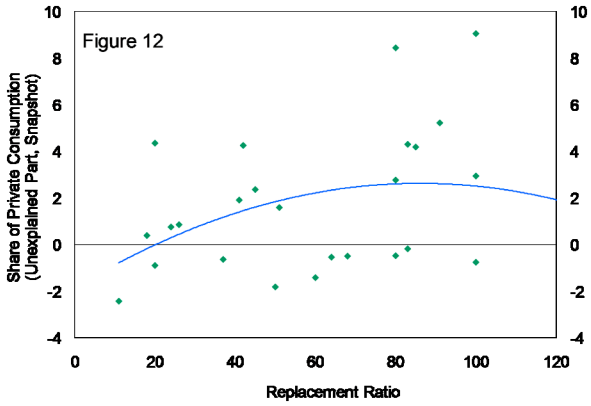
to be substitutable to private consumption on average across the selected economies. The share of private consumption declines with that of public consumption. An alternative explanation could be that public consumption captures crowding out behavior, with households reducing their spending in the face of higher deficit-financed spending. However, for China, this result is not consistent with alternative evidence from provincial data which suggests that government spending on health (but not on education) reduces urban household saving (with a one yuan increase in government health spending translating into a two yuan increase in households' consumption) (Barnett and Brooks, 2009). Barnett and Brooks (2009) evidence for rural households is more mixed as increases in government health expenditure in rural areas appear only to have an impact on savings in the higher-income provinces.

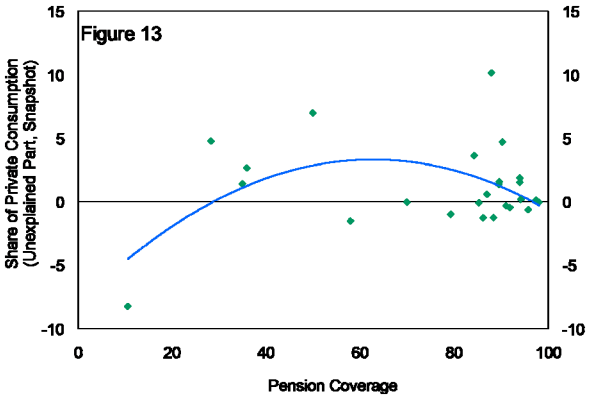
- *Demographics.* The evidence presented in Table 1 suggests that the consumption share rises with the dependency ratio on average across economies as older people draw down their lifetime savings. China's does have a lower dependency ratio than other countries and this has a depressing effect on private consumption share when compared with other countries. However, despite the expectation of a rising dependency ratio in China in the coming years, it is not clear that this will translate into higher consumption. Indeed, the evidence suggests that average urban household saving rate in China is actually, contrary to theory and the behavior in other countries, highest among the youngest and the oldest households. Therefore, the aging of the population in China and the increase in the dependency ratio may not necessarily lead to an increase in consumption. This highlights the importance of implementing measures to reduce precautionary savings amongst the elderly, such as pension and healthcare reform so that rising dependency ratio could increase consumption over time.



- *The neglected role of pensions.* Available information on the sampled economies suggests that most of them have introduced a pension system after World War II and have undertaken major reforms to their systems, particularly with regard the replacement rates (perhaps in reflecting the increased burden pay-as-you-go system has put on those economies fiscal positions) (Table 2). However, because of data limitation (especially on the time dimension of pension data), we have not included into equation (1) a variable to control for the role pensions play in households' consumption. Nevertheless, the figures below show a positive relationship between the residual in equation (1) and key features of pensions systems, such as coverage ratios and replacement rates. The effect of pension coverage appears to die out as economies get close to full coverage, but non-negligible gains could be made during

the transition (with coverage explaining about 20 percent of the residual). The relationship between the residual and the replacement rate is also non-negligible (with a R^2 of around 13 percent). This result suggests that the government efforts to expand the coverage of the pension system to include rural and urban workers could help lift private consumption (Dunaway and Arora, 2007).





V. CONCLUSION

This paper finds that China's share of private consumption in GDP is low when compared with benchmark derived from international comparators. However, China's low share of private consumption in GDP can largely be explained by its relatively low share of household income and by other factors that influence households' savings rate, including the level of development, the share of employment in the service sector, the level of financial development, and changes in the real exchange rate.

It also suggests that the current level of consumption is not pre-determined and somehow special to China due to its historical or cultural background. Instead, policy efforts in a range of areas can yield results in raising consumption and bringing China back to a level of household consumption that is more consistent with other countries that are or were in the past at China's level of development. In particular, efforts to further increase households' income, develop capital markets (including liberalizing interest rates and creating alternative savings instruments) and raising the share of employment in the services sector can generate tangible results.

Table 2. International Pension

	Pension introduced /1	Most recent major reform /1	Contributors / Labor Force /2
Argentina	1946	2008	53.0
Australia	1908	1991	
Austria	1906	1955	95.8
Belgium	1900	1967	86.2
Brazil	1936	1991	36.0
Canada	1927	1952	91.9
China,P.R.:Hong Kong	1973	2000	
Chile	1924	1980	70.0
Colombia	1965	1993	35.0
Denmark	1891		89.6
Egypt	1950	1975	50.0
Finland	1937	1956	90.3
France	1910	1945	88.4
Germany	1889	2002	94.2
Greece	1934	1951	88.0
Iceland	1909	2007	92.0
India	1952	1995	10.6
Indonesia	1977	1992	8.0
Ireland	1908		79.3
Israel	1957	1974	
Italy	1919	1995	87.0
Japan	1941	1959	97.5
Korea, Republic of	1973	2007	58.0
Malaysia	1951	1991	48.7
Netherlands	1901	1957	91.7
New Zealand	1898	2001	
Norway	1936	1997	94.0
Peru	1936	1992	20.0
Philippines	1954		28.3
Portugal	1935	2007	84.3
Singapore	1955	2001	73.0
South Africa	1928	2004	
Spain	1919	1994	85.3
Sweden	1913	1998	91.1
Switzerland	1946		98.1
Taiwan Province of China	1950	2008	
United Kingdom	1908	1995	89.7
United States	1935		94.0

1/ Social Security Administration, 2009, Social Security Programs Throughout the World.
2/ International Patterns of Pension Provision by Palacios and Pallares-Miralles (2000).

REFERENCES

Aziz, Jahangir, and Li Cui, 2007, "Explaining China's Low Consumption: The Neglected Role of Household Income," IMF Working Paper 07/181.

Bai, Chong-En, and Zhenjie Qian, 2009, "Factor Income Share in China: The Story Behind the Statistics," *China Economic Journal*, Vol. 2.

Barnett, Steve and Ray Brooks, 2009, "China: Does Government Health and Education Spending Boost Consumption?," IMF Working Paper, forthcoming.

Barro, Robert, 1981, "Output Effects of Government Purchases," *Journal of Political Economy*, Vol. 89(6), pp. 1086-121.

Blanchard, Olivier, and Francesco Giavazzi, 2005, "Rebalancing Growth in China: A Three-Handed Approach," MIT Working Paper 05-32 (Cambridge, Massachusetts: Massachusetts Institute of Technology).

Chamon, Marcos and Eswar Prasad, 2008, "Why are Saving Rates of Urban Households in China Rising?" IMF Working Paper 08/145.

Dean, Andrew, Martine Durand, John Fallon and Peter Hoeller, 1989, "Saving Trends and Behaviour in OECD Countries," OECD Economics Department Working Papers 67, OECD, Economics Department.

Dunaway, Steven, and Vivek Arora, 2007, "Pension Reform in China: The Need for a New Approach," IMF Working Paper 07/109.

Feyzioglu, Tarhan, 2009, "Does Good Financial Performance Mean Good Financial Intermediation in China?" IMF Working Paper 09/170.

Guo, Kai, and Papa N'Diaye, 2009, "Employment Effects of Growth Rebalancing in China," IMF Working Paper 09/169.

Kuijs, Louis, 2005, "Investment and Saving in China," Policy Research Working Paper No. 3633 (Washington: World Bank).

Masson, Paul, Tamim Bayoumi, and Hossein Samiei, 1998, "International Evidence on the Determinants of Private Saving," *The World Bank Economic Review*, Vol.12(3), pp. 483-501.

Modigliani, Franco, 1966, "The Life Cycle Hypothesis of Saving, the Demand for Wealth and the Supply of Capital," Social Research, 33(Summer), pp. 160-217.

Modigliani, Franco, and Shi Larry Cao, 2004, "The Chinese Saving Puzzle and the Life-Cycle Hypothesis," Journal of Economic Literature, vol. 42(1), pp. 145-170.

Porter, Nathaniel, Elöd Takáts, and Tarhan Feyzioglu, 2009, "Interest Rate Liberalization in China", IMF Working Paper 09/171.

Wei, Shang-Jin, and Xiaobo Zhang, 2009, "The Competitive Saving Motive: Evidence from Rising Sex Ratios and Savings Rates in China," NBER Working Papers 15093, National Bureau of Economic Research.