Towards Understanding Global Imbalances: Are Chinese Households "Special"?

by

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CONTENTS

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ABSTRACT

Global imbalances have been and continue to be an important destabilizing force in the world economy. Global imbalances are the result of a very complex set of factors, and researchers are far from having a complete understanding of how they can be addressed. One particularly relevant component is the extraordinarily high household saving rate in China. The Chinese saving rate dwarfs almost all other countries, and as the world's second largest economy this makes China's household savings a major piece on the surplus side of global imbalances.

This feature is made yet more interesting by the fact that economists have proposed a number of theories suggesting that China is in some way "special". That is, despite a fairly extensive literature on the determinants of household saving rates across countries, many researchers believe that unusual features of China's structure and policies make the Chinese saving rate higher than the typical determinants would imply. The main goal of this paper is to evaluate if China is indeed special or if China's high saving rate can actually be explained by relationships that are true for the average country. The results show two sides to the story. First, there is evidence that China-specific factors do play a role in raising China's saving rate. On the other hand, my model predictions show that even without the "special" Chinese features, the Chinese saving rate would still be considerably higher than other countries. Main reasons for this may include demographic shifts, a weak healthcare and insurance system, slow-moving consumption habits, and liquidity constraints on households.

INTRODUCTION
The Problem of Global Imbalances

Global imbalances—the persistent flow of funds from countries running large current account surpluses to a few major deficit countries—have been a hot topic of discussion over the last few years for their involvement in creating and exacerbating the recent financial crisis. A number of countries, particularly China and oil exporters[1], ran large current account surpluses in the early and mid 2000s. As Figure 1 illustrates, these imbalances grew rapidly between the late 1990s and the beginning of the crisis. Since global current accounts must balance, any international imbalance requires both a creditor and a debtor. However, many economists have pointed to unusually low real interest rates, both in the U.S. and around the world, as an indication that the global imbalances were a result of a "savings glut" in the surplus countries, rather than high demand for investment in deficit countries (Bernanke, 2005; Sneddon Little, 2008; Obstfeld and Rogoff, 2010). That is, surplus countries were saving excessively and simply looking for somewhere to invest those savings.

A large portion of the excess savings was funneled into United States Treasuries. Post-crisis researchers have found that the huge increase in foreign purchases of Treasuries brought yields down by half a percentage point or more (Kirshnamurthy and Vissing-Jorgensen, 2010; Warnock and Warnock, 2009). The lower yield on U.S. Treasuries induced investors to look for higher yield in other investments. In turn, this unleashed a flood of liquidity throughout U.S. and other markets and created a "search for yield" (Portes, 2009), which had several effects.

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[1] For the purposes of this paper, oil exporters include Iran, Kuwait, Libya, Nigeria, Norway, Russia, Saudi Arabia, United Arab Emirates, and Saudi Arabia.

[2] Other policy steps, such as tighter monetary policy to at least partially offset the incoming

First, it made liquidity much cheaper and easier for companies to access by bringing down yields on corporate bonds, which encouraged corporations to make new investments. Second, it held down real interest rates, especially on mortgages, which created a boom in the housing market and allowed many individuals to spend on credit. Third, it encouraged financial innovations to squeeze out higher yields. Specifically, a number of relatively opaque new financial instruments were constructed to allow households to capitalize on rapidly rising home prices.

Had it been invested wisely, this flood of liquidity could actually have been very beneficial to the U.S. However, this assumes that when banks become highly leveraged there is no increase in risk, which is very unlikely in practice. As capital continued to flow into the market year after year, incentive structures for individual banks and bankers across the system encouraged risk to become more and more underpriced (Obstfeld and Rogoff, 2010). Banks, which had been largely deregulated since the 1980s (Lin, 2009), made increasingly risky investments, which facilitated the formation of bubbles and created systemic risk (Kohn, 2010; Van Ark, 2012; Suonimen, 2010). The steadily increasing risk levels ultimately resulted in the housing bubble collapse and the crisis that ensued.

Many observers have focused on issues in the housing market that led to the collapse, but the key point for this paper is the underlying catalytic role of global imbalances. The search for yield was not created by the booming housing market. On the contrary, the flood of liquidity caused by the savings glut led investors to search for yield, and their risky investments in housing created a bubble. So while it is certainly sensible to take steps to correct the housing market, this only fixes a

symptom of the root issue[2]. The excessive savings in China and oil exporting countries flowing into the U.S. facilitated the creation of a bubble, and the wide-spread failure to identify—much less address—the housing bubble suggests that if global imbalances are not corrected, future crises may also be difficult to catch before it is too late.

However, the financial crisis and the recession that followed have had a deep impact on the global economy, and Figure 1 shows that current account imbalances in the U.S., China, and oil exporting countries have shrunk considerably in the wake of the crisis. This naturally prompts the question, are global imbalances still an issue?

On the deficit side, the United States current account imbalances since 2009 have been well under half of their peak levels right before the crisis. Several factors, including corrections in the housing market and pressure for banks and households to deleverage, have driven down investment and increased national saving (Van Ark, 2012). However, throughout the pre-crisis period of rising deficits, low household savings were identified as the central cause of U.S. current account deficits (Marchetti et al, 2012; Blanchard and Milesi-Ferretti, 2012). Despite the fact that overreactions to the crisis, the short-term need to repay debt, and a tightening of credit have most likely resulted in a transitory hike in saving rates, the U.S. household saving rate remains low by international and historical standards (Van Ark, 2012).

Meanwhile, after a brief drop in 2009, oil exporting countries as a group are already running current account surpluses comparable to their peaks prior to the

[2] Other policy steps, such as tighter monetary policy to at least partially offset the incoming funds and stricter bank regulations to prevent extreme leveraging and opaque financial innovation, may be more effective ways of suppressing systemic risk without necessarily addressing global imbalances.

crisis. China, on the other hand, has reduced current account surpluses to about half of their peak levels, relative to world GDP. However, despite repeated commitments by Chinese officials to lower saving rates and shift the composition of GDP towards consumption, the reduction in the current account has largely been a result of slow growth in exports and greater demand for investments rather than a sustainable structural shift (Van Ark, 2012). In general, for both the United States and China, empirical research has found that the post-crisis decrease in current account imbalances is more a result of cyclical factors than structural ones (Cheung et al, 2010). This suggests that the underlying causes of global imbalances have not been fixed, and that concerted efforts to rebalance the world economy are still needed.

Unfortunately, as Blanchard and Giavazzi (2010, p. 2) put it, "global imbalances are probably the most complex macroeconomic issue facing economists and policy makers". Therefore, rather than tackle the entire issue at once, this paper focuses on one particularly important and interesting driver of global imbalances: China's household saving rate. Households save an extraordinarily high portion of their income in China, and this is thought to be a major reason for the large current account surpluses described above.

While the literature on household saving rates is fairly extensive, China's saving rate is particularly interesting because researchers have proposed a number of theories suggesting that unusual and largely distortionary forces are driving up the Chinese household saving rate. The main goal of this paper is to analyze how relevant these China-specific factors are for explaining China's high saving rate. Importantly, rather than addressing the validity of any one of these theories, they are

evaluated as a whole by testing how well a cross-country model fits China's data. If China is indeed "special", the saving rate should not be predicted well by cross-country models. That is, the difference between the predicted saving rate from a cross-country model and the actual saving rate in China can be taken as a reflection of how unique China actually is. If the actual saving rate is much higher than the prediction from a cross-country model, it would support the importance of China-specific factors. On the other hand, if a cross-country model actually fits China's data well, it would suggest that China is not special but rather that the saving rate is driven by relationships which are common across a wide range of countries.

This approach requires two steps, and this paper is accordingly divided into Part 1 and Part 2. Part 1 uses a panel of countries that does not include China to establish a baseline cross-country model. Part 2 then analyzes how unique China may be by applying the model constructed in Part 1 to China. Part 2 also includes a discussion of the results and their implications in the context of what China is already doing to address the savings glut and what remains to be done.

PART 1
Saving Rates Across Countries

Before it is possible to examine how similar or dissimilar China's saving determinants are to those of other countries, it is critical to build a baseline against which to compare China. Part 1 builds that baseline by establishing and evaluating a model for household saving rates across countries, excluding China. Section 1.1

begins by explaining the framework for understanding household saving rates at the national level. This includes a review of the literature on the various theoretical determinants of saving and the data used to capture them. Section 1.2 discusses the model, including context on the various methodologies that have been used previously to research saving rates in the cross-country setting. Finally, section 1.3 presents the results and discusses some of their implications.

1.1 DETERMINANTS OF HOUSEHOLD SAVING

The most prominent framework for understanding household saving rates is the Life-Cycle Hypothesis (LCH) developed primarily by Franco Modigliani (Modigliani and Brumberg, 1954; Modigliani, 1966; Modigliani, 1970; Modigliani, 1986; Modigliani, 1988). The basic premise of the LCH is that individuals attempt to smooth their consumption over their lifetimes and therefore save in a pattern to make this possible. One of Modigliani's central assumptions is that the average individual's disposable income[3] follows a hump shape over the course of his or her lifetime. That is, income is low or zero in early years, peaks during middle years, and then drops off again after retirement. If individuals smooth their lifetime consumption patterns, this implies that saving rates should follow a similar trajectory: low or negative during youth (financed by credit on future earnings), high during working life, and low or negative after retirement (financed by a reduction of the accumulated wealth from working years).

[3] Throughout this paper, all references to "income" should be thought of as disposable income (i.e. after-tax income), unless otherwise noted.

This simple model of saving has a number of implications for household saving rates at the national level. Over the last 50 years, Modigliani and the many other researchers who have employed his framework have built upon the LCH to put together a range of factors that may influence saving rates. The following subsections discuss these factors theoretically, review some of the empirical literature on each of them, and explain the data used to capture each one. For a concise list of variables, abbreviations, expected signs, and data sources, see Table 1.

Age structure

Perhaps the most straightforward implication of the LCH at the national level is that age demographics influence saving rates. Since individuals during their working years save more relative to their disposable income than young and old individuals, countries with a high proportion of working-age individuals will have higher saving rates than those with a greater share of old and young citizens. I follow the vast majority of empirical studies in taking the "dependency ratio" as a proxy for this effect (e.g. Edwards, 1995; Masson et al, 1998; Sarantis and Stewart, 2001; Modigliani and Cao, 2004). This data is drawn from the World Bank World Development Indicators (WDI), which defines the dependency ratio as the number of citizens under the age of 15 or older than 64 per 100 individuals between 15 and 64 years old. A higher dependency ratio means that a larger portion of the population is composed of low-saving young and old individuals, so the coefficient on this variable is expected to have a negative sign.

One shortcoming of the dependency ratio is that it uses age ranges to proxy for working versus non-working individuals. When used across a wide range of countries, this may not be a strong measure of the true variable of interest: ideally the LCH is concerned with how close individuals are to earning at their peak levels. This may be an especially large issue in panels that include both developed and developing countries, as individuals are likely to begin earning near-peak incomes at a much earlier age in developing countries. This could explain why studies have returned somewhat mixed results on the significance of the dependency ratio. Many studies (e.g. Callen and Thimann, 1997; Sarantis and Stewart, 2001; de Mello et al, 2004; Ferrucci and Miralles, 2007) get the expected negative sign at significant confidence levels. However, other important studies find it to be insignificant (Haque et al, 1999; Loayza et al, 2000), and Hondroyiannis (2006) actually gets a significant positive sign.

Income growth and level

When cohort effects are incorporated into the LCH, it most likely implies that income *growth* will have a positive impact on national saving rates. As Modigliani (1966; 1970) argues, income growth raises the expected lifetime income of non-retired generations, but does not impact retired people. Due to higher expected lifetime income, current income-earners will save more to finance greater consumption in retirement. Although these current workers may not increase their saving *rate,* retirees will not decrease their saving (or increase their dissaving) at all because they are not affected by the growth in income. Therefore, at the aggregate

level more money will be saved relative to disposable income than before the growth in income.

However, this positive relationship may be offset by young people who take out credit on their increased expected lifetime income (Deaton and Paxson, 2000). In most scenarios, liquidity constraints (discussed below) make it unlikely that dissaving by young people will fully offset the increase in saving from the working-age group. However, at high rates of income and population growth, the expected wealth of young people could be sufficiently large relative to older cohorts to significantly weaken the impact or even switch the sign.

Empirical work generally includes income growth as an explanatory variable, although some older studies use GDP growth as a proxy, and my dataset draws household income figures from the OECD Statistics database. As foreshadowed by the above discussion, most researchers find that income growth has a positive effect on aggregate saving rates, but findings of significance vary. For example, Sarantis and Stewart (2001) study 20 OECD countries and find a significant, positive coefficient in the "overwhelming majority" (p. 34) of them, but get statistical significance in only twelve.

It is also worth noting that Friedman's permanent income hypothesis (Friedman, 1957) states that only permanent changes in income affect consumption and saving patterns, implying that growth in permanent income would actually be the relevant metric for this relationship. Most empirical work does not make this distinction because of data availability. However, Smith (2001) points out that permanent income and total income are highly correlated, which suggests that the

difference is primarily a theoretical point with only minor implications for measuring the relevant relationship.

Income *levels* have an effect that is conceptually different from income growth, and should increase saving rates in two ways. First, households at subsistence levels of consumption are able to put proportionally less of their income towards basic needs and instead begin to save as their income grows. This effect is subject to the caveat that if households are significantly below subsistence levels, they may need to continue putting all of their income towards current consumption. Although this will not increase the saving rates of the households themselves, if income distribution shifts towards these households the total saving rate could decrease at the aggregate level.

The second pathway requires a minor extension to the LCH. While the LCH assumes that individuals will smooth consumption by distributing their entire lifetime income across consumption over their lives, in the real world many individuals leave some inheritance to the next generation (creating the negative wealth effect described above). Assuming a decreasing marginal utility to consumption, individuals with higher income levels will substitute more saving in place of current consumption in order to build up their estate.

To obtain income levels that are comparable across countries, the household income data described above is converted to USD using national currency per U.S. dollar data from the IMF International Financial Statistics (IFS) database. Following the vast majority of the literature, this data is normalized by taking the natural log.

Government surplus/deficit

Another component of expected income comes from what is known as Ricardian offsetting (Barro, 1974). Originated by David Ricardo and developed by Robert J. Barro, the Ricardian equivalence theorem states that the private sector will offset any government deficit (surplus) through an increase (decrease) in saving of the same amount. This is because the government has only two sources of funds: bonds and taxes. If the government finances a deficit through bonds, the private sector assumes that the government will eventually have to repay those bonds through an increase in taxes. Therefore, households and corporations save in preparation for the expected future tax burden. Similarly, if the government runs a surplus, the private sector expects that the government will distribute that money and so decreases saving accordingly.

The Ricardian equivalence theorem is controversial and full equivalence is generally rejected both theoretically and empirically. Ricardian equivalence requires that all members of the private sector have infinite time horizons and no liquidity constraints among other unrealistic assumptions (de Mello et al, 2004). However, there is considerable empirical support for some Ricardian offsetting. That is, although there is not a 1:1 inverse relationship between public and private saving, the government surplus/deficit does seem to have a significant, negative relationship with private and household saving. Masson et al (1998), Haque et al (1999), Loayza et al (2000), de Serres and Pelgrin (2003), and de Mello et al (2004) all report significant negative coefficients on the government budget balance with magnitudes ranging from about 0.2 to .77. In general, empirical studies tend to find an offset of about 0.4.

In interpreting these results, it is important to note that the coefficients may be overstated by a difference in denominators. The Ricardian equivalence theorem says that for every dollar of government deficit, the private sector must save one dollar in order to pay the future tax. However, in the vast majority of empirical studies, government budget balance is taken as a fraction of GDP, while saving rates are often (appropriately) measured as a share of disposable income. Since disposable household income is consistently smaller than GDP, this can skew the measure of Ricardian offsetting upwards in magnitude. To illustrate this, consider a simple arithmetic example. Suppose GDP is $10 and private sector disposable income is $5. If the government runs a $1 deficit (10% of GDP), full Ricardian equivalence says the private sector would save an additional $1 (20% of disposable income). In this case, using the uneven denominators, the researcher would report a Ricardian relationship of 2:1 despite the actual 1:1 ratio. This bias is exacerbated by large differences between GDP and private disposable income and by relatively small surplus/deficits.

The variable used to capture this effect is government cash surplus/deficit as a share of household disposable income. Following Loayza et al (2000) and Athukorala and Sen (2004), disposable income is taken as the denominator, rather than GDP, in order to mitigate the overstating effect described above. In the numerator, the cash surplus/deficit is drawn from the World Bank WDI. The World Bank describes the cash surplus/deficit as the closest measurement to overall budget balance, with the distinction being that government lending minus repayments is not included in the cash surplus/deficit. This should make the cash surplus/deficit a more

precise measurement of the true Ricardian effect than the more commonly used budget balance since lending is not a liability that must be repaid.

Liquidity constraints and financial market development

The LCH assumes that the young population—those that have not yet reached their peak income—will smooth their lifetime consumption by borrowing against future income. However, as Jappelli and Pagano (1994) and others have noted, liquidity constraints make this implausible. Risk management by lenders will tend to prevent young people from accessing cash for the full amount that they would consume under perfect conditions. Jappelli and Pagano show that, under imperfect markets where young people are not able to spend as much as they would if there were no liquidity constraints, aggregate saving rates will be higher. That is to say, as liquidity constraints ease, saving rates decrease.

However, liquidity constraints are very difficult to isolate and decreasing constraints are generally associated with more fully developed financial markets. More general financial market development could have an impact on financial inclusion (Guo and N'Diaye, 2010; Bailliu and Reisen, 1997) and the availability of more appropriate borrowing and saving instruments (Prasad, 2009; Slacalek, 2009), both of which have ambiguous effects on saving rates. Particularly in developing countries, it may also provide safer opportunities to save, increasing saving rates (Athukorala and Sen, 2004).

Empirically, researchers have tried to capture financial market development and liquidity constraints through a variety of fairly crude proxies. These include M2

(e.g. Edwards, 1995; Loayza, 2000), credit to the private sector (e.g. Sarantis and Stewart, 2001; Ferrucci and Miralles, 2007), and bank density (Athukorala and Sen, 2004). For my dataset, I follow the recommendation of Cihak et al (2012) in a World Bank study on "benchmarking financial systems" and use private credit by deposit banks and other financial institutions as a share of GDP[4]. This data is drawn from the World Bank Global Financial Development database (GFD).

Real interest rate

The real interest rate has two competing effects on saving rates, making the sign of its coefficient ambiguous. The first is a substitution effect. As real interest rates go up, the return on saving goes up. Therefore, at higher real interest rates, individuals may substitute saving for current consumption in order to maximize lifetime income, which would increase the saving rate. On the other hand, there is also a negative income effect. The higher return on saving offered by higher real interest rates means that expected future income increases. Since individuals now have higher expected future incomes, they should increase current consumption rates in order to smooth consumption over the rest of their lives, which decreases saving rates.

It is worth taking a few sentences to clarify why the income effect in this context has a negative effect on saving rates, while income growth is described above as having a positive effect on saving. This is because the positive impact of income growth was driven by a cohort effect. Namely, retirees are no longer earning income,

[4] More sophisticated measures of financial development do exist, such as the World Economic Forum's Financial Development Index, but their coverage only begins in the last few years.

so across-the-board income growth will increase the amount that high-saving income-earners save without increasing the amount that low-saving retirees dissave. On the other hand, an increase in interest rates benefits all individuals equally, so there is no cohort effect.

Following Loayza et al (2000), the real interest rate is defined as $ln[(1+i)/(1+\pi)]$ where i is the nominal interest rate and π is the inflation rate, measured as forward-backward inflation (the average of inflation for the current period and the next period). Since the real interest rate drives saving decisions based on the return on deposits, the deposit interest rate would be the most appropriate measurement to use here. Unfortunately, deposit rate data is very scarce, so I instead follow a number of recent papers (e.g. de Serres and Pelgrin, 2003; Salotti, 2009; Hufner and Koske, 2010) in using the long-term interest rate. Data on the nominal long-term interest rate is taken from the OECD Statistics database, while inflation data comes from the IMF World Economic Outlook (WEO).

As might be expected based on the ambiguous sign, empirical studies have returned mixed results on the relationship between saving and interest rates. Some researchers have found evidence of a dominant substitution effect (e.g. Masson et al, 1998; Sarantis and Stewart, 2001), while other have found the opposite sign (e.g. de Serres and Pelgrin, 2003; de Mello et al, 2004), and yet others do not get significant results in either direction (e.g. Haque et al, 1999; Loayza et al, 2000).

Risk

Assuming that the average individual is risk-averse, higher levels of uncertainty should be associated with higher saving rates as a precaution against risk. In studying saving rates, two major types of risk seem to be especially relevant. The first is income uncertainty. For individuals to smooth their lifetime consumption, as the LCH proposes, they must know their lifetime income. Of course, in the real world, it is not possible to be certain of exact levels of future income. The less confidence individuals have in their future income, the more they will save as a precaution against lower future income.

The second important factor is risk pooling. Risk pooling, in terms of health care, natural disasters, etc., can come either in the form of a strong governmental social safety net or a deep and competitive insurance market. The better individuals can pool risks, the less risk each person experiences. This allows everyone to decrease precautionary saving and lowers aggregate saving rates.

Researchers have had a particularly difficult time adequately capturing risk in a relevant and widely available metric. In fact, as far as I am aware the only proxy that has been used in existing literature is the inflation rate. To the extent that inflation captures uncertainty, it should have a positive sign. However, there is also strong evidence that high inflation is associated with lower growth (e.g. Fischer, 1993; Andres and Hernando, 1997). Economic growth is closely associated with income growth, and income growth is thought to have a positive impact on saving rates, as described above. So through this channel, high inflation should decrease saving rates. Although some studies provide evidence of a positive coefficient (e.g.

Callen and Thimann, 1997; Loayza et al, 2000; Ferrucci and Miralles, 2007), implying that inflation does indeed capture uncertainty, many also find the relationship to be insignificant (e.g. Haque et al, 1999; de Serres and Pelgrin, 2003; de Mello et al, 2004).

Due to the weakness of this variable, both theoretically and empirically, I instead use out-of-pocket health spending as a measure of risk pooling. Out-of-pocket health spending is measured as a percent of total health spending and is taken from the World Bank WDI. A higher share of health spending paid out of the pockets of consumers implies a weaker social safety net and insurance market, since insurance in a perfectly competitive world would be actuarially fair and all risk-averse individuals would fully insure (Levin, 2006). This means that the variable's coefficient is expected to have a positive sign.

In some senses, this metric is stronger than a measurement of the social safety net because it incorporates not only government programs, but also the extent to which people are insured. However, it does have some weaknesses. For one, people who are not insured may be less likely to see a doctor or go to the hospital. Secondly, health is only one aspect of uncertainty. Other forms of risk that may drive up precautionary saving, such as job security and natural disasters, will most likely be poorly captured by this variable.

Wealth

Wealth's impact on saving rates is theoretically negative. Since individuals smooth consumption over their lifetime, they will incorporate any inherited wealth

(or expected inheritance) into their consumption function. Since inherited wealth is not a component of income, this allows them to spend beyond lifetime income and decreases saving rates.

However, this relationship may be masked by a correlation between national wealth and the number of individuals at or near their peak earning level. According to the LCH, individuals save at progressively higher rates as they prepare for retirement. Other than inheritance, wealth is a reflection of saving over previous periods; thus, wealth will follow a similar hump-shaped trajectory. This implies that saving rates will have a positive correlation with wealth, regardless of any causal relationship.

Researchers have used a number of different proxies to capture wealth, with varying results. Masson et al (1998) use the sum of lagged savings and find that the coefficient is positive in developed countries and negative but insignificant in developing countries. Ferrucci and Miralles (2007) use stock market capitalization and find a negative but insignificant relationship. Salotti (2009) uses the most sophisticated measure of wealth. He follows the work on wealth effects by Case et al (2005) in constructing a measurement of "tangible wealth" based on the product of the home ownership rate, the number of households, and a property price index. Salotti does find a negative relationship between his proxy and saving rates, but its significance is highly sensitive to specification.

Unfortunately, the data needed to construct Salotti's more sophisticated measurement is not available for a large portion of my sample. Instead stock market capitalization as a share of GDP is used, with data taken from the World Bank

Global Financial Development database. Stock wealth is certainly not a complete measurement, but it does represent an important aspect of household wealth. It is therefore often used as an indicator of wealth and is thought to be related to saving and consumption patterns (Poterba, 2000; "World Wealth Report", 2011). However, as Cihak et al (2012) point out, stock market capitalization may also capture the extent of financial development, so results should be interpreted with care.

Corporate saving

I believe corporate saving is one of the most under-researched determinants of household saving rates: to my knowledge, no empirical studies have controlled for corporate saving. This is primarily due to the fact that data availability has forced most of them to take private saving—the sum of corporate and household saving—as the dependent variable. When past researchers have mentioned corporate saving, it is generally only in an attempt to justify the use of private saving as the dependent variable despite the fact that all of the above determinants are drawn from the theory of household consumption (e.g. de Serres and Pelgrin, 2003; Ferrucci and Miralles, 2007). In fact, the LCH makes very little sense when applied to corporations.

The basic justification for using private saving rather than household saving is that households "pierce the corporate veil" and internalize corporate saving into their own saving decisions. This is because households are the ultimate owners of corporations, so they can expect corporate saving to flow to them in the form of dividends and capital gains. Ferrucci and Miralles (2007) point out that there is evidence of an inverse relationship between the two forms of saving (e.g. Poterba and

Summers, 1986). However, they also admit that this relationship has been found to be less than 1:1, which means that changes in corporate saving do affect private saving. In finite samples, this will create a bias of unknown direction, with the sign depending on the direction of movement in corporate saving.

Corporate saving data is taken from the OECD Statistics database. Since the expected relationship between corporate saving and household saving is a negative offsetting effect, the denominator for this variable is household disposable income. The rationale for this denominator is identical to the reasoning explained above for the Ricardian offset.

Inertia

Inertia in saving rates may come from two forces. The first of these is simply habit. While there is little literature to suggest *saving* habits, per se, there is some evidence for the existence of consumption habits (Prasad, 2009; Fuhrer, 2000; Brulle and Young, 2007). If incomes change relatively slowly compared to other determinants, this will create inertia in saving rates as households continue to spend the same amount despite shifts in other factors that should impact the saving rate. Second, as Loayza et al (2000) point out, if there is persistence in some or all of the variables that drive saving, this will also create persistence in the saving rate. To account for this fact, nearly all recent studies have employed a dynamic specification with a lag of the saving rate included as an explanatory variable. These coefficient estimates are consistently positive and significant.

1.2 DATA AND MODEL

Data

My dataset consists of 23 OECD countries[5], with data from 1995-2010 for 11 of the countries and data from 1996-2010 for the other 12. Since the goal of this section is to develop a baseline against which to evaluate China, China is excluded from the panel that is used for estimation. Beyond that, the selection of countries was driven by data availability and may suffer from an overconcentration on developed and European countries. This may be an issue if different societies place higher or lower value on saving, and there do seem to be some regional trends. For example, East Asian economies have tended to have higher saving rates, while Latin American and African countries have particularly low saving rates (Loayza et al, 2000). That being said, almost none of the major studies control for regional effects but rather attempt to explain the regional phenomena through similarities in structural and policy factors.

Review of models

Empirical work on cross-country determinants of household saving rates largely began in the mid-1990s. The earliest works all use static fixed effects regressions with a large number of regressors. For example, major studies by Edwards (1995), Callen and Thimann (1997) and Masson et al (1998) take this

[5] The countries included are Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Hungary, Italy, Republic of Korea, Netherlands, Norway, Poland, Portugal, Slovak Republic, Slovenia, South Africa, Sweden, Switzerland, United Kingdom, and United States.

approach, with the minor exception that Edwards uses instrumental variables in an attempt to control for possible endogeneity of GDP growth rates.

However, in what Salotti (2009) describes as a "path-breaking paper", Haque et al (1999) take the data from Masson et al (1998) and show that there are critically important dynamics and heterogeneity in the coefficients of explanatory variables. Since then, researchers have employed a variety of models that attempt to take these effects into account. Focusing on the dynamics and evidence of cointegrating relationships between the saving rate and many of the common explanatory variables, some of the models that have been used include dynamic OLS (Sarantis and Stewart, 2001) and fully modified OLS (Hondroyiannis, 2006). Most prominently, a number of recent studies use the pooled mean group (PMG) estimator. This model accounts for dynamics and allows for heterogeneity in slope parameters across countries, and this is the methodology that I will be using here.

However, separate from the trend towards adjusting for dynamics and heterogeneity, a few papers have followed Loayza et al (2000) in estimating the saving rate equation using a General Method of Moments (GMM) approach that focuses on controlling for possible endogeneity. Particularly, income growth and wealth may be endogenous if higher saving promotes growth via investment (Jappelli and Pagano, 1994) and since wealth is related to past values of the saving rate (Salotti, 2009). Loayza et al (2000) use the two-step systems GMM estimator developed by Arellano and Bond (1991). This method uses "internal instruments", or lags of the variables in the regression, as instrumental variables and is specifically designed to control for endogeneity in panel regressions.

This paper does not follow the GMM strain of literature for several reasons. First, Haque et al (1999) and others have shown convincingly that there is important heterogeneity in slopes across countries, which the GMM method cannot account for. In fact, Pesaran and Smith (1995) show that GMM (as well as traditional IV) estimation of slope parameters will be inconsistent in the presence of slope heterogeneity. Second, since the determination of saving rates seems to be a dynamic process, the use of lagged values as instrumental variables in GMM may be inappropriate because all lags may actually be correlated with the current dependent variable (Haque et al, 1999). Third, other models may sufficiently control for endogeneity. Although not specifically tailored to handle endogeneity, Pesaran and Smith (1999) show that auto-regressive distributed lag (ARDL) models, which have become common since Haque et al (1999), can correct for endogeneity in long-run relationships if appropriate lags are chosen. As will be explained later, the PMG method that is favored in this paper is primarily concerned with long-run relationships, making an ARDL model potentially as effective as GMM in controlling for endogeneity. Finally, there is also evidence that endogeneity may not actually be an issue at all. In a major study with a panel of 123 countries over 34 years, Attanasio et al (2000) show quite robustly that although lagged values of saving have a positive impact on growth, the direction of causation in the current period is from growth to saving.

Mean group and pooled mean group estimators

Since Haque et al (1999), the most popular approach to saving rate regressions has been pooled mean group (PMG) estimation. The mean group (MG) estimator was proposed by Pesaran and Smith (1995) as a method to handle panel data where slope coefficients, as well as intercepts, vary across the cross-sectional unit. Mean group estimation is performed much like the name suggests: each panel (i.e. cross-sectional unit, such as countries, individuals, etc.) is estimated separately by OLS and then the average of the parameters from the separate panels is taken as the overall estimate. That is, $\hat{\beta} = (\frac{1}{N}) \sum_{i=1}^{N} \widehat{\beta_i}$ where N is the number of panels, $\widehat{\beta_i}$ is the OLS estimate for each panel $i = 1, 2, \ldots, N$, and $\hat{\beta}$ is the mean group coefficient estimate. Pesaran and Smith (1995) show that when slope parameters vary randomly[6], as described in Swamy (1970), the MG estimator provides consistent and unbiased estimates of a variable's average effect for large N and T[7] even when lagged dependent variables are included[8]. On the other hand, the commonly used pooled estimators (i.e. fixed and random effects) are inconsistent in dynamic models even for large N and T, with potentially large biases. This is because in the presence of slope heterogeneity that is not accounted for, serial correlation in the explanatory variables creates serial correlation in the residuals. In dynamic models, this form of serial correlation leads to inconsistent estimates irrespective of the size of T.

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[6] Haque et al (1999, p. 13) point out the MG estimation is also valid when "slope coefficients are…fixed in the sense that the diversity in the slope coefficients across countries can not be captured by means of a finite parameter probability distribution."

[7] T refers to the number of time periods.

[8] In analyzing the various models, Pesaran and Smith impose a strict exogeneity assumption on the regressors other than the lagged dependent variable. However, as described briefly above and in greater detail in Pesaran and Shin (1999), this assumption may not be critical in well-specified ARDL models.

As de Serres and Pelgrin (2003) put it, pooled estimation (fixed and random effects) and mean group estimation can be thought of as opposite cases. Mean group estimation assumes full heterogeneity across panels, while the pooled estimators assume full homogeneity (not including intercepts). As described above, fixed and random effects models are inconsistent in dynamic models when the homogeneity assumption fails. However, the mean group estimator does not allow for the possibility that some homogeneity restrictions may be valid. This weakness in the "middle ground", where some but not all coefficients are homogeneous across panels, is where pooled mean group estimation becomes important.

The pooled mean group estimator proposed by Pesaran, Shin, and Smith (1999) is an extension of the MG estimator. PMG estimation gets its name from the fact that it allows some coefficients to vary across countries, as in mean group estimation, but also imposes homogeneity restrictions on some variables as in the pooled estimators. In practice, this is generally applied to cases where there is reason to believe that long-run responses should be similar across panels, but short-run reactions are likely to vary because of, for example, slow-moving institutions which differ across countries. In cases where some coefficients are homogenous, PMG is more efficient than MG.

Specification and lag order selection

Based on theoretical and empirical support from a number of previous studies (e.g. Haque et al, 1999; de Serres and Pelgrin, 2003; Ferrucci and Miralles, 2007), I begin my specification under the hypothesis that the short-run effects are

heterogeneous across countries but that homogeneity restrictions are valid in the long run. The theoretical basis for the long-run homogeneity comes from the theories described in section 1.1, namely the Life-Cycle Hypothesis and various extensions on it, which should apply in any country. However, in the short run "institutional constraints are likely to be more binding" (Haque et al, 1999, p. 7) and "adjustment costs…are likely to have a larger influence" (de Serres and Pelgrin, 2003, p. 14), making homogeneity unlikely.

Before testing these hypotheses it is of course necessary to specify the model. Following the majority of recent literature, an auto-regressive distributed lag specification is used, and the variables included are those described in section 1.1. The first order of business is to select the appropriate lag order for each variable. To do this, I follow Ferrucci and Miralles (2007) and others (e.g. de Serres and Pelgrin, 2003) in using the lag order selection approach proposed by Pesaran et al (1999) along with some guidance from economic theory. Since the basic idea behind using the PMG model is that there is likely to be important heterogeneity across countries, models including different lag orders are tested individually for each country in the sample up to a predetermined maximum lag. As is "the established practice in modeling with annual data" (Athukorala and Sen, 2004, p. 7) and as recommended by Pesaran and Shin (1999), the maximum lag for the dependent variable is set at 2. For the independent variables, following Pesaran et al (1999) and de Serres and Pelgrin (2003) the maximum lag is set at one. The Schwarz-Bayesian Information Criterion is then used to select the correct number of lags (as in Peseran et al, 1999; de Serres and Pelgrin, 2003; Ferrucci and Miralles, 2007; and others). These results give the

following ARDL(1,0,1,1,0,0,1,0,0) model with one lag included for the saving rate, cash surplus/deficit, private credit, market capitalization, and corporate saving, and zero lags for all other variables:

$$(1)\ SAV_{it} = \mu_i + \lambda_i SAV_{i,t-1} + \delta_{i10} DEPRATIO_{it} + \delta_{i20} GINC_{it} + \delta_{i30} LINC_{it} + \delta_{i40} SUR_{it} + \delta_{i41} SUR_{i,t-1} + \delta_{i50} CRED_{i,t} + \delta_{i51} CRED_{i,t-1} + \delta_{i60} RIR_{it} + \delta_{i70} OOPHLTH_{it} + \delta_{i80} CAP_{it} + \delta_{i81} CAP_{i,t-1} + \delta_{i90} CORP_{it} + \delta_{i91} CORP_{i,t-1} + \varepsilon_{it}$$

For explanations of each variable abbreviation, see Table 1. The i (i=1,…,N), j (j=1,…,9), k (k=0,1), and t (t=1,…,T) subscripts respectively refer to country, variable, lag order, and time period. For example, δ_{ijk} is the coefficient for country i on variable j with lag order k. Pooled mean group estimation assumes a long-run relationship between the dependent variable and at least some of the independent variables, and is interested in differentiating between the long-term and short-term effects. Therefore, the model is reorganized and re-parameterized into error correction form:

$$(2)\ \Delta SAV_{it} = \phi_i (SAV_{i,t-1} - \theta_{i0} - \theta_{i1} DEPRATIO_{it} - \theta_{i2} GINC_{it} - \theta_{i3} LINC_{it} - \theta_{i4} SUR_{it} - \theta_{i5} CRED_{it} - \theta_{i6} RIR_{it} - \theta_{i7} OOPHLTH_{it} - \theta_{i8} CAP_{it} - \theta_{i9} CORP_{it}) - \delta_{i41} \Delta SUR_{it} - \delta_{i51} \Delta CRED_{it} - \delta_{i81} \Delta CAP_{it} - \delta_{i91} \Delta CORP_{it} + \varepsilon_{it}$$

where $\phi_i = -(1-\lambda_i)$; $\theta_{0i} = \mu_i / (1-\lambda_i)$; $\theta_{ij} = \delta_{ij0} / (1-\lambda_i)$ for $j = 1, 2, 5, 6, 8$; and $\theta_{ij} = (\delta_{ij0} + \delta_{ij1}) / (1-\lambda_i)$ for $j = 3, 4, 7, 9$. For the PMG estimation $\theta_{ij} \forall\ i, j$ are constrained so that $\theta_{ij} = \theta_j$.

Assumption and specification testing

Several assumptions are required for PMG to be consistent and efficient. As mentioned above, perhaps the most central of these is that heterogeneity exists across countries in the short run, but that the long-run homogeneity restriction is still valid. The Hausman test statistic is used in order to test these assumptions, following Blackburne and Frank (2007), Pesaran et al (1999), and de Serres and Pelgrin (2003), among others.

First, in order to test the validity of the heterogeneity assumption, the model described above is estimated using a fixed effects model, which makes the assumption of full slope homogeneity, and with mean group (MG) estimation, which assumes full slope heterogeneity. As described above, whether or not slopes are homogenous the MG, estimator will be consistent. However, if the homogeneity restrictions invoked by the fixed effects estimator are valid, then MG will be inefficient while fixed effects will be consistent and efficient. On the other hand, if the homogeneity restriction is invalid, the fixed effects estimator will be inconsistent. Therefore, the two models meet the requirements of the Hausman test. As expected from previous empirical work, the test convincingly rejects the null hypothesis of no systematic difference in the coefficients with a *p*-value of 0.00. This implies a rejection of the fixed effects model assumption of slope homogeneity.

A similar test is applied for the PMG assumption of long-run homogeneity. Again, the MG estimator is consistent whether or not the assumption is valid, but if long-run homogeneity is supported then the PMG estimator will be both consistent and efficient. This time, the Hausman test cannot reject the null hypothesis at

traditional confidence levels. Since there is no evidence of a systematic difference in the coefficients of the two models, the efficient estimator (i.e. PMG) is preferred. So, as has been the case in previous work, the data suggests the PMG should be preferred over full pooling or full disaggregation.

In order for PMG to be valid, several other conditions must also be met. The first of these is that a long-run relationship between the dependent and independent variables actually exists. As suggested by de Serres and Pelgrin (2003), two different methods are used to test this assumption. First, I test for a cointegration relationship between the saving rate and each of the explanatory variables separately. To do this, the panel cointegration tests developed by Westerlund (2007) are applied. Westerlund provides four different cointegration tests, all of which are based on testing whether the error correction term is significantly less than zero. Like the commonly used test proposed by Pedroni (2004), Westerlund's tests take no cointegration as the null hypothesis, but Westerlund shows that his tests have good accuracy and more power in small samples than the Pedroni test. Of the four Westerlund tests, two are "group mean" tests, which allow the error correction coefficient to vary across panels. The other two pool the data in the sense that they restrict all of the error correction terms to be the same. Since the error correction term is concerned with the short-run dynamics and both the theory and the empirical evidence suggest that short-run dynamics differ across countries, the group mean estimators are the appropriate choice. Of the two mean group estimators, one normalizes the data by the length of the time series in each panel. According to Westerlund, this may affect hypothesis testing in relatively small time series,

especially if the number of lags is relatively large. Therefore, the fourth test, which Westerlund labels G_τ, is the most relevant. The G_τ test results provide support for the existence of a cointegration relationship with six of the nine explanatory variables at the 5% level. These results are summarized in Table 2.

While these tests do provide evidence that a cointegration relationship exists with the majority of the explanatory variables, it obviously does not say that one exists with *all* of the variables. Particularly, the *p*-value from the G_τ test for the cash surplus/deficit is very large. This result is not especially surprising as the Im-Pesaran-Shin panel unit root test rejects the null of a unit root for the cash surplus/deficit at the 1% confidence level.

Conveniently, however, standard estimation and inference techniques are valid in panel error-correction models even if some of the variables are I(0) as long as some of the variables are cointegrated and the model is stable (Pesaran et al, 1999). The Westerlund tests show convincingly that some of the explanatory variables are cointegrated, and stability of the model only requires that the error-correction term, denoted ϕ in equation (2), is less than zero. To test the negativity of the adjustment term, equation (2) is estimated to see the sign and significance of ϕ. The PMG estimation returns a coefficient of -0.29 and it is significant at the 1% level (*p*-value = 0.00). Individually, the sign of the adjustment term is negative in 21 of the 23 countries in the panel and is very small and insignificant in the two countries where the sign is positive. Taken together with the Westerlund test results, this provides strong evidence for the existence of a cointegration relationship.

Finally, accurate PMG estimation requires a number of standard conditions, including normality and homoskedasticity of errors, no serial correlation, and correct specification. I follow Haque et al (1999) and de Serres and Pelgrin (2003) in the choice of tests used for these conditions. The tests are the Jarque-Bera test of normality in residuals, which has the null of normality; the Breusch-Pagan test of homoskedasticity, which has homoskedastic errors as the null; the Breusch-Godfrey tests for residual serial correlation, which has the null of no serial correlation; and Ramsey's RESET test for omitted variables, which has the null of no omitted variables. The results for all of these tests are presented in Table 3. The tests for normality, heteroskedasticity, and omitted variables do not raise any red flags: of the 23 countries in the sample, three, one, and two countries, respectively, reject the null of normality, homoskedasticity, and no omitted variables at the 5% confidence level.

The serial correlation tests provide a bit more cause for concern. The Breusch-Godfrey test, which allows for higher-order serial correlation, rejects the null of no serial correlation at the 5% level in 8 of the 23 countries. As Haque et al (1999) describe, common causes of serial correlation are omitted variables, serially correlated explanatory variables that are heterogeneous but constrained to be equal, and excluded lags. The functional form and Hausman tests performed previously make the first two causes relatively unlikely in this case. In terms of excluded lags, it is possible that higher order lags would be appropriate. Unfortunately, the relatively short time component of the data does not allow for inclusion of higher order lags while still maintaining a long enough panel for PMG estimation to be possible.

If serial correlation is indeed an issue in the full panel, it could have two important effects. First, it could make the standard errors inconsistent and generally too small. In order to understand the relevance of this issue, it is important to remember that the purpose of this section is to obtain *coefficient estimates* on the relevant variables, as a baseline against which to compare China. Under-predicted standard errors will inflate *t*-statistics and lead to potentially incorrect findings of significance. In light of this, all findings of significance should be interpreted with care. However, this effect will not impact the coefficient estimates, which are of primary interest for the ultimate application to China.

The second issue with serial correlation is that coefficient estimates may be inconsistent in dynamic models, which would present a much more severe problem for the China application. However, as Wooldridge (2002) explains, serial correlation in the errors does not necessarily lead to inconsistent estimates even in the presence of a lagged dependent variable. Inconsistency arises only if the order of serial correlation is the same as the lag of the dependent variable. The model used in this paper includes only one lag of the saving rate, so inconsistency will only be an issue if there is first-order serial correlation. To assess this, Table 3 also includes the results of the alternative Durbin-Watson statistic, which tests strictly for first-order serial correlation in the errors. This test only rejects the null of no serial correlation at the 5% level in four of the 23 countries. While this is still a larger number than one might hope for, it is considerably less worrisome than the results of the Breusch-Pagan test and suggests that inconsistency in the full panel estimates may not be a critical issue.

1.3 RESULTS

As explained previously, the main goal of the model developed in this section is not to draw policy implications or other inferences. Rather, the purpose is to apply the coefficient estimates to data from China in order to obtain predicted values for China's saving rate. Therefore, this section will only delve briefly into the meaning of the various findings.

For PMG estimation, the parameters of interest are the long-run coefficients and the adjustment parameter. The values for these parameters are reported in Table 4. The findings largely match expectations, although the high levels of significance should be interpreted with caution since serial correlation may be shrinking the calculated standard errors, as explained above. The sign of the dependency ratio, income growth, government cash surplus/deficit, private credit, out-of-pocket health expenditure, and income level all match the theoretically predicted sign. The real interest rate, which has a theoretically ambiguous sign, returned a relatively large and significant positive coefficient. This implies that the substitution effect of high interest rates is stronger than the income effect. That is, when interest rates are high, people will save in order to earn the higher return on their money, rather than spend more because of the increased expected income.

Stock market capitalization returned a small but positive and significant sign. This result is somewhat at odds with the theory, which seems to more strongly suggest a negative sign. However, as explained above, this could reflect either that high-saving and high-wealth periods in an individual's life tend to correspond or that stock market capitalization is actually capturing various aspects of financial market

development rather than wealth. Therefore, the positive sign is not particularly shocking and the first response should be to look for stronger proxy variables for wealth, rather than reassess the theory.

Perhaps the most interesting variable in the model is corporate saving. As discussed previously, the empirical impact of corporate saving on the household saving rate has largely been ignored. Even worse, many researchers who use the private saving rate (rather than the household saving rate) as their dependent variable actually assume that corporate and household savings offset at a one-for-one pace. However, the estimation here returned a significant and fairly large *positive* coefficient on corporate saving in the long run.

Because of this unexpected result, the short-run impact of corporate saving is also included in Table 4. In keeping with the offset theory, there is a significant negative impact in the short run. However, it is considerably less than one and is almost exactly equal in magnitude to the long run coefficient. It is outside the scope of this paper to analyze the result much further, but it is certainly a question that requires more empirical attention before researchers continue to assume a perfect offset in their work.

PART 2
Saving in China

The revious section built a baseline against which to compare China by establishing a model of saving rates that fits across countries. The goal of this section is to see how "special" China is (i.e. how different from other countries) by seeing how well the Section 1 cross-country model fits China's data. Part 2.1 explains how the numbers from Section 1 are applied to China and presents the results of that application. Section 2.2 discusses those results in the context of what China is doing to address the savings glut and what still needs be done.

2.1 MODEL APPLICATION TO CHINA

Methodology and data issues

The basic premise of the application to China is to take the relationships identified in Section 1 (i.e. the estimated slope coefficients and intercept) and apply them to China's data. That is, I will take equation (1) from Section 1, namely,

$$SAV_{it} = \mu_i + \lambda_i SAV_{i,t-1} + \delta_{i10} DEPRATIO_{it} + \delta_{i20} GINC_{it} + \delta_{i30} LINC_{it} + \delta_{i40} SUR_{it} + \delta_{i41} SUR_{i,t-1} + \delta_{i50} CRED_{i,t} + \delta_{i51} CRED_{i,t-1} + \delta_{i60} RIR_{it} + \delta_{i70} OOPHLTH_{it} + \delta_{i80} CAP_{it} + \delta_{i81} CAP_{i,t-1} + \delta_{i90} CORP_{it} + \delta_{i91} CORP_{i,t-1} + \varepsilon_{it}$$

and set all slope coefficients and the intercept equal to the estimates from Section 1. I then use China's data for the explanatory variables to return estimates of the household saving rate, $\widehat{SAV}_{it}$, for China.

There are two difficulties with this application method. First, the mean group aspect of pooled mean group estimation assumes heterogeneity across countries in the short-run coefficients as well as the intercept. Since China is excluded from the dataset used for the original model, country-specific estimates for these parameters are not attainable. However, the mean group estimator, which is simply the unweighted average of the individual coefficients for each country, is a consistent estimator of the effect across countries. Since the ultimate goal is to compare China to the baseline of other countries, using these mean group values for the short-run coefficients and intercept should actually give a good estimate of how China compares to the average country (in both the colloquial and technical sense of the word).

A second issue is data availability. Unfortunately, data on some variables included in the model are unavailable for China. Namely, the data sources for household saving, household income, corporate saving, government cash surplus/deficit, and the real interest rate do not have data for China. As a substitute for the saving rate taken from the OECD, data from the United Nations System of National Accounts is used. This data overlaps with the OECD data in the original cross-country sample for 384 observations and the two have a correlation of 0.941. Next, following many prior saving rate researchers (e.g. Masson et al, 1998; Jappelli and Pagano, 1994), per capita GDP is substituted for household income. This data is taken from the World Bank WDI and has a 0.882 correlation with the OECD income data in 623 overlapping observations. For corporate saving, data from the IMF's 2009 Regional Economic Outlook report on Asia and the Pacific is used. This data is only

on China, so the correlation with the corporate saving data for the countries in the cross-country sample cannot be directly tested. However, the IMF China data also includes household saving rates, and this data has a 0.745 correlation with the UN System of National Accounts data. As a substitute for government cash surplus/deficit data from the World Bank WDI, a similarly named variable from the IMF International Financial Statistics is used. This variable has a 0.587 correlation with the WDI data in 296 observations. Finally, in place of the World Bank's long-term interest rate, the benchmark rate drawn from Trading Economics' data on China is used.

Results

With these issues in mind, Figure 2 presents the predicted values for China's household saving rate versus the actual values. To reemphasize the point of this application, the predicted values reported here are based *only* on the relationships and variables that are relevant across countries, so any China-specific factors are not included. In addition, since the intercept used here is simply the mean group estimate from the Section 1 cross-country model, these predicted values exclude any Chinese fixed effects.

Two points stand out in these results. First, the predicted values are consistently below the actual values. The root mean squared error (RMSE) of the predictions is 4.51. To provide a sense of how large this value is, Figure 3 presents the RMSE for all of the countries in the sample. Importantly, in order to facilitate comparison with China, these values are obtained by using the mean group estimates

of the short-run coefficients and intercept, despite the fact that country-specific values are available for the countries in the original sample (i.e. all the countries besides China). By this measure, China is the worst-predicted of the 24 countries. With the exception of South Africa, the difference in fit between China and the other countries is quite large: China's RMSE is a full 30% greater than third-place Finland and over twice as large as the average.

However, the difference is even more pronounced when the sign of the error is taken into account. The really interesting fact about China's saving rate is not how unusual it is, but more specifically how *high* it is compared to other countries. Root mean squared error measures quality of fit in general, but it loses information about the sign. Figure 4 shows the average difference between the predicted and actual values for each country: it is visually striking how much larger this value is for China than for other countries. On average, the actual saving rate in China is 4.33 percentage points higher than the cross-country model's prediction, which is almost twice as wide a gap as the second most under-predicted country. This implies that features not captured in the model have a considerable effect in driving up China's actual saving rate. So to answer the original question of whether China is in some way "special", there is no doubt that these results provide support for the theory that China-specific factors do play a role in explaining China's high saving rate.

However, there is a second—and at least equally important—point to take away from the results. Despite being noticeably under-estimated, the model's predicted saving rate for China is still extremely high by international standards. The predicted values range from 23.4% in 1995 to 34.9% in 2007. To put this in

perspective, Figure 5 shows the predicted values for China along with the maximum and average predicted value from all the other countries in the sample for each year. China's predicted value is much higher than the next-highest predicted value in every single year, and the China estimates range from three to five times above the average! So although it is true that the model does significantly under-predict China's saving rate, implying the importance of excluded factors, there is also a very large portion of China's high saving rate that is the result of drivers which are not unique to China.

2.2 ADDRESSING THE SAVINGS GLUT

The above results suggest that the factors driving up China's saving rate can be divided into two categories: those that are captured by my model and those that are more specific to China. As mentioned previously, there are a number of theories suggesting that China is unique, and these serve as the basis for understanding why China's saving rate is significantly higher than predicted. However, since the importance of these variables is determined only by the error in my model, it is outside the scope of this paper to identify which of the various theories is best supported.

Chinese officials are keenly aware of the need to rebalance the economy towards domestic consumption, and a number of steps have been taken in recent years to address the savings glut. In addition to discussing the reasons that China's saving rate is so high, this section describes both the policy moves that China has already made and what remains to be done. It is worth nothing that this section is not intended to cover all policies that could reduce China's current account. A number of

long-standing Chinese policies, such as the export-led growth strategy and possible currency manipulation, may have important impacts on the current account. However, although the current account imbalance does serve as a motivation for this paper, the focus has been on the household saving rate. The discussion in this section is therefore confined to policies that are important for adjusting the saving rate.

Captured drivers

As described in Part 1, demographic effects are among the primary implications of the LCH, and my model captures this relationship through the dependency ratio. This may be an especially potent consideration in China where a one-child policy imposed since 1978 has greatly reduced the size of the younger cohorts (Modigliani and Cao, 2004; Huang and Tao, 2011; Yang, 2012). Figure 6 illustrates this demographic shift through the steady and dramatic decline in the youth dependency ratio[9] from over 64 children per 100 working age adults in 1978 to only 26 in 2011.

This effect raises China's saving rate in two ways. First is the typical channel described in Part 1. Namely, young people draw upon expected future earnings to finance higher consumption rates; with fewer young people in the age structure, this depressing effect on the saving rate will not be as strong (Ge et al, 2012). The second channel is more specific to China. China has a weak social safety net for the elderly, and Chinese culture generally expects children to support their parents (Modigliani and Cao, 2004). Since the existing policy restricts parents from having multiple

[9] The youth dependency ratio is defined as the number of individuals below 15 years old per 100 working age individuals (between 15 and 64 years old).

children, this means that current members of the Chinese labor force will not be able to rely as heavily on their children once they retire and therefore must save more over their own working lives in order to finance their retirement. This second effect may not be captured by the coefficient estimated in Part 1 since the OECD countries in the original dataset generally have stronger social safety nets and the elderly rely less on their children for support.

Of course, the one-child policy is not primarily a mechanism for adjusting the saving rate and it has many other important implications, both good and bad. For a number of reasons, many observers believe that Chinese officials are currently considering relaxation of the fairly strict policy (Wee and Li, 2013). While there are clearly many elements to take into account, such as social stability and sustainability of the pension system, decision makers should certainly factor the policy's impact on the savings glut into their evaluation.

Many researchers believe that habit formation is also an important factor in determining saving rates (e.g. Carroll and Weil, 1994). My cross-country model, like the vast majority of recent saving rate models, attempts to capture this effect by including lags of the saving rate as explanatory variables. The large magnitude of the estimated coefficient on the lagged saving rate plays an important role in the high predicted values for China's saving rates. However, as described in Part 1, habits are most likely formed in consumption and not in saving. As long as incomes grow relatively slowly, the lagged saving rate should do a decent job at capturing this effect. However, from 1978 to 2007, Chinese wages increased by a factor of seven (Yang, Chen, and Monarch, 2010), and from 2001 to 2011 wages rose by a whopping

14% annually on average (Flannery, 2011). If consumption is relatively sticky, then rapid income growth could imply an increase in the saving rate independent of the fact that higher-income individuals tend to save more. Of course, there is also evidence that consumption generally tracks income quite closely (Campbell and Mankiw, 1991). To the extent that income growth simply allows households to overcome the significant liquidity constraints discussed below, it is also possible that saving rates would not be greatly affected.

Unfortunately, there is little that policymakers can do on this front. Habits simply change gradually, and the welfare-increasing effects of income growth are almost certainly worth the destabilizing impact of higher saving. However, as the rate of income growth inevitably slows, the elevating impact on saving rates should also weaken.

Large structural changes in the late 1990s have also had a profound impact on China's economy. Through the mid-1990s, the state-owned enterprises (SOEs) that were established in the 1978 reforms dominated the Chinese economy. Under what has been called the "iron rice bowl" system, employees were guaranteed employment and benefits that included healthcare, education, and a strong pension. However, in the mid-1990s, massive financial losses forced China to aggressively reform the SOE system. Starting in 1994, China began to privatize the small and medium enterprises. Then in 1997, as losses continued to mount, China was forced to end the iron rice bowl. Tens of millions of Chinese lost their jobs and many that were still employed lost the significant benefits that they had received before (Cai et al, 2008).

As a result of these reforms, a huge number of people have lost their health coverage and there is not a deep private insurance market to fill the gap (Zhou, 2009). As described in Part 1, the inability to pool risk raises the need for precautionary saving. This issue is made worse by the fact that China's health system has been plagued by poor primary care and high costs. Poor primary care, in terms of both access to doctors and the quality of those doctors, means that individuals are more likely to get sick because of the lack of preventive medicine and that health problems are less likely to be taken care of at an early stage. Expensive care then makes the financial risk of getting sick more severe. Between the heightened risk of health problems, high cost of care, and lack of options for risk pooling, the need for precautionary savings is extremely high[10] (Chamon and Prasad, 2010; Blanchard and Giavazzi, 2006). This factor is captured in my model through the out-of-pocket health expenditure variable, and Figure 7 shows China's out-of-pocket health spending compared to the other countries in the sample. China's figures have dropped markedly since peaks in the early 2000s, but the share of health spending that the Chinese pay out-of-pocket is still over twice as high as the sample average.

These numbers reflect the fact that China recognizes the importance of improving the health system and has already taken some measures to do so. On the primary care front, China is building more clinics and primary care facilities and working to improve the quality of care. In 2011, China's State Council committed to implementing a general practitioner system by 2020, which will set a higher minimum skill level with standardized training for primary care physicians and

[10] This effect is exacerbated by the heavy liquidity constraints discussed below.

ensure that there are two to three doctors for every 10,000 people in an area (Eggleston, 2012). These improvements will also have an impact on reducing the high cost of care, which is in large part a result of the overuse of hospitals when cheaper clinics would be sufficient.

Major strides have also been made in the availability of insurance. In 2001, 60% of total health expenditures were paid out-of-pocket; by 2011, that share had dropped to 36%. This decrease may be due to the adoption of the New Cooperative Medical Scheme (NCMS), a publicly funded insurance program. Where the majority of Chinese were uninsured just a decade ago, now 95% have health insurance, mostly through the voluntary adoption of NCMS insurance (Eggleston, 2012).

However, there is still significant room for improvement. While coverage is now very broad, it is also very shallow and most expensive procedures remain uncovered. Not only does this mean that serious health problems still pose a substantial financial risk, but a study by McKinsey and Co. found that most policyholders in China do not understand the limits of their coverage and often incur large out-of-pocket expenses unexpectedly (Sussmuth-Dyckerhoff and Wang, 2010). Because of this, researchers have found that NCMS insurance plans do not decrease out-of-pocket health spending and that the likelihood of large spikes in healthcare costs actually increases (Wagstaff et al., 2009; Lin and Lei, 2009). Deeper coverage and better communication about the limitations of insurance could therefore provide a major improvement in the effectiveness of risk pooling, lowering the need for precautionary saving.

A number of incentive distortions in the healthcare system also increase the cost and reduce the quality of care. One of these distortions is a payment scheme that rewards physicians for seeing large numbers of patients. This encourages doctors to discharge patients too early and/or send difficult patients on to hospitals, where care is more expensive. A second distortion arises from kickback payments that doctors receive for prescribing expensive medicines. In order to supplement meager pay, many doctors will prescribe unnecessary medications to poorly informed patients (Currie et al, 2011; Hahn and Passell, 2011). This raises the cost of medical treatment and can be harmful to the patient. There are no obvious fixes for these distortions, but mitigating measures could include stricter supervision of the quality of care and raising doctors' pay to reduce incentives for profitable but unsafe measures.

Uncaptured drivers

The economic restructuring of the late 1990s has also had some important impacts that are not captured in the cross-country model. The first of these is uncertainty created by the loss of job security and privatization in general. From 1996 to 2002, about 32 million workers were laid off (Yang, Zhang, and Zhou, 2010) and the urban unemployment rate rose from 6.1% to 11.1% (Giles et al, 2005). During the current transitional phase, this extreme uncertainty could have raised the saving rate (Chamon and Prasad, 2010; Yang, Zhang, and Zhou, 2010). Chamon and Prasad (2010) point out that this form of uncertainty is difficult to quantify since it is largely a result of fear over the transition rather than income uncertainty.

Next, the shift from publicly provided to fee-based education may drive up saving rates in the short term (Yang, Zhang, and Zhou, 2010; Jha et al, 2009; Chamon and Prasad, 2010). Fee-based education requires families to save when they have young children to pay for the child's future education expenses. In the long run, the amount that households with young children save for future education should be cancelled out by the amount that households with school-age children pay for current education[11]. However, during the transition period there will be many families that did not save up for future education expenses since they expected education to be provided publicly. Those families that did not save for education but now have school-aged children may not be able to send their children to school at all. Therefore, families with young children will begin saving for future education but fewer families will be drawing down savings to pay for current education, which could raise the saving rate at the national level.

Finally, reforms of the pension system increased contributions and reduced the replacement rate[12] from 80% in the early 1990s to about 50% in 2007 (Yang, 2012). The life-cycle model predicts that expected future pension payments should be incorporated into current consumption smoothing. This means that the unexpected reduction in pension wealth caused by the pension reforms will make the past savings of workers insufficient for retirement. To compensate for that fact, households must now save more in preparation for retirement (Ma and Wang, 2010; Blanchard and Giavazzi, 2010; Yang, Zhang, and Zhou, 2010). Therefore, the weakening of pension

[11] This assumes relative certainty and constancy in the price of education.
[12] The replacement rate is the percentage of a retiree's previous income that the pension pays during retirement.

systems could have a positive impact on the saving rate during the ongoing transition period.

All three of these factors are likely increasing the household saving rate as families transition to the new systems, and since they are not captured by my model they may contribute to the gap between the actual saving rate and my predicted values. However, future cohorts should adjust to the new market system and incorporate new expectations for education costs and pension payments into their saving behavior. This means that in the long run there should not be a significant impact, and to the extent that these factors are responsible for the high saving rate, the savings glut should shrink without any government intervention.

There are also a number of China-specific theories to explain the high saving rate beyond the effects of restructuring. One of these is heavy liquidity constraints on households. Interestingly, by the measure of credit availability included in my model as well as many other national metrics, access to credit is actually better in China than international averages. However, these macroeconomic data points mask the underlying story.

China's weak and highly distorted financial systems are well documented (e.g. Dobson and Kashyap, 2007), but in many ways Chinese policymakers have successfully improved the country's banks. Since the beginning of the market reform era in 1978, the banking system has been undergoing a gradual transformation from carrying out the state's agenda to operating as market-driven institutions. This process accelerated after China's accession to the World Trade Organization in 2001, which marked the beginning of an aggressive restructuring program. Since then,

large steps have been taken in strengthening banks' balance sheets, establishing greater supervision, and improving profitability (Aziz, 2006; Okazaki et al., 2011).

However, there has been little improvement in easing liquidity constraints on households. The major state-owned banks that dominate the Chinese financial market continue to strongly favor state-owned enterprises and large corporations in key industries, making it difficult for households to access credit (Barboza, 2012; Lin et al, 2011; Wei, 2010). So although my cross-country model is intended to control for liquidity constraints, since the issue is in distribution rather than overall credit availability, my model is ineffective at capturing the effect in China. However, the results from Part 1 show that liquidity constraints do drive up saving rates. This suggests that these distribution problems may contribute to the gap between the actual saving rate and my model predictions. An adjustment in funding priorities away from large enterprises and towards households could be a valuable policy shift for reducing China's savings glut.

Income inequality may also be an important issue in China. Significant inequality may increase saving rates because higher-income households tend to save more. When income inequality is severe, such a large proportion of aggregate household income goes to wealthy households that their high savings dominate the low saving rates of poor households. Because of this effect, some early researchers considered income inequality as a variable in cross-country regressions, but consistently found it to be insignificant (e.g. Edwards, 1995). However, income inequality is especially large in China, with an officially reported Gini index of 0.47 in 2012 (Qi and Kazer, 2013). This is notably above the 0.4 level which generally

signals a risk of social instability, and the actual figure may be much worse. China is notorious for manipulating national statistics, and a major recent study by a Chinese university reports that the Gini index has risen to an alarmingly high 0.61, the second highest level in the world (Fisher, 2012; “To each, not according to his needs”, 2012). This extreme inequality has led many economists to believe that income inequality may in fact play an important role in driving up China's saving rate (e.g. Blanchard and Giavazzi, 2006; Yang, Zhang, and Zhou, 2010).

Chinese officials are very aware of the importance of reducing inequality. In February 2013, the new Xi Jinping administration set forth a 35-point plan to address income inequality. The plan includes some tangible measures, such as raising the minimum wage to 40% of the average salary by 2015. Other important features include cutting down on corruption and reforming the huge non-salary benefits for government officials (Pei, 2013). However, given China’s poor record in following through on promises to reduce inequality, many Chinese and outside observers see the plan as too vague to be trusted. In order to address inequality’s impact on the savings glut, as well as on social stability and welfare, the new Chinese government must be willing to sacrifice some of the luxuries past leaders have enjoyed and follow through on their commitments.

As described above, the one-child policy has raised the saving rate by decreasing the size of younger cohorts in China, but it may also have a more unexpected effect: "competitive saving". Chinese society strongly values having sons, and since the implementation of the one-child policy, prospective parents have routinely taken advantage of inexpensive ultrasound B machines to avoid having

daughters (Wei and Zhang, 2009). According to the World Bank's World Databank, in 2011 only 841 females were born in China for every thousand males, the lowest sex ratio at birth in the world. In fact, the World Databank shows that China has had the greatest disparity between boys and girls at birth in every year since 1989[13]. This has led to a major gender imbalance and created serious competition in the marriage market. To attract a wife, many young men and their families will now save "competitively" as a sign of social status (Wei and Zhang, 2009; Du and Wei, 2011; Yang, 2012). Again, the one-child policy has implications for many characteristics of Chinese society other than the savings glut, but this is yet another consideration for policymakers to keep in mind when deciding the future of the one-child policy.

Finally, Huang and Tao (2011) make an interesting case that distortions in factor markets—such as capital, resources, labor, and land—are driving up the saving rate. Although China has liberalized most product markets, the government still affects the factor markets in a number of ways that generally decrease factor costs. For example, land prices are artificially set and limitations on migration from rural to urban areas prevent labor mobility. Huang and Tao argue that these distortions raise the saving rate through two channels. First, they act as subsidies for investment, which shifts funds away from consumption. Second, they are "equivalent to taxes on owners of these factors, mainly households" (p. 12). This may contribute to further income inequality and raise saving rates in that way.

Huang and Tao point out that some progress has been made in removing factor market distortions. In capital markets, the financial system reforms described

[13] This statistic is not reported annually, but in all seven years reported from 1989 to 2011, China's sex ratio is considerably lower than any other country.

above are moving in the direction of liberalization, although households and small to medium enterprises still have difficulty accessing capital. Environmental costs are also coming closer to their full value, as the government is making a concerted effort to protect the environment from rapid degradation. In labor markets, the household registration (*hukou*) system, which limits the ability of rural households to move to urban areas, is still in place. However, the Chinese government recently stated that it would accelerate reform of the system (Back, 2012) and labor mobility has improved considerably. Only in land privatization does there seem to be little progress, despite pressure from Chinese farmers and Western observers. Continued movement towards market-determined factor prices in all of these areas should have a positive impact on equality and welfare, in addition to further reducing the savings glut.

CONCLUSION

Summary of Findings

Global imbalances continue to be a major destabilizing force in the international economy, and world leaders face an extremely complex task in addressing them. The focus of this paper has been to make a contribution towards the understanding of global imbalances by studying one important and unusual component: the Chinese household saving rate. Specifically, the goal has been to evaluate the relevance of various theories which imply that China is "special" compared to other countries in the sense that policies and structural features unique to China are driving up the saving rate.

To analyze this question, a two-step approach was taken. Part 1 draws upon the fairly extensive literature on cross-country saving rates to develop a baseline model using a sample of 23 countries and excluding China. Using the pooled mean group method, this model was estimated to obtain coefficients that should represent saving rate relationships for the typical country. Part 2 then compares China to this baseline by applying those coefficients to data from China. The extent to which the actual Chinese saving rate exceeds the predicted values obtained from this application should reflect the amount that China-specific factors are responsible for raising the saving rate.

The findings from this application tell a two-part story. First, there is a considerable difference between the actual Chinese saving rate and the predicted values obtained from the model. This can be seen in the fact that the root mean squared error is greater for China than for any other country in the sample. Even more impressively, when the sign of the error is taken into account, China is nearly twice as under-predicted as the next closest country. This result suggests that China-specific factors do play an important role in explaining the high household saving rate.

However, despite the fact that the model predictions fall well short of the actual values, the predicted values for China are still much higher than for any other country. In fact, in some years China's predicted value was over five times as high as the sample average and nearly three times the next highest country. This means that although the China-specific theories are not irrelevant, the relationships which

determine saving rates in the typical country are responsible for a very large share of China's high saving rate.

More specifically, the results provide evidence that demographic shifts, a weak healthcare and insurance system, slow-moving consumption habits, and liquidity constraints on households are particularly relevant factors for explaining China's high saving rate. Additionally, China-specific elements including transitions in education and pension programs, severe inequality, competitive saving, and distortions in factor markets may explain the gap between China's actual saving rate and my model's predicted values. Some of the transitional effects will correct themselves over time; on other fronts, Chinese officials seem to be aware of the issues and are taking steps to address them. However, there is still significant work to be done. Notably, the results here suggest that deeper healthcare coverage, improved access to credit for households, and an end to the one-child policy would all lower the saving rate. Although many of these goals will not be easy to achieve, lowering the saving rate and shrinking the Chinese savings glut is a critical step towards reducing global imbalances and stabilizing the world economy.

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TABLES AND FIGURES

TABLE 1

INFORMATION ON VARIABLES

Variable	Abbreviation	Expected Sign	Data Source
Dependency ratio	DEPRATIO	-	WDI
Household disposable income growth	GINC	+	OECD
Log per capita disposable household income	LINC	+	OECD (income); IFS (conversion rates)
Government cash surplus/household disposable income	SUR	-	WDI
Private credit/GDP	CRED	- (+)	WDI
Real interest rate	RIR	+/-	OECD (interest rate); WEO (inflation)
Out-of-pocket health expenditure/total health expenditure	OOPHLTH	+	WDI
Stock market capitalization/GDP	CAP	- (+)	GFD
Corporate saving/household disposable income	CORP	-	OECD

* +/- indicates theoretical ambiguity. Signs in parentheses indicate possible ambiguities but with weaker theory.

** WDI = World Bank World Development Indicators; OECD = OECD Statistics; WEO = World Economic Outlook; IFS = IMF International Financial Statistics; GFD = World Bank Global Financial Development database.

TABLE 2

WESTERLUND G_τ COINTEGRATION TEST RESULTS

Variable (see Table 1 for definitions)	G_τ Test p-value
DEPRATIO	0.00
GINC	0.00
SUR	0.016
CRED	0.736
RIR	0.021
OOPHLTH	0.126
CAP	0.00
LINC	0.204
CORP	0.01

TABLE 3

P-VALUES FOR VARIOUS SPECIFICATION TESTS BY COUNTRY

Country	Normality	Homoskedasticity	Serial Correlation (Durbin-Watson)	Serial Correlation (Breusch-Godfrey)	Functional Form
Austria	0.737	0.675	0.260	**0.016**	0.857
Australia	0.781	0.091	0.420	**0.048**	0.162
Belgium	0.374	0.280	**0.023**	**0.001**	0.693
Canada	**0.021**	0.434	0.959	**0.029**	0.158
Czech Republic	0.869	0.067	0.905	0.906	0.259
Denmark	**0.002**	0.872	0.748	0.950	0.097
Finland	0.514	0.943	0.533	0.667	0.473
France	0.661	0.665	0.772	0.840	0.800
Germany	0.950	0.956	0.176	**0.015**	0.640
Hungary	0.832	0.941	0.706	0.130	0.257
Italy	0.761	0.866	0.270	**0.026**	**0.029**
Korea	0.892	0.143	0.139	**0.001**	0.173
Netherlands	0.813	0.392	0.663	**0.015**	**0.003**
Norway	0.139	0.327	0.989	0.439	0.140
Poland	0.709	**0.033**	0.102	**0.000**	0.609
Portugal	0.829	0.645	0.374	**0.000**	0.776
Slovakia	0.173	0.467	0.377	0.566	0.888
Slovenia	**0.003**	0.292	0.877	0.577	0.527
South Africa	0.876	0.768	0.213	**0.008**	0.512
Sweden	0.657	0.693	**0.011**	**0.001**	0.115
Switzerland	0.740	0.614	0.786	0.074	0.550
United Kingdom	0.850	0.672	**0.001**	**0.001**	0.875
United States	0.474	0.429	**0.006**	**0.001**	0.198

* The test statistics shown are *p*-values with values that reject the null hypothesis written in bold for the reader's convenience. The tests used are as follows:

Normality: Jarque-Bera—null hypothesis of normal residuals
Homoskedasticity: Breusch-Pagan—null hypothesis of homoskedasticity
Serial correlation: alternative Durbin-Watson and Breusch-Pagan—nulls of no serial correlation
Functional form: Ramsey's RESET—null of no omitted variables

TABLE 4

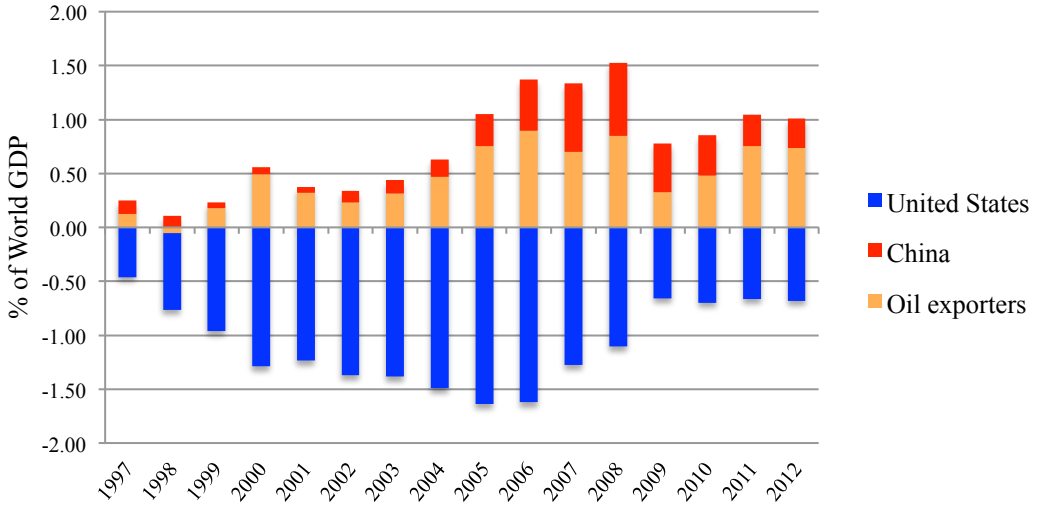
PMG ESTIMATION RESULTS[†]

Variable	Coefficient	Standard Error
(1) DEPRATIO	-0.149**	0.069
(2) GINC	0.249***	0.010
(3) LINC	0.185***	0.009
(4) SUR	-0.170***	0.017
(5) CRED	-0.002***	0.005
(6) RIR	0.297***	0.100
(7) OOPHLTH	0.152***	0.029
(8) CAP	0.007***	0.002
(9) CORP	0.236***	0.026
(10) EC	-0.289***	0.075
(11) CORP (SR)	-0.242***	0.063

[†] Lines 1-9 are the long-run coefficients from the PMG estimation. That is, they represent θ_j for $j=1,\ldots,9$ from equation (2). Lines 10 and 11 are the error-correction term and short-run coefficient for corporate saving, ϕ and δ_{91} from equation (2), respectively. The error correction term is of interest for the reasons described in section 1.2, while the importance of the short-run corporate saving coefficient is explained in section 1.3. However, these are both short-term parameters, so unlike the other coefficients in the table they are calculated using the mean group procedure (i.e. unweighted average of the panels with no homogeneity constraint).

FIGURE 1

CURRENT ACCOUNT IMBALANCES OVER TIME

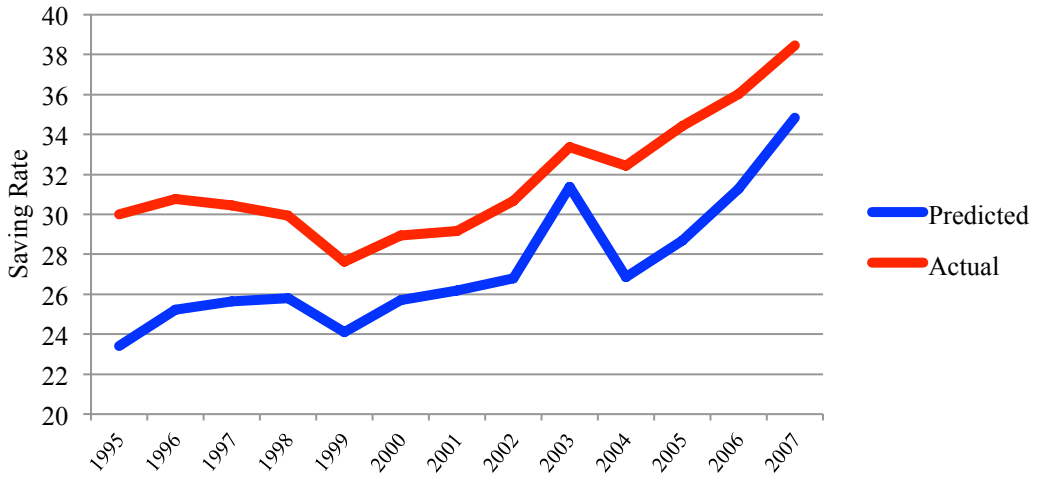


Source: IMF World Economic Outlook

FIGURE 2

CHINA HOUSEHOLD SAVING RATE

ACTUAL VERSUS PREDICTED



Source: United Nations System of National Accounts

FIGURE 3

ERROR IN SAVING RATE PREDICTIONS

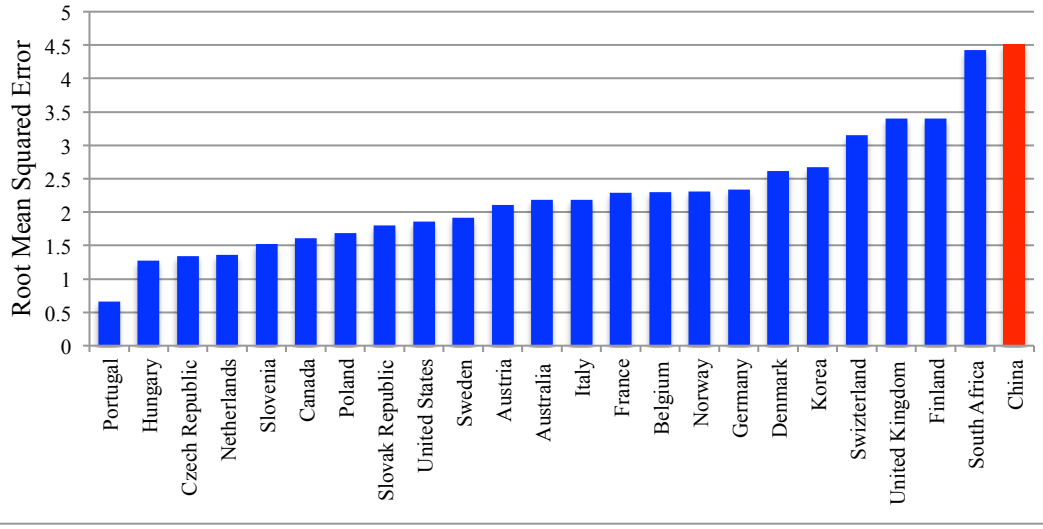


FIGURE 4

AVERAGE DIFFERENCE BETWEEN
ACTUAL AND PREDICTED SAVING RATE

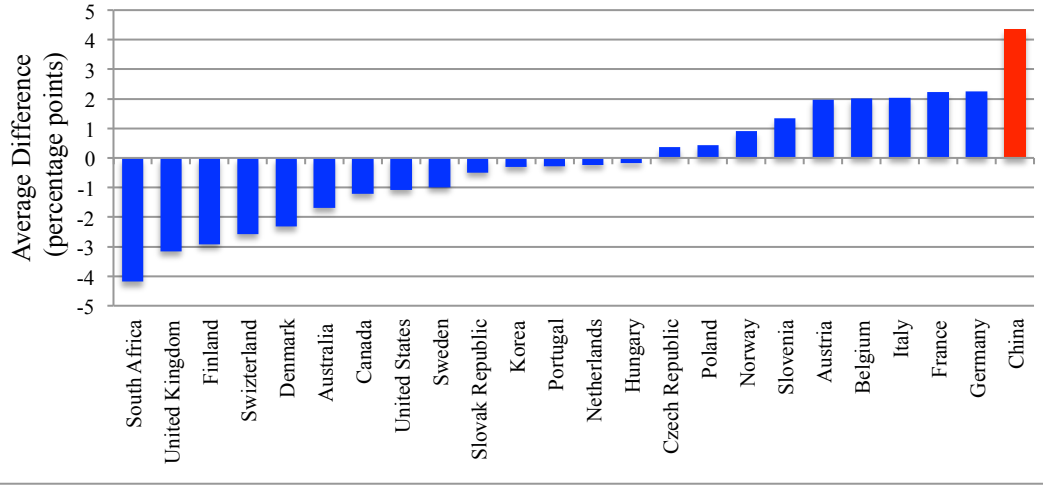


FIGURE 5

MODEL PREDICTION OF SAVING RATES
CHINA VERSUS SAMPLE AVERAGE AND MAXIMUM

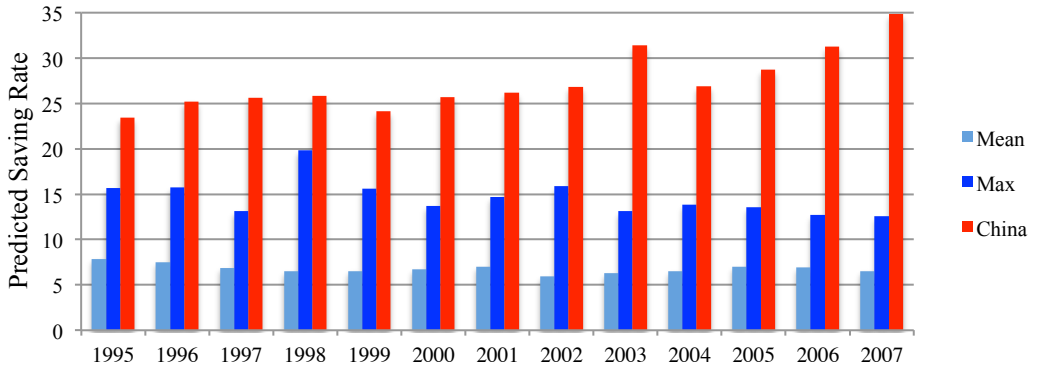
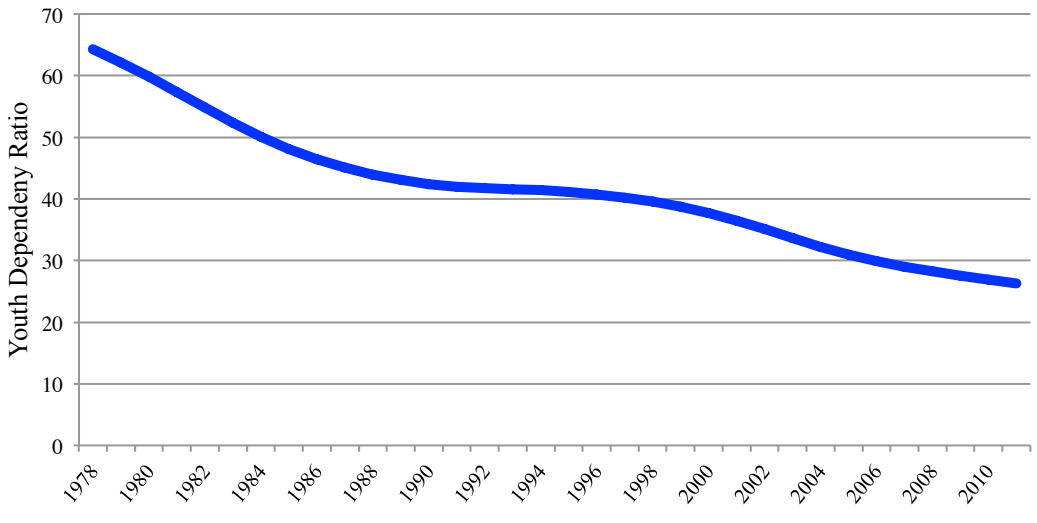


FIGURE 6

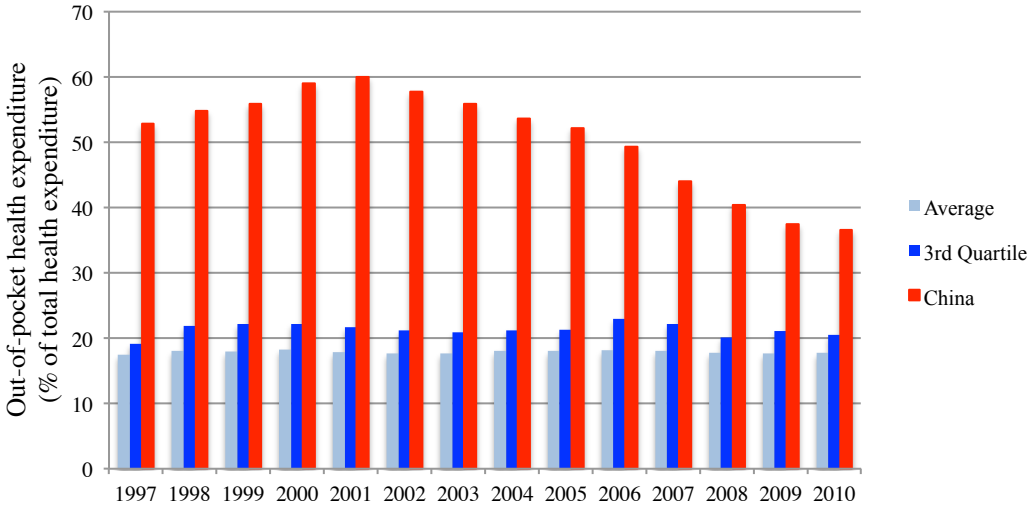
YOUTH DEPENDENCY RATIO IN CHINA



Source: World Bank World Development Indicators

FIGURE 7

OUT-OF-POCKET HEALTH SPENDING



Source: World Bank World Development Indicators