

Determinants of Private Saving in Turkey: An Update

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The Turkish private saving rate has declined over time and is currently low in international comparisons, in particular relative to developing Asia. This paper provides an update and extension of an earlier ERF paper on the same topic, based on 3 additional years of household survey data and revised demographic data. It also brings macro-data as well as ISE corporate saving data to bear on questions related developments in total and corporate saving. An equation estimated on macro-data for Turkey for 1988-2009 suggests that the decline in private saving is related to fiscal consolidation, an increase in credit availability, and a reduction in uncertainty (as proxied by inflation) following stabilization of the economy. Household budget survey data for 2004-08 show that a wealth effect also appears operative, with households who own their homes responding strongly to the business cycle (compared to tenants). Available corporate saving data for firms listed on the Istanbul Stock Exchange indicates that the key determinant of corporate saving appears to be profits, not dividend payments. The results suggest that, as financial deepening resumes after the current crisis, the private saving rate may decline again (directly, as credit becomes more widely available, and through a wealth effect if this increase in credit contributes to a rise in real estate values). We also find, based on Turkstat demographic projections, that demographic changes—a reduction in the youth dependency ratio combined with an increase in the old-age dependency ratio—will be at best neutral for the private saving rate. Meanwhile, reforms to social security may stimulate private saving over time, but this is uncertain as the social security reform also includes a lengthening of the contribution period, which should reduce private saving for retirement. The study concludes with policy prescriptions.

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1. Introduction

Turkey appears to belong to the set of countries that, other than in crisis times, have relatively low domestic saving rates, and relatively high current account deficits. Policy makers have been concerned about this low saving rate, and in search of measures to increase it, both with a view of increasing “domestic resource mobilization” and hence resources for investment and growth, and reducing the current account deficit, a main source of vulnerability, as demonstrated most recently in 2008.

While the Turkish current account deficit fell by two thirds in 2009 under the impact of the global crisis, Turkish history suggests that it will increase again as international conditions improve, hence the current account, and therefore the shortfall of saving compared to investment, remains a source of concern.

Turkish investment is relatively low in international comparisons, and one motivation for raising domestic saving is to raise investment. The recent literature suggests that one channel through which this could happen in the context of an open capital account (where the link between investment and saving is severed) is if equity stakes by domestic investors reduce agency problems and encourage foreign investors to bring in technical know-how.¹

¹ Aghion, Comin, and Howitt (2006) provide a model where higher domestic saving allows local entrepreneurs to take an equity stake in projects. This mitigates an agency problem and as a result encourages foreign investors, with the technical know-how, to participate in such projects.

While Turkey's saving rate has been the subject of considerable concern, it should be noted that it compares unfavorably mostly in comparison with high-saving Asian countries. Turkey's national saving rate is comparable to that in Central and Eastern Europe and is not much lower than that in the EU, or the Western Hemisphere countries. The situation is similar for the private saving rate. One might say that developing Asia is the outlier, not Turkey.

The contrast between countries like Turkey and developing Asia can perhaps best be understood in terms of research on the "allocation puzzle"—the mystery of why capital flows from countries with high marginal product of capital and high productivity growth (such as China) to countries with low marginal product of capital and low productivity growth. Gourinchas and Jeanne (2009) add distortions to incentives to save and invest to the neoclassical growth model and show that explaining the allocation puzzle requires distortions to saving that are strongly correlated with productivity growth. Countries like China score very poorly on the "saving wedge"—i.e. they appear to tax saving, while also having high productivity growth. A possible explanation for such saving wedges is poor financial intermediation in low income countries (the countries that also have high productivity growth). The inability of consumers to obtain loans from the financial sector makes for high precautionary saving as well as an inability to move consumption forward. Corporate saving would also be higher in the absence of bank lending.

Turkey, in contrast to China and other high-saving Asian countries, fits the neoclassical paradigm better, having both relatively high productivity growth and being a recipient of

capital flows on average. There does not seem to be a “tax” on saving which would cause saving to be low, given the high reliance on consumption rather than income taxes and the relatively well-developed banking sector. There would be no point trying to emulate China when it comes to the reasons for its high household saving rate, such as its undeveloped domestic financial system and general high level of social insecurity. Other policy avenues would have to be pursued, and we explore these in this paper.

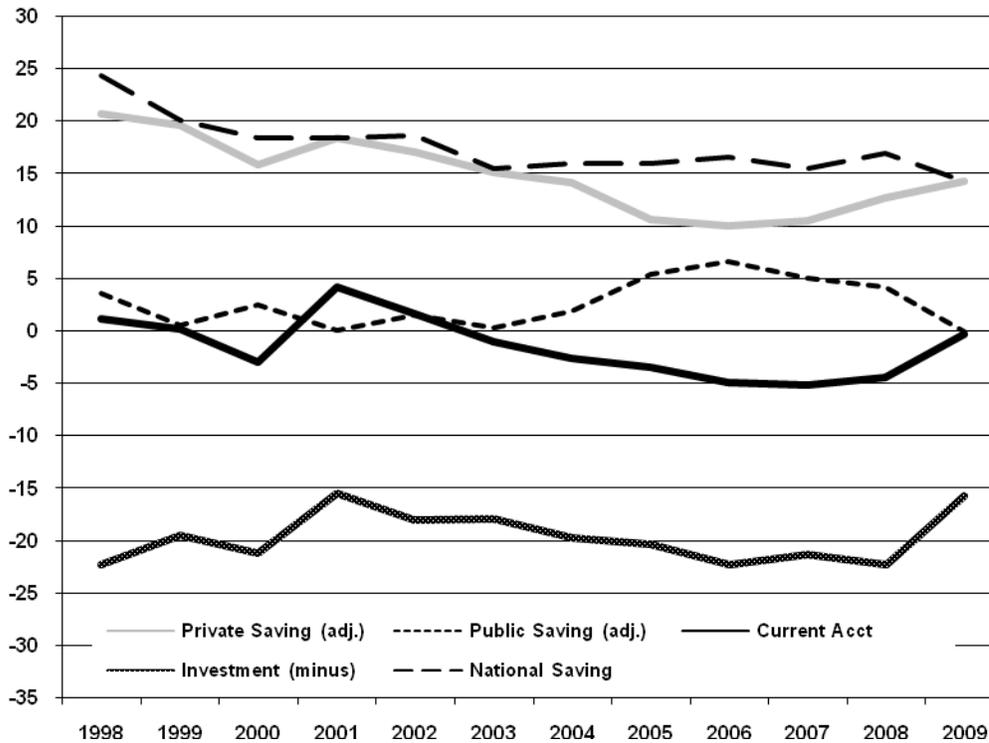
The recent Turkish context is that of a successful stabilization of the fiscal accounts and of inflation after the deep financial crisis of 2001, in the context of an IMF program. Policy credibility took some time to be established, and it was not until 2004 that expectations of default and inflation, as well as real interest rates, declined to moderate levels. The global context of saving glut and low interest rates were also supportive of these trends, with gross capital inflows (i.e. before reserve build-up by the banking sector including the Central Bank) of over \$150 billion (cumulative) in the period from 2004 through 2007. Credit, real estate and consumption booms followed,² even though Turks remained skeptical of the future as indicated by consumer confidence indicators.³ At

² Consumer credit rose from around 4% of total private consumption in 2003, to some 15% at the end of 2007. For consumer loans, the increase started relatively early, in 2003. Housing loans start to increase substantially in 2005. Overall, credit to the private sector does not pick up noticeably until 2004. 2004 is also the year real interest and inflation fall to around 10 percent. Housing prices bottomed out in 2003 and recorded large increases every year thereafter, through 2007.

³ In particular during 2004-05, when the largest decline in saving was observed, the CNBC-e indicator of “consumer expectation” showed more persons expected the economic situation and their finances to deteriorate rather than to improve over the next year. In theory, this should have called for an increase in saving, not a decrease, following the argument of Campbell (1987). Indicators of “consumer sentiment” and “consumer confidence” remained stronger for longer, but these indicators reflected the current appetite to buy durable goods as well as the current financial situation of respondents, rather than purely expectations of the future. Similarly, expectations for employment (naturally, the major source of income growth) from Turkstat show that expectations were rather gloomy, with more people expecting the job situation to deteriorate than to improve starting in early 2004. The same is true for purchasing power as of mid-2004 and the general economic situation starting the second quarter of 2005.

the same time, with oil prices increasing, Turkey experienced declining terms of trade, adding to its current account deficit and reducing saving.⁴ The story fits theory—since the usual suspects—fiscal stabilization, credit boom, real estate boom, terms of trade, and reversals therein match trends in saving. The aim of this paper is to provide a more formal analysis of saving developments in which policy recommendations can be grounded.

**Figure 1. Drivers of the Current Account
(as % of GDP)**



Earlier econometric studies on the Turkish private saving rate are Ozcan, Gunay, and Ertac (this journal; 2003) (henceforth OGE) covering the period 1968-1994; IMF (2007)

⁴ Initially the decline in the terms of trade was stymied by high export prices for Turkish goods (owing to the strength of the euro), so it is not until 2006-07, that the terms of trade decline significantly.

covering the period 1980-2005. These studies focus on the role of macro-economic variables, such as growth, the terms of trade, credit (and its rate of change), inflation (a proxy for uncertainty), and public saving. The studies generally find the expected effects, in line with both theoretical predictions and earlier panel-data results (the seminal study in this area is Loayza, Schmidt-Hebbel, and Servén, 2000). For the latest boom episode, IMF (2007) finds that the 8% of GDP decline in the (inflation-adjusted) private saving rate in Turkey between 2001-05 is largely explained by the increase in the public saving rate (a contribution of -7% of GDP), the decline in inflation (a contribution of -3%) and an increase in growth (a contribution of 6%).⁵ For dependency ratios the Turkey-specific studies do not find statistically significant effects, but this could simply reflect lack of variation in the data. Van Rijckeghem and Ucer (2009) try to explain the decline in saving after Turkey's economy stabilized. They study the role of improved prospects by referring to consumer confidence indices, and come out favoring an explanation based on the rapid expansion of credit instead. They use household survey data for 2004-05 to investigate the role of social security and health insurance and homeownership, inter alia, based on a specification similar to that of Chamon and Prasad (2008).⁶ They find evidence that self-employed and those with higher health spending risk had higher saving than other households—consistent with the precautionary saving motive. They also find

⁵ The strong role of government saving likely reflects the effect of reduced crowding out of lending to the private sector and of improved credibility of policies, which brought down real interest rates. The alternative explanation, of “Ricardian equivalence”, is unlikely in the Turkish case given that assumptions underlying Ricardian equivalence do not hold in the Turkish case, inter alia, because of the existence of liquidity constraints.

⁶ Aktas and others and Yilmazlar (both May 2010), in studies prepared independently from ours which we received as we went to press, also study household saving and consumption decisions based on household survey data. Aktas and others use the same Household Budget Survey data as we do, covering in addition 2003 and focus on various definitions of saving, including expenditures for jewelry, durable goods, and health and education expenditures. Yilmazlar uses the new Survey of Consumer Finances conducted in 2008. See Adaman and others (2009).

that households owning their home reduced their saving more than tenants. In the context of rapidly rising real estate prices, this is consistent with the existence of a wealth effect.

This paper revisits the question of substitutability between private and public saving and that of the role of social security and health insurance and homeownership, with more recent data.

We start out with the relevant literature survey, taking care to discuss results relevant to the Turkish case (section 2). We continue by establishing the relevant stylized facts for Turkey (section 3) and place the Turkish domestic saving rate in international comparison. We discuss trends public and private saving, including a separate discussion of trends in household and corporate saving. We then proceed to study determinants of private saving (section 4), both based on time-series data (1988-2009) and on household survey data (2004-2008). Next we surmise on the future of the private saving rate, based on projections for access to credit, demographics, and a qualitative analysis of the recent social security reform (section 5). In Section 6, we discuss policy measures that could help to raise the national saving rate, as well as other policies that would reduce the current account deficit and Turkey's vulnerability to sudden stops. Section 7 concludes.

2. Literature review: On the micro and macro determinants of private saving

In this section, we review both the theoretical and empirical literature on the determinants of the private saving rate to set the stage for the discussion to follow in the remainder of this paper. This section can be skipped by readers familiar with the literature on saving. We first review the main theories of household saving and their predictions for the effect of key macro-economic and demographic variables on household saving. Given the absence of an established theory on corporate saving, we touch only briefly on this topic. We then report findings from available comprehensive studies as well as some more recent ones of particular interest.

2.1 – Theories of household and corporate saving

Modern consumption theory starts with the presumption that consumers like to smooth out consumption over time, whether over the life-cycle (Modigliani-Brumberg, 1954) or in the face of temporary fluctuations to income (the permanent income hypothesis of Friedman, 1957). Models have become increasingly realistic over time, with the recognition of a precautionary saving motive (for risk-averse consumers), liquidity constraints, and hyperbolic discounting. “Buffer-stock saving” models, which combine a precautionary saving motive with impatient consumers, fit many stylized facts well.⁷ We discuss these various models briefly below, with special focus on what they may have to say for factors at play in the case of Turkey, notably demographic transition; terms of trade; government saving; growth; interest rates; liquidity, in particular the role of revolving credit; and wealth effects.

⁷ The literature on household saving is well-developed, and can be found in standard textbooks such as Romer (2001).

Life-cycle saving (Modigliani-Brumberg, 1954): This theory suggests that consumers smooth consumption over a lifetime. As a result saving will be high when incomes are high (during working-age), and there will be dissaving after retirement. In the absence of a bequest motive, saving of any individual is zero over a lifecycle. And in the absence of growth or demographic change, aggregate saving will be zero as well. Yet, growth and changes in the population structure have implications for aggregate saving. If productivity growth makes the young richer than the old, saving by the young (who now need to finance higher consumption after retirement) will be greater than dissaving by the old. Thus, *aggregate* saving will increase with **growth**. This is referred to as the Modigliani's "aggregation effect". This feature of lifecycle saving is often invoked to explain the strong empirical correlation between growth and saving.

Similarly, aggregate saving is affected by **demographic transition**, i.e. the decline in mortality and fertility rates. Life-cycle theories predict a rise in saving as the **youth-dependency** ratio declines in the latter stages of demographic transition (Lee and Mason, 2006). There are three phases in demographic transition. Early on, mortality falls, which leads to more surviving children. This can cause saving to decline. In the intermediate phase, as fertility continues to decline, the youth-dependency ratio declines. The resources that are freed as a result (and which could be saved or consumed) are called the *first demographic dividend*.⁸ In the late phase, an older working age population, which

⁸ Formally, if adults with households with fewer children have more resources available over a life-time, and these additional resources are consumed by the adults themselves (rather than on children's education for example), consumption smoothing implies that consumption will also be higher after retirement, and hence saving for retirement will have to be higher (Attanasio, Banks, Meghir and Weber, 1999; Scholt,

also faces greater longevity and can no longer rely on children to take care for them in old age, saves to accumulate assets for retirement, unless it believes government will provide for its needs. This increase in saving is called the *second demographic dividend*.

⁹ In Section 5 of the paper, we use these predictions to extrapolate the Turkish saving rate into the future.

The life-cycle hypothesis also predicts that windfall gains on wealth (e.g., a rise in the stock market or housing prices) will be consumed over the remainder of the life-time.

This wealth effect is in theory different for housing and financial assets, and depends on age, being stronger for the elderly for whom the windfall would be consumed in fewer years. Some have suggested that *housing wealth isn't wealth* (Buitert, 2006), because cashing in on this wealth requires downsizing to smaller or less well-located housing.

Only those “long” housing, in the sense that they (plan to) use less housing services than they own, are better off when house prices increase (e.g., the elderly). Families who don't own their home, or who plan to purchase a larger home, are worse off. These implications are testable in the Turkish case by comparing saving of households who own their home with those who don't. Economy-wide there will only be a positive effect of higher house prices on consumption, if households are, on average, “long” housing.

Seshadri, and Khitatrakun, 2006; Skinner, 2007). While such persons will spend more (and dissave more) after retirement, this effect will not be felt until later, and savings increases during the transition. A caveat here is that parents may well use these resources for their children (e.g. education) rather than themselves, that is, they would tend to substitute the *quality* of children for *quantity*. In that case there would be no need for greater retirement saving to allow consumption smoothing.

⁹ Formally, children are a substitute for monetized saving because they make transfers to their parents in old age (the household demand model; see Schultz, 2004). This means that adults who have fewer children now need to provide for their retirement themselves. Such adults will *dissave* more after retirement, but this effect will not be felt for a while, so that aggregate saving increases in the transition. The impact on saving is accentuated as the result of greater longevity, which implies a need for higher assets to finance retirement.

Permanent-income hypothesis or PIH (Friedman, 1957): In this theory, consumption equals permanent (as opposed to current) income, which takes into account longer-term income expectations, and hence is relatively smooth. Transitory income shocks have only a small impact on consumption, and are mostly absorbed as saving or dissaving.

A well-known testable implication of the permanent income hypothesis is that movements in saving should anticipate movements in income (Campbell, 1987), i.e. people should save when they expect their incomes to decline in the future, and dissave (or save less) when they expect them to increase. This follows directly from consumption smoothing motive, i.e. high saving today being necessary to allow consumption to remain unchanged when incomes fall in the future. Brought to the data, the implication is that saving will decline when **consumer confidence** is high. We use this approach later in the Turkish context. Furthermore, when current **growth** is considered an indication of future growth, people will expect future income to be greater than income today, and will dissave, following the same argument as above. Put differently, growth today and in the future will raise permanent income (and consumption) more than it raises current income, *depressing* saving. This logic applies to workers with a substantial fraction of their working life ahead of them. For older workers, permanent income will not change much in response to higher growth, resulting in little change in consumption. For those workers, growth in current incomes then increases saving (Jappelli and Pagano, 1997, provide a good exposition; see also Carroll and Weil, 1994).

The PIH also suggests that effects of changes in the **terms of trade** (hence in incomes) on consumption will be smoothed over time, if these changes are expected to be temporary, and will be absorbed as changes in saving. For example, saving will decline in response to a *temporary* negative terms of trade shock, but then recover after the shock is over. In contrast, consumption fully responds to a *permanent* decline in the terms of trade, with no impact on saving.

The PIH, under certain assumptions, implies “Ricardian equivalence”—the idea that private saving will offset changes in **public saving** one for one. If public saving increases because of higher taxes (or lower transfers), but this is expected to lead to lower future taxes, agents’ life-time budget constraint, and hence consumption is unaffected and private saving declines (since disposable income declines). If public saving increases because of lower spending and this cut in spending is expected to be permanent, agents have higher life-time resources and increase private consumption by an amount equal to the reduction in public spending. Private saving again declines. According to the theory, agents also adjust their bequests to offset the effect of future taxes on future generations (Barro, 1974). However, the PIH only holds in the absence of liquidity constraints, when agents are risk-neutral (or are able to insure against risk at actuarial cost), government spending is unproductive and agents plan to leave bequests. It also requires changes in government spending to be permanent, and changes in taxes not to lead to offsetting changes in spending over time. These assumptions are rarely met in the real world, but Ricardian equivalence is such a persuasive theoretical concept that it often

surfaces as an explanation for the inverse relationship between public and private saving rates.¹⁰

The impact of changes in the **real interest rate** is typically studied in a simple two-period version of this model in which agents either borrow or lend in a first period as a function of the path of their labor income (e.g., borrowing if incomes are increasing) and interest rates. While one might intuitively think that increases in interest rates will lead to increases in saving, this is not necessarily the case because changes in interest rates have both a substitution and an income effect. An increase in interest rates makes delaying consumption more attractive (the substitution effect). This effect goes in the same direction for lenders and borrowers, that is, both will tend to save more (borrow less) in the initial period when interest rates increase. This is the effect one intuitively expects.

But there is also an income effect on consumption, which affects borrowers and lenders differently. The income effect of an increase in interest rates is positive for those lenders who now earn more interest income and hence can consume more in both periods, and negative for borrowers, who have to pay more interest. Overall, the impact of an increase in interest rates on consumption in the initial period is uncertain for lenders, and negative for borrowers (they will consume less and borrow less). Another interesting aspect is the responsiveness of saving to interest rates at low levels of income. Increasing saving in

¹⁰ When these assumptions are not met (e.g. when there is precautionary saving and taxes are a function of income), a cut in taxes today financed by future taxes will lead to some increase in consumption today (and the offset between public and private saving will be less than one for one). This is due to the fact that income taxes reduce the volatility of future (after-tax) income, therefore reducing the need for precautionary saving. Similarly, when some households plan not to leave bequests, they will raise their consumption in the face of a tax cut which is to be financed by higher taxes on future generations.

response to higher interest rates is difficult when incomes are already near subsistence since first period consumption cannot be compressed (Ogaki, Ostry, Reinhart, 1996). Inter-temporal substitution is almost impossible and the substitution effect non-existent.¹¹

Precautionary saving: In this theory, households save because they are risk-averse, i.e. the greater the uncertainty about future income, the greater the saving (see Romer, 2001 for a good exposition). **Inflation** is often used, in studies of private saving, as a proxy for uncertainty about future income. Rural incomes may be more uncertain than urban ones, in which case precautionary saving would fall with urbanization. Precautionary saving incidentally is one reason for not observing a rundown of wealth to zero during old age (in addition to a bequest motive): wealth (in the form of home ownership, for instance) is insurance against a catastrophic event. Since people do not know when they will pass away, on average people die leaving bequests.

Liquidity constraints: In this theory, households save more when they are liquidity-constrained. Liquidity constraints act both directly to restrict consumption below what consumption smoothing implies, and indirectly, as the possibility of the liquidity constraint becoming binding in the future makes shifting resources to the future (saving) more desirable. A relaxation of liquidity constraints makes higher consumption in the present possible, but at the expense of lower consumption in the future. Liquidity constraints are captured by the amount of **credit** available in the economy, and

¹¹ In technical terms, the marginal utility of income is very high around subsistence levels, hence the willingness to substitute consumption over time is very low. With consumption tracking income closely, there is also no income effect.

sometimes by variables such as loan-to-value ratios for home purchases.¹² The amount of credit available in the economy is likely influenced by **housing prices**, if higher collateral improves access to credit (e.g., through home equity loans). Households may wish to access additional credit resulting from higher house prices (i.e., withdraw equity from their homes) if they were credit-constrained before.

Buffer-stock saving. Such models combine a precautionary saving motive, impatience and sometimes a liquidity constraint (Deaton, 1991; Carroll, 1992, 2001, 2004). Households target a wealth/permanent income ratio to act as a buffer in case of adverse income developments. More patient households and households which are more risk-averse or face higher uncertainty target a higher wealth/income ratio. Factors that reduce the need for precautionary wealth—such as lower uncertainty or a **relaxation of liquidity constraints** or a **positive shock to wealth**—lead to dissaving, until the new target wealth is reached. After the target is reached, precautionary saving continues as before. These factors therefore have only a temporary effect on saving, albeit one that could last several years (Carroll, 2001; 2006).

Buffer stock saving models match certain features of the data well, notably the close correlation between consumption and income growth; the fact that most households save little, and that wealth is concentrated; and the correlation between wealth holdings and uncertainty. The buffer-stock model of saving seems to explain saving behavior for ages between mid-20s to mid-40s (Gourinchas and Parker, 2002).

¹² See e.g. Jappelli and Pagano (1994).

Hyperbolic discounting: Hyperbolic discounting refers to a situation where people simultaneously use a *high* discount rate for discounting the near future and a *low* discount rate for discounting the distant future, i.e. they act impatient when discounting the near future but patient when discounting the far future. For instance, when offered the choice between \$50 now and \$100 a year from now, many people will choose the immediate \$50. However, given the choice between \$50 in five years, or \$100 in six years almost everyone will choose \$100 in six years, even though that is the same choice seen at five years' greater distance. This also means preferences are dynamically inconsistent: after 5 years, people will reverse their preferences, preferring \$50 in year five over \$100 in year six. Hyperbolic discounting helps to explain seemingly irrational behavior, such as procrastination and impulsive behavior (lack of self-control). Importantly in our context, it also helps to explain over-use of credit card (over-use in the sense that people will eventually regret having taken on credit) and helps to explain why widespread availability of credit cards reduces saving even of those who are not liquidity-constrained (i.e., those who have financial assets) in the first place (Laibson, 1997).

Habit persistence. When real income increases (decreases), spending may not rise (fall) immediately; or when taxes increase, reducing disposable income, spending may not decline (Carroll, Overland and Wei, 2000). Habit persistence explains the stylized fact of sluggishness in consumption. Persistence in consumption habits causes a temporary decline in saving in case of a temporary shock (as under the PIH), but also implies a reduction in saving which persists for some time in the case of a permanent negative shock (unlike under the PIH where saving does not respond to a permanent shock).

Persistence in consumption habits is consistent with the positive correlation between growth and saving because growth in incomes is not immediately followed by growth in spending. Habit persistence also implies a negative relationship between public and private saving, when private consumption is persistent in the face of a change in taxes. Thus, an increase in taxes (an increase in public saving), which reduces disposable income, will be associated with a reduction in private saving if consumption is persistent.

Corporate saving. There is no well-developed theoretical literature on corporate saving akin to that for household saving. It is recognized that the main motivation for corporate saving (retained earnings) is to finance investment, and it has been suggested that corporate saving would be higher when investment opportunities are particularly promising but other sources of finance (equity, debt or bank loans) are not available or more expensive. Another determinant is the tax treatment of dividend income versus capital gains tax. In the case of tax discrimination, with higher dividend income tax than capital gains tax, there would be an incentive for the firm to retain earnings, since the capital gains resulting from retaining earnings would be taxed at a lower rate (Poterba, 1987; see Aron and Muellbauer (1999) for a literature survey).

2.2 – Empirical findings on determinants of saving

Several researchers have developed the insights gained from the household saving theories into an empirically-motivated macro literature, focusing on the determinants of both within- and cross-country variance in private saving rates. The most comprehensive

effort to date on saving is by the World Bank “Saving Across the World.” The project aimed to explain the variation in private savings rates across countries; to establish the direction of causality between saving and growth (the above mentioned study by Rodrik, 2000 forms part of the study); and to draw policy implications on how to raise national saving rates. The study includes an overview chapter (Loayza, Schmidt-Hebbel, and Servén, 2000a; henceforth LSS), which reviews earlier studies in the literature, as well as a comprehensive panel-data analysis of determinants of private saving (as a share of private disposable income), covering 150 countries over the period 1965-1994, and estimated with system GMM (Loayza, Schmidt-Hebbel, and Servén, 2000b). Private savings data in this study is inflation-adjusted, as it should be. Another comprehensive panel-data study on (national) saving is provided by IMF (2005).

Two studies focus specifically on Turkey, by Ozcan, Gunay, and Ertac (2003) (henceforth OGE) covering the period 1968-1994, and by IMF (2007) covering the period 1980-2005. Both studies report results for unadjusted and inflation-adjusted private saving rates, but we focus on the latter below.

In what follows, we draw extensively on the overview chapter in LSS and literature review in IMF (2007), as well as the subset of results of LSS for developing countries and the subset of results for IMF (2005) for emerging markets.

Income

All panel studies reviewed above as well as those contained in the various literature surveys find this variable to be an important determinant of saving/disposable income, with a positive coefficient. This finding is consistent with both the original Keynesian formulation for the consumption function (with a declining average propensity to consume) and more recent theories (see Dynan, Skinner and Zeldes, 2000).

Growth

Studies typically find a statistically positive and significant effect for real per capita GDP growth on savings. This is the case for the panel data studies of LSS, IMF (2005) as well as several earlier studies.¹³ The findings of a positive coefficient on growth are consistent with various theories (e.g, Modigliani's aggregation effect, habit formation). Other methods confirm this finding as well. Carroll and Weil (1994) provide evidence based on US household data that predictable growth in earnings is associated with higher saving among the young. This is the opposite of what one would expect for the young, and the authors suggest that habit formation along with uncertainty about future earnings is responsible for this result. Rodrik (2000) studies "growth transitions", that is transitions from low to high growth rates, and finds that "growth transitions tend to be followed by significant, and *sustained*, improvements in saving performance." He does not, however, specify the mechanism by which growth may be driving saving. For Turkey, studies differ in their findings, with no statistically significant effect in OGE, but a statistically significant and large positive coefficient in IMF (2007).

¹³ This is however not the case for all studies, for example Haque, Pesaran and Sharma (1999). See Loayza et. al. (2000a), De Serres and Pelgrin (2002), and IMF (2007) for surveys of results of a large number of panel data studies.

Terms of trade

Studies consistently find a positive coefficient on the terms of trade (LSS, IMF (2005), and all studies reviewed therein). As noted in the theoretical literature above, this is what one would expect when terms of trade movements are of a temporary nature. OGE find this result for Turkey, but it is not confirmed in IMF (2007).

Inflation

A few studies find a positive coefficient on inflation (LSS; Masson, Bayoumi, and Samiei, 1998). Inflation is a measure of uncertainty, and this result is interpreted as being consistent with a precautionary motive for saving. OGE and IMF (2005) also find this effect for Turkey.

Credit

Credit tends to be statistically significant in empirical studies, but they differ on the specific form—*level* of credit/GDP vs. *change* in credit/GDP—which turns out to be pertinent. For instance, LSS find a statistically significant role for the level of credit/GDP, whereas IMF (2005) finds a role for its change. Finding a role for the level implies that liquidity constraints matter for saving, whereas finding a role only for the change in credit/GDP ratio implies that liquidity constraints do not matter, other than

when they change. The first result is consistent with standard models of liquidity constraints, whereas the second result is what one would expect from buffer-stock saving models. In the latter case, a relaxation of liquidity constraints means target wealth can be less, and wealth will be drawn down in the transition to a new steady state. After reaching that new steady state, saving recovers.

For Turkey, studies vary in their findings. OGE found a role for the level of credit/GDP ratio in a restricted regression which excluded, *inter alia*, government saving and inflation. IMF (2005) found that the coefficient on the change in credit/GDP ratio was not statistically significant. This latter result could be caused by multi-collinearity, however, since variables highly correlated with credit, such as public savings and inflation, are controlled for in the regression.

Gross and Souleles (2002) provide additional detail on the role of credit. They find that increases in credit limits lead to an immediate rise in debt, and that, consistent with the buffer stock saving hypothesis even people starting well below their credit limit, respond to the increase in limits.

Real interest rate

Knowing the impact of real interest rates is crucial for informing policy on stimulating saving (for instance, to answer questions, such as whether raising the after-tax rate of return through tax measures would succeed in raising private savings). As noted before, its impact is ambiguous in theory and depends on the relative magnitude of the

substitution and income effects. The real interest rate does not have a statistically significant effect in most studies (LSS and studies cited therein and in IMF, 2007). An exception of a study which finds a positive coefficient is Masson et. al. (1998). Both studies on Turkey also do not find a statistically significant coefficient on the real interest rate.

Further insights are gained by Ogaki, Ostry, and Reinhart (1996), who study the intertemporal rate of substitution at different levels of income. The authors find evidence that the intertemporal rate of substitution is low at low levels of income. In essence, saving cannot respond positively to interest rates in poor countries, because first period consumption cannot fall below subsistence levels.¹⁴ This provides an explanation for the lack of responsiveness of saving to interest rates in episodes of “financial liberalization” (freeing of deposit rates) in low-income countries as well as for the statistical insignificance of the real interest rate in panel data studies focusing on developing countries.

Wealth

Wealth is not studied explicitly in the panel-data studies reviewed so far, but other studies are available. Some of these studies suggest the existence of a wealth effect on

¹⁴ The marginal utility of income is very high around subsistence levels, hence the willingness to substitute consumption over time is very low.

consumption.¹⁵ Studies find a medium-term marginal propensity to consume out of housing wealth in the range of 0.04–0.10 and 0.04–0.07 for stock market wealth. As expected, the effect is stronger for the elderly. Studies disagree on whether the effect is stronger for housing or financial wealth.¹⁶ It is also not clear how long the wealth effect lasts. Some studies find that the wealth effect of stock market prices disappears over 1–3 years (as cited in Funke, 2002).

The finding of a wealth effect has been criticized as spurious (Calomiris, Longhofer, and Miles, 2009): improved economic prospects would increase both consumption and housing wealth, so a correlation can be expected in the data between consumption and housing wealth, even in the absence of any causal link from housing wealth to consumption. Evidence to that effect comes from instrumental variable estimation which finds a zero or small effect from housing wealth on consumption.¹⁷ Further evidence supporting the interpretation of spurious correlation comes from a study which finds that the wealth effect is the same for renters and homeowners, in the UK, suggesting that what is really driving consumption is improved prospects (Attanasio and others, 2009).

Akin (2008) estimates an error correction model for Turkey relating durable and non-durable consumption to inter alia stock market and housing wealth (controlling for

¹⁵ Carroll et. al. (2006); Funke (2002), and Sierminska and Takhtamanova (2007) provide good overviews. One well-known study is that of Case, Quigley and Shiller (2005), who construct estimates of housing wealth for the 50 US states over 1982–99. They found a large wealth effect for housing wealth, which was also larger than the impact from changes in equity wealth.

¹⁶ For instance, Ludwig and Sløk (2002) estimate a larger effect of stock wealth than housing wealth in a panel of 16 OECD countries, whereas Carroll et. al. (2006) and Sierminska and Takhtamanova (2007) find the opposite.

¹⁷ Specifically, the quarterly change in log retail sales at the US state level is regressed on the change in log wealth, instrumented by lags of log wealth.

disposable income and private sector credit). She finds evidence that both stock market and housing wealth affect consumption in the long-run.

Government saving

An increase in government saving is associated with lower private saving in all panel-data studies (LSS, IMF, 2005; all studies reviewed in LSS and IMF, 2007). In the panel-data studies offsets are far from complete for developing countries. For instance, LSS and IMF (2005) find offsets of -0.5 and -0.2 , respectively, so that one percentage point increase in public saving succeeds in raising total saving by 0.5-0.8 percentage point. The (partial) offsets could reflect Ricardian effects (in anticipation of lower future taxes), but as discussed in the literature review above, might also be the result of a multitude of factors such as habit formation (unchanged consumption levels despite higher taxes), a boost to credit to the private sector and lower real interest rates, or a reduced need for private saving when higher government saving reflects the introduction of programs such as social security or unemployment insurance.

For Turkey specifically, OGE (in one specification¹⁸) and IMF (2007) find very high offsets to public saving. OGE finds a long-run coefficient on public saving of -1.2 (implying private saving falls more than public saving rises) and IMF (2007) finds -0.7 . These findings, taken at face value, suggest that an increase in government saving will fail to raise overall saving by much, if at all, in Turkey.

¹⁸ The specification that excludes growth, credit and the current account, and defines government as the non-financial public sector.

Demographics

Many studies find evidence of an impact of the youth and old-age dependency ratios (the ratio of the number of young or old to the working age population). For the youth dependency ratio, LSS estimate that a 1 percentage point reduction in this ratio is associated with a 0.3 percentage point increase in the saving rate in the short-run (0.5 percentage points in the long-run).¹⁹ The corresponding figures are 1.4 and 2.8 for the old-age dependency ratio. These variables were not significant in the Turkey-specific studies, but this is not too surprising, given the lack of variance in the series.

Corporate saving

The empirical literature in this area is very sparse. Poterba (1987) for the US estimates an error correction model for aggregate real dividends as a function of earnings and a tax discrimination variable (which captures the extent to which taxes paid by households would be lower if profits were retained, leading to capital gains, versus distributed), and finds these variables to be significant. The equation also includes Tobin's q , in order to control for profit opportunities, which would lead to higher retention, should external finance be more expensive than internal finance, but this variable turns out not to be significant.

¹⁹ Based on their GMM system estimator for LDCs. Long-run coefficient is calculated as the short-run coefficient divided by one minus the coefficient on lagged saving.

The main reference for developing countries is the study by Aron and Muellbauer (1999) on South Africa. The authors develop models for both the share of profits in national income (a function of terms of trade, tax effects and the markup of prices over unit labor costs) and the share of corporate saving in profits. The latter is shown to be influenced by inflation, the real interest rate, dividend taxation and financial liberalization.

3. Turkish Saving Rate in Historical and International Context

In this section, we first provide data on total saving and its components—public and private saving, as well as the sub-components of private saving—household saving and corporate saving for companies listed on the stock exchange. We then provide, within the limits of available data, international comparisons of the Turkish national and private saving rates. We show that the Turkish domestic and private saving rates are low in international comparisons, but that this reflects for the most part an unfavorable comparison with China and East Asia, as well as strong cyclicity in Turkey’s private saving rate, in particular during the latest growth phase from 2002 through 2006.

3.1 – Historical Context

Data

Data are available on a consistent basis since 1998 for *total, private and public saving*. 1998 constitutes a break in the data because the NIA revision of 2007, which was

retroactive only to 1998.²⁰ For earlier years we used SPO data based on the 1987 NIA revision.²¹ The public sector refers to the non-financial public sector. As is customary in the literature, we construct inflation-adjusted private and public saving data to ensure the saving data correspond to the real accumulation of assets, rather than just to compensation for the erosion of real assets as the result of inflation.²²

The NIA data do not distinguish between household and corporate saving, the two components of private saving, but other data is available which can cast some light on trends in these subcomponents. For households, the data is from the household surveys and for enterprises from the Istanbul Stock Exchange.²³

Data on *household saving* from the household surveys are available for 1994 and 2002-08. There are important conceptual differences between surveys over time, however, and only the surveys starting in 2003 provide comparable data on disposable income, spending, and therefore saving.²⁴ The surveys do not strictly refer to saving in any given year, which instead has to be derived from disposable income and spending data. Participants are interviewed once a year, with interviews phased in over the course of the year, starting in January. They report on income during the previous 12 months and

²⁰ Data obtained from SPO's website.

²¹ The 2008 revision led to an upward adjustment of GDP of over 30% to take into account informal activities. Both consumption and investment were revised upward.

²² We make this adjustment following the World Bank (1998) methodology. Inflation adjustment is required because in times of high inflation private saving overstates the amount of asset accumulation because the underlying assets are being eroded by inflation. At times of disinflation, this by itself causes an illusory decline in the raw private saving data (since private saving was never that high to begin with). Public saving, conversely, are understated in the absence of adjustment, as inflation erodes the real value of public debt. Total saving does not require an inflation adjustment, since the adjustment on private and public saving offset each other.

²³ Data is available on the Istanbul Stock Exchange website, e.g. ISE TEMETTU_2008_12.

²⁴ The 2002 data for household saving indicate a household saving rate of 10 percent, versus an unadjusted 23% saving rate in the NIA.

spending in the last month (Appendix 1). For this reason, the aggregate saving data combine both current and prior year information and do not accurately measure full current year saving.

Data is not publicly available on *corporate saving* in Turkey, though the Central Bank of Turkey does compile data on this. On the other hand, the ISE makes available data on corporate saving on its website in the form of data on profits and dividend payments. The drawback of this data is its limited scope. This is most easily demonstrated by comparing profits in the ISE listed enterprises with the share of profits estimated in the cost side estimates of GDP. The former averaged 1.3% of GDP during 1999-2008, whereas the operating surplus in the cost side estimates of GDP is 50% in 2006.²⁵

In the raw ISE data, profits refer to current year profits and dividends refer to dividends paid out from those profits. These dividends are usually approved and paid out the *next* year, after the company's annual meeting. Hence, in order to have a concept of saving which could correspond to that in the national accounts, we need to make an adjustment to bring all cash flows (profits and dividends) on a same year basis. We calculate corporate saving (retained earnings) as current year profits minus dividend payments paid out that year, a concept we refer to as "retained earnings, cash basis".²⁶ Appendix 2

²⁵ Net operating surplus is a measure of gross (pre-tax) profits, available from the cost side estimates of GDP. It excludes depreciation and includes self-employment income. It is a residual balancing item in the product account and equals gross value added minus indirect taxes paid by producers (net of subsidies received) minus compensation of fixed capital minus compensation of employees. Cost side estimates of GDP are only available through 2007. They have not yet been revised in line with the 2007 NIA revision.

²⁶ We do not deduct dividends given in the form of stocks, hence implicitly treat these as retained earnings.

provides a summary of the raw data and shows how we constructed retained earnings, cash basis.

Findings

NIA data indicate that inflation-adjusted private saving was on average 17.3% of GDP between 1998-2004, after which it declined sharply to 10% in 2005-06. The drop from peak to trough between 2001-06 was more than 8% of GDP. Inflation-adjusted private saving is estimated to have risen to 13-14% of GDP in 2008-09.

Private and public saving rates are practically mirror images of each other. This is so for a variety of reasons, as discussed in the literature survey, and does not necessarily indicate the presence of Ricardian equivalence. In the latest episode, for example, it is easily argued that the economic crisis caused both the decline in public saving (counter-cyclical fiscal policy as well as the automatic response of revenues to declining income) and increase in private saving (higher uncertainty; less access to credit).

Figure 2. Unadjusted and Adjusted Savings Rates,

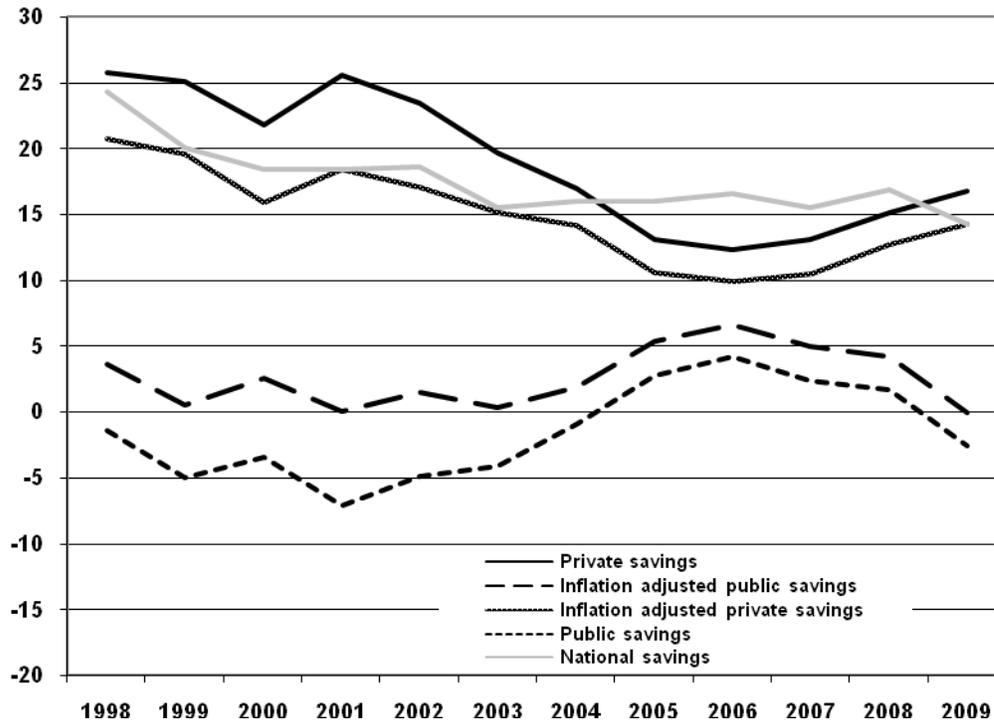


Table 1 provides information on the components of private saving, and contrasts this with total private saving from the NIA. The table shows the household saving rate as a share of household disposable income, based on the household survey data of 2004-08 and corporate saving by ISE listed firms as a share of GDP. This data is unadjusted for inflation, and hence should be compared with unadjusted private saving data from the NIA.

Household saving using this measure showed similar tendencies as total private saving in 2004-07. Notably, household saving declined sharply between 2004 and 2005, from 17 percent of disposable income in 2004 to 10 percent in 2005 (the unadjusted private saving

rate based on NIA data shows a decline from 17 to 13 percent of GDP). We have argued in earlier work (Van Rijckeghem and Ucer, 2009) that this is more likely the result of increased availability of credit than of improved consumer confidence and found some evidence of the presence of a wealth effect, notably that those owning their home reduced their saving more drastically than those who did not (see also below).

Table 1. Components of Private Saving

	2004	2005	2006	2007	2008
Private saving (%GDP)	16.9	13.1	12.3	13.1	15.1
Household saving (% disposable income)	17.0	10.0	10.3	12.2	7.9
Retained earnings, ISE listed corporates (%GDP)	1.8	1.0	1.8	-0.4	1.5

Saving then remained relatively flat using both sets of data through 2007. However, the data diverge for 2007-08, with the household survey data showing a decline from 12% to 8% (saving/disposable income), whereas the unadjusted private saving rate based on NIA data increases from 13% to 15% of GDP (saving/GDP)—that is there is a large gap in what the sources say regarding developments between 2007 and 2008.

Some 2% of GDP of the divergence can be explained based on the behavior of corporate saving, which swung from -.4 to 1.5 percent of GDP between 2007 and 2008.²⁷ The reason for the negative corporate saving in 2007 is related to the bankruptcy of some very large media related firms (Medya, Sabah and Sapaz). These bankruptcies were related to tax fines imposed by the tax authorities, rather than the economic situation. When

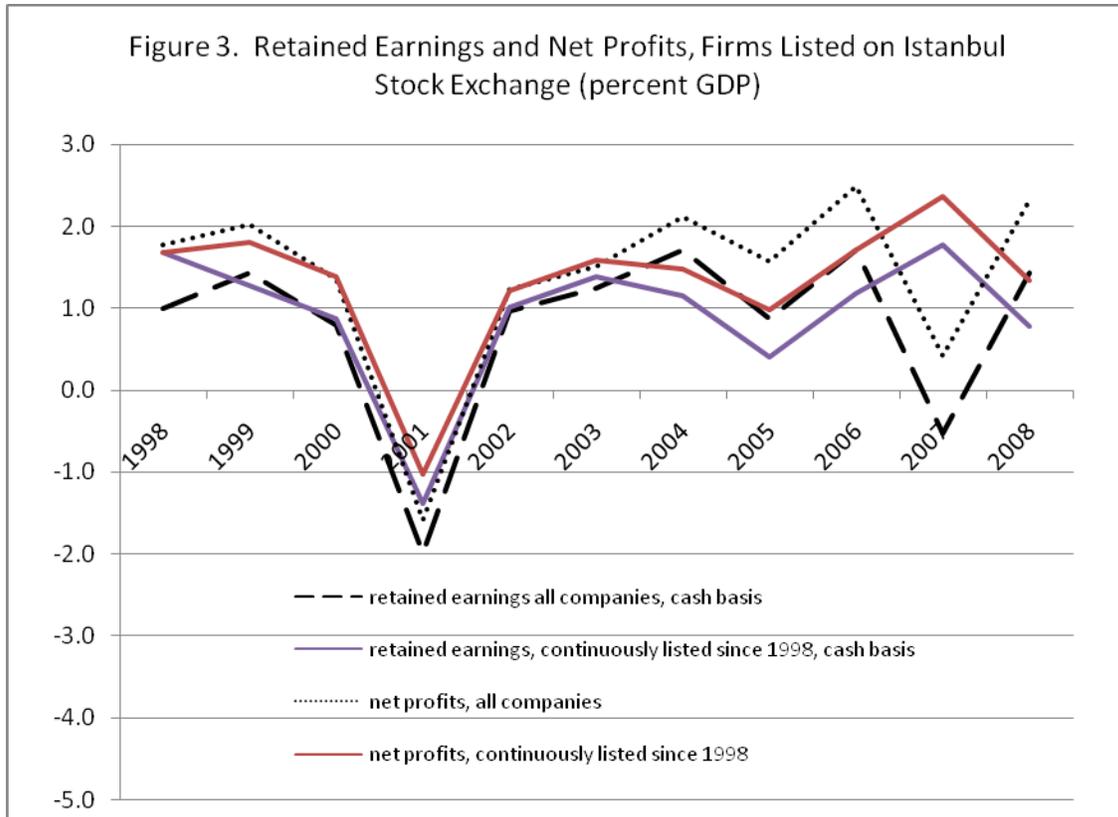
²⁷ Indeed, based on the household saving data (a decline of 4% of disposable income) and corporate saving data (an increase of some 2% of GDP), we would have expected private sector saving to fall substantially (by some 4% of household disposable income), rather than increase as it does in the official statistics (by some 2% of GDP). Part of the reason for the discrepancy probably reflects the fact that household saving data do not actually measure saving over the entire year, since they sample people throughout the year.

looking at a core group of firms that remained listed on the stock exchange throughout the period, retained earnings are positive and sizeable in 2007 (Table 2).

Table 2. Corporate Profits, Dividends and Saving (% GDP)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
All firms listed on ISE											
Net profits	1.8	2.0	1.4	-1.6	1.2	1.5	2.1	1.6	2.5	0.4	2.3
Cash dividend (paid following year)	0.6	0.6	0.4	0.3	0.3	0.4	0.7	0.8	0.9	0.9	0.9
Retained earnings	1.2	1.4	1.0	-1.9	1.0	1.1	1.4	0.8	1.5	-0.5	1.4
Retained earnings, cash basis	1.4	1.6	1.0	-1.9	1.0	1.3	1.8	1.0	1.8	-0.4	1.5
continuously on ISE since 1998											
Net profits	1.7	1.8	1.4	-1.0	1.2	1.6	1.5	1.0	1.7	2.4	1.3
Cash dividend (paid following year)	0.5	0.5	0.4	0.2	0.2	0.3	0.6	0.5	0.6	0.6	0.3
Retained earnings	1.1	1.3	1.0	-1.2	1.0	1.3	0.9	0.5	1.1	1.8	1.1
Retained earnings, cash basis	1.7	1.3	0.9	-1.4	1.0	1.4	1.2	0.4	1.2	1.8	0.8

From inspection of Table 2 and also Figure 3 below, the key determinant of corporate saving is profits, with dividend payments relatively constant, as a share of GDP. For example, corporate saving declines a lot in the crisis year 2001, becoming very negative, tracking profits. One reason for the stability of dividends is a legal requirement (abolished in 2010) that dividend payments (in cash or bonus shares) should be at least 20 percent of distributable earnings.



3.2 – The International Context

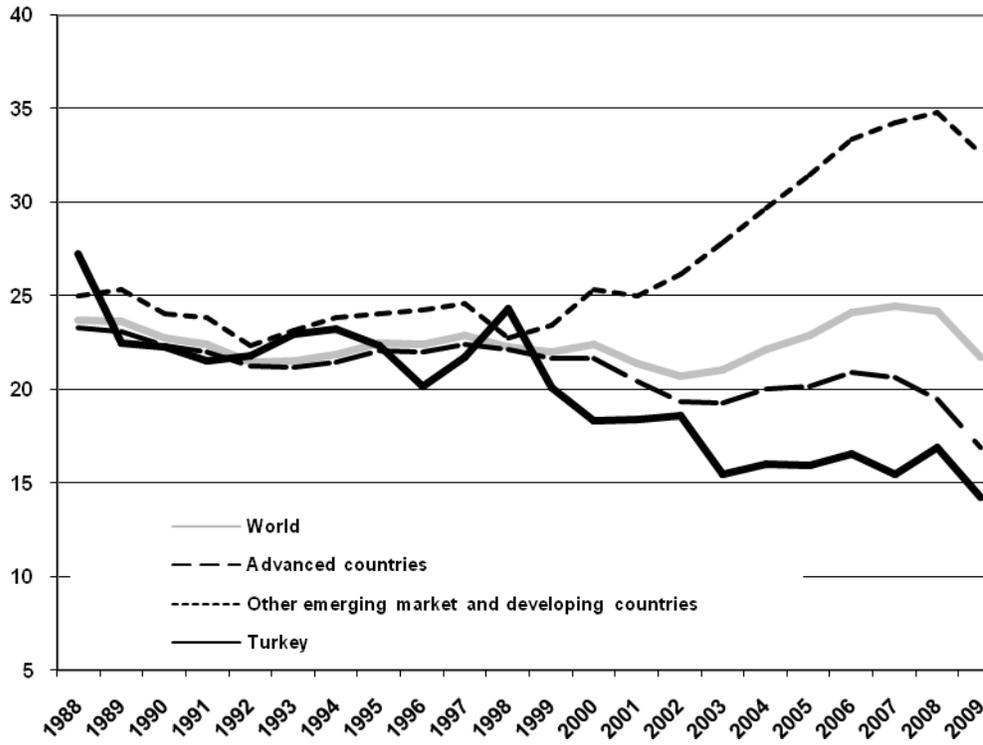
We now turn to international comparisons. Figure 4 shows that Turkey’s national saving rate has been low over the past decades, by emerging market standards. A regional breakdown (Figure 5), shows that this is largely a reflection of very high and rising saving rates in Asian and Middle-East economies. Turkey’s national saving rate is comparable to that in Central and Eastern Europe (chart includes Turkey) and is not much lower than that in the EU, or the Western Hemisphere countries.²⁸ Also of interest is the simultaneous decline in national saving in all country groupings estimated for 2009.

²⁸ According to 2005 WDI data, Turkey has a lower domestic saving rate than the median, ranking 96th out of 171 countries. It has a saving rate similar to that of Italy, Costa Rica, Chile, Pakistan, Israel, Poland, France, and higher than in Bulgaria, Hungary, Greece, UK, US, Iceland, Lebanon, and most African countries. Countries with higher saving rates include all of Asia, oil-exporters, Switzerland, Netherlands,

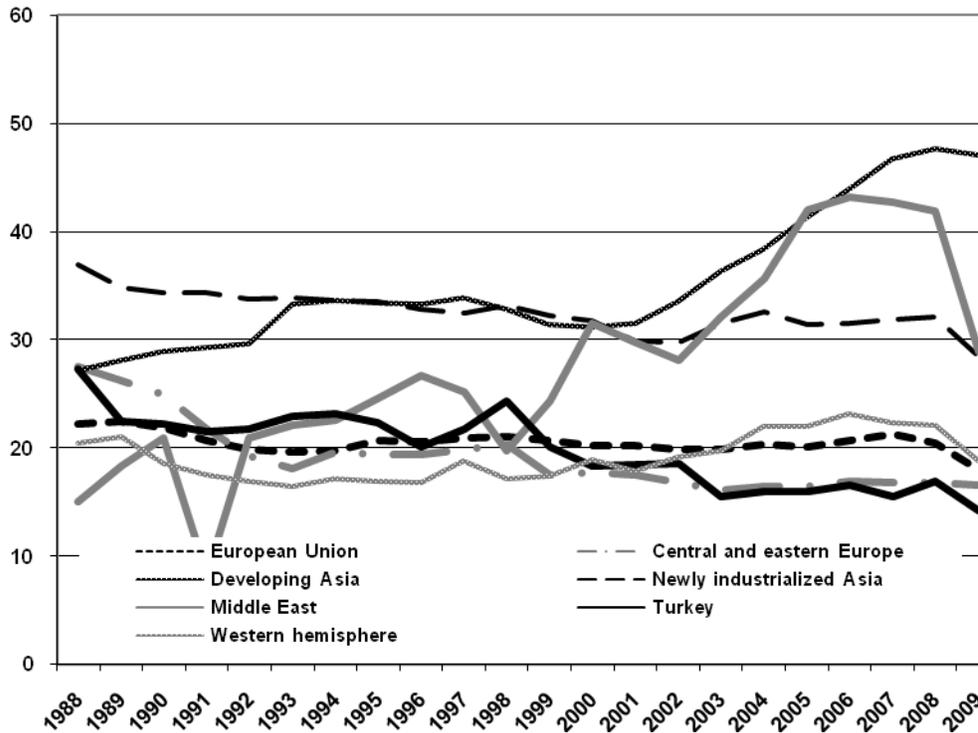
The Turkish national saving rate is also about the same as in the Western Hemisphere *before* the increase in commodity prices starting around 2003, which greatly benefited most of the commodity-exporting countries there, thereby increasing their savings. As discussed in the theoretical survey above, the latter becomes the typical response to a positive but transitory shock to income. Differences with Middle-East economies are, as for the Western Hemisphere countries, also readily explained by terms of trade improvements. It is interesting to observe that Turkey's saving rate is similar to that in Eastern European countries, which have also experienced "credit booms" during the last decade, and are in the EU-"convergence club". From this perspective, the main question therefore is why the Turkish saving rate is so much less than the Asian saving rate. Though this is a big puzzle that is yet to be answered fully satisfactorily, high Asian saving are often attributed to demographic factors, the precautionary saving motive (in conjunction with an inability to smooth consumption through borrowing from the banking sector, as mentioned in the introduction), high productivity growth, and high returns to investment.

Czech Republic, Ukraine, Argentina, Canada, Germany, and Egypt. This statistic also suggests that Turkey's saving rate is low but not exceptionally so according to international comparisons.

**Figure 4. National Savings Rates
(as % of GDP)**



**Figure 5. National Savings Rates
(as % of GDP)**



An international comparison of *private* saving rates is more difficult, because the necessary data to compute private saving is not readily available for a global sample. Here we rely on results published in IMF (2005), with the drawback that the data ends in 2004.

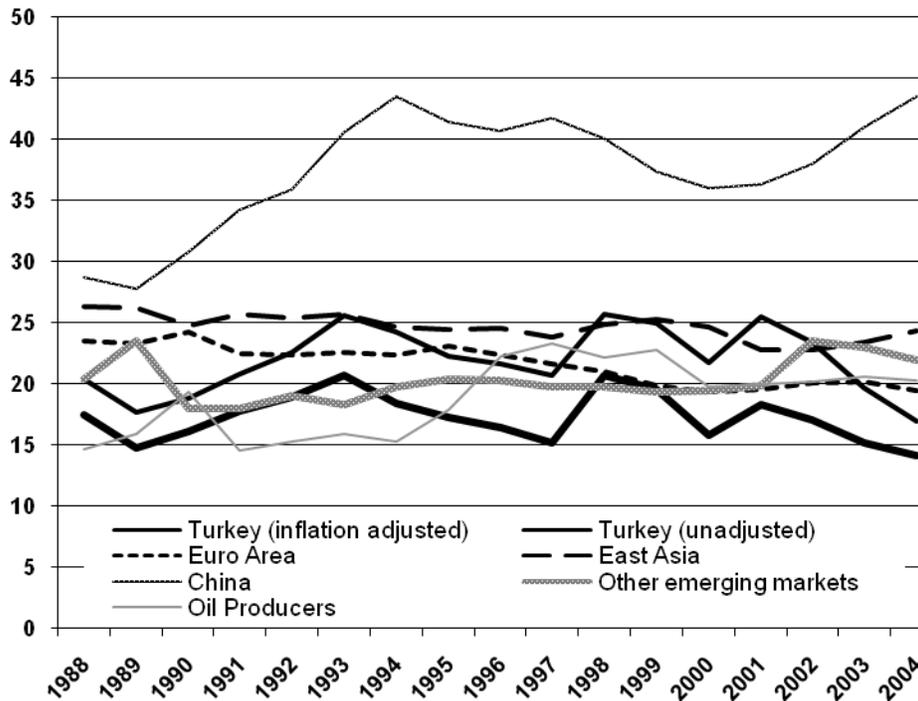
The IMF data for comparator countries are based on saving rates unadjusted for inflation, hence saving is artificially boosted to the extent high inflation countries are included. The data shows that unadjusted private savings have been roughly stable at around 20 percent of GDP for emerging markets excluding China, East Asia and oil producers. Turkey does not fare too badly in comparison to this set of countries, until the year 2002;

saving unadjusted for inflation lay somewhat above comparator countries, while saving adjusted for inflation lay somewhat below.²⁹ From 2002 onwards, however, Turkish private savings declines dramatically. Also of note, is that the private saving rate in Turkey showed large cyclical swings several times in the past (Figure 6).

Turkish public saving rises in parallel with the decline in private saving, explaining the limited decline in overall domestic saving in recent years. In terms of levels, a comparison with other countries based on the same IMF study shows that the Turkish public saving rate at the onset of the global crisis compared favorably with other emerging markets (over 3% of GDP in Turkey based on unadjusted 2007 data versus a modestly negative number (-0.5%) for emerging markets).

²⁹ Comparing unadjusted data provides a rosy picture as Turkish inflation was likely higher than that in comparator countries. Using adjusted data for Turkey on the other hand, biases the comparison in the other direction, since data are unadjusted for other countries.

**Figure 6. Private Saving Rates
(as % of GDP)**

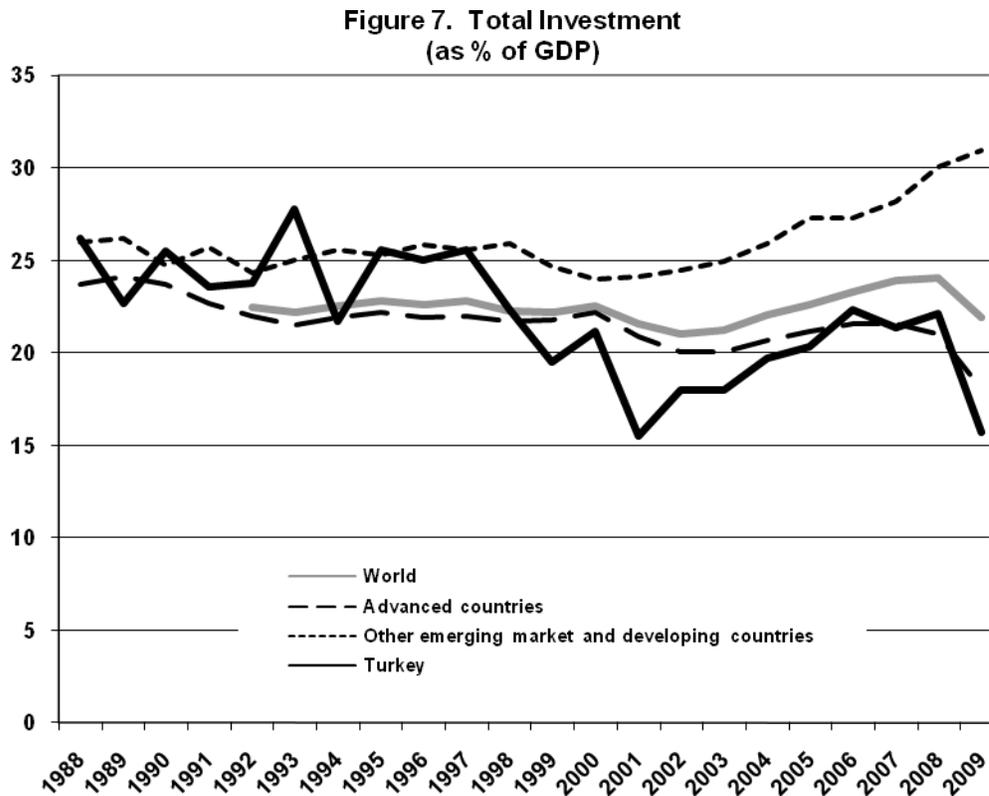


If Turkish saving, and in particular private saving, has been low relative to the world average, what about broad trends in investment and the current account balance? WEO data indicates that Turkish investment rates, too, have been low compared to other emerging markets, and to even mature markets, for extended periods of time (Figure 7).³⁰ Investment also contracted very sharply in the recent crisis.

This has kept the average Turkish current account balance close to zero, while showing wild fluctuations in the interim, a reflection of Turkey's near-term macro history, characterized by booms followed by busts (Figure 8). Still, the current account balance was worse, on average, vis-à-vis both the emerging markets and mature markets. An exception is Central and Eastern European countries, again EU convergence countries,

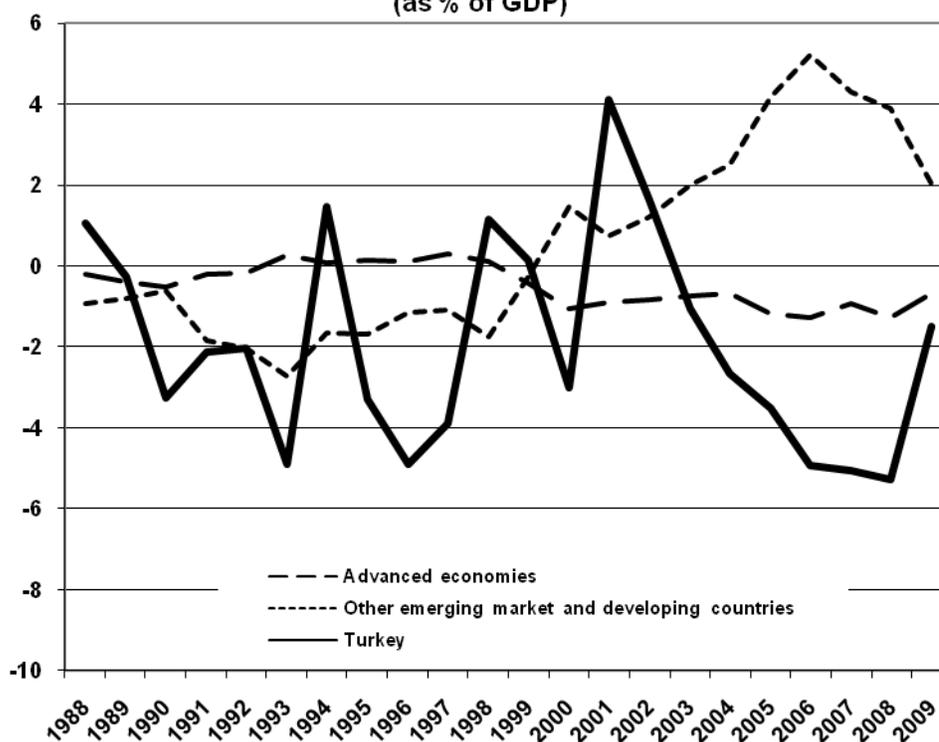
³⁰ The figure uses old NIA data until 1997 and revised NIA data thereafter.

most of which have completed EU-accession in recent years (i.e. a first batch in 2004; another in 2007). These countries have had substantially higher CADs than Turkey for a protracted period.³¹



³¹ The literature on the experience of current account dynamics of EU accession countries is large. For a recent take, see Rahman (2008).

**Figure 8. Current Account Balance
(as % of GDP)**



4. Determinants of private saving in Turkey

4.1 Economy-wide regressions

In this section we revisit determinants of saving based on 22 years of data, covering 1988-2009. We find that the only robust determinants of private saving are government saving and the government overall balance (both adjusted for inflation).

We start out by estimating the IMF (2007) specification (column 1, Table 3), though the data is different due to the different period studied by the IMF (1980-2005), and the revision of the NIA data for data after 1998. We find similar coefficients as the IMF

study on public saving adjusted for inflation and inflation as measured by the GDP deflator (both in size and statistical significance); Also, like the IMF results, growth in the terms of trade, the change in credit, the ex ante real interest rate and the unemployment rate are not statistically significant. On the other hand, we do not find any statistically significant effect for per capita GDP growth, nor do we find any evidence of long-run dynamics in this first specification (the coefficients on lagged private and public saving are statistically insignificant). For ex ante real interest rates a caveat on the data quality is in order, which could explain its lack of significance. Expectations surveys which would allow us to calculate true ex ante interest rates are not available except for the past few years, and we had to construct ex ante interest rates (nominal interest rates minus expected inflation) by assuming expected inflation could be proxied by the average of 12-month past and future inflation. This formulation was suggested by the fact that a regression of expected inflation (on which data only becomes available starting in January 2002) on past and future inflation proved to be a very good fit (Appendix 4).

We proceed (column 2) to drop some variables in order to gain degrees of freedom with the aim of raising these above 15, still less than the normally required 20. We drop the unemployment rate (which given its lack of variability—other than a trend—has little information content), lagged public saving, and the ex ante real interest rate, all of which were statistically insignificant in column (1). We replace the growth in the terms of trade with the terms of trade index itself (the usual formulation) and add an indicator of business confidence as a forward looking variable.

These changes make a small difference to the size of the coefficient on public saving, which drops from -0.7 to -0.6 in the short-run. In the long-run, the results imply an even smaller effect on private saving (since the coefficient on lagged private saving is more negative than in the previous specification), but as before the coefficient on lagged saving is not statistically significant at the 5% level.

In this specification the change in credit and the terms of trade become highly statistically significant. These results are in line with the general findings in the literature and are as expected for Turkey. While the change in credit/GDP becomes significant, the coefficient on public saving remains sizeable, suggesting that public saving does not affect private saving purely through credit availability.³²

Business confidence is marginally significant (negative sign, as expected), and growth in per capita GDP almost so (positive sign as expected). We believe this result may be spurious however, reflecting the high positive correlation between GDP per capita growth and confidence.

So as not to make too much of this last finding, which could be spurious, we next drop the confidence variable (column 3). Results are hardly affected by dropping this variable and we adopt the specification in column 3 as our key specification.

³² Kannan (2008) has shown that fiscal variables affect real interest rates. In a cross-section of countries, he found a significant relationship between domestic debt and ex post real interest rates. Also, in Turkey specific regression, the foreign exchange risk premium in the interest parity condition was a function of the budget deficit. Finally, the change in debt had an adverse impact on the probability of that the economy would transition from a high to low inflation rate regime, pressuring nominal interest rates.

Table 3. Turkish Private Saving Equation, 1988-2009

	(1) IMF replication		(2) Parsimonious adding confidence		(3) Key specification		(4) Different fiscal variable	
	coefficient	std error						
Constant	16.54	6.63 **	11.80	6.00 *	0.36	3.37	4.87	6.58
Lagged private saving (%GDP)	-0.09	0.31	-0.23	0.13 *	-0.31	0.17 *	-0.03	0.17
Public Savings (%GDP; adjusted)	-0.73	0.33 **	-0.63	0.15 ***	-0.63	0.16 ***		
Overall balance (%GDP; adjusted)							-0.54	0.14 ***
Lagged public saving (%GDP)	0.18	0.25						
GDP deflator (%change)	0.08	0.03 **	0.05	0.02 **	0.05	0.02 **	0.03	0.02
GDP per capita growth (%change)	0.03	0.11	0.16	0.09	-0.01	0.04	-0.08	0.05
Change in private credit as % of GDP	-0.39	0.26	-0.46	0.15 ***	-0.53	0.16 ***	-0.07	0.21
Terms of trade (index)			0.17	0.04 ***	0.20	0.04 ***	0.09	0.06
Terms of trade (%change)	0.07	0.11						
Business confidence indicator			-0.11	0.04 *				
Ex ante real rate	-0.03	0.06						
Unemployment rate	-0.04	0.32						
R squared	0.85		0.91		0.92		0.86	
Number of observations	22		22		22		22	
Degrees of freedom	12		14		15		15	

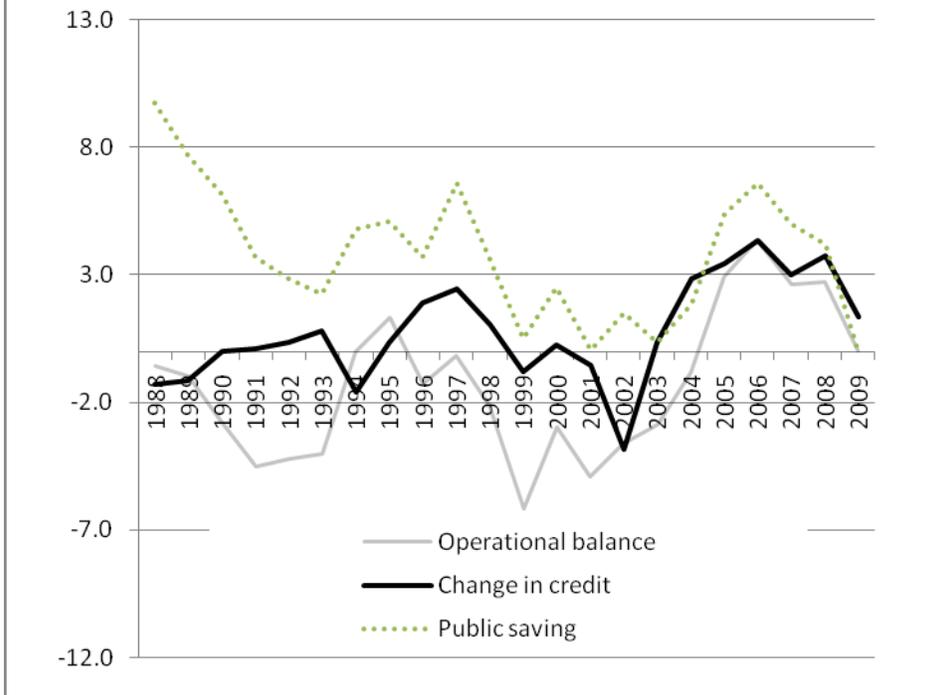
Huber-White-Sandwich heteroscedasticity consistent estimator for standard errors

*** Statistically significant at the 1% level; ** statistically significant at the 5% level; * statistically significant at the 10% level.

Finally, we check our results for robustness to changes in definition in our fiscal variable. In particular, we replace public saving with the overall balance adjusted for inflation (in other words we use the so-called “operational balance”). In essence this variable equals inflation adjusted public saving minus investment. This measure might in theory be a more relevant determinant of private saving. For example, in the theory of Ricardian equivalence, people would expect their future tax burden to be lower not only when government saving increases (an increase in taxes or a reduction in government consumption), but also when government investment falls, if that investment is not very productive. From the point of view of crowding out and availability of credit to the private sector as well, the public S-I balance is likely to be more relevant than government saving.

The result of a strong offset between public and private sector saving is robust to this change, as we find a similar coefficient and significance level for the new fiscal variable. On the other hand, the statistical significance of inflation, the change in credit, and the terms of trade disappears completely, so we cannot be sure there really is any effect through these variables on private saving. The correlation matrix (Appendix 3) shows that the change in credit is much more highly correlated with the operational balance (0.7) than it is with public saving (0.1) (also see Figure 9)—the same is true for the terms of trade (-0.6 vs. 0.2)—and this may cause the operational balance to pick up the effect of changes in credit and terms of trade.

Figure 9. Change in Credit and Fiscal Variables



The conclusion from the above is that there is a large offset between private and public sector saving. We would like to caution, however, against the classical interpretation of this result as reflecting Ricardian equivalence. In that view, to reiterate, the increase in public savings (thanks to a strong fiscal adjustment) would have led to a decline in private saving because improved public savings today implied a lower future tax burden for forward looking, rational agents. We think this interpretation is far from realistic because there is room to suspect that, as in many emerging market economies, the strong theoretical assumptions required for the Ricardian equivalence result to hold -- notably the absence of liquidity constraints, risk-neutral agents, internal equilibria with bequests for everyone, and especially, the certainty that government spending will not increase in the future -- are largely absent in the Turkish case as well.

While we could not demonstrate this in our regressions, since public saving does not lose its significance when adding our credit variable, a more natural and broader interpretation of these findings in our judgment is that government saving is a good proxy measure for general economic conditions. In the recent Turkish stabilization experience, clearly, the increase in public savings (or overall fiscal position) through generation of unprecedented primary surpluses and an attendant decline in interest payments during this period, contributed to restoration of confidence after the 2001 financial crisis. This, in turn, led to lower inflation, lower real interest rates, a greater ability to borrow from abroad, and strong FDI inflows (from 2005 onward). All these factors combined to release resources for lending to the private sector, or creating a so-called “crowding in” effect for the private sector. Growth in lending, which is controlled for in the regressions, should in

theory capture this “crowding in”, but is possibly an imperfect measure. As already noted above, for the last few years, it can be argued that it was the global crisis which caused both government saving to decline and private saving to rise—causing a correlation between the variables, rather than that there was any direct response of private saving to public saving.

Finally, measurement error could contribute to the finding of a strong offset coefficient. Private and public saving are not derived independently. Measurement error in public saving could cause an offsetting measurement error on private saving. Similarly, any measurement error in the inflation adjustment introduces negative correlation, biasing the coefficient on public saving downwards to -1 in the regressions, as also noted in IMF (2007).³³

4.2 Household Survey Data

In this section, we use household budget survey data to explore whether changes in the aggregate saving rate were shared among various groups, a method standard in the literature (see e.g., Japelli and Pagano, 1997). This also allows us to examine various hypotheses on the drivers of the decline in the saving rate. We then estimate an equation for aggregate household saving, very similar to that of Chamon and Prasad (2008), to check, inter alia, for the effect of private health expenditures, social security, and home-ownership on saving. The data are from the Household Budget Surveys of 2004-2008 (see Appendix 1 for details and some caveats on the data).

³³ A robustness check using instrumental variables in IMF (2007) did not find that measurement error substantially affected the estimates.

Saving across groups

Table 2 shows the household saving rate by characteristic of the household head for 2004-08.³⁴ The purpose of the table is to illustrate whether any trends in overall saving were shared among demographic and socio-economic groups. The main developments we are interested in are the sharp decline in saving from 17 to 10 percent between 2004 and 2005 and the recent decline in household saving from 12 to 8 percent between 2007 and 2008. The latter is somewhat of a mystery given that private sector NIA data point to an increase in saving. The decline between 2004-05 occurred in the context of a rapidly growing economy (growth rates around 9%), whereas the decline between 2007-08 occurred after growth lost some of its momentum, with growth declining to 4.7 and 1 percent in 2007 and 2008 respectively.

2004-05

The sharp decline in saving from 2004 to 2005 turns out to have been shared broadly. Saving rates declined roughly by the same amount irrespective of urban-rural location, number of children present in the household, age of the head of household, and wealth/income, as proxied by rooms per adult equivalent and education.³⁵ The exceptions are that saving rates almost did not decline for workers in the public sector

³⁴ Each sub-group in the table accounts for at least 500 observations.

³⁵ We cannot condition on income or green card (free health care) because of under-reporting of income, which is likely to be worse among green card holders, whose benefits depend on reporting low income. Adult equivalents are based on the modified OECD equivalency scale. This scale takes into account economies of scale in household consumption and lower spending on children and the elderly. The equivalency scale assigns the first adult a weight of 1, additional persons over 13 years of age a weight of 0.5, and children under 14 a weight of 0.3. Thus children under 14, for example, are assumed to consume 0.3 times as much as the household head. The lower weights for additional household members reflect economies of scale and hence lower costs for additional members.

and that saving declined more for those living in their homes--an indication that a wealth effect may be operating since real estate prices were booming in 2005--and less for those earning interest income. Homeowners reduced their saving rate from 19 to 11 percent whereas tenants reduced their saving rate much less, from 10 to 7 percent, and the data indicate this resulted mainly from higher spending growth.

Of special interest is the fact that saving declined as much in households headed by elderly persons as in other households. This is surprising because the elderly should be relatively unaffected by improved economic prospects (retirement income should not be affected), an improved fiscal outlook (lower future taxes will affect future generations not the elderly themselves³⁶), or relaxed liquidity constraints (income is not rising over time, so such households should not wish to borrow). We believe this may be related to the high rate of ownership among the elderly and a possible wealth effect operating in the economy. Almost 90% of elderly households owned their own home.³⁷ If the elderly do not simply wish to pass on their higher assets as inheritance, they will draw down some of their assets after an increase in their value, or at least reduce their saving rate.

The wealth effect deserves some further comment. A wealth effect from higher housing prices will be present if people consume more real estate services now than they will in the future. As noted in the literature survey, and consistent with our results here, this may be the fact for the elderly; it holds additionally for owners of lots of land on which larger buildings can be built through e.g., partnership with construction companies, as is often the case in Turkey. In those cases, owners will receive a share of the new

³⁶ In theory it is possible that the elderly internalize the impact lower prospective taxes on their children and plan to leave fewer bequests (hence reduce their saving), as pointed out by Barro (1974).

³⁷ 66% of households with household head under 40 owned their residence, versus 79% and 88% respectively for those with household head of 40-60 and over 60 years old.

construction in proportion to the value of the land, hence may receive more than their planned real estate services when prices are high. There will also be a wealth effect if higher housing prices increase access to credit (home equity loans or higher limits for personal loans) and affect saving through that channel.

“Living off interest income” is a typical feature of many households in Turkey, the result of years of chronic fiscal deficits, macroeconomic instability and high real interest rates, hence the emergence of a “rentier class”. This means that there is a large class of people for whom the income effect of lower interest rates—real interest rates fell from almost 30% in the immediate aftermath of the crisis, to high single digits—was adverse, reducing consumption and increasing saving. We attempt to capture these people through a dummy variable for people who had interest income and found that such households did not reduce their saving, as they moderated their spending growth.³⁸ The policy implication of finding a large income effect (which outweighs the substitution effect) for households with interest income, is that measures such as reducing taxation of interest may not achieve their goal of raising private saving, while having a budgetary cost.

The failure of saving among employees in the public sector to decline substantially³⁹ reflect higher income growth, not lower spending growth relative to private sector

³⁸ Interest income was defined as the sum of bank interest income (local and foreign currency deposits) and interest income on government and bank bills. 15 percent of households had such income in 2005. Households with interest income experienced income increases of 12% and spending increases of 12%; in contrast, households without interest income experienced income increases of 13% and spending increases of 24%.

³⁹ Public sector is defined as civil service plus public enterprises. However, in the sample, there seem to be very few public enterprise workers, based on answers to the questionnaire.

workers. Possibly the large income increase may have been seen as transitory, thereby limiting consumption out of this higher income.

2007-08

Table 2 indicates that the decline in saving rate between 2007 and 2008 was shared among all groups (the only exception is extended families). Younger households, tenant households, and households where the household head had middle and high school education experienced especially large declines. The unemployed and those with tertiary education experienced smaller declines in saving. The slowdown in real estate values did not happen till September 2008 (time of the Lehman debacle), so it is unlikely that tenants felt substantially better off, which would have explained a large decline in their saving. More generally, the decline in saving is mysterious, because in the past Turkey always seemed to respond to economic crises by raising saving (and the NIA data, unlike the household survey data, do point in that direction).

Table 4. Group Household Savings Rates, Characteristics of Household Head

	2004	2005	2006	2007	2008
overall	0.17	0.10	0.10	0.12	0.08
rural	0.17	0.10	0.10	0.12	0.08
urban	0.16	0.10	0.10	0.12	0.08
<40 years old	0.17	0.08	0.09	0.13	0.03
40-60 years old	0.16	0.11	0.10	0.12	0.10
>60 years old	0.19	0.11	0.13	0.12	0.10
zero kids (and head of household under 60) 1/	0.22	0.08	0.12	0.16	0.05
1 kid (nuclear family)	0.18	0.09	0.11	0.14	0.10
2 kids (nuclear family)	0.16	0.12	0.09	0.13	0.05
3 or more kids (nuclear family)	0.12	0.05	0.07	0.09	0.06
extended families	0.19	0.15	0.13	0.12	0.12
other (single and zero kids with head of household over 60)	0.16	0.08	0.10	0.09	0.06
have interest income	0.13	0.13	0.14	0.20	0.17
no interest income	0.17	0.09	0.09	0.11	0.07
owns residence	0.19	0.11	0.11	0.13	0.12
doesn't own residence	0.10	0.07	0.08	0.10	-0.03
public	0.13	0.12	0.11	0.16	0.10
private	0.21	0.12	0.13	0.14	0.09
N/A	0.09	0.04	0.03	0.06	0.05
self-employed and employers	0.40	0.20	0.22	0.24	0.18
not self-employed	0.15	0.07	0.07	0.09	0.03
NA 3/	0.09	0.04	0.04	0.06	0.05
green card	-0.15	-0.19	-0.10	-0.06	-0.08
no green card	0.17	0.11	0.11	0.13	0.09
enterprise< 10 employees	0.22	0.14	0.15	0.16	0.08
enterprise>=10 employees	0.16	0.11	0.10	0.12	0.08
NA 3/	0.09	0.04	0.03	0.06	0.05
lowest 20% household income	-0.25	-0.36	-0.27	-0.24	-0.36
highest 80% household income	0.19	0.13	0.13	0.14	0.10
lowest 90% household income	0.08	0.02	0.03	0.04	-0.01
highest 10% household income	0.35	0.28	0.30	0.31	0.28
primary education or less	0.14	0.09	0.08	0.09	0.05
middle and high school education	0.16	0.10	0.11	0.13	0.07
higher education	0.22	0.15	0.16	0.18	0.16
employed	0.19	0.12	0.13	0.14	0.09
unemployed	0.09	0.04	0.03	0.06	0.05
lowest 20% rooms/adult equivalent	0.15	0.09	0.09	0.10	0.04
highest 80% rooms/adult equivalent	0.17	0.10	0.11	0.13	0.09
no hot water	0.12	0.01	0.05	0.04	0.00
hot water	0.18	0.12	0.11	0.13	0.09
doubtful 4/	-0.71	-0.82	-0.57	-0.52	-0.59
not doubtful	0.18	0.13	0.12	0.14	0.10
memo: percent doubtful observations	6	8	8	8	10

1/ There is a break in the data in 2008. Previously data referred to nuclear households only; in 2008 data refers to all households without kids.

2/ Categories do not sum to total, because single people and households without kids but with household head over 60 not included.

3/ Corresponds to roughly 30% of the cases.

4/

Doubtful cases are those where household income was in lowest quartile, yet had hot water; those with negative income or spending and cases of extra-large dissavings, where dissavings is larger than 2.6 times annual income. Six-11 percent of observations were classified as doubtful depending on the year, with a clear upward trend.

Saving equation

We next estimate a comprehensive equation for the household saving ratio (saving/disposable income) following Chamon and Prasad's (2008) work on China. This equation controls for demographics of the household, household income, education, insurance and employment characteristics, large expected health expenditures,⁴⁰ home ownership, and interest income. Five different categories of insurance are distinguished: (1) participation in the general social security scheme (SSK). This is the omitted category in the regressions; (2) participation in the scheme for civil servants (Emekli Sandigi); (3) participation in the scheme for the self-employed (Bag-Kur); (4) other; and (5) no social security.

The equation includes the log of household income, and is estimated with instrumental variables given the measurement error in this variable.⁴¹ It is estimated for a core group of households, which excludes households whose head was under 25, over 70, a student,

⁴⁰ Expected health expenditures are obtained from a separate probit equation, which follows Chamon and Prasad (2008). The dependent variable equals one when health expenditures exceed 10 percent of consumption expenditures. Independent variables are the log of non-health expenditures, a dummy variable for urban/rural location, a dummy variable indicating the presence of health insurance, and 4 variables indicating the number of persons under 15, 15 to 39, 40 to 59, and over 60. The regression is estimated for pooled 2004-05 data and for 2006, 2007, and 2008 separately, with year dummies interacted with demographic variables. "Absence of any health insurance" has a positive coefficient in this equation, the number of household members under 15 has a negative coefficient, and the number of household members over 60 has a positive coefficient. An indicator variable is then constructed based on this probit, which equals one when the probability of large health expenditures exceeds 10 percent. This indicator variable is then entered in the household saving regression.

⁴¹ In Chamon and Prasad (2008) no such instrumentation is done, but this is critical here given under-reporting of incomes (see Appendix II).

involuntarily unemployed, disabled or sick, waiting for work or in seasonal employment.

⁴² The sample was also restricted by excluding doubtful observations. ⁴³

Using IV is critical in our case since measurement error on income causes spurious correlation between S/Y and Y . When Y is low because of under-reporting, $(Y-C)/Y$ will automatically be low even if there is no behavioral relationship between Y and S/Y . As instruments we use all independent variables (other than income) plus, in order to capture income, a dummy variable for whether the household has hot water and the number of rooms per capita (specifically, the number of rooms divided by the number of adult equivalents, using the modified OECD scale described in Section 4). The three classic conditions for a valid instrument to solve the problem of measurement error seem to be satisfied. These conditions for the instruments are (1) low correlation with measurement error; (2) high correlation with income; and (3) instruments do not belong in the regression in their own right. If the instruments were to be correlated with measurement error, say because the true value of income is correlated with measurement error (e.g. the truly poor underreport more), we would continue to have spurious correlation between S/Y and instrumented income (e.g. when true income is low, under-reporting is more and S/Y is lower). To check whether this is the case, we construct a proxy for measurement error (a dummy variable which is one when saving ratios are below -1, that is dissaving equal to 100 percent of income) and check the correlation with our instruments. In the

⁴² This follows the literature (see e.g., Japelli and Pagano, 1997, Chamon and Prasad, 2008). Households with young or older heads are typically wealthier than average, and including them would thus cause selectivity bias.

⁴³ Given the very large number of cases of large negative saving rates, we had cause to believe there was large under-reporting (Appendix 1). We thought this problem would be larger for cases where the head of household did not report social security status, where incomes were in the lowest quintile yet the household had access to hot water, where income or spending were negative (theoretically impossible), and where dissaving were larger than 260% of income, and restricted the sample by excluding these observations.

entire sample the correlation is close to zero, though in the restricted sample the correlation is somewhat high at -.11 for our instrument “access to hot water” (“sicaksu”). Other instruments included by virtue of the 2SLS procedure are all close to zero in correlation with measurement error proxied by “low saving”. The instruments are also reasonably highly correlated with income—around 50% and 20% correlation for the hot water dummy and number of rooms per capita (“roomsperocd”) respectively (Appendix 3).

Table 4 shows the results for the household saving equation for each year from 2004 to 2008. The findings are remarkable constant across years.

Table 5: Survey Instrumental Variables Regression: Savings/Disposable Income

	2004		2005		2006		2007		2008	
	Coef.	t								
Log income	0.144 ***	4.7	0.224 ***	7.1	0.197 ***	6.5	0.207 ***	6.6	0.191 ***	5.2
Urban location	-0.024	-1.5	-0.025	-1.2	-0.017	-1.0	-0.067 ***	-3.5	-0.053 ***	-2.7
Social security scheme										
Emekli Sandigi (civil servants)	0.040	1.4	0.067 **	2.0	0.019	0.5	0.018	0.6	0.074 **	2.3
Bag-Kur (self-employed)	0.142 ***	6.7	0.063 ***	2.6	0.126 ***	6.0	0.075 ***	3.5	0.040	1.6
Other	0.089	1.3	0.143	0.9	-0.149	-1.1	0.082 *	1.8	0.150 ***	3.3
No social security	-0.003	-0.2	-0.012	-0.6	0.028	1.5	0.022	1.3	-0.002	-0.1
Private sector	-0.011	-0.5	0.018	0.7	-0.009	-0.3	-0.049 **	-2.0	-0.006	-0.2
Have interest income	-0.030	-1.4	0.010	0.5	0.012	0.6	0.007	0.4	0.001	0.0
Health risk	0.272 ***	6.1	0.272 ***	4.8	0.230 ***	2.9	0.247 ***	3.8	0.257 ***	2.6
Homeowner	0.027 *	1.9	0.001	0.1	0.011	0.7	-0.004	-0.3	0.089 ***	5.3
Head aged 40-60	0.003	0.2	0.010	0.6	-0.019	-1.1	-0.001	0.0	-0.004	-0.2
Head aged over 60	0.015	0.4	-0.138	-1.6	-0.055	-1.0	-0.087 *	-1.7	-0.026	-0.6
Log household size	-0.052 **	-2.2	-0.070 **	-2.2	-0.014	-0.4	-0.110 ***	-4.0	-0.103 ***	-3.1
Share members aged 0-4	-0.054	-0.9	0.115	1.5	0.003	0.0	0.049	0.7	-0.040	-0.5
Share members aged 5-14	-0.108 **	-2.1	0.055	1.0	-0.070	-1.2	0.117 **	2.1	0.049	0.7
Share members aged 15-19	-0.112 **	-2.1	-0.057	-0.8	-0.169 **	-2.6	0.022	0.4	-0.107	-1.5
Share members aged 60+	0.070	1.1	0.051	0.4	0.104	1.1	0.196 ***	2.9	0.034	0.3
Share members that are housewife	0.063	1.6	-0.024	-0.5	-0.109 **	-2.2	-0.038	-0.9	-0.108 **	-2.2
Secondary education, head	0.008	0.5	-0.049 ***	-2.8	-0.011	-0.7	-0.022	-1.4	-0.003	-0.2
Tertiary education, head	-0.030	-1.0	-0.118 ***	-3.5	-0.057 *	-1.7	-0.075 **	-2.5	-0.024	-0.7
Secondary education, spouse	0.003	0.2	-0.030	-1.4	-0.005	-0.3	-0.004	-0.2	-0.042 **	-2.2
Tertiary education, spouse	0.008	0.2	-0.109 **	-2.4	-0.043	-1.2	0.011	0.4	-0.059	-1.7
Extended family	-0.008	-0.4	0.015	0.6	-0.015	-0.6	0.011	0.5	0.056 **	2.1
Constant	-1.189 ***	-4.4	-1.993 ***	-7.2	-1.780 ***	-6.4	-1.742 ***	-6.0	-1.745 ***	-5.1
Number of observations:	5134		5107		5330		5132		4948	
R-squared	0.19		0.15		0.15		0.15		0.17	

Estimated with instrumental variables. Instruments for log income include all variables in the regression plus access to hot water and number of rooms per adult equivalent. Sample consists of a core group of households, which excludes households whose head was under 25, over 70 [65 for surveys starting in 2006], a student, involuntarily unemployed, disabled or sick, waiting for work or in seasonal employment. Sample excludes doubtful cases. Doubtful cases are those where household income was in lowest quartile, yet had hot water; those where social security status of household head was not reported; those with negative income or spending and cases of extra-large dissavings, where dissavings is larger than 2.6 times annual income Health risk is a dummy variable equal to 1 for households where a probit regression indicates a 10% or greater chance of health expenditures in excess of 10% of consumption expenditures. Omitted categories: head of household 25-29, social security=SSK scheme (general scheme); spouse education primary or less, or no spouse in household.

***statistically significant at the 1% level; ** 5% level; * 10% level.

Income is statistically significant with positive coefficients for both years, indicating that the average propensity to save is higher for the rich than the poor, consistent with empirical evidence and both the original Keynesian formulation and more recent theories (see Dynan, Skinner and Zeldes, 2000). The coefficients are of a reasonable order of magnitude. For example, a one percent increase in income is associated with an increase in the saving/income ratio of 0.2 percentage points in 2005. ⁴⁴

There is some evidence for a positive impact of **uncertainty** on saving in line with theory. Health spending risk has a positive, large and statistically significant impact on saving. Participation in the social security scheme for the self-employed, who are presumably subject to greater uncertainty than employees, has a positive statistically significant coefficient. This result could also reflect enterprise saving, since the self-employed include small business owners.

We also find some evidence that **homeownership** was associated with higher saving (compared to tenants) in 2004 and not in 2005, consistent with a relative wealth effect which would have driven down saving for homeowners relative to tenants (as home prices increased substantially in this period ⁴⁵). These results fit our earlier finding that the saving rate for homeowners as a group declined much more than that of others

⁴⁴ Note that the coefficients cannot be interpreted as reflecting the link between permanent income and the saving ratio. Following the original Friedman (1957) argument, there would be a positive relationship between income and the saving ratio even in the absence of any link between permanent income and the saving ratio. This is because under the PIH, temporary income shocks are reflected in saving so that temporarily richer households save more, which leads to a positive relationship between income and saving ratios. This suggests some caution in suggesting that as incomes increase in Turkey, saving ratios will increase; or in suggesting that richer people save more.

⁴⁵The increase in house prices (and also stock prices) is a feature of the post-2001 crisis experience, and is related to the sharp decline in interest rates and increased availability of credit.

between 2004-05 (Table 2). Some care is necessary in interpreting these findings. As noted in the literature survey, it is difficult to justify the existence of a wealth effect for homeowners on theoretical grounds: after all, home-owners will normally continue to live in their homes, so are not directly better off simply because these homes are worth more. In fact, home-owners face two offsetting effects: an increase in value of an asset, and an increase in imputed housing costs. Nevertheless, psychological factors (or money illusion) might have been at play, boosting spending among homeowners. In addition, home-owners might have experienced an increase in access to liquidity as owners of collateral which had gone up in value. Tenants were worse off as the result of the housing boom and attendant increase in rents, and would naturally have been more reluctant to borrow or reduce saving. Our finding that home-owners reduced saving relatively more than tenants in 2005 stands in contrast with that a finding for the UK, referred to in the literature survey, where home-owner and tenants reduced their saving by similar amounts (Attanasio and others, 2009). The latter finding has been adduced as evidence against a wealth effect in the UK, and in favor of interpreting the link between consumption as housing wealth as reflecting general economic prospects (Calomiris, Longhofer, and Miles, 2009). Our finding here suggests that in Turkey there truly may be a wealth effect, possibly because of the special factors referred to above (the possibility of building larger buildings in partnership with construction companies), because of money illusion, greater access to credit, or because the elderly do not wish to pass on the entire increase in their home's value to their descendants.

Between 2007-08 a reversal seems to occur, whereby homeowners tend to increase their saving relative to tenants. This is consistent with our earlier finding that the saving rate for homeowners did not decline as much as for others during 2007-08. Home prices and rents declined in 2008 (though only toward the end of the year), and this would have caused homeowners to increase their saving relatively to tenants (e.g., because they found their credit restricted, and hence needed more buffer saving). Why the saving rate of tenants, and indeed economy-wide, would have fallen in absolute terms is however not clear.

The dummy for households with **interest income** is insignificant, somewhat surprising given our earlier findings that such households did not reduce their saving rate in 2005 whereas others did.

Age of household head has no effect (other than in 2007), which is not surprising, given that the regressions control for other factors (income, household size, number of children of various ages) that underlie the relationship between age of household head and saving ratio.

Household size, which captures the effect of the **number of children**, has a significant negative impact on saving, as does the share of household members 10-14 and 15-19 (some years only), consistent with findings in the literature that a high dependency ratio depresses saving.

Tertiary **education** for the head of household has a significant negative effect on the saving ratio (2005-07 only). Possibly this reflects greater access to credit for those layers of the population. The share of household members who are housewives and the dummy for extended families are for the most part statistically insignificant.

5. Projecting Turkish Saving: the role of demographics, credit, and social security

In this section we pay special attention to three determinants of saving which are likely to change in the future: (1) demographics, as the demographic transition proceeds (a reduction in the youth dependency ratio and increase in the old-age dependency ratio); (2) credit to the private sector, as financial deepening proceeds; and (3) social security, where substantive reforms were carried out in 2008. In the first two areas, we obtain a quantitative estimate what could happen to the private Turkish saving rate in future based on econometric estimates of importance of these factors. For social security reform, we provide a qualitative appreciation only.

Demographics

Population projections for Turkey based on recent censuses ⁴⁶ indicate that the largest population groups are the 6 5-year cohorts spanning the ages of 0 to 29. Each of these 5-year cohorts contains about 6.4 million people (men and women combined), in 2010. As a result, the population pyramid contains large vertical sections at the base (Figure 10). The youth dependency ratio—the ratio of 0-14 to 15-64 year olds—is a still sizeable 39

⁴⁶ Since 2006, Turkey uses address-based censuses, which has resulted in a downward projection of the population by 5 million people.

percent. Over time, as these large segments age, in conjunction with lower fertility, the youth dependency ratio is projected to decline to 32 percent by 2025. The old-age dependency ratio—the ratio of 65+ to 15-64 year olds—is projected to increase from 10 to 14 percent, reflecting lower mortality.

The decline in youth dependency ratio is expected to lead to an increase in saving, because spending on children will decline as there are fewer of them. This increase in saving will of course be tempered to the extent that parents substitute quality for quantity of children and increase education expenditures (which are classified as consumption, though they are really investment in human capital). On the other hand, fewer children go hand in hand with the breakdown of the family support system, and parents will need greater retirement saving. In addition, there is the impact of greater longevity, which leads to a need for more saving to cover longer retirement, and of youth unemployment, which will probably fall as the number of youths falls over time. Overall, therefore, saving is likely to increase as the result of a lower youth dependency ratio. On the other hand, aging of the population may lead to a decline in saving, since older people, while still having positive saving in Turkey (as in many other countries), tend to save less than working age people.

What quantitative impact will the change in demographic structure have on saving? One quick way to gauge this is to use existing estimates based on panel data studies. Loayza et. al. (2000b) estimates for LDCs using a GMM system estimator that a 1 percentage point reduction in youth dependency ratio is associated with a 0.3 percentage point

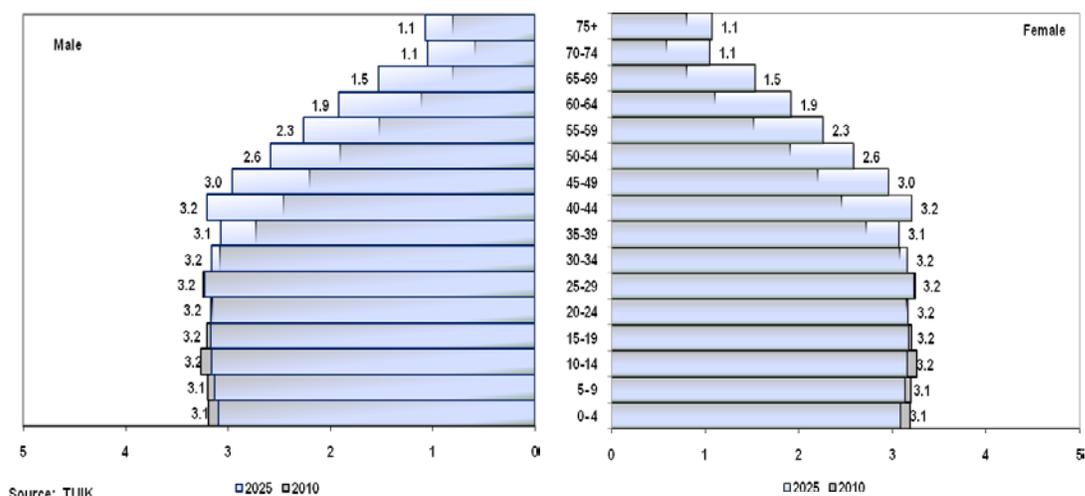
increase in the saving rate (as a share of private disposable income) in the short-run and a 0.5 percentage point increase in the long-run.⁴⁷ Multiplying by the projected decline in the youth dependency ratio from 39 to 32 percent, we might then expect an increase in private saving ratio of some 3.5 percentage points in the long-run. For the old-age dependency ratio, a 1 percentage point increase in the old-age dependency ratio is associated with a decline of 1.4 percentage points in the saving rate in the short-run and of 2.6 percentage points in the long-run. Based on these estimates, the projected increase in the old-age dependency ratio of some 4 percentage points should be associated with a decline in the saving rate of 10.4 percentage points in the long-run. Overall these estimates suggest the saving rate will decline by 7 percentage points as a result of the combined changes in youth and old-age dependency ratios. There is of course uncertainty surrounding these estimates, but at any rate, demographics do not provide encouraging news for the private saving rate, contrary to what is generally believed.⁴⁸ For OECD countries, the magnitudes of the coefficient on both the youth and old-age dependency ratios are much lower, implying only a 1 percentage point decline in the saving rate in the long-run (Appendix 5), and the decline in saving would be less.

Figure 10. Turkey Population Pyramids, 2010 and 2025

⁴⁷ Their Column 3 results, reproduced as Table 5 in Appendix 5.

⁴⁸ In our earlier paper, we had found a much larger decline in the youth dependency ratio, based on older projections by the US Census, which in turn assumed a much faster decline in fertility than more recent projections do.

Chart. Turkish Population Projection



Other, more sophisticated methods can be used to estimate the effect of demographics on future saving. For example, Dynan, Edelberg and Palumbo (2008) for the US and Attanasio and Székely for various Latin American and South East Asian countries, project saving forward after deriving the age-savings profile *by age of household head*, taking into account cohort effect. For new cohorts of households they assume that the age-saving profile will be the same as the youngest observed cohort. For the future age distribution of household heads, they simply use the projected age distribution of the population, a rather strong assumption. Van Rijckeghem and Ucer (2009) obtain estimates of future saving after deriving the *individual* age saving profile from the profile of saving by age of household head (see Figures 18-20), and match this profile to the projected age distribution of the population. By working at the individual level, they avoid having to assume that the age distribution of household heads equals that of the

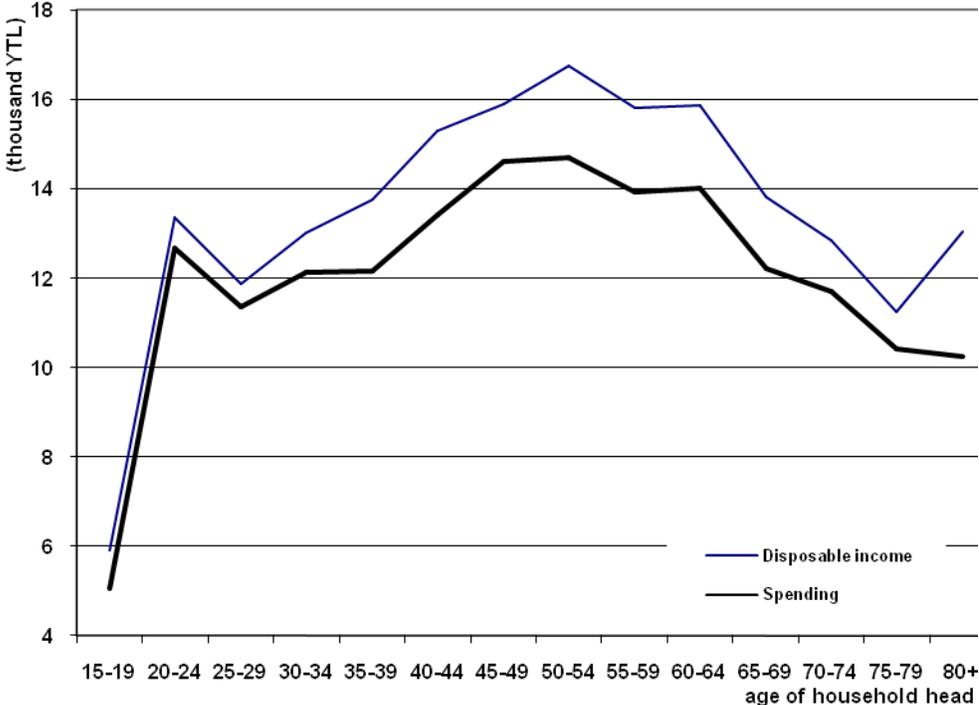
population. A caveat to their analysis is however that it presumes “cohort effects” are negligible, since the data is not available to estimate these cohort effects.⁴⁹

The standard shape of the individual saving-age profiles derived for Turkey using two different methods⁵⁰ confirms that a decline in the relative number of dependents should lead to an increase in saving and an increase in the relative number of elderly should lead to a decline in saving, at least if these age profiles reflect true age effects rather than cohort effects.

⁴⁹ Cohort effects refer to factors affecting an entire cohort, such as a frugal attitude resulting from war-time experiences, attitudes towards leaving bequests, or differential social security entitlements. Year effects reflect macro-shocks or measurement error specific to that year. It has been long recognized that it is not possible to separately identify the effects of age, year (time), and cohort (birthyear) in panel data, since the variables are a linear combination of each-other ($\text{time} = \text{birthyear} + \text{age}$). Restrictions need to be made on the data and these may be arbitrary. The literature has often followed Deaton (1997) in restricting average year effects equal to zero and making year effects orthogonal to a trend. An alternative approach recognizes that the change in the slope of the cohort, age and time effects can be estimated without restriction, by second differencing the data with respect to two of the three effects (McKenzie, 2006). Imposing one restriction on the slope and two restrictions on the level is then sufficient to recover slope and level of the effects. Another approach is to restrict age, time, and/or cohort effects to follow a higher-order polynomial. Japelli, 1999, for example uses a 5th degree polynomial. These methods can unfortunately not be used in Turkey because of the relative few surveys combined with the fact that since 2006 the data no longer identify age, but only 5-year age groups. Since this means surveys have to be 5 year apart to follow a 5-year cohort through time, we have in effect only 2 useable surveys for the moment (2003 and 2008). Even though we assume cohort effects are zero, hence leaving our results open to the criticism that they may reflect cohort effects, our findings for the age-saving profile are in correspondence with what one would expect for life-cycle saving. It is hard to imagine how cohort effects would cause this pattern. Very recent cohorts and older cohorts would have to save little; and middle cohorts would have to save a lot.

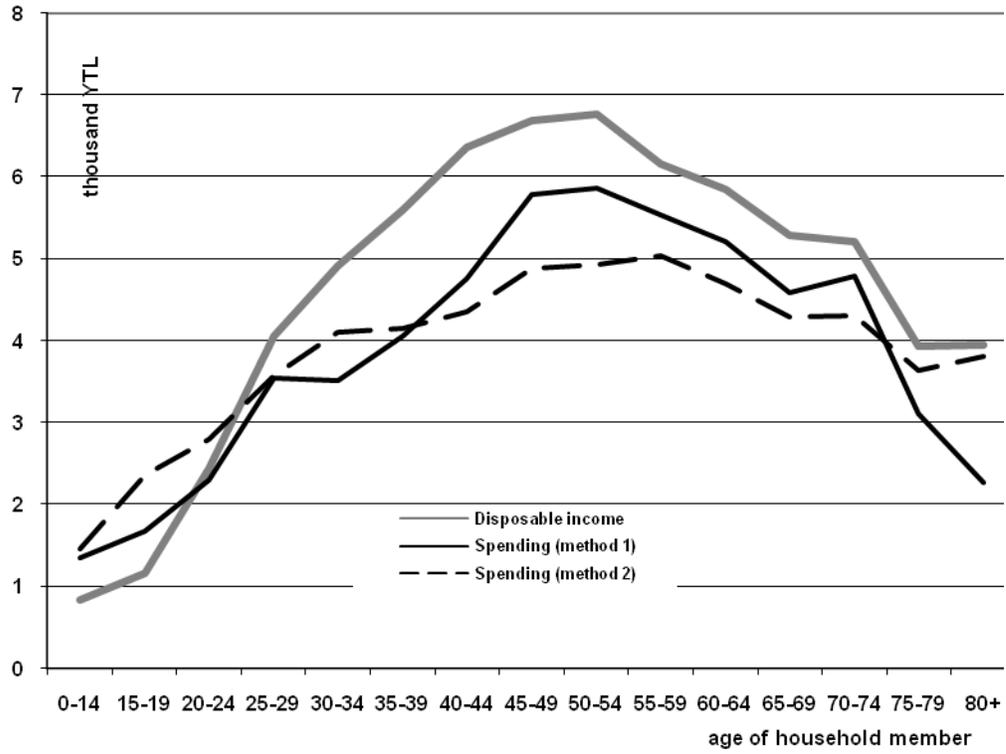
⁵⁰ The first method involves obtaining the contribution of persons of each age-group to household saving by regressing household saving on the number of persons of each age-group in the household. The second method uses the OECD equivalency ratios to derive consumption for each person of a certain age from household income. See Van Rijckeghem and Ucer (2009). The age-saving profiles do show very high saving for persons 75 years of age or older. This however likely reflects a selection bias, whereby richer persons (who likely also save a lot) also tend to live longer.

Figure 11. Income and Spending by Household, 2005

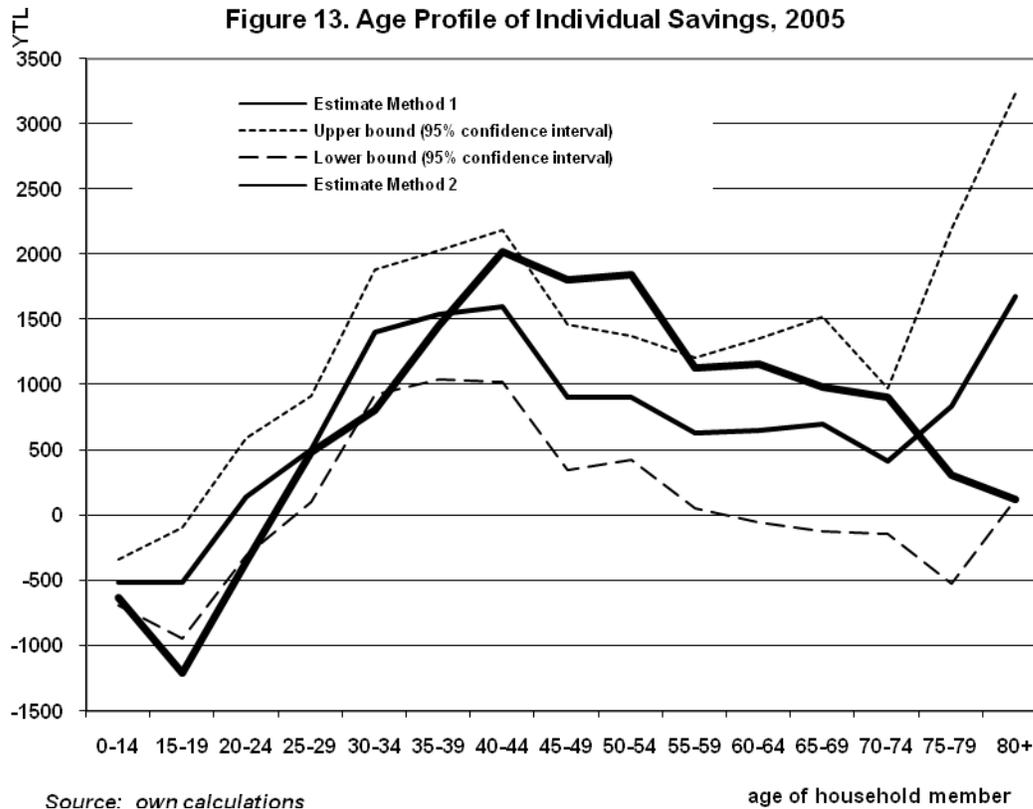


Source: Household Budget Survey, 2005

Figure 12. Individual income and Spending Over the Life Cycle (2005)



Method 1: regression analysis to uncover age effects.



Credit

LSS estimates that for LDCs, a 1 percentage point increase in credit flow/GDP is associated with a 0.5 percentage point decline in the private saving/GDP ratio in the short-run.⁵¹ Turkey's private sector credit to GDP ratio is currently a very low 25%. We will study the effect of an increase in private credit to levels in Eastern Europe—of around 50% of GDP—spread over 10 years. Assuming nominal GDP growth of 12% a

⁵¹ Note that under this specification, it is not credit/GDP but the credit flow, divided by GDP. This is not the best measure of credit conditions, since owing to inflation, it is possible to have a positive credit flow, without having any increase in real credit or in credit/GDP.

year (7% inflation and 4.5% real growth), we find that the necessary credit flow is some 7% of GDP during 2010-2019, up from 4% in 2009. This would, based on LSS estimates, be associated with a decline of 1.5 percentage points $((7-4) \times 0.5)$ in the short run (double in the long-run). The estimate for LDCs is on the high side—for OECD countries, the estimate is only $1/6^{\text{th}}$ this size, and would imply a reduction of saving/GDP of less than 0.3 percentage points (triple this in the long-run).⁵²

Our own estimates from our “key specification” suggest a role for the change in the credit/GDP ratio rather than its level. For saving to decline requires an increased rate of change in credit/GDP. Starting from a stable level of credit/GDP, a 1 percentage point increase in credit/GDP ratio is associated with a 0.5 percentage point decline in the saving ratio in the short-run. In the long-run, the effect is 0.4 percentage points, if credit continues to increase by 1 percentage points a year. If credit/GDP stabilizes at a higher level, the long-run effect of the increase in credit is zero. From this point of view, an increase in credit poses no long-run problems. It is of course possible that the effect of credit is also captured through government saving, in which case there would be long-run effects not captured here.

Social security reform

⁵² We follow Hevia (2010) in taking this approach. However, Hevia considers a *reduction* (where we consider an increase) in flow/GDP by comparing the historical value of credit flow for 1980-2008 with a hypothetical lower value for credit flow. In our view, the historical values (which are very high) are misleading since they are driven by high inflation.

The social security reform of early 2008 comprised the following: (a) the retirement age remains unchanged until 2035 (currently 60 for male and 58 for female), and then is raised by one year, every other year, to reach 65 for both sexes in 2048. This means that men born in 1975 will have to retire in 2036 instead of 2035, i.e. work one year more, and have a one-year shorter retirement. Men born in 1980 and after (those 30 years old or younger in 2010) will have to work 5 years more and spend up to 5 years less in retirement.⁵³ Women born in 1977 will have to retire in 2036 instead of 2035. Women born in 1982 and after will have to work 7 years more and spend up to 7 years less in retirement. Because time in retirement is likely to go down, plus years with opportunity to save (working years) would increase, retirement saving would likely fall. This type of measure is therefore beneficial for the social security deficit, but may lead to lower private saving. (It is quite likely of course that given progressively greater longevity, the need for retirement saving is increasing in the background). Currently about 1/3 of the working age population is affected (those currently under 30 years old), but over time the entire working population will be.

b) the number of premium days is raised to 9,000 days from 7,000 at SSK—the general insurance scheme (it is already 9,000 days at Bag-Kur, the scheme for self-employed and Emekli Sandigi, the scheme for civil servants) by increasing it 100 days every year from 2007 onward, thereby reaching 9,000 in 20 years. Premium days are a second criterion, in addition to the minimum retirement age. Only those who would otherwise have met the retirement age but now need to delay retirement according to the higher premium

⁵³ If working longer is good for longevity, time spent in retirement may not be reduced by this much.

days requirement will be affected. As for the first measure, there will be less time in retirement and more working years and a likely reduction in retirement saving.

(c) the income replacement rate for retirement pensions is slightly reduced to 2.5 percent for every 360 days of total 'premium paid days', from levels around 2.6%-3% depending on the social security scheme. It is then reduced further to 2% from 2016 onward. Such reductions in replacement ratio should stimulate private saving as individuals now need to provide for their own retirement to a greater extent than before. The measures, however, have an impact only over the medium-term since grandfather clauses protecting existing rights specify that accrued pension benefits cannot be reduced, so that the replacement rate will take time to fall.

d) In determining the pensionable base, wages are valorized according to a (50-50) weighted average of inflation and wage growth, and all future pensions are indexed to inflation. Compared to past practice, both measures serve to reduce pensions and should stimulate private saving.

6. Policy Options

When thinking about policy options, one possibility is to take the agnostic line: that the role of savings in resolving Turkey's main macro challenges is somewhat overstated. If Turkey were to figure out the true bottlenecks to growth, say, through a well-thought out process of "growth diagnostics", a solid saving ratio could simply *follow*. In other words,

this line of thinking would probably advise putting the emphasis on obstacles to growth rather than on raising the saving rate per se (see Chapter 2 in Rodrik, 2007). In this context, one needs to look for measures that can raise growth, without a need to raise investment (i.e. reforms which increase total factor productivity), so as to ensure a reduction in the current account deficit. One assumption underlying this line of thinking is that growth will raise saving, as panel-data regressions seem to indicate is the case—but this is not guaranteed to be the case for Turkey. In fact, recent interpretations (discussed in the introduction) of the positive correlation between growth and saving argue that this link follows from distortions to the saving decision (such as financial frictions which prevent consumption smoothing; Gourinchas and Jeanne, 2009). Such distortions do not seem to be present in the Turkish case, and in fact Turkish growth and saving in the past always went in opposite directions.

An alternative tack is to address external imbalance—the vulnerability which results when domestic saving are inadequate to finance investment – through the generic expenditure-switching and expenditure-reducing policies, i.e. through lower absorption/growth (consumption plus investment) and a weaker currency. These could be engineered through a tighter fiscal and looser monetary policy mix. However, this would not come without complications, given Turkey’s -- in our view its entirely sensible -- commitment to an Inflation Targeting framework (a combination of a floating exchange rate regime with emphasis on price stability as the overriding objective).

Another complication is the large offset of private saving to increases in public saving. This would call for tighter monetary policy or prudential regulations (“sand in the wheels”), to control credit growth, rather than looser monetary policy. Tighter monetary policy would tend to lead to appreciation of the exchange rate, and exports would fall victim to this strategy. A more promising alternative might be macro-prudential regulations to stem a credit boom. Jeanne (2008) has proposed a tax on debt. The economic justification for this is an externality: individual borrowers impose a negative externality on others because their borrowing increases systemic risk by contributing both to a higher current account deficit and the probability of a credit crisis.

A less benign global environment may do the job of reducing vulnerabilities, too, as witnessed during 2008-09, by reducing capital inflows and hence investment, but the casualty would again be low growth. The good news is that Turkey has shown resilience in the global crisis, and managed capital outflows without a currency or financial crisis, or large corporate bankruptcies.

Another line of thinking is to insist on policy activism explicitly targeted at increasing the saving rate. The bad news is that, the ability of policy to affect the private saving rate seems somewhat limited in Turkey, the main reason being that there do not seem to be large distortions favoring consumption over saving.

What are the standard micro-economic options to encourage private saving? A standard option is to encourage a shift from income taxes to consumption (indirect) taxes, which would stimulate saving since it would no longer be taxed. However, in Turkey,

consumption taxes already make up two-thirds of tax revenue, in contrast to international practice, notably in OECD countries.

Liberalization of the financial sector and the development of institutions that facilitate long-term saving are another tool for increasing saving. Laws and practices in this area do not seem to be an impediment for long-term saving in Turkey, however. Liberalization of deposit rates occurred in the early 1980s in Turkey. The institutional framework for long-term saving—insurance, mutual funds, and private pension funds—is also fully in place.⁵⁴ Portfolio allocation rules are not restrictive, unlike in some countries where the majority of funds under management by insurance companies and pension funds are required to be invested in government bonds. As a result, returns on these instruments are competitive, and are thus not an impediment to long-term saving.⁵⁵ Nevertheless the number of participants in insurance, mutual funds and pension funds is quite limited. The number of life-insurance policies is small, amounts under management by mutual funds are some 3 percent of GDP, and there are only about 1.5 million contributors to private pension plans, with contributions of only \$3.3 billion as of December 2007, or some 0.5% of GDP.⁵⁶ Still, participation is not out of line with other emerging markets with voluntary pension schemes, especially given the fact that pension funds only started operating in October 2003.

⁵⁴ The basic laws are the new 2007 Turkish Insurance Law, prepared in accordance with EU norms (replacing the 1959 Insurance Supervision Act and its various amendments), the 2007 Revision of the Mutual Funds Law (various laws dated 1993 through 2006), and the 2001 Law on Private Pensions Savings and Investments. The legal and institutional framework for private pensions was completed in 2002.

⁵⁵ See, for instance, Mulheisen (1997) for a discussion of the case of India.

⁵⁶ Group policies are very limited, constituting only 10% of total policies (the remainder being individual policies). Rules for vesting (portability of pension rights when shifting employers) were initially unclear, reducing demand for group pensions, but these issues were largely resolved in 2006.

Interest taxation could be reduced; this could through a substitution effect lead to higher private saving.⁵⁷ Or US-style Individual Retirement Accounts (IRAs), which allow IRA contributions to be deducted from taxable income (with retirement income taxed in exchange, but at a lower tax-rate), could be introduced. However, these measures would be risky as they would also reduce government revenues. The overall impact on national saving would depend on how elastic private savings are to the measures. The World Bank Saving Project concludes that, “tax incentives have only small effects on national saving, particularly when the negative effects on public saving are taken into account.” Our own finding that there is likely a substantial income effect on interest earners, which would go in the direction of higher consumption and lower saving, also suggests tax incentives may have a limited impact, though more research is necessary to verify this result.

Another standard prescription is social security reform. As discussed above, replacement rates have already been reduced in Turkey and the social security deficit itself is no longer a concern. An option to raise private saving is to use public funded pension programs (where investors receive the returns on their saving), rather than PAYG programs. The latter tend to depress private saving as private consumption is higher to the extent people expect pension benefits to exceed their pension contributions. A switch to a fully funded system is certainly no panacea for Turkey, notably because in the transition to such a system, the government continues to be liable for existing pension liabilities, without having corresponding revenues.

⁵⁷ The income effect would make interest-earners better off, which would lead to a further boost in consumption, so the overall effect is not clear. Also, in response to lower taxation, interest rates might fall, if supply is fully elastic (as it is under perfect capital mobility), muting the impact on saving.

7. Conclusions

In this paper, we found that Turkish overall and private saving rates have not been chronically low in the sense that, excluding Asia and oil-exporting countries, both have been about equal to emerging market averages. However, there is a chronic problem in another sense: the overall saving rate -- in particular private saving rate – tends to fall sharply during each boom period, as we've observed in this paper. Having experienced a recent boom from the aftermath of the 2001 financial crisis, this explains why Turkish saving is currently low by international and its own historical standards.

Motivated by this observation, we proceeded to ask why saving fell dramatically during the last boom episode, by examining the “usual suspects”, suggested by the theoretical and empirical literature. These usual suspects include improved prospects, higher access to credit, lower interest rates, the wealth effect, and Ricardian effects from higher public saving. We used macroeconomic data, confidence data and household survey data to shed light on the issue.

Our time-series results point to the role of ample liquidity, itself the by-product of a successful fiscal-led stabilization program and a benign international environment, and a possible independent role for increased government saving.

We also found evidence of an effect of home-ownership: home-owners reduced their saving rate substantially, whereas the reduction was only minor for tenants. This result

makes sense, given that tenants were relatively worse off as the result of the boom in house prices and rents, and also helps explain another finding in the paper, namely the large decline in savings among households headed by the elderly. Finally, we find that households with interest income did not reduce their saving, consistent with a relatively large income effect from reduced interest rates. The policy implication of this finding is that measures to stimulate saving by increasing its rate of return (such as reduced interest taxation), may not have much of an impact.

While private saving increased as the result of the financial crisis of 2008, as liquidity dried up and economic prospects deteriorated, we can expect saving to fall again to 2007 levels in the next upturn when credit growth resumes. Demographics are more likely to lead to a decline in private saving than not, and the same is true for the impact of recently implemented social security reforms. Hence policy measures to increase the total saving rate by a few percentage points will be required to contain the current account deficit within the safe zone of 2-3% of GDP. This could be accomplished through tighter fiscal policy, which would however need to be accompanied by tight monetary policy and/or prudential mechanisms targeted at curbing extensive credit growth. This would be necessary to prevent spillovers from higher public saving into lower interest rates and higher credit, and thus to avoid a large decline of private saving in response to public saving.

The ability of policy to affect the private saving rate, as opposed to the public saving rate, seems somewhat limited in Turkey, the main reason being that there do not seem to be

large distortions favoring consumption over saving. Measures which could be tried, such as reduction of interest taxation and IRA-type policies to encourage retirement saving are not certain to raise private saving, given that they also have an income effect which tends to reduce saving, while having a budgetary cost.

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Appendix 1. Household Budget Survey Data

The household surveys of 2004-08 used in this study cover about 8000 households each, and over 30,000 individuals. They provide extensive data on household income, expenditures, and assets. Incomes are in theory comprehensively measured as they include the imputed rent on owner-occupied housing as well as the value of in-kind payments by employers and of own production. Separate questions aim to identify, both cash and in-kind, wage income, presents, bonuses and tips, temporary work, real estate income, other property income (bank interest, bond interest, stock dividends, etc.), various forms of transfers. Spending includes both non-durable and durable goods, but not home purchases.

The surveys do not follow the same households. Thus comparisons made across groups of households involve similar households only.

The surveys were carried out throughout the year, and each interview covered income over the current and previous 11 months (disposable annual income, or *yilkulgel*) and spending over the month. *Yilkulgel* is annual income (also available on a monthly basis) plus imputed rent minus fines and fees and regular cash transfers to other families.⁵⁸

Because surveys are carried out throughout the year for past year income, for all but December survey participants, income data refers in part to the prior calendar year. Income across households is also not comparable for this reason. The statistical office, TUIK, makes an adjustment to the data to bring households sampled in different months on a comparable basis (e.g., for those sampled in January 2005, TUIK applies an 11 month index, and for those sampled in December 2005, it does not adjust the data). Because of this adjustment, and also because income refers to 12 months and spending only to the last month, income and spending will not be strictly comparable and there will be measurement error at the individual level as a result of the procedure, to the extent there is inflation. Saving will be overestimated for those sampled early in the year (because inflation means spending will be low early in the year) and underestimated for those sampled late in the year. An equal number of participants were sampled every month, so on average spending should be measured accurately. However, there will still be bias for the sample as a whole to the extent that income does not accurately capture that year's income.

Monthly income data is available which is directly comparable to spending data from a timing point of view, so an option would be to obtain saving based on this data. One would first have to add imputed rents minus fines and fees and regular cash transfers to other families, since these are not included in the monthly income data (but data is available on an annual basis). However, monthly income data seems unreasonably low, when compared to annual incomes. In some 100 cases, in 2008, annualized monthly

⁵⁸ Disposable income, *yilkulgel* is calculated as $(\text{topgelyl} + \text{imputed rent} - \text{fines and fees} - \text{cash transfers to family members}) \times \text{inflation index}$, where *topgelyl* is past 12 month income.

family incomes (topgelayx12 aggregated by family) were less than half reported income over the past 12 months (topgelyl aggregated by family). We checked our results on monthly data, by constructing an equivalent to yilkulgel as monthly income (topgelay aggregated by family) plus 1/12 of imputed rent-fines and fees – transfers to family members. Calculating saving using this measure of disposable monthly income and the same month's spending, we found similar results to those reported in the paper, though the goodness of fit and statistical significance of coefficients in the saving equation was less.

Another issue with the data is under-reporting of income, given the existence of a large underground economy coupled with concerns that the survey data might be shared with the tax authorities. Indeed, Yukseler and Turkan (2007) document major discrepancies between national accounts data and household survey data on disposable income, and the recent revisions to the NIA make the discrepancy even larger. In our data, this translates into saving rates that are sometimes implausibly large and negative, in particular for (apparently) low-income households. This issue is described in more detail in Van Rijckeghem and Ucer (2009).

Appendix 2. Istanbul Stock Exchange Data

We calculate retained earnings, cash basis for two samples—a fixed sample of 220 firms continuously listed since 1998, and the full sample of listed firms (sample varies from year to year). The original data refers to profits in a given year and dividends paid out on the basis of these profits (see Table below). These dividends are paid out the next year (usually in May), after being set during the companies' annual meetings. The contribution of corporate saving to national saving should therefore be measured as net profits in a given year minus dividends paid out that year (on the basis of prior year results). The latter corresponds to prior year dividends in the Table below.

The raw data used to calculate corporate saving (retained earnings) is as follows.

Table xx. Corporate Profits and Dividends, Raw Data (Million TL)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
All firms listed on ISE											
Net profits	1.25E+09	2.11E+09	2.27E+09	-3.82E+09	4.30E+09	6.85E+09	1.18E+10	1.02E+10	1.89E+10	3.58E+09	2.21E+10
Cash dividend	4.14E+08	6.00E+08	6.65E+08	6.56E+08	9.33E+08	1.84E+09	3.91E+09	5.15E+09	7.18E+09	7.58E+09	8.89E+09
Stock dividend	1.48E+08	6.99E+08	4.01E+08	2.41E+08	3.79E+08	4.23E+08	5.32E+08	6.70E+08	8.32E+08	1.47E+09	2.44E+09
Continuously on ISE since 1998											
Net profits	1.2E+09	1.9E+09	2.3E+09	-2.5E+09	4.2E+09	7.3E+09	8.3E+09	6.4E+09	1.3E+10	2.0E+10	1.3E+10
Cash dividend	3.8E+08	5.4E+08	5.9E+08	4.7E+08	7.4E+08	1.5E+09	3.2E+09	3.5E+09	4.5E+09	4.8E+09	2.7E+09
Stock dividend	1.4E+08	6.8E+08	3.7E+08	1.9E+08	3.8E+08	2.7E+08	1.8E+08	3.0E+08	5.9E+08	1.0E+09	1.1E+09

Appendix 3. Correlation Matrices

Simple Correlation Coefficients

	Private Sav	priv -1	Public S unad	Public Savings (%pubS1.34	obaladj	realint	primbudbal	GDP defl%	gdppcgr	confidence	tot	tot%	credit/gdp	change cre	UR	
Private Sav	1															
priv -1	0.7	1.0														
Public S ur	-0.5	-0.5	1.0													
Public Savi	-0.3	-0.3	0.9	1.0												
pubS1.34	-0.3	-0.3	0.9	1.0	1.0											
obaladj	-0.8	-0.7	0.6	0.5	0.6	1.0										
realint	0.0	0.1	-0.7	-0.6	-0.6	-0.3	1.0									
primbudbal	-0.6	-0.4	-0.1	-0.1	-0.1	0.5	0.7	1.0								
GDP defl%	0.7	0.7	0.0	0.3	0.3	-0.4	-0.3	-0.6	1.0							
gdppcgr	-0.3	-0.1	0.3	0.3	0.3	0.2	0.0	0.2	-0.1	1.0						
confidence	-0.4	-0.1	0.1	0.1	0.2	0.3	0.1	0.3	-0.3	0.9	1.0					
tot	0.8	0.6	0.0	0.2	0.2	-0.6	-0.4	-0.8	0.8	0.1	-0.1	1.0				
tot%	0.1	-0.2	0.0	-0.1	-0.1	-0.3	-0.2	-0.4	-0.1	0.4	0.3	0.4	1.0			
credit/gdp	-0.6	-0.7	0.1	-0.1	-0.1	0.6	0.0	0.4	-0.7	-0.2	0.0	-0.7	-0.1	1.0		
change cre	-0.7	-0.7	0.3	0.1	0.2	0.7	-0.1	0.4	-0.5	0.4	0.4	-0.4	0.2	0.6	1.0	
UR	-0.5	-0.5	0.0	-0.3	-0.3	0.4	0.0	0.3	-0.8	-0.2	0.0	-0.7	0.0	0.6	0.3	1.0

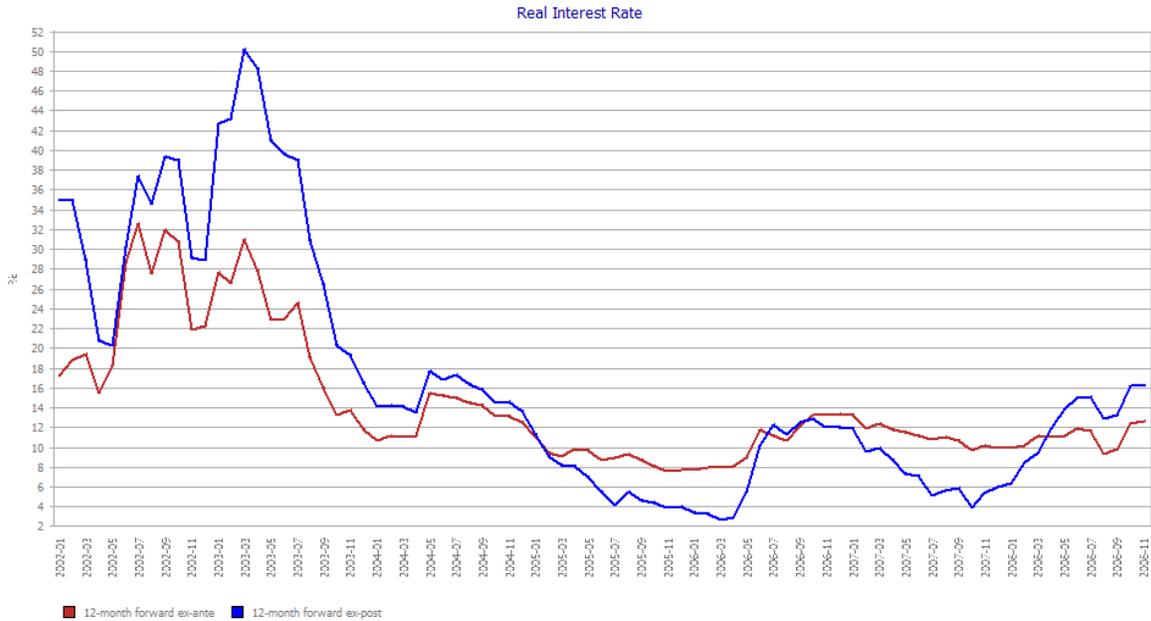
Correlation Between Log Income, Instruments for Income and Measurement Error

	low savings dummy	log income	hot water	roomsperoeqd
low savings dummy (proxy for mst error)	1			
log income	-0.17	1		
hot water dummy	-0.11	0.52	1	
Roomsperoeqd	-0.04	0.20	0.26	1

Based on 2008 data, 4948 observations

Low savings dummy equals one when dissaving is 100% of income or more and is a proxy for measurement error. Hot water dummy and rooms per adult equivalent member are instruments for log income

Appendix 4. Determinants of the Ex Ante Real Interest Rate



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SUMMARY OUTPUT

12-month forward ex-ante

jan 02-nov 08

Regression Statistics	
Multiple R	0.957106
R Square	0.916051
Adjusted R Square	0.913952
Standard Error	1.902135
Observations	83

ANOVA					
	df	SS	MS	F	Significance F
Regression	2	3158.47	1579.235	436.4798089	9.13313E-44
Residual	80	289.4493	3.618117		
Total	82	3447.919			

	Coefficient	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	4.4108	0.439543	10.03496	8.26277E-16	3.536080452	5.285519	3.53608	5.285519
12-month backward €	0.296233	0.047193	6.277052	1.67048E-08	0.202315865	0.39015	0.202316	0.39015
12-month forward ex-	0.399262	0.022761	17.54171	3.81158E-29	0.353966751	0.444557	0.353967	0.444557

Appendix 5. Main Results from Loayza, et. al. (2000b)

Table 5

Private saving: Alternative samples, system estimator
(Dependent variable: Gross private saving/GPDI)

Sample	1	2	3	4
	Full	Bounded*	LDC	OECD
Lagged private saving rate	0.587 (9.254)	0.494 (10.330)	0.476 (17.820)	0.674 (12.704)
Real per-capita GDP ^{a/}	0.049 (2.458)	0.035 (2.408)	0.071 (7.473)	0.013 (0.382)
Real growth rate of per-capita GDP ^{b/}	0.450 (5.828)	0.379 (6.103)	0.425 (13.282)	0.285 (2.036)
Real interest rate ^{a/ c/}	-0.253 (-5.011)	-0.162 (-3.408)	0.002 (.084)	0.020 (0.313)
M2/GNP	-0.020 (-0.562)	-0.007 (-0.262)	0.024 (1.001)	0.028 (1.989)
Terms of trade ^{a/}	0.078 (5.096)	0.060 (5.921)	0.044 (4.875)	0.068 (3.641)
Urbanization ratio	-0.382 (-3.538)	-0.241 (-3.452)	-0.240 (-5.101)	-0.080 (-1.751)
Old dependency ratio	-0.655 (-3.069)	-0.555 (-4.531)	-1.370 (-4.321)	-0.218 (-1.42)
Young dependency ratio	-0.299 (-4.017)	-0.275 (-5.607)	-0.279 (-5.816)	-0.068 (-0.639)
Government saving/GPDI	-0.285 (-5.097)	-0.172 (-3.782)	-0.238 (-8.333)	-0.112 (-2.782)
Private credit flow/GPDI	-0.318 (-3.989)	-0.316 (-5.791)	-0.508 (-9.955)	-0.085 (-2.427)
Inflation rate ^{a/ c/}	0.143 (2.034)	0.127 (3.325)	0.177 (4.181)	0.157 (2.963)
Wald test of joint significance (p-value)	0.000	0.000	0.000	0.000
Sargan test (p-value)	0.400	0.174	0.292	0.942
Test for 1st-order serial correlation (p-value)	0.001	0.001	0.000	0.013
Test for 2nd-order serial correlation (p-value)	0.121	0.362	0.690	0.157
Test for 3d-order serial correlation (p-value)	0.221	0.404	0.353	0.889
Number of observations (Number of countries)	872 (69)	845 (73)	475 (49)	397 (20)

Notes: T-statistics (in brackets) computed with heteroskedasticity-consistent standard errors.

* Observations more than 4 Standard Deviations away from mean of variables are dropped.

^{a/} Expressed in logs (log of [1+x] for the real interest rate and the inflation rate)

^{b/} Measured by the first difference of the log

^{c/} Both the real interest rate and the inflation rate are bounded between -50% and 50%

Appendix 6. Data Sources, Definitions, and Data Transformations

SPO: private and public saving as percent of GDP; GDP forecast for 2009; GDP deflator forecast for 2009.

Overall balance. Scaled by GDP. We adjusted GDP upward by 34% during 1988-1997 to be consistent with the NIA revisions of 2007.

Inflation adjustment, World Bank (1998) method. See Van Rijckeghem and Ucer (2009) for details for the Turkish case. We scale the inflation adjustments with GDP from the revised 2007 NIA. For years before 1998, we use historical data for GDP scaled up by 34%, which is the size of the NIA revision to 1998 data.

CBRT Banking System Credit Volume: Average monthly credit stock divided by GDP. For 2009, only 3 quarters of data were available. 4th quarter credit stock was set equal to 3rd quarter credit stock. 2009 GDP forecast from SPO. 1987-1997 GDP scaled upward by 1.34 to take into account findings of 2007 NIA revision.

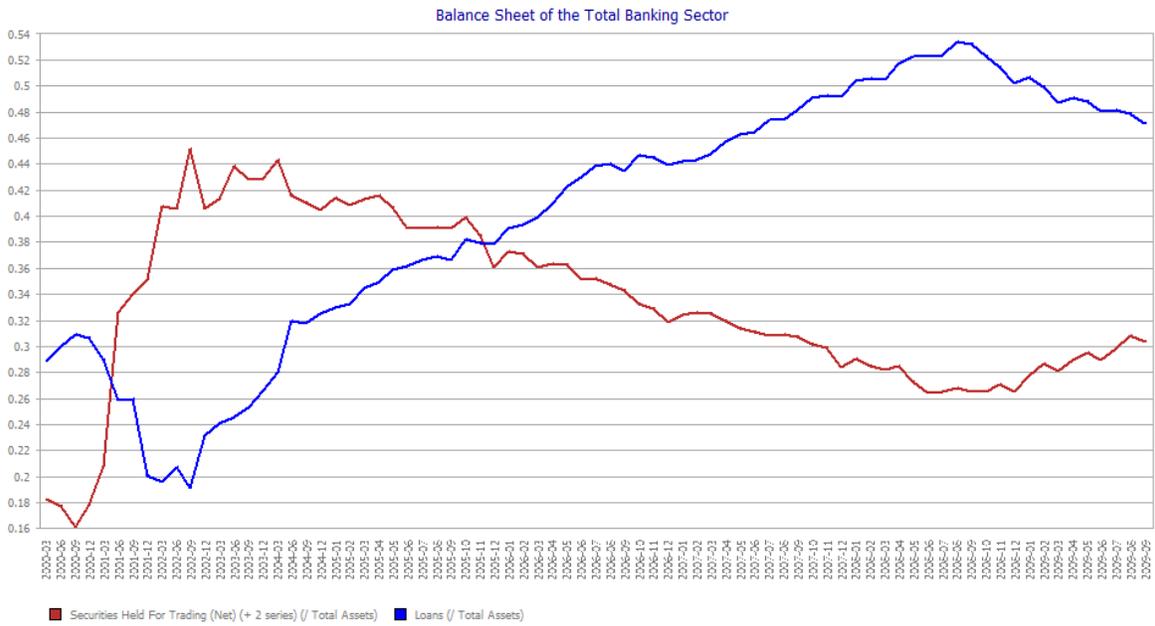
Turkstat: annual unemployment rate; For 2009, 4th quarter unemployment rate was set equal to 3rd quarter unemployment rate.

Population growth for 2009 set at 2008 levels

Terms of trade (export unit prices/import unit prices): from WEO

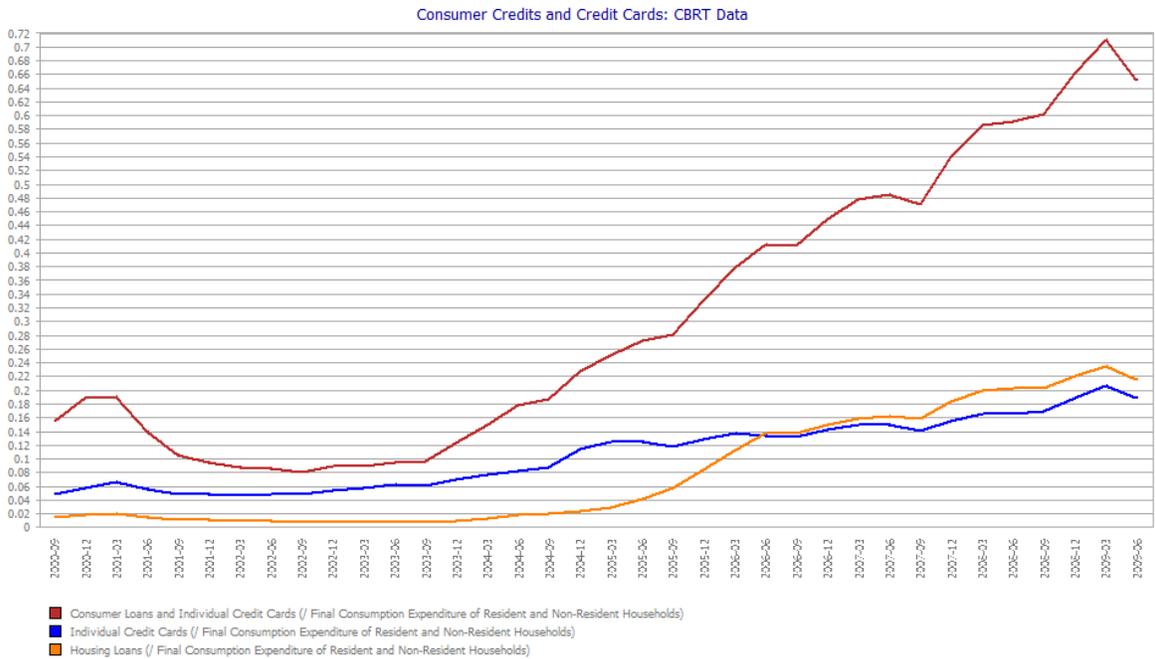
Real sector confidence index. 2009 based on average of 11 months.

12 month deposit rate—last 10 months for 2009



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Securities include: securities held for trading; securities available for sale; securities held to maturity.



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*Adjunct faculty, Boğaziçi University. This is a significantly revised and expanded version of an earlier paper co-authored by Murat Üçer, “Van Rijckeghem, Caroline and Murat Ucer, “The Evolution and Determinants of Private Saving in Turkey: What Lessons for Policy?,” ERF Research Report Series No. 09-01 (February 2009).