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# Mobilising for development:

## Assessing the relationship between public savings institutions, financial inclusion and domestic savings

Dissertation submitted by

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in partial fulfilment of the requirements for the degree of

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**Abstract**

This study evaluates the relationship between public saving institutions, financial inclusion, and domestic savings. I employ multivariate cross-sectional and panel data regressions to assess this, followed by an in-depth case study of the SACCO policy in Rwanda. Challenging cultural, income and demographic theories of savings, the main finding is that public institutions matter more than these structural factors in determining access to financial services and also the aggregate savings level. The positive relationship between public saving institutions and domestic savings is consistent across models using different controls and observations.

**Figures and tables**

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## i. Introduction

The search for ways to finance development is a topic with timeless relevance. In economic theory, savings has had an important role: the Lewis model of economic growth holds that an increase in savings is a precondition to economic growth; and the Harrod-Domar model predicts that a country's growth rate depends on the level of investment level, which in turn depends on available capital (Hundie, 2014). Indeed, the World Bank Commission of Growth and Development has found that the one factor countries that have reached catch-up development all have in common is high saving rates (2008). However, and despite this broad understanding, there is no consensus in the academic literature on why some countries have higher levels of domestic savings than others.

It is often assumed that low-income countries are unable to save (Sachs, et. al., 1994). According to Keynes' saving function, saving is a function of and varies directly with income, and thus, savings should be low or negative at low levels of development. However, there are large divergences between countries, and also between countries with similar incomes, suggesting that institutional and/or policy variables may have a role to play. For instance, if one looks at the list of some of the fastest growing countries in the world (using compound growth rates; Holodny, 2015), one finds a number of low and middle-income countries, Ethiopia, China, India, Cote d'Ivoire and Bhutan, with domestic savings at above 20 per cent of GDP (the world average is 17.97). These countries are characterised by large informal sectors, low per capita GDP, and high dependency ratios, precisely the factors that are theoretically predicted in the literature to work against savings.

Most existing empirical research on domestic savings have focused on macroeconomic variables, including interest rates, investment, FDI, debt and growth (Verma and Wilson, 2005; Freytag and Voll, 2013). However, findings by Garon (2011; 2013) and Scher (2004) suggest that instruments such as public saving campaigns, forced savings (pension saving) and/or domestic development finance institutions, are key to explain divergence between countries.

This study intends to probe this further; by assessing the relationship between public saving institutions (PSIs), such as postal saving banks and state-owned or controlled banks providing affordable and accessible accounts, and savings. Empirical tests of these propositions may have important policy implications. Asset holding is not only a contributor to domestic resources by increasing the funding available for investments, but also has positive individual effects on economic security, resilience and welfare (Karlan, Ratan and Zinman, 2014; Kendall, 2010). Accordingly, my hypotheses are three-fold. First of all, it is hypothesised that the level of financial inclusion of rural populations will tend to be higher in the presence of PSIs compared to when there are no PSIs. Financial inclusion is defined here as the spread and the usage of saving institutions across the country (Rao, 2015). Second, it is hypothesised that countries with high financial inclusion also have higher domestic savings. Third, it is hypothesised that countries with public saving institutions have a higher percentage of domestic savings.

By making a broad-based quantitative study of government interventions, this research bridges two different literatures, namely the developmental state and domestic resource mobilisation literatures, consisting mostly of case studies, and the quantitative literature on national savings, which has so far been dominated by neoclassical macroeconomics and behavioural economics (Freytag and Voll, 2013). In this literature, the role of the public sector in savings mobilisation has been neglected (Krieckhaus, 2001), and in particular, there have been few studies of public institutions from a quantitative perspective. When institutional variables have been included in cross-country regressions, these have been introduced through variables such as corruption, law and order and stability, rather than actual policy interventions.

To explore the hypotheses, this article contains five parts. Section two outlines the debates regarding savings in the literature, highlighting in particular how different government instruments have been neglected. Section three presents the theoretical framework. In the fourth part, the data and the methodology, namely

multiple regressions and multiple regression with time-series dominated pooled data, will be presented. Section five outlines and interpreters the results. In part six, a case study of the SACCO programme in Rwanda will be presented, exploring the relationship between public saving institutions in a specific context. This will be followed by a discussion.

## ii. Literature review

### ii.1. Savings and national development

The study of domestic savings has its root in the development economics of the 1950s. For these scholars, increasing savings was considered the central challenge of development. For instance, in Lewis' seminal paper, '*Economic Development with Unlimited Supplies of Labour*' (1954), he argues that the development process starts with a substantial increase in savings. Once savings increase, more investments can be made, thus bringing about greater opportunities in the economy. Likewise, Nurkse argued that an "increase in the proportion of national savings devoted to capital accumulation is the primary aim of public finance in the context of economic development" (1953:147, cited in Kriekhaus, 2002). These scholars demonstrated that growth was directly linked to savings. In a manner analogue to the external jump-start afforded to post-war Europe by the World Bank and the Marshall Plan, it was believed that domestic development banks could play a similar role in the developing world by mobilising domestic savings to finance initial infrastructure investments.

Although some have questioned this line of argument (Carrol and Weil, 1994; Dayal-Gulati and Thimann, 1997), most scholars today agree that a certain level of savings is needed and positive for economic growth by increasing funds available for investment (Ndikumana and Boyce, 2000). National savings also have empirically proven relations with higher income growth (Loayza, Schmidt-Hebbel and Serven, 2000) and greater stability in times of sudden shifts in international markets (Deaton, 1990). In addition to the positive impact on investment, private savings also have a number of individual effects, including improving resilience, this reducing the risk of falling into poverty, and increasing productive investments in education, health, homes or businesses (Kendall, 2010).

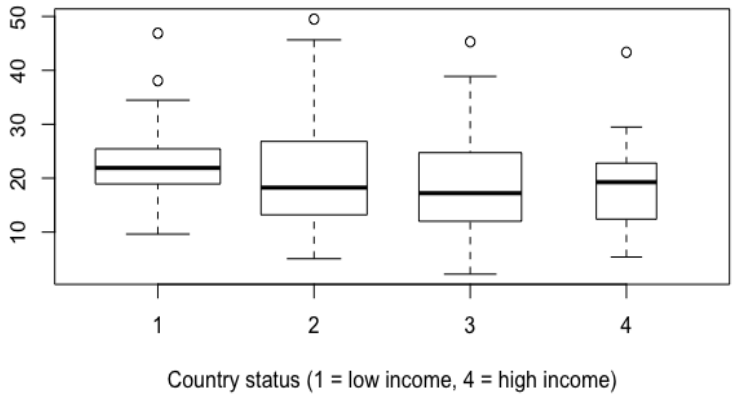


### ii.2. Theories of the determinants of savings

A rich literature on the determinants of domestic savings exists, but is far from conclusive. Three factors are often repeated in the literature: the level of income

(GDP per capita), economic growth and the dependency ratio[1] (Deaton and Paxson, 1994; Loayza, Schmidt-Hebbel and Serven, 2000; Verma and Wilson, 2005). However, these are not without their critics: Although high-income countries have higher average saving rates than middle-income countries, which in turn have higher average savings than low-income countries, there are also significant overlaps between income groups (see Graph 1). A number of low-and middle-income countries have savings levels at above 25 per cent of GDP, which is similar to high-income countries (see Graph 1). These outliers can also be found across regions and over time, suggesting that policy interventions have a role to play in mobilising savings.

**Figure 1. Savings across income groups (high income, upper middle income, lower middle income and low income)**




Source: Own elaboration using WDI data (2016)

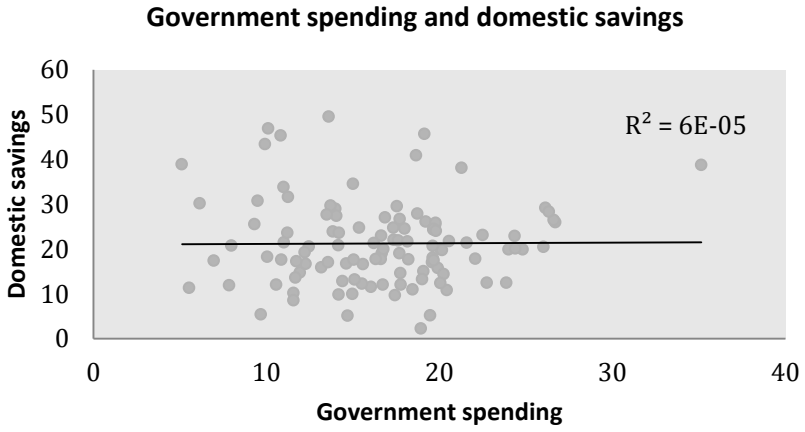
The dependency ratio theory posits that countries with higher ratios of children or economically unproductive elderly pensioners will have a reduced ability to save, as the relative size of the working population is smaller. Another version of this is the life-cycle theory of savings (Modigliani, 1966; Attanasio, Picco and Scorcu, 2000), which claims that people save in a "rational" way; saving the least when they are young, most in their middle years as they plan for retirement, before they de-save at the end of their lives (Deaton, 1990). However, using regression analysis,

[1] The dependency ratio refers to the proportion of dependents per 100 working-age population (WDI, 2016).

a study conducted by Gutiérrez (2008) finds no relationship between dependency ratios and the savings rate in Latin America, and neither between the financial climate and savings. This is supported by an experimental study conducted by Dupas and Robinson on savings behaviour in Western Kenya, which finds no relationship between being a provider (having children who are dependent on you) and savings behaviour (2011).

Culture is also often voiced to be the reason why savings have been so high in East Asia (close to 35 per cent of GDP). Conversely, as argued by Garon (2011; 2016), the thrifty culture in East Asia is more a result of deliberate government action and institutional borrowing during the inter-war and post War periods. High household savings were initially considered essential to finance military might, and only later came to be seen as important for financing catch-up development.

**Figure 2. Government spending and savings (as a % of GDP)**




Source: Own elaboration using WDI data (2016)

A different theory is that countries with a limited welfare state have higher savings, because people require a greater individual safety net in case of a health emergency or for their pensions. This is an argument often used to explain high savings in China after the turn to market economy (Garon, 2013). Indeed, the low household savings in the Scandinavian social democratic regimes supports this line of argument. However, examining the correlation between savings and government spending worldwide, this correlation can only be described as a weak

one (see graph 2). Indeed, Western Europe, the region with the largest welfare states, is also home to many high saving countries. The US population save relatively little, although their welfare system is weaker than most Western European countries.

**ii.3. Public institutions and savings**

Despite the prominence of domestic resource mobilisation in the international policy agenda of recent years, the literature on the institutional determinants of savings mobilisation is still very scarce (Freytag and Voll, 2014). For instance, Culpeper and Bhushan (2008) devote several paragraphs to institutions and policies promoting domestic savings, but make no mention of public saving institutions. In particular, very little is still known about their role in fostering household savings. The existing literature consists mainly of simple or comparative case studies. Examples are the comparative studies conducted by Diop, Dorsner and Gross (2003) on savings institutions in West Africa, and the Consultancy Group to Assist the Poorest (CGAP), a World Bank Microfinance programme (1998), which compares three public saving institutions in Asia and one in Colombia.

It appears that public financial institutions play an important role in fostering savings by increasing access and affordability. Scher (2001) argues that countries with publicly provided saving institutions, also have higher levels of financial inclusion. Experimental studies assessing behavioural traits have demonstrated that the availability of a safe storage place is the major determinant of saving (Dupas and Robinson, 2011). Worldwide, 20 per cent report that formal banking institutions are too far away (Demirgüç-Kunt, 2008). In addition, bank accounts are often unaffordable to people. In Findex surveys, unaffordability is cited as the most common reason for people not having a formal account (Demirgüç-Kunt and Klapper, 2012). Indeed, Beverly (1999) has looked at the institutional determinants of saving in the US, including institutionalised saving mechanisms, targeted financial education, and saving incentives and facilitation, finding indicative evidence that there is a relationship between accessible and affordable saving institutions and savings.

Historical evidence supports this line of argument: Garon (2011), in a comparative analysis of resource mobilisation in Asia, Western Europe and the US, finds that, historically, most governments were reluctant to increase taxation, and instead utilised massive saving campaigns. Throughout the 20th century, the state took an active role in increasing access to saving mechanisms, for instance through postal saving banks. Postal offices were considered a convenient way to collect savings from the unbanked, this being a centralised organisation that reached the whole territory (d'Alcantara, Dembinski and Pilley, 2011). In addition, the state would incentivise people to save through different saving campaigns, such as school saving. According to Garon (2011), the countries that had public saving banks are also the highest saving countries today. In addition, Scher (2001) argues public saving institutions may have increased savings in these countries by improving the quality and accessibility of private bank institutions, by adding competitive pressure to the industry.

A number of authors have written about the role of postal-saving offices as an effective way of making saving accounts accessible to the rural population and those working in the informal sector (Diop, Dorsner and Gross, 2003, Garon, 2011). In the study carried out by CGAP (1998), they find that public ownership matters for financial inclusion and affordability, and that the security inherent in these banks gives them a cost advantage over other banks. D'Alcantara, Dembinski and Pilley (2011) argue that in countries with unstable financial systems, which often describe low-and middle-income countries, safety and security of deposits matter more to savers than returns. Indeed, because the postal savings do not offer very high returns, government's only means through which to sustain their attractiveness is the maintenance of trust through a state guarantee of deposits.

In the last two decades, a number of developing countries have introduced saving policies through public saving institutions with the aim of increasing financial inclusion and promote savings. Examples include the SACCO programme in Rwanda (AFI, 2014), where the government has promoted financial inclusion by providing subsidies to establish a SACCO (a local member based cooperatives) in

every administrative sector in the country, and Ethiopia, where the National Bank of Ethiopia had a key role in expanding financial access to rural areas, where most people, 85 per cent of the population, live **(**Hagos and Asfaw, 2014). There was an increase in bank branches from 421 in 2006 to 1289 in 2012, of which the publically owned National Bank of Ethiopia stood for most of the increase (World Bank, 2013).

From the literature, it is evident that whereas public interventions in the banking sector previously tended to take the form of public saving campaigns or postal saving banks, the current landscape of public provision of financial services is far more diverse with extensive cross-country variation. It also includes many institutions beyond the post office banks. Whereas some have outright public ownership, others have privatised previous public banks, but retain control through partial state ownership, as is the case of the Netherlands and Germany (Scher and Yoshino, 2004). Other countries have a mid-way in which the banks are run like private companies, but the central government keeps control through subsidies or other means, as is the case in Rwanda (Kantengwa, 2009; d'Alcantara, Dembinski and Pilley, 2011). In Denmark, Australia and Indonesia, the postal offices have entered an agreement with the government to provide saving services. In these cases, the banks are required to meet some government standards and to fulfil a mandate serving the public good (Scher and Yoshino, 2004).

**iii. Theoretical framework**

From the literature review above it is clear that the predominant theories of saving devote relatively little attention to deliberate government interventions, despite the substantial number of countries not conforming to the theoretical predictions in the academic literature. In addition, the role of public institutions in savings accumulation is relatively under-studied.

In seeking to address this deficit, the framework presented here builds on insights from developmental state theory, in that it assumes that government intervention can have a potentially positive effect on domestic savings mobilisation, by acting as a catalyst of domestic resources and thus overcoming market failures. Inherent in this assumption is that some economic and social policy objectives will go unattended if left to the private sector alone. Indeed, following the financial liberalisation that much of the developing world experienced in the 1980s, access to banking services declined in many places, which in turn has brought a decrease in household savings and overall domestic savings (Bandiera, et. al. 2000). The banking sector in emerging economies is also frequently characterised by high user charges and high lending interest rates (Culpeper and Bhushan, 2008), demonstrating that the allocation problem cannot be overcome simply by fostering the right market conditions.

Existing case studies suggest that public saving institutions affect aggregate domestic savings by incentivising individuals to save and also through formalising already existing savings: This happens, first of all, by providing a place of safe storage for people's savings. A number of experimental studies have found that this matters for influencing savings behaviour (Karlan, Ratan and Zinman, 2014). Second, it makes it easier to save by improving access across space and levels of affordability. Third, institutions formalise savings because, when given the option, people may well choose to save in formal accounts rather than informally at home. Mobilising funds outside the banking system opens a large stream of additional resources for investment (Porter, 2015). For instance, it has been estimated that Sub-Saharan Africa has more than $200 billion flowing outside of the formal banking system (Kakar, Mwangi and MacDevette, 2015), illustrating the potential

benefits of formalising savings. Thus, it is expected that countries with higher levels of financial inclusion will also have higher levels of savings.

For the purpose of this study, I start from the guiding assumptions that a large portion of individuals wish to accumulate at least some savings, be that for health purposes or in order to smooth consumption. This is likely to be truer in developing countries, where a high number of people work in the informal sector, which is characterised by unstable and/or seasonal income. Obviously, many individuals face major hurdles in accumulating assets, but there are also plenty of examples of individuals using saving technologies when these are available to them (Karlan, Ratan and Zinman, 2014). It is not registered in formal statistics, but in a number of low-income countries, people save informally, although they do not earn interest on their savings. Indeed, a number of persons express a desire to save *more*; which is made difficult by social pressures to spend or give away money (Kristof, 2009). The fact that a number of individuals in countries with poor access to financial services pay money-keepers to store their money is indicative of the value they give to savings (Kalala, 2001).

It needs to be further considered that within the developmental state literature, there is a consensus that specific contextual conditions matter; especially the quality of corporate governance, political leadership, the concrete market conditions, and the coherence of public policies (Mkandawire, 2001, Booth and Golooba Mutebi, 2011). I try to incorporate institutional and governance factors by testing for rule of law and regulatory quality, defined as "the ability of the government to formulate and implement sound policies and regulations" (WDI, 2016). Nevertheless, my findings as regards the role of public policies in expanding access and increasing savings will be suggestive at best, but considering the limited attention this topic has received in the literature, this is an important step in furthering understandings. Beyond the theoretical implications implied here, if the models are found to correlate with domestic savings, this could serve as guidance for those policy makers and donors working to increase domestic resource mobilization (DRM).

Following from the above, my research questions and hypotheses are as follows:

### iii.1. Research questions and hypotheses

$Q_1$: What is the impact of public saving institutions on household and national savings?

Sub-questions following from the first question are:

$Q_{1.1}$: What role can the central and/or local governments play in the generation of financial services?

$Q_{1.2}$: Where do public saving institutions fit into an international donor agenda seeking to increase DRM?

In order to answer this question, I explored the following three hypotheses:

$H_1$: Countries with public saving institutions have higher levels of financial inclusion

This is expected, as governments can use ownership rights and subsidies to increase access across space, and are also able to take on the cost and risk of providing affordable services on a greater scale than private banks are willing to do.

$H_2$: Countries with higher levels of financial inclusion have higher domestic savings

Based on previous studies of household savings, it is reasonable to assume that a large portion of the populace have an interest in saving. In addition, the literature on financial access has found availability of a secure place for depositing funds to be one of the main determinants of people's decision to save, Thus, it should be expected that greater access will increase aggregate savings.

$H_3$: Countries with public saving institutions have higher domestic savings

Studies suggest that public saving institutions work both through improving inclusion and by placing competitive pressure on the financial sector to provide low-cost financial services (Garon, 2011), thus mobilising small-scale savings.

**iv. Methodology**

In order to explore the link between public saving institutions, financial access and savings, I employed a multivariate regression analysis. It is recognised that some of the processes driving savings are complex and sometimes only play themselves out in the long term, and might therefore not be captured by this study. Nevertheless, the approach employed in this investigation can be useful for establishing relationships between variables that remain unexplored in the savings literature. Second, the chosen methodology allows for comparison with existing studies. Third, it allows for a broader scope, capable of summarising vast amounts of information. Fourth, a quantitative approach will enable the broad generalisation of the results. Although it is recognised that global averages disguise variations existing within countries, this study can aid in identifying trends and relationships that may be relevant for those working on savings strategies in a developing country context.

**iv.1. Sampling**

This study was carried out using two different samples. The first sample consists of countries whose savings data were publicly available in 2013, the most recent year with complete data. I excluded countries severely affected by conflict in the last decade and those with populations of less than 200,000. Countries that rely on natural resource rents for more than one fourth of their GDP are likewise excluded (using the World Bank Data indicator for natural resource dependence). The latter group have above average savings, and may therefore distort the result. This leaves a total of 122 countries.

In addition, a second sample was used to test the effect of public saving institutions on household, rather than national, savings, which is the type of savings predicted by my theoretical framework to be the most affected by such institutions. This sample is limited to OECD and G20 countries, which are the only countries for which household saving data is available. Although most of these countries are developed countries, the data are complete and go far back in time, and can therefore contribute to understanding the link between public saving institutions and savings.

The small number of countries in this sample constrains the ability of the regression models to provide robust conclusions about the relationship between PSIs and savings. Time-series dominant pooled analysis has therefore been employed, combining cross-country data and time periods to produce a larger data set. This approach has several limitations (the data analysis section will elaborate on these weaknesses further), but was useful in that it solved some of the problems inherent in comparative cross-country research, namely the small N and the large errors that follow (Podestà, 2002). In addition, by using panel data, the time and the country-dimension could be controlled for in order to check whether the results have held both over time, and across different countries.

**iv.2. Data collection**

There is no global database reporting on saving institutions, but I created one by collecting cross-country data on saving institutions. This was done through an extensive literature review using the search words "financial inclusion", "savings", "postal saving banks", and "subsidised saving accounts". Due to time-limitations, only one dummy variable was used for countries in which the government promotes financial inclusion through whole or partial ownership of a saving bank, or uses subsidies to provide affordable saving services to the population. The selection criteria were based on whether these were widely available to the population, and whether the institutions provide saving accounts, thus excluding those that limit themselves to providing credit or transaction services. I also did not pay attention to whether people use the banks or not (only whether they were publicly available), as this might bias the result.

Scher (2001) and Scher and Yoshino (2004) provide survey data on postal savings banks covering 80 countries, including those that have abandoned public saving institutions. More recent sources include d'Alcantara, Dembinski and Pilley (2014), which include in-depth information on eight developing countries, and Garon's work (2011; 2013), which analyses such institutions in Europe and Southeast Asia. In addition to these, I have added the Commercial Bank of Ethiopia (Engida, et. al. (2011) and Rwanda's SACCO programme (Kantengwa, 2009). A complete list of all the countries with public saving institutions can be found in the Appendix.

I did not differentiate between the banks that have been privatised and those that have not, as long as the government retained at least partial ownership. This is because the mechanisms through which public saving banks work through are likely to remain even when these become partially or even fully privatised. For instance, in Western Europe, public saving banks were critical for ensuring financial inclusion through space and between different income groups (Garon, 2011). In addition, it is evident that previous experiences of public savings banks shape people's expectations from banks, both in terms of security and affordability. To illustrate this, in both Norway and the Netherlands, where the public saving banks were partially privatised in the 1990s and early 2000s, a large part of depositors still believe that the government guarantee their deposits (Scher, 2001)[2]. Another relevant mechanism is the competitive pressure that they put on other banks to provide affordable services (Scher, 2001). The legacies of these banks are evident in Garon (2011), which finds that those countries in Western Europe and Asia that used to have postal saving banks on a large scale also have higher household savings today.

Domestic savings, the first dependent variable considered by this study, were measured as a percentage of GDP. The data on savings was taken from World Bank's World Development Indicators. The number of countries covered varied year-on-year, and particularly data on the low-income country group was lacking. I used 2013 data, this being the most recent year with a relatively complete data set.

Financial inclusion was the dependent variable when testing H1; in the other models, it was considered an intervening variable. Financial inclusion data were taken from the World Bank Financial Inclusion database (Findex, 2016). This data is from 2011. The justification for the lag in the data is that the IVs are likely to take a few years to make an impact in the DV. Financial inclusion was measured using two indicators, one measuring access and the other measuring use:

$Indicator_1$: The percentage of the population with access to an account in rural areas

[2] Norway also subsequently resumed postal saving banks in 2002 (Scher and Yoshino, 2004).

Indicator$_2$: The percentage of the population who saved in the last year in rural areas

**Table 1. Summary of the variables used in the cross-sectional models**

Table 1: Summary of the variables

| Statistic | N | Mean | St. Dev. | Min | Max |
|---|---|---|---|---|---|
| Year | 122 | 2,013.000 | 0.000 | 2,013 | 2,013 |
| SAVINGS | 113 | 21.120 | 9.250 | 2.202 | 49.503 |
| GDPPC | 120 | 16,163.160 | 21,698.680 | 239.900 | 113,726.600 |
| Access.account | 110 | 59.031 | 29.812 | 6.707 | 100.000 |
| Account.poor | 110 | 51.848 | 32.566 | 2.271 | 100.000 |
| Account.rural | 109 | 54.977 | 31.687 | 2.822 | 100.000 |
| Saved.rural | 109 | 51.522 | 18.353 | 10.326 | 89.797 |
| Saved | 110 | 53.764 | 17.595 | 13.321 | 89.788 |
| Countryst | 122 | 2.148 | 1.058 | 1 | 4 |
| HI.dummy | 122 | 0.361 | 0.482 | 0 | 1 |
| EA.dummy | 122 | 0.041 | 0.199 | 0 | 1 |
| Pub.sav.inst | 122 | 0.377 | 0.487 | 0 | 1 |
| Gov.spending | 119 | 16.366 | 5.198 | 5.116 | 35.140 |
| Dep.ratio | 120 | 56.992 | 16.457 | 30.120 | 112.310 |
| Gov.eff | 121 | 0.176 | 0.942 | -1.626 | 2.214 |
| Reg.qua | 121 | 0.221 | 0.885 | -1.538 | 1.963 |
| Rule.law | 121 | 0.064 | 0.970 | -1.686 | 1.949 |
| OECD.dummy | 122 | 0.279 | 0.450 | 0 | 1 |

Note: Pub.sav.inst = Public saving institution, Gov.eff = Government effectiveness, Reg.qua = Regulatory quality; HI.fummy = High-income dummy; EA dummy = East Asia dummy. Data is collected for different years prior to 2013, depending on availability.

Considering the importance of corporate governance and public sector efficiency, I also included government effectiveness, rule of law and regulatory quality variables, to test whether there is an intervening effect between these and public saving institutions.

My control variables were those identified from the literature as preconditions to savings, namely GDP and the dependency ratio. I also included an East Asia dummy to test whether the East Asian 'culture' impacts the results. Data on growth and the dependency ratio were taken from the World Bank's statistical database. Table 1 reports some descriptive statistics of the variables included in the preliminary analysis of the study. A number of these are highly correlated (for

instance, rule of law and regulatory quality and government effectiveness). This is problematic because it is tricky to tell which has the bigger effect, and also because it increases the standard error. In the final analysis, the variables that were found to have a negligible impact on the model were excluded.

**Table 2. Summary of the variables used in the panel data models**

Table 2: Description of the data

| Statistic | N | Mean | St. Dev. | Min | Max |
|---|---|---|---|---|---|
| Year | 534 | 2,005.575 | 5.384 | 1,996 | 2,015 |
| Household.sav | 534 | 6.551 | 6.926 | -10.768 | 38.986 |
| Pub.sav.inst | 534 | 0.524 | 0.500 | 0 | 1 |
| GDPPC | 525 | 29,891.390 | 11,856.440 | 2,049.357 | 66,812.220 |
| Interest.Rates | 471 | 3.717 | 3.195 | -0.019 | 23.958 |
| national.savings | 508 | 7.467 | 5.646 | -6.434 | 27.620 |
| Work.age.pop | 495 | 67.367 | 2.040 | 62.067 | 73.105 |

**Table 3. Expected theoretical relationships between the IVs and domestic savings**

| Variable | Expected relationship |
|---|---|
| Public saving institutions | + |
| Financial inclusion (Access to accounts in rural areas, and the percentage of persons who saved in rural areas) | + |
| Dependency ratio | - |
| Working age population | + |
| Regulatory quality | + |
| GDP per capita | + |
| Government spending | - |
| Interest rates | + |

The dependent variables in the time-series cross sectional models were national savings and household savings. The dataset was taken from the OECD database. For these countries, I also collected time-series data on national savings, GDP per capita, the working age population (demography ratio data was not available from

this database), and short-term interest rates over the period 1996 – 2015. It should be noted that the countries with available data varied over time and across variables. In addition, I tested for institutional characteristics by introducing a dummy variable for each country, and tested for time events by using a time dummy for each year. These were valuable in checking whether the results held both across and within countries and years.

To restate, the limitations of this analysis do need to be taken into account, especially as some of the variables have been derived from other variables and were therefore subject to measurement error. In addition, for developing countries, which are those this study is most interested in, many data points were missing.

**iv.3. Data analysis**

In order to explore the association between the IVs and domestic savings, I employed multivariate regression analysis. The advantages of multiple regression analysis are that one can estimate the relationship between two variables, controlling for other variables. It also provides a measure of error, which indicates whether the explanatory variable is a good predictor of the outcome variable. In the first part, cross-sectional data were used, as most of the variables were only available for one or a few years in time. The result from this, however, should be interpreted with caution, because it only considered the impact of PSIs on savings at one point in time.

For the countries with household data available, I used panel data to carry out a time-series dominant pooled analysis. This type of analysis is useful when dealing with a limited number of observations, which is the case of countries with available household data. However, regression analysis assumes that all the observations are independent, which makes such an approach problematic. More specifically, it opens up a risk that errors could be contained in both time and cross-sectional components, reflecting time and cross sectional effects.

I tried to correct for this by creating two additional models, in which I employed fixed effects using dummy variables[3]. Controlling for country effects is useful in models in which the observations have some individual characteristics that may influence the DV (for instance, in the US, the 2008 financial crisis has led to an increase in household savings; Garon, 2011)). Equally, controlling for time effects is advisable in the case that special historical events my affect the DV. To illustrate this, it can easily be hypothesized that economic crises may have a negative impact on savings. Fixed effects control for such individual effects by exploring the relationship between the DV and the IVs within a country and within a year.

The complete data analysis was carried out using R statistical software. To ensure replicability, the code used has been attached in the appendix.



[3] More information on these tools can be found here: Oscar Torres-Reyna, Getting Started in Fixed/Random Effects Models using R, fall 2010, available at: http://www.princeton.edu/~otorres/Panel101R.pdf

## v. Regression analysis

### v.1. Cross sectional analysis I

In this section, the aim is to explore the first hypothesis:

$H_1$: Countries with public saving institutions have higher levels of financial inclusion

In order to test this hypothesis, I rely on the following linear model:

$$Y_i = a + bX_1 + bX_2 + bX_3 + bX_4 + \varepsilon$$

Where $Y_i$ is financial inclusion and $X_1$ is public saving institutions. $X_2$ equals institutional quality, measured using rule of law. $X_3$ is GDP and $X_4$ equals the dependency ratio. I also included a dummy for high-income countries, due to that in most of the high-income countries; close to or a hundred per cent of the population has access to accounts, even in rural areas. Including these countries without controlling for income may have created a biased result. This dummy variable was, however, not included in the model testing the effect on the percentage that saved, as this variable followed a normal distribution and varies across income groups. This test created the following regression output:

**Table 4. Public saving institutions and financial inclusion**

| Regression Results | | |
|---|---|---|
| | Dependent variable: | |
| | % who saved last year | % with access to an account |
| | (1) | (2) |
| Public saving institutions | 9.088*** | 5.034* |
| | (3.068) | (2.892) |
| Dependency ratio | 22.220*** | -10.353 |
| | (7.435) | (7.322) |
| GDPPC | 3.296 | 11.733*** |
| | (2.103) | (2.315) |
| Rule of law | 7.965** | 5.614* |
| | (3.173) | (3.070) |
| High income dummy | | 13.100** |
| | | (5.102) |
| Constant | -72.116* | -15.321 |
| | (41.264) | (42.581) |
| Observations | 106 | 106 |
| R2 | 0.364 | 0.814 |
| Adjusted R2 | 0.339 | 0.805 |
| Residual Std. Error | 15.063 (df = 101) | 14.189 (df = 100) |
| F Statistic | 14.442*** (df = 4; 101) | 87.569*** (df = 5; 100) |
| Note: | | *p<0.1; **p<0.05; ***p<0.01 |

Note: For GDPPC and the dependency ratio, I employed a logarithm transformation, as both of these were skewed to the right.

### v.1.1. Interpretation of results

The public saving institution variable was positively correlated with both higher rates of savings in rural areas and access to financial products (or bank accounts) in rural areas, which supports $H_1$. In particular, the effect on the percentage that saved last year appears to be large (9.088).

The dependency ratio was positively correlated with whether people save, which is interesting, as the theoretical prediction assumes a negative relationship, namely that countries with a higher dependency ratio save less. This is, however, in accordance with the findings of Dupas and Robinson (2011), namely that being a dependant did not hinder people from saving. It did not have a statistically significant relationship with whether people have access to an account or not.

Rule of law was positively correlated to whether people have saved in the last year and whether they have access to an account, suggesting that thrust in institutions is important in people's decision to save.

The high-income dummy and GDP per capita are, as expected, highly correlated with access to accounts. This is expected as most high-income countries have either close to complete or complete access to accounts (Demirguc-Kunt, et. al., 2014). By controlling for high-income countries, the effect of GDP was less than it otherwise would have been.

### v.2. Cross-sectional analysis II

To test hypothesis II and III, whether financial inclusion and public saving institutions are correlated with domestic savings, I relied on the following linear model:

$$Y_i = a + bX_1 + bX_2 + bX_3 + bX_4 + \varepsilon$$

Where $Y_i$ equals domestic savings as a % of GDP, and $X_1$ equals public saving institutions. $X_2$ are the financial inclusion variables, access to accounts and percentage who saved in rural areas. $X_3$ equals government spending, and $X_4$ equals the dependency ratio.

**Table 5. Public savings institutions and domestic savings as a % of GDP**

Regression Results

| | Dependent variable: | | |
|---|---|---|---|
| | Domestic savings | | |
| | (1) | (2) | (3) |
| Access to accounts (rural) | 7.787*** | 6.425** | 8.014*** |
| | (2.416) | (2.511) | (2.453) |
| Saved last year (rural) | 0.066 | 0.031 | 0.066 |
| | (0.077) | (0.079) | (0.077) |
| Government spending | -0.593* | -0.758** | -0.636** |
| | (0.304) | (0.315) | (0.313) |
| Public saving institutions | 6.251** | 6.272** | 6.664** |
| | (2.665) | (2.634) | (2.758) |
| Dependency ratio | -6.344 | -7.654 | -7.088 |
| | (6.669) | (6.635) | (6.802) |
| OECD dummy | | 5.962* | |
| | | (3.397) | |
| East Asia Dummy | | | -3.662 |
| | | | (5.971) |
| Constant | 17.438 | 30.267 | 20.246 |
| | (30.512) | (31.034) | (30.959) |
| Observations | 95 | 95 | 95 |
| R2 | 0.283 | 0.307 | 0.286 |
| Adjusted R2 | 0.243 | 0.260 | 0.238 |
| Residual Std. Error | 11.890 (df = 89) | 11.753 (df = 88) | 11.932 (df = 88) |
| F Statistic | 7.032*** (df = 5; 89) | 6.511*** (df = 6; 88) | 5.882*** (df = 6; 88) |
| Note: | | | *p<0.1; **p<0.05; ***p<0.01 |

Two additional models are included. The first tested for the individual effect of OECD countries, which are dominated by European countries, using a dummy variable. Equally, Model tested whether East Asian countries[4] are exaggerating the positive relationship between PSIs and savings, as these are both high saving countries and also have a long history with PSIs (Garon, 2011).

**v.2.1. Interpretation of results**

The coefficient of determination, the adjusted R2, indicates that the second model was able to explain the greatest share of variation in domestic savings. It can be observed from this model that the percentage of the population with access to accounts in rural areas was positively correlated with domestic savings. However, the other indicator of financial inclusion, the percentage that saved in the last year in rural areas, was not statistically significant. The number reporting to be saving also includes those that report to be saving through informal channels, which is not contributing to total domestic savings. According to these results, I could only partially confirm $H_2$, namely that countries with higher financial inclusion have higher domestic savings.

The PSI variable was positively correlated with savings in all three models. The relationship remains positive and statistically significant, even when the control variables were included. The OECD dummy was, as expected, positively correlated with savings. However, the East Asia dummy was not statistically significant, although these countries are both high savers and all use public saving institutions. Thus, the presumption that that these countries exaggerate the positive results was incorrect.

The dependency ratio was not correlated with savings when public saving institutions were included, which does against the theoretical prediction that high dependency ratio countries have a lower savings level. This is particularly interesting, as dependency ratio is often mentioned as one of the main determinants of savings. Government spending is, as expected, negatively correlated with domestic savings.

[4] East Asia observations included in the dataset: China, Japan, Hong Kong, Mongolia and South Korea.

### vi.3. Time-series cross-section analysis

The linear model used to test the relationship between public saving institutions and household savings is the following one:

$Y_i = a + bX_1 + bX_2 + bX_3 + bX_4 + \varepsilon$

Where $Y_{ct}$ is household savings, and $X_1$ constitutes public savings institutions, $X_2$ is short-term interest rates. $X_3$ equals GDP per capita and $X_4$ the working age population. It should to be noted that the relationship between the working age population and the savings rate was expected to be positive instead of negative, which is the case of the dependency ratio. The first model tested the impact of public saving institutions on household savings, and the second model tested the relationship between PSIs and national savings. The results can be seen in Table 6.

There was some reason to suspect that China, which has very high household savings (above 30 per cent), may exaggerate the positive relationship between public saving institutions and household savings. Thus, I carried out the same test excluding China's household saving data. The public saving institutions coefficient was somewhat reduced when the China observations were excluded, but the result remained positive and statistically significant.

**Table 6. The effect of public saving institutions on household savings and national savings (without fixed effects)**

Regression Results

| | Savings | |
|---|---|---|
| | Household savings | National savings |
| | (1) | (2) |
| Public saving institutions | 1.247*** | 3.872*** |
| | (0.443) | (0.474) |
| Short term interest rates | 0.345 | 1.497*** |
| | (0.210) | (0.224) |
| GDP per capita | 0.00001 | 0.0001*** |
| | (0.00002) | (0.00002) |
| Working age population | -0.135 | 0.095 |
| | (0.107) | (0.115) |
| Constant | 12.732* | -7.392 |
| | (7.397) | (7.947) |
| Observations | 425 | 420 |
| R2 | 0.031 | 0.249 |
| Adjusted R2 | 0.022 | 0.242 |
| Residual Std. Error | 4.292 (df = 420) | 4.580 (df = 415) |
| F Statistic | 3.358** (df = 4; 420) | 34.444*** (df = 4; 415) |
| Note: | | *p<0.1; **p<0.05; ***p<0.01 |

### v.3.1. Time series – cross sectional model using fixed effects

In this section, I test Hypothesis III, whether countries with PSIs have a higher percentage of savings (as a % of GDP), using country and year fixed-effects. The reason for doing this is that regular multi-linear regressions assume that all the observations are independent of each other, and therefore do not consider heterogeneity across groups. Fixed-effects control for the individual effects of countries and years, thus studying the relative effect of the IV when country and year is considered.

First, I created a model using country fixed effects (the Table can be found in the Appendix 1). When individual country effects are taken into account, there is no statistically significant relationship between public saving institutions and household savings. This might imply that individual country-characteristics might be more important in explaining household savings than the variables identified here.

Second, I applied year-fixed effects to the model assessing the relationship between public saving institutions and household savings (the Table with the results can be found in Appendix 2). Year fixed effects allow one to control for special events, such as economic or financial crises. In this model, PSI remained significant, but the coefficient diminishes.

Third, I employed year fixed effects, assessing the relationship between public saving institutions and national savings. In this model, the results do not change much, and public saving institutions, GDP per capita and interest rates remained positive. However, the years 2009 – 2012 are negatively correlated with savings, and statistically significant at the 0.90 level. This may be the effect of the financial crisis, and the European debt crisis.



### v.3.2. Interpretation of results

In Table 5, I found that public saving institutions are positively correlated with household savings and with national savings. This model confirmed the results found in the cross-sectional study. However, from the coefficient of determination, the adjusted R2, it is evident that the first model explains only a minor part of the

variance in household savings. The second model has a much higher adjusted R2, and the effect of public saving institutions was also greater. This may imply that the effect of public saving institutions does not predominantly play out through individual financial inclusion and household savings, as my theoretical framework predicted, but rather through either corporate or public savings.

GDP per capita appeared to have no effect on household savings, and only a minor positive effect on national savings. Short-term interest rates had no statistically significant effect on household savings, but did have a positive effect on national savings.

There was no statistical significant effect of working age population in either of the models, suggesting that the dependency ratio theory of savings does not hold in this group of countries. It should be considered that the working age population is relatively homogenous across the OECD and G20 countries, at between 62 and 67 per cent of the total population (see Table 2), which may explain why there is no relationship in the model. However, this also confirms what was observed in the cross-country models, namely that the dependency ratio did not matter when public saving institutions were taken into account.

From the fixed effects models, it was confirmed that the results hold over time, but not across countries. This is indicative of the fact that individual country characteristics are more important in determining the domestic savings level.

### vi. Public saving institutions in practise: the case of Rwanda's Umurenge SACCO policy

The purpose of this case study was to review the experience of a country in which the government has intervened in the banking sector with the specific purpose of increasing domestic savings. As an emerging economy that laid out an ambitious national savings strategy (NSS) plan in 2009, with the explicit aim of increasing financial access and savings, Rwanda presented itself as an excellent case study that is useful to explore potential causal mechanisms going from public saving banks to savings, in a more in-depth way than is possible through statistical analysis. Rwanda's NSS was followed by a concrete policy intervention; the decision to support at least one Umurenge SACCO, a financial institution operating as a cooperative, in each administrative subdivision of the country (Nahayo, et.al., 2013).

Rwanda is not the only emerging economy actively promoting savings, other examples being Ethiopia and Ghana (World Bank, 2013). Rwanda was selected as a case study, as information on the project is widely available. There was data on financial access both prior to and after the intervention, which made it possible to assess the effectiveness of this programme. In addition, being a policy that has been carried out in cooperation with the private sector, it made an interesting case within which to study alternative forms of public saving institutions.

#### vi.1. Case background: Savings and financial inclusion in Rwanda

Rwanda has been one of the fastest growing economies in Africa in the last ten years, and GDP per capita nearly doubled between 2001 and 2014. Nevertheless, it remains a low-income country (WDI, 2016; see Table 1 for more socio-economic indicators). Going just a few years back, both financial inclusion and savings were low, even by comparison with neighbouring countries. This was largely due to a history of ethnic and political conflict, but also other factors such as high dependency ratio (84 per cent) and a high percentage of the population living in rural areas, with poor access to financial services. In 2008, the first FinScope survey revealed that more than half of the population were financially excluded, meaning

they were deprived of access to any type of financial service, be that formal or informal (AFI, 2014).

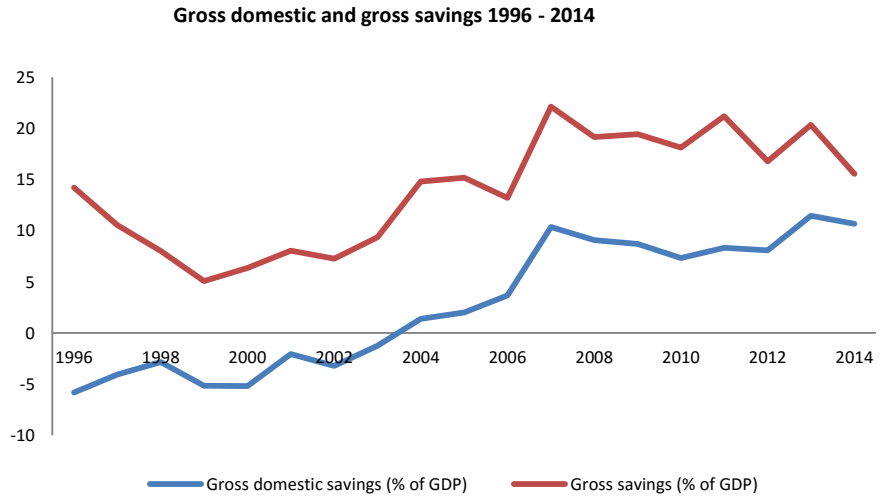
**Table 7. Basic socio-economic indicators**

| Indicator | Value |
|---|---|
| GDP per capita (2014) | $ 445.6163 |
| GDP growth (2014) | 6.96 % |
| Percentage living in rural areas (2016) | 84 % |
| Dependency ratio (2014) | 79 % |
| Financial inclusion (2016) | 89 % |

Sources: WDI data (2016)

The country had negative domestic savings throughout the 1990s, and was dependent on outside resources and aid (see Graph 3). Indeed, the high growth that the country experienced in the 1990s and 2000s, has taken place despite low savings, making Rwanda one of the few countries to have experienced continuous high growth without prior resource mobilisation (World Bank, 2013). Nevertheless, the government considers the lack of capital a key constraint hindering further investment and growth (2013).

**Figure 3. Gross domestic and gross savings, 1996 - 2014**




Source: Own elaboration using WDI data (2016)

In answer to this challenge, the Rwandan cabinet passed the National Savings Strategy (the NSS) in 2009 (MINECOFIN, 2013b), which identified a number of policy actions to increase savings both in the private and the public sector, itself followed by the passing of the Umurenge SACCO policy in March 2009. The SACCO policy consisted of the commitment to support at least one SACCO (a saving cooperative that is owned by its own members) at the level of each administrative subdivision of the country. This programme began operating in June of the same year, and was promoted through a nationwide communication campaign educating people about the benefits of the programme and of saving in general.

The SACCOs appeared a convenient way to increase financial inclusion, as saving cooperatives already existed in the country and people were familiar with how they operated. In addition, because the members own and administer the SACCO, and also get equal voting rights regardless of their contribution, their main aim is to benefit the members, by providing loans and insurance services within the community, not to increase profits (Nahayo, et. al., 2013). This was important to ensure that the SACCO remained affordable even for low-income groups.

In terms of the regulatory framework, within which the SACCO operates, the Government commits to providing initial financial subsidies, office space and assistance in acquiring plots for office buildings. The Government has also invested in infrastructural upgrades, resulting in that all SACCOs have access to electricity, computers and internet (AFI, 2014). In turn, the SACCO is supervised by the Central Bank, the National Bank of Rwanda (NBR). The NBR also employs supervisors tasked with ensure sound management practices within the SACCOs. In addition, SACCO managers and employees are also offers different types of on-going training in management and business practises.

A number of special regulations have been established particularly for SACCOs, namely that no local political official could sit on a SACCO board, and the capital requirement was also made higher than for normal banks. An external audit is also supposed to be carried out every second year, which would also include a review

of the Board of Director members' accounts. At the initial stage, the SACCOs were also limited to providing saving and deposit accounts, and could not give out loans. In addition, it was made clear from the start that the license could be revoked if the SACCO did not adhere to the guidelines and regulations set out by the government.

**vi.2. Evaluating the effect of the SACCO intervention**

The first SACCO rating report was published in 2012. This report found that the majority of the SACCOs (304 out of 401) had a balanced budget, even when government support was excluded (AFI, 2014). For the second report (2013), the number was even higher (355 out of 416). For those that had achieved a balanced budget, subsidies were to be gradually be phased out. In addition, these would be able to work under a lower liquidity ratio than the others, to be decided upon on an individual basis (AFI, 2014). In terms of usage, it is reported than more than 2 million persons, more than a quarter of the adult population, have a SACCO account and use it. Indeed, FinScope (2016) has reported that usage is more frequent than for regular bank accounts.

The table and graphs below look at the effect on savings and on financial inclusion, using data from FinScope (2016). FinScope has carried out three surveys in Rwanda between 2008 and 2016, in which they ask people about their access and use of financial services. This data is useful for assessing the impact of the SACCO intervention because the first survey was carried out prior to the policy intervention, whilst the two following ones were carried out three and seven years after the intervention, making it possible to track progress over time, albeit with data which is limited to a few years. Conversely, it should be considered that the Government promoted a range of saving products in this period, and that not all the variation is due to the SACCO policy.

First of all, Table 8 demonstrates the evolution of the financially excluded, as well as the percentage that use different financial products, and the percentage that are reported to be saving. Formal services other than banks include services such as mobile banking, microfinance (MFI) and SACCO cooperatives. Informal services

are saving groups, money keepers (persons that are paid to deposit money) or other types of informal, unregistered mechanisms that are not regulated by a central or local government (FinScope, 2016). The totals are above 100 due to there being a number of people use two or more types of services.

Table 8 demonstrates that financial exclusion ratios have been drastically reduced in the period 2008 – 2016. Second, usage has increased across the range of financial products, with formal products experiencing the highest increase. This reflects the increase in the usage of SACCOs, but probably also the fact that mobile banking and MFIs has become widespread in the same period. Nevertheless, informal products remain the most used product. Third, the percentage of the population that are reported to have saved in the last year has increased by 20 percentage points, from 25 to 45 per cent.

**Table 8. Financially excluded and included, by usage (2008 - 2016)**

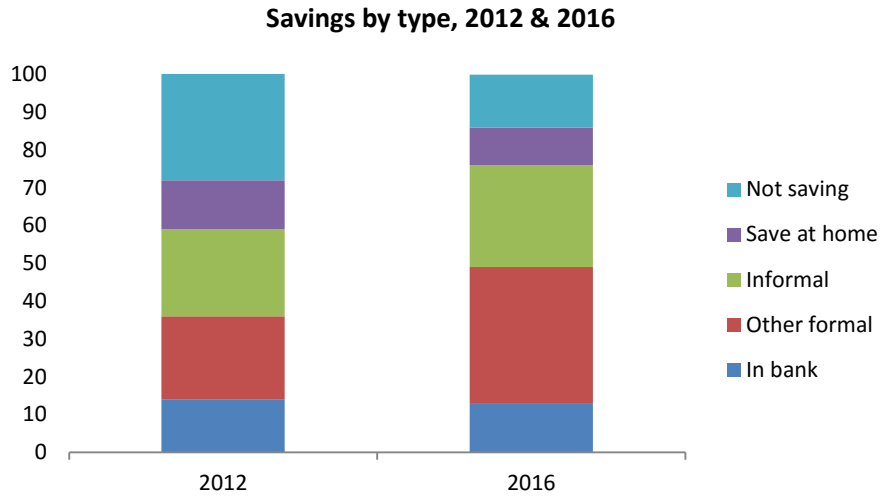
| Year | Financially excluded | Used formal products | Used informal product | Used banks | Saves |
|---|---|---|---|---|---|
| **2016** | 11 % | 65 % | 72 % | 26 % | 45 % |
| **2012** | 28 % | 42 % | 57 % | 23 % | 25 % |
| **2008** | 52 % | 21 % | 26 % | 14 % | - |

Note: Own elaboration using Finscope, 2008; 2016; this graph demonstrates all type of accounts, including saving accounts; totals are larger than 100 because some use various services.

Second, when looking at the effect on savings behaviour, Graph 4 demonstrates the changes in saving practises between 2012 and 2016. From this graph, it is evident that a much higher number report active saving practices in 2016 than in 2012. Saving at home has declined, implying that a greater percentage of savings has been channelled into the formal system. However, the number reporting to be saving in banks has decreased from 13 to 12 per cent. This is despite the fact that a number of saving schemes have been initiated, such as saving for homeownership, monthly, and periodical saving schemes, which are helpful for those with seasonal earnings.

The largest increase can be seen among those saving in formal sectors, followed by those saving through informal mechanisms. When considering the fact that few of the other formal service providers offer saving accounts (MFIs only occasionally provide saving services), it is reasonable to assume that SACCOs stood for most of the increase in the percentage of the population reporting to save. Indeed, data from the National Bank of Rwanda reports that deposits in SACCOs increased from 6.33 billion RWF in 2010 to 36.9 billion RWF in 2013. This is also supported by the data on overall domestic savings, rising from 8.7 per cent in 2009, to 11.4 in 2013 and 10.7 in 2014 (see Graph 3; WDI data).

**Figure 4. Savings by type, 2012 and 2016**



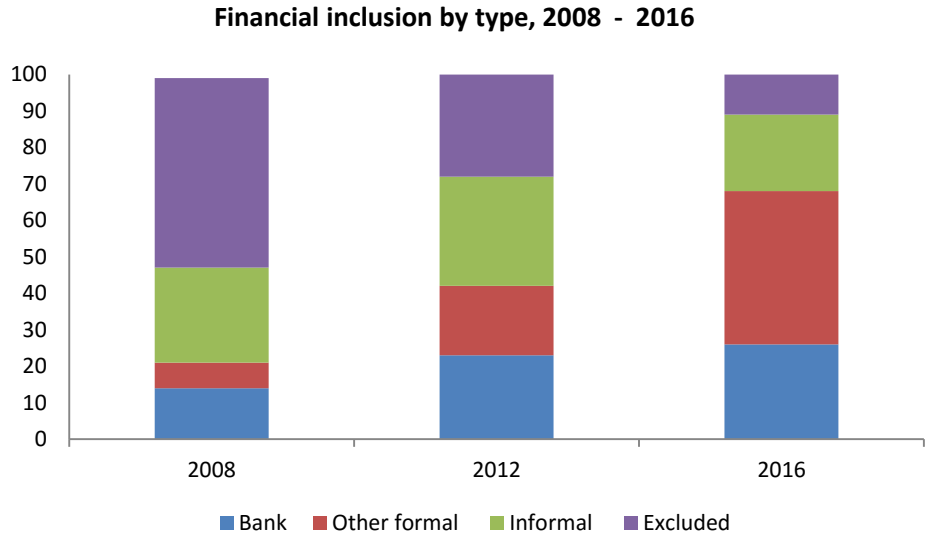

Source: Own elaboration using FinScope data (2016).

Third, Graph 5 demonstrates financial inclusion by type. It should be noted that this data is not limited to financial inclusion in terms of saving accounts, but also reports on access to other types of financial services, such as insurance or credit. From the graph it becomes evident that the financially excluded have decreased sharply in number since 2008, from 52 per cent prior to the SACCO programme, to 11 per cent in 2016. The largest increase has been in other formal services, which is what was observed in Table 8 as well.

It should also be mentioned that Rwanda has done better on financial inclusion compared to other countries in recent years, meaning that the improvement has

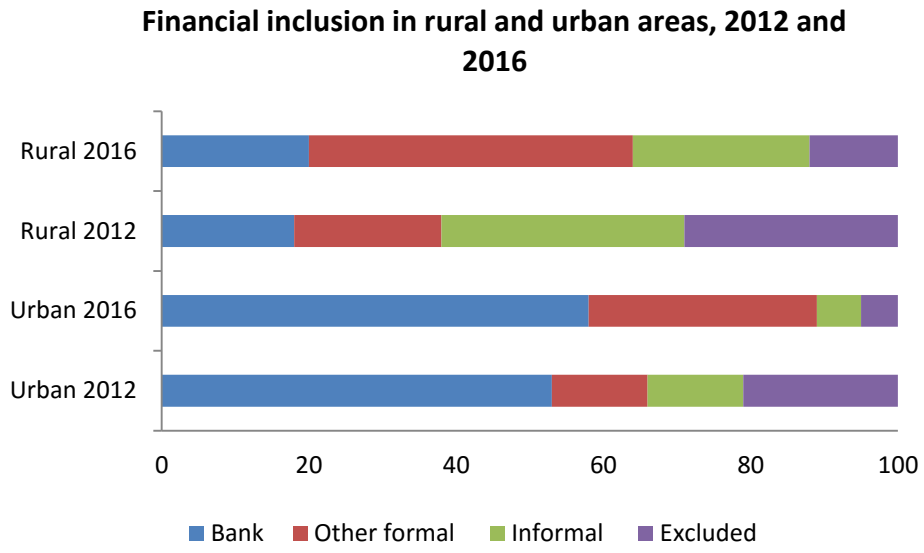
been both in absolute and in relative terms. For instance, whereas it used to rank 12th out of the 15 African countries that FinScope publishes data on, it now ranks 2nd on financial inclusion, and it is in 6th place for formally served population (FinScope, 2016: 42-44). However, in terms of banked population, Rwanda is still lagging behind other countries, and remains among the lowest performing countries. Thus, the improvement has been due to the increase in other formal providers, but bank access is still limited.

**Figure 5. Financial inclusion by type, 2008 - 2016**




Source: Own elaboration using FinScope data (2008; 2016).

**Figure 6. Financial inclusion in rural and urban areas, 2012 - 2016**




Source: Own elaboration using FinScope data (2008; 2016).

Finally, the last graph demonstrates the difference between rural and urban areas in terms of the financially excluded and the services that they use, in 2012 and 2016. It is evident that both rural and urban areas have benefitted from greater access to financial services, and in addition, formal financial services have had the largest impact in both groups. At the same time, the inequality in access between rural and urban areas remains. More than 50 per cent of the population in the cities have access to banks, whereas it is only 21 per cent in rural areas. Indeed, informal financial services are more common in rural than in urban areas.

In sum, it can be established that the programme has been successful in terms of coverage and financial sustainability; even though the SACCOs relied on government subsidies in the first years, the large majority became financially independent within a few years, and a quarter of the population report to being part of one. In addition, the SACCO programme has been successful in promoting formal saving accounts for those parts of the population who otherwise are unlikely to have them. The relative low increase in bank accounts demonstrates that these have not attracted a lot of users, despite of increased saving promotion and new saving products. This is also reflected by the fact that financial inclusion has improved rapidly in the eight-year period studied, both relative to other countries and in absolute terms.

In terms of savings, the result is less clear. Almost half of the adult population report themselves as engaging in one form or another of savings behaviour, whilst the number of people using formal mechanisms, in particular, has risen. However, in addition to the SACCO policy, the Government has also actively promoted financial education and financial literacy (MINECOFIN, 2013a), which may also have had an impact on people's saving behaviour. Nevertheless, increased financial literacy would have had little impact on private savings had there not been any formal channels through which to engage in savings. The Government has promoted a whole range of different saving incentives during this period, which cannot be limited to SACCOs *per se*. For instance, saving has been promoted through house saving schemes, in which people are eligible for a house loan when they have reached a certain threshold, and education and pension saving schemes. However, considering that these schemes are usually offered through banks, and are therefore targeted at the relatively well-off population, together with the fact that numbers of bank accounts have not increased much, formal institutions other than banks are likely to account for this dramatic increase in saving accounts. Formal institutions also include mobile telephone banks and MFIs, but these do not usually provide saving accounts (MFIs tend to focus on credit and mobile banking are generally used for making transfers and payments (Demirguc-Kunt, et. al., 2014)). It is therefore reasonable to conclude that a large part of the increase in the percentage reporting to be saving is due to the expansion of SACCO accounts.

Finally, in regards to explaining the success of the SACCO programme, several factors can be identified from this analysis: First of all, we see that there was a strong national commitment, constructed around national development and a certain element of patriotism. Second, a broad range of stakeholders was included from the start. In particular, the fact that local government and community leaders were in charge of initiating the programme was key to ensuring community-ownership and trust, as people knew the persons managing the banks. Third, several safeguards were put in place to ensure good governance and avoid corruption, including monthly reporting and external audits every two years. In addition, the fact that operational subsidies had an end-date and could be revoked,

might have contributed to the observation that most of the SACCOs are financially sustainable today. Fourth, a number of additional policies were put in place alongside the SACCO programme, including a national communication strategy and efforts to increase financial literacy, which are likely to have played a role in incentivising people to save.

**vi. Discussion and conclusions**

In this paper, using regression analysis with cross sectional and panel data, I have assessed the relationship between public saving institutions and levels of domestic saving, followed by an in-depth case study of the SACCO policy in Rwanda. I put forward and tested three hypotheses, namely that countries with PSIs would have higher levels of financial inclusion; that countries with higher financial inclusion would have higher domestic savings, and that countries with PSIs would have higher levels of domestic savings.

The first hypothesis was confirmed by the first regression models, which demonstrate a positive relationship between public saving institutions and access to accounts in rural areas, as well as to the likelihood of persons engaging in saving practices in rural areas. Stein (2010) has argued that financial liberalisation, contrary to the expectation of improved efficiency, leads to a reduction of access in many developing countries, precisely because it becomes unprofitable to operate in rural and remote areas. My regression analysis supports the idea that the result of such market failure, i.e. financial disenfranchisement of the rural poor, has given rise to a number of attempted resolutions through various public interventions in the banking sector. The findings from the regression analysis indicate that public interventions can succeed in overcoming this market failure. This also supports the findings by Dupas and Robinson (2011) that access is the most important factor in determining whether or not people save.

In addition, the case study on Rwanda demonstrates that public intervention was key to increasing financial inclusion. This case also reveals how public interventions in the banking sector can take numerous forms, but suggests that these are likely to work best when in cooperation with local governments and institutions.

In regards to the second hypothesis, the second set of regression analyses has shown that access to accounts in rural areas had a statistically significant relationship with savings. However, this was not the case for the percentage of the rural population reported to be saving. This might reflect the fact that a number of

persons are saving informally, and thus, these funds are not registered in formal statistics. Indeed, the Rwanda case study demonstrated that a large part of the effect of SACCOs on savings was generated through channelling informal savings into the formal sector. Thus, it appears that public saving institutions might predominantly work by *formalising* savings, rather than through incentivising people to save.

Finally, the third hypothesis was supported by the cross-country regression, which demonstrated that public saving institutions are positively correlated with savings, even when controlling for GDP per capita, the dependency ratio, and culture (the East Asia dummy). These are variables that are mentioned prominently throughout both the academic and the policy literature as preconditions to savings. However, the analysis presented here also demonstrates that the relationship is far more ambiguous than has so often been presumed. For starters, GDP per capita does not appear to have any effect on savings. Although average savings are higher in high-income countries, there is a large spread and outliers are present among all income groups. In addition, the dependency ratio did not demonstrate a negative relationship with savings in any of the models, which stacks the deck still further against the common theoretical presumption. It is therefore unclear what the exact relationship with savings is, albeit that the dependency ratio is still likely to matter in certain contexts.

In the panel data models, I further explored the link between public saving institutions and national savings by looking at household savings. In accordance with my theoretical framework, it was presupposed that public saving institutions work by increasing access for individuals, and would therefore increase household savings accordingly. Conversely, although the pooled models and the year fixed-effect model demonstrated a positive relationship, this disappeared when country fixed-effects were introduced. In addition, the coefficient of determination of the model, demonstrates that it could only explain a very limited part of the total variation in household savings. However, it should be noted that this analysis was carried out using OECD and G20 countries, most of which have either close to

complete or complete access to financial services, and that given this, the variation is very small. Endogenous factors may be more important in explaining savings in these countries.

Finally, it should be noted that this study has only been able to capture and explain a part of the variation observed across countries. Noting that neither of the regression models was able to explain more than 30 per cent of the variation in saving levels also underscores the complex nature of savings. This is due to the array of factors driving savings, with some only likely to play themselves out in particular contexts, as illustrated by the country-fixed effect models, and in the long term. For instance, I could not find a significant relationship between governance variables and savings, albeit the Rwanda case study clearly demonstrated that governance did play some role in determining whether public saving banks succeeded in mobilising savings or not. It would be interesting to use other types of indicators or other databases to better understand the role of public management, but it is also probable that the interaction effect between quality of governance and public saving institutions is better explored using case studies rather than a statistical approach.

Despite of these limitations, these results may still prove valuable, when we consider that savings has been of debate for scholars in academic and policy circles for decades, without reaching anything like a stable consensus. And whereas existing simple and comparative case studies have shed some light on the potential for public interventions in the banking sector, this study has first tried to put these findings through the rigours of quantitative testing, and then has employed a qualitative case study as an exemplary case in order to shed further light on these mechanisms. In particular, I believe these results can contribute to the developing evidence on public institutions and savings, an area that has received only limited attention in the literature, and also contribute to understandings on the role of public savings within DRM.

Whilst the relationship between public saving institutions and savings may appear rather self-evident, it should be considered that most donor DRM projects are

concerned predominantly with taxation, or with mobilising funds from the wealthy elite or diaspora abroad, and, therefore, it is important to remind policy makers that public saving institutions can work to increase savings by mobilising savings from within the population. The case study also demonstrates that the SACCO policy was key to introducing informal savings into the formal sector, and therefore also contributing to overall savings. Indeed, Garon (2011) has demonstrated that the funds to finance war and reconstruction in Japan and much of Western Europe were not predominantly mobilised through taxation, nor funding from the wealthy, but through the mobilised savings of the broader populace. This in turn, suggests that there is a greater potential to mobilise domestic resources, and in addition, that there are a range of policy options available for governments interested in increasing DRM.

Following from these findings, it appears evident that the DRM literature has given inadequate attention to an important source of savings, namely household savings drawn from the broad populace. As has been pointed out by d'Alcantara, Dembinski and Pilley (2014), there is little hard data and research-based evidence on the effect of public saving banks in this vital policy sphere, and it is therefore hard to argue for the introduction of such a policy. However, this study indicates that public savings institutions do contribute to expanding access to areas that are unlikely to be covered by the formal system. In turn, mobilising and encouraging household savings in these areas does increase savings in the formal system, leading to higher national savings on average. Such an approach might be a useful alternative means for resource mobilisation within countries that wish to decrease their dependence on external funding, but are reluctant to increase taxation.

In terms of future research, the study of public saving institutions would benefit from developing the ability to differentiate between type of ownership, and also between types of banking institution. Such a study may say more about exactly what specific kind of institutions may be optimally beneficial for DRM within various contextually specific conditions. In addition, whilst I have framed my

study around DRM, it would also be interesting to look at the effect of PSIs on poverty reduction, inequality and resilience.

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**x. Appendices**

**1. Regression model with country-fixed effects – DV: Household savings**

```
Coefficients: (1 not defined because of singularities)
                         Estimate Std. Error t value Pr(>|t|)
Pub.sav.inst            9.868e+00  1.024e+01   0.963  0.33594
log(p$Interest.Rates) -6.940e-02  1.706e-01  -0.407  0.68436
GDPPC                 -5.863e-05  2.515e-05  -2.331  0.02025 *
Work.age.pop          -5.668e-02  1.575e-01  -0.360  0.71903
factor(Country)AUS     1.099e+01  1.073e+01   1.024  0.30631
factor(Country)AUT     1.606e+01  1.080e+01   1.488  0.13762
factor(Country)BEL     5.308e+00  1.265e+00   4.196 3.36e-05 ***
factor(Country)CAN     9.823e+00  1.100e+01   0.893  0.37249
factor(Country)CHE     1.659e+01  3.221e+00   5.150 4.13e-07 ***
factor(Country)CZE     1.765e+00  1.503e+00   1.174  0.24097
factor(Country)DEU     5.775e+00  1.306e+00   4.423 1.26e-05 ***
factor(Country)DNK    -5.742e+00  1.308e+00  -4.391 1.45e-05 ***
factor(Country)ESP     8.899e+00  1.082e+01   0.822  0.41136
factor(Country)EST     3.395e+00  1.066e+01   0.318  0.75041
factor(Country)FIN    -2.388e+00  1.289e+00  -1.853  0.06463 .
factor(Country)FRA     5.858e+00  1.242e+00   4.714 3.36e-06 ***
factor(Country)GBR     8.270e+00  1.051e+01   0.787  0.43168
factor(Country)HUN     1.105e+01  1.086e+01   1.017  0.30976
factor(Country)IRL    -2.356e+00  1.425e+00  -1.653  0.09918 .
factor(Country)ITA     3.599e+00  1.280e+00   2.812  0.00517 **
factor(Country)JPN    -6.190e-01  1.230e+00  -0.503  0.61521
factor(Country)KOR     9.939e-01  1.928e+00   0.516  0.60646
factor(Country)MEX     1.256e+01  1.012e+01   1.241  0.21553
factor(Country)NLD     3.019e+00  1.393e+00   2.168  0.03075 *
factor(Country)NOR     1.949e+00  1.445e+00   1.349  0.17813
factor(Country)POL     8.820e+00  1.117e+01   0.790  0.43018
factor(Country)PRT     7.182e+00  1.063e+01   0.676  0.49967
factor(Country)SVK     8.120e+00  1.123e+01   0.723  0.47020
factor(Country)SVN     1.316e+01  1.113e+01   1.183  0.23748
factor(Country)SWE            NA         NA      NA       NA
factor(Country)USA     1.144e+01  1.068e+01   1.071  0.28493
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 2.779 on 395 degrees of freedom
  (109 observations deleted due to missingness)
Multiple R-squared:  0.835,     Adjusted R-squared:  0.8225
```

**2. Modelling the effect of public saving institutions on household savings, using time fixed effects**

```
lm(formula = Household.sav ~ Pub.sav.inst + log(p$Interest.Rates) +
    GDPPC + Work.age.pop + factor(Year) - 1, data = p)

Residuals:
     Min       1Q   Median       3Q      Max
-13.7834  -2.5253   0.0379   3.4184  11.9690

Coefficients:
                        Estimate Std. Error t value Pr(>|t|)
Pub.sav.inst           1.082e+00  4.556e-01   2.375    0.018 *
log(p$Interest.Rates)  3.802e-01  2.409e-01   1.578    0.115
GDPPC                  4.088e-05  2.489e-05   1.642    0.101
Work.age.pop          -6.443e-02  1.095e-01  -0.589    0.557
factor(Year)1996       9.838e+00  7.543e+00   1.304    0.193
factor(Year)1997       8.707e+00  7.552e+00   1.153    0.250
factor(Year)1998       8.180e+00  7.563e+00   1.082    0.280
factor(Year)1999       7.165e+00  7.571e+00   0.946    0.345
factor(Year)2000       7.106e+00  7.583e+00   0.937    0.349
factor(Year)2001       7.788e+00  7.599e+00   1.025    0.306
factor(Year)2002       7.345e+00  7.624e+00   0.963    0.336
factor(Year)2003       7.142e+00  7.610e+00   0.938    0.349
factor(Year)2004       6.456e+00  7.639e+00   0.845    0.399
factor(Year)2005       6.245e+00  7.673e+00   0.814    0.416
factor(Year)2006       5.556e+00  7.696e+00   0.722    0.471
factor(Year)2007       5.369e+00  7.714e+00   0.696    0.487
factor(Year)2008       6.248e+00  7.714e+00   0.810    0.418
factor(Year)2009       8.664e+00  7.696e+00   1.126    0.261
factor(Year)2010       7.778e+00  7.689e+00   1.012    0.312
factor(Year)2011       6.907e+00  7.680e+00   0.899    0.369
factor(Year)2012       6.710e+00  7.654e+00   0.877    0.381
factor(Year)2013       7.214e+00  7.641e+00   0.944    0.346
factor(Year)2014       6.501e+00  7.727e+00   0.841    0.401
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 4.262 on 402 degrees of freedom
  (109 observations deleted due to missingness)
Multiple R-squared:  0.605,     Adjusted R-squared:  0.5824
F-statistic: 26.77 on 23 and 402 DF,  p-value: < 2.2e-16
```

**3. Modelling the effect of public saving institutions on national savings, using time fixed effects**

```
lm(formula = national.savings ~ Pub.sav.inst + log(p$Interest.Rates) +
    GDPPC + Work.age.pop + factor(Year) - 1, data = p)

Residuals:
    Min      1Q  Median      3Q     Max
-9.5657 -2.9521 -0.7835  2.3937 13.3395

Coefficients:
                         Estimate Std. Error t value Pr(>|t|)
Pub.sav.inst            3.454e+00  4.817e-01   7.170 3.69e-12 ***
log(p$Interest.Rates)   1.187e+00  2.549e-01   4.658 4.37e-06 ***
GDPPC                   1.849e-04  2.659e-05   6.955 1.46e-11 ***
Work.age.pop            1.557e-01  1.159e-01   1.343   0.1799
factor(Year)1996       -1.145e+01  8.010e+00  -1.429   0.1538
factor(Year)1997       -1.095e+01  8.017e+00  -1.366   0.1727
factor(Year)1998       -1.145e+01  8.026e+00  -1.427   0.1543
factor(Year)1999       -1.106e+01  8.031e+00  -1.377   0.1694
factor(Year)2000       -1.041e+01  8.035e+00  -1.295   0.1960
factor(Year)2001       -1.105e+01  8.052e+00  -1.372   0.1707
factor(Year)2002       -1.188e+01  8.079e+00  -1.471   0.1422
factor(Year)2003       -1.158e+01  8.064e+00  -1.435   0.1519
factor(Year)2004       -1.133e+01  8.095e+00  -1.400   0.1623
factor(Year)2005       -1.074e+01  8.131e+00  -1.321   0.1874
factor(Year)2006       -1.089e+01  8.156e+00  -1.336   0.1824
factor(Year)2007       -1.127e+01  8.176e+00  -1.378   0.1690
factor(Year)2008       -1.320e+01  8.176e+00  -1.615   0.1071
factor(Year)2009       -1.546e+01  8.158e+00  -1.896   0.0587 .
factor(Year)2010       -1.413e+01  8.151e+00  -1.734   0.0837 .
factor(Year)2011       -1.404e+01  8.141e+00  -1.725   0.0853 .
factor(Year)2012       -1.342e+01  8.115e+00  -1.654   0.0989 .
factor(Year)2013       -1.302e+01  8.102e+00  -1.607   0.1089
factor(Year)2014       -1.244e+01  8.205e+00  -1.516   0.1303
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 4.498 on 397 degrees of freedom
  (114 observations deleted due to missingness)
Multiple R-squared:  0.7441,    Adjusted R-squared:  0.7293
F-statistic: 50.19 on 23 and 397 DF,  p-value: < 2.2e-16
```

**4. Code used in this study**

```
#Get excel file

s <- read.xlsx("DAIR_exam.xlsx", sheetIndex = 1, rowIndex = NULL, header =
TRUE, startRow = 1, endRow = 127)


#Get rid of missing data

dim(s)

s <- s[complete.cases(s[, c("SAVINGS", "OECD.", "Reg.qua", "Gov.spending",
"Dep.ratio", "GDPPC", "Saved.rural", "Account.rural", "PS.inst", "HI.dummy")]), ]

stargazer(type="text", title ="Table 1: Description of the data", s)


#Hypothesis II

#The first regression - no dummies

s1 <- lm (SAVINGS ~ log(s$Account.rural) + log(s$GDPPC) + Gov.spending +
Reg.qua + PS.inst + log(s$Dep.ratio) + Saved.rural, data = s)


#Making the regression model - with OECD and HI dummy

s2 <- lm (SAVINGS ~ log(s$Account.rural) + log(s$GDPPC) + Gov.spending +
Reg.qua + PS.inst + log(s$Dep.ratio) + Saved.rural + OECD., data = s)

summary(s2)

s3 <- lm (SAVINGS ~ log(s$Account.rural) + log(s$GDPPC) + Gov.spending +
Reg.qua + PS.inst + log(s$Dep.ratio) + Saved.rural + EA.dummy, data = s)
```

```
#LM in text

stargazer(s1, s2, s3, type="text", title="Regression Results",
dep.var.labels=c("Savings"), covariate.labels = c("Access to accounts (rural)",
"GDPPC", "Government spending", "Regulatory quality", "Public saving
institutions", "Dependency ratio", "Saved last year (rural)", "OECD dummy", "East
Asia Dummy"), out = "Table1.txt")


#Hypothesis I

#H1 PUBSAV AND FINANCIAL INCLUSION

m4 <- lm (Saved.rural ~ PS.inst + log(s$Dep.ratio) + log(s$GDPPC) + Reg.qua, data
= s)

m5 <- lm (Account.rural ~ PS.inst + log(s$Dep.ratio) + log(s$GDPPC) + Reg.qua +
HI.dummy, data = s)

stargazer(m4, m5, type="text", title="Regression Results", dep.var.labels=c("% who
saved last year", "% with access to an account"), covariate.labels = c("Public saving
institutions", "Dependency ratio", "GDPPC", "Rule of law", "High income dummy"),
out = "Table2.txt")


#Panel data

p <- read.xlsx("OECD2.xlsx")

stargazer(type="text", title ="Table 2: Description of the data", p)

stargazer(type="text", pr[1:4,], summary=FALSE, rownames=FALSE)


#Public savings institutions LM - without fixed effects
```

```
p1 <- lm (Hh.sav ~ Pubsavinst + log(p$SHIR) + GDPPC + WAP, data = p)

summary(p1)


p4 <- lm (n.savings ~ Pubsavinst + log(p$SHIR) + GDPPC + WAP, data = p)

stargazer(p1, p4, type="text",   title="Regression Results", summary = TRUE,
dep.var.caption = "Savings", dep.var.labels=c("Household savings", "National
savings"), covariate.labels = c("Public saving institutions", "Short term interest
rates", "GDP per capita", "Working age population"))


#With fixed effects

fixed.dum <-lm(Household.sav ~ Pub.sav.inst + log(p$Interest.Rates) + GDPPC +
Work.age.pop + factor(Year) - 1, data=p)

fixed.dum2 <- lm(Household.sav ~ Pub.sav.inst + log(p$Interest.Rates) + GDPPC
+ Work.age.pop + factor(Country) - 1, data=p)
```

**5. List of countries with public saving institutions**

| | | |
|---|---|---|
| Algeria | Greece | Netherlands |
| Australia | Hong Kong | Niger |
| Bangladesh | India | Nigeria |
| Belgium | Indonesia | Norway |
| Brazil | Ireland | Pakistan |
| Cameroon | Israel | Philippines |
| China | Italy | Rwanda |
| Cote d'Ivoire | Japan | Singapore |
| Czech Republic | Kenya | South Africa |
| Denmark | South Korea | Sweden |
| Egypt | Madagascar | Tanzania |
| Ethiopia | Malaysia | Thailand |
| Finland | Mauritius | Togo |
| France | Morocco | Tunisia |
| Germany | Namibia | Vietnam |
| Ghana | Nepal | |