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Mobilising for development:

Assessing the impact of public saving institutions in determining national savings levels

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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 analysing how the Rwandan SACCO initiative – a subsidised nation-wide savings cooperatives network – has affected financial inclusion and savings there. 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 countries' aggregate savings level. The positive relationship between public saving institutions and domestic savings is consistent across models using different controls and observations.

Keywords

Domestic resource mobilisation, financial inclusion, development finance, public saving institutions, savings

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1. INTRODUCTION

The search for ways to finance development is a topic with timeless relevance. In economic theory, savings has 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 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 all countries that have reached catch-up development¹ have in common is high saving rates (2008). Despite such a broad appreciation of the importance of savings, there is no consensus in the academic literature on why some countries achieve 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, savings is a function of income that varies directly with it; thus, savings should be low or even negative at low levels of development. However, the large divergences between countries with similar incomes suggest that institutional and/or policy variables may have a role to play. Looking at 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, that all have 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 those factors predicted in the theoretical literature to work against savings.

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

This study probes this further by assessing the relationship between public saving institutions (PSIs) and savings. PSIs include postal saving banks and state-owned or state-controlled banks providing affordable and accessible accounts to the population. Empirical tests of these propositions may have important policy implications; Savings do not only contribute to domestic resources by increasing the funding available for investments, but scholars have also found positive 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 tends 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 a country (Rao, 2015). Second, it is hypothesised that countries with high financial inclusion also have higher

¹ Defined as a process in which a developing country reach the economic level of advanced economies (Lee, 2013).

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 mainly of case studies, and the quantitative literature on national savings, so far 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 (Kriekhaus, 2001), and in particular, there have been few studies of public institutions from a quantitative perspective. When institutions 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 my 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 regression 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 analysis of the SACCO programme in Rwanda will be presented, using data on financial inclusion and savings to elaborate on the effects on PSIs in a specific contemporary context. My research demonstrates that there is a positive relationship between public saving institutions and domestic savings, which is consistent across models using different controls and observations.

2. LITERATURE REVIEW

2.1 Savings and national development

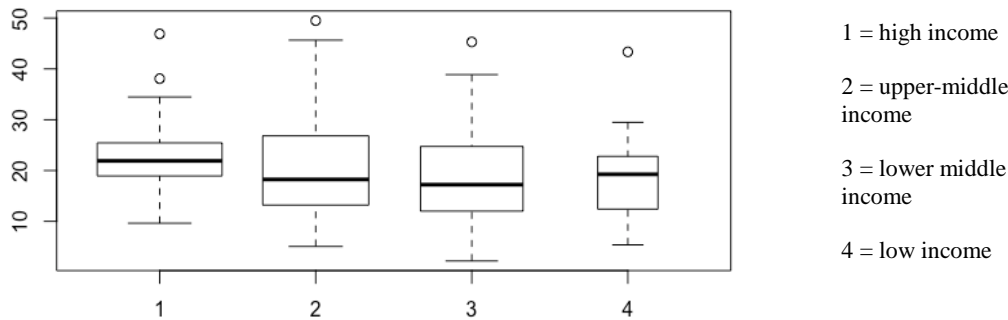
The study of domestic savings has its root in the development economics of the 1950s. For these scholars, increasing savings was considered the central challenge of development. Lewis' seminal paper, *'Economic Development with Unlimited Supplies of Labour'* (1954), for instance, argues that the development process starts with a substantial increase in savings. Once savings increase, more investments can be made, thus bringing about greater production 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 now agree that a certain level of savings is necessary for economic growth, by increasing the funds available for investment (Ndikumana and Boyce, 2000). Scholars have also found that savings are related to higher income growth (Loayza, Schmidt-Hebbel and Serven, 2000), greater stability in times of sudden shifts in international markets (Deaton, 1990), and a higher level of productive investments in education, health, homes and businesses (Kendall, 2010). Private savings also have positive individual effects by improving resilience and reducing the risk of falling into poverty.

2.2 Theories of the determinants of savings

The rich literature on the determinants of domestic savings is far from conclusive. Three factors are regularly cited in academic and policy articles: levels of income (GDP per capita), economic growth rates, and the dependency ratio² (Deaton and Paxson, 1994; Loayza, Schmidt-Hebbel and Serven, 2000; Verma and Wilson, 2005). These are not without their critics: Although high-income countries have higher average saving rates than upper middle-income countries, which in turn have higher average savings than lower middle-income countries, there are also significant overlaps between income groups (see the boxplot in Figure 2.1; the boxes go from the first quartile to the third quartile of the data set; the dots represent outliers). 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. These outliers can also be found across regions and over time, suggesting that policy interventions have a role to play in mobilising savings.

Figure 2.1 Savings across income groups (high income, upper middle income, lower middle income and low income)



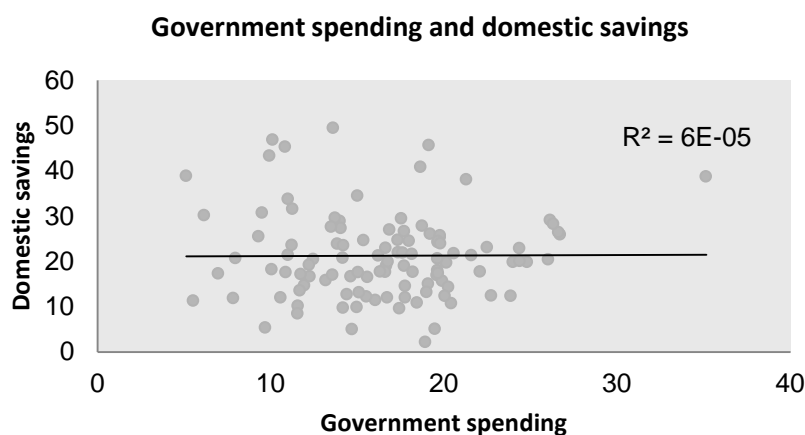
Source: Own elaboration using WDI data (2016)

² The dependency ratio refers to the proportion of dependents per 100 working-age population (WDI, 2016).

The dependency ratio theory posits that countries with higher ratios of children or pensioners will have a reduced ability to save, as the relative size of the economically productive 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, 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).

It is often speculated that culture can account for the exceptionally high savings levels 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 for military might, and only later came to be seen as important for financing catch-up development.

Figure 1.2 Government spending and savings (as a % of GDP)



Source: Own elaboration using WDI data (2016)

A different theory to explain high savings in East Asia is that these countries have limited welfare systems, making it necessary for individuals to accumulate savings as a safety net in case of a health emergency or their pensions. This is an argument often used to explain high savings in China after the turn to a market economy (Garon, 2013). Indeed, low household savings in the Scandinavian social democratic regimes supports this line of argument. However, examining the correlation between savings and government spending worldwide, the correlation is weak (see Figure 2.2). Indeed, Western Europe, the region where we find many of the most extensive welfare systems, is also home

to many high saving countries. Further complicating the picture, although the US welfare system is limited compared to Western European standards, the US population save relatively little.

2.3 Public institutions and savings

In recent years, questions of domestic resource mobilisation have featured prominently on the international policy agenda. Despite this, the institutional determinants of savings mobilisation remain underexplored (Freytag and Voll, 2014); we still know very little about the role of public institutions in fostering household savings. For instance, a paper on fiscal capacity in developing countries (Culpeper and Bhushan 2008) devotes several paragraphs to institutions and policies promoting domestic savings, but makes no mention of public saving institutions. In addition, the existing literature consists mainly of simple or comparative case studies, such as those 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.

Whilst some authors have recognised that institutions can play a role in fostering savings, the relationship between institutions and savings is not well studied in the literature. However, historical evidence suggests a relationship between public saving institutions and a country's savings level: Garon (2011) has found that many countries that have introduced public saving banks also rank amongst the highest saving countries today. His comparative analysis of resource mobilisation in Asia, Western Europe, and the US finds that most governments in the first half of the 20th century utilised massive saving campaigns, as they were reluctant to increase taxation. Indeed, throughout this time-period, the state took an active role in increasing savings across Western Europe and East Asia, for instance through postal saving banks and savings campaigns. Postal offices were considered a convenient way to collect savings from the 'unbanked', this being a centralised organisation that reached the whole territory, including the rural population and those working in the informal sector (Diop, Dorsner and Gross, 2003; d'Alcantara, Dembinski and Pilley, 2011). In addition, Garon found that the state would incentivise people to save through different promotional campaigns, such as school saving. The countries that utilised such active saving policies are also the highest saving today (Garon, 2011; 2012).

The current landscape of public provision of financial services has become a lot more diverse, and many institutions beyond post office banks now feature on this landscape. For instance, in the last two decades, a number of developing countries have introduced public saving institutions to increase financial inclusion and promote savings. One example is 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 cooperative) in every *umurenge* (municipality) in the country. In another case, the partially state-owned National Bank of Ethiopia has played a key role in expanding

financial access to rural areas, where 81 per cent of the population live (Hagos and Asfaw, 2014). Between 2006 and 2012, Ethiopia saw an increase in the number of bank branches from 421 to 1289, most of which are accounted for by the National Bank (World Bank, 2013).

In addition, whereas many of these institutions are publicly owned outright, some countries have privatised previously public banks with the state retaining control through partial ownership, as is seen in the Netherlands and Germany (Scher and Yoshino, 2004). In Denmark, Australia and Indonesia, postal offices have entered into 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 public service mandate (Scher and Yoshino, 2004). Other countries operate a hybrid system, where the banks are run like private corporations, but the central government maintains control through subsidies and specific regulations, as is the case in Rwanda (Kantengwa, 2009; d'Alcantara, Dembinski and Pilley, 2011).

One prominent mechanism through which public financial institutions facilitate higher savings levels is by increasing access and affordability. The World Bank Global Findex surveys, which assess financial inclusion worldwide, routinely find that unaffordability and inaccessibility are the most cited reasons for people not operating a formal savings account (Demirgüç-Kunt and Klapper, 2008; 2012). 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. She finds indicative evidence of a relationship between accessible and affordable saving institutions and relative savings levels. Experimental studies assessing behavioural traits support this. For instance, Dupas and Robinson (2011) found that the one major factor influencing people's propensity to save was access to a safe storage place.

The literature also suggests that public saving institutions affect savings by increasing access in the private savings market: In the study carried out by CGAP (1998), they argue that the security inherent in these banks gives them a cost advantage over other banks. Scher's (2001) study suggests that public saving institutions increased savings in East Asia by improving the quality and accessibility of private bank institutions, by adding competitive pressure to the industry, thus forcing private banks to offer more affordable solutions.

3. THEORETICAL FRAMEWORK

The literature review above makes clear that deliberate government interventions have received relatively little attention in academia, despite the substantial number of countries not conforming to the theoretical predictions in the literature. Additionally, the role of public institutions in savings accumulation is relatively under-studied.

To address this deficit, the framework presented here builds on insights from developmental state theory. This theory 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, on the one hand, by incentivising individuals to save, and, on the other, 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. 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 public institutions such as postal saving banks do not offer very high returns, the only means through which governments can sustain their attractiveness is through the public's trust that the state will guarantee their deposits.

Mobilising funds outside the banking system opens a large stream of additional resources for investment (Porter, 2015). For instance, it is estimated that Sub-Saharan Africa has more than \$200 billion flowing outside the formal banking system (Kakar, Mwangi and MacDevette, 2015), illustrating the potential benefits of formalising savings.

It can be assumed 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, characterised by unstable and/or seasonal income. Obviously, under these circumstances, 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). Thus, it is expected that countries with higher levels of financial inclusion will also have higher levels of savings.

Within the developmental state literature, there is a consensus that specific contextual conditions matter, and 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). The statistical models in this article have incorporated institutional and governance factors by testing for the 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 with regard to the role of public policies in expanding access and increasing savings are suggestive at best. Considering the limited attention this topic has received in the literature, however, 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 policymakers and donors working to increase domestic resource mobilisation (DRM).

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

3.1 Research questions and hypotheses

Q₁: 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:

H₁: Countries with public saving institutions have higher levels of financial inclusion

This is expected because 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.

H₂: 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 inclusion 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 would increase aggregate savings.

H₃: 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.

4. 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 is useful for establishing relationships between variables that remain unexplored in the savings literature. Also, the chosen methodology allows for comparison with existing studies, and is capable of summarising vast amounts of information, allowing for a broader scope of analysis. Further, 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.

4.1 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 cases.

In addition, a second sample was used to test the effect of public saving institutions on savings at the household, rather than national level, just 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 further elaborate on these weaknesses), 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, I could control for the country and the time dimensions in order to check whether the results hold over time and across different countries.

4.2 Data collection

There is no global database reporting on saving institutions, and one had to be created 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 are 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.

The dataset does 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 across space and between different income groups in the first half of the 20th century (Garon, 2011). 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)³. Another relevant mechanism is the competitive pressure that public banks place on the private sector to provide affordable services (Scher, 2001).

Domestic savings, the first dependent variable considered by this study, was measured as a percentage of GDP. The data was taken from the World Bank's World Development Indicators. The number of countries covered varied year-on-year, and there was a particular lack of data on the low-income country group. 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 reason 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:

Indicator₁: The percentage of the population with access to an account in rural areas

Indicator₂: The percentage of the population who saved in the last year in rural areas

Table 4.1 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

³ Norway also subsequently resumed postal saving banks in 2002 (Scher and Yoshino, 2004).

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 variables measuring 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 4.1 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 4.2 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 4.3 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 made using OECD Data (2015). 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 type of analysis needs 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.

4.3 Data analysis

In order to explore the relationship between the IVs and domestic savings, I employed multivariate regression analysis. The advantage of multiple regression analysis is 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 variables⁴. Controlling for country effects is useful in models in which the observations have some individual characteristics that may influence the DV. Equally, controlling for time effects is advisable in the case that special historical events can affect the DV. To illustrate this, it can easily be hypothesised that economic crises may have a negative impact on savings (for instance, in the US, the 2008 financial crisis has led to an increase in household savings; Geron, 2011). 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.

5. REGRESSION ANALYSIS

5.1 Cross sectional analysis I

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

H₁: Countries with public saving institutions have higher levels of financial inclusion

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

$$Y_i = a + bPSI_1 + bIE_2 + bGDP_3 + bDR_4 + \varepsilon$$

Where Y_i is financial inclusion and PSI_1 is public saving institutions. IE_2 equals institutional quality, using a measure of rule of law. GDP_3 is GDP per capita and DR_4 equals the dependency ratio. I included a dummy for high-income countries, as close to 100 per cent of the population have access to accounts in most high-income countries. Thus, 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 varied across income groups.

This test created the following regression output:

⁴ 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>

Table 5.1 Public saving institutions and financial inclusion

Regression Results		
=====		
	Dependent variable:	
	% who saved last year (1)	% with access to an account (2)

Public saving institutions	9.088*** (3.068)	5.034* (2.892)
Dependency ratio	22.220*** (7.435)	-10.353 (7.322)
GDPPC	3.296 (2.103)	11.733*** (2.315)
Rule of law	7.965** (3.173)	5.614* (3.070)
High income dummy		13.100** (5.102)
Constant	-72.116* (41.264)	-15.321 (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 GDP per capita and the dependency ratio, I employed a logarithm transformation, as both of the variables were skewed to the right.

5.1 a) 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), which supports H₁, 'countries with public saving institutions have higher levels of financial inclusion'. 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 trust 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, the effect of GDP per capita was less than it otherwise would have been.

5.2 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:

$$Y_i = a + bPSI_1 + bFI_2 + bGS_3 + bDR_4 + \varepsilon$$

Where Y_i equals domestic savings as a percentage of GDP, and PSI_1 equals public saving institutions. FI_2 are the financial inclusion variables, access to accounts and percentage who saved in rural areas. GS_3 equals government spending, and DR_4 equals the dependency ratio.

Table 1.2 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*** (2.416)	6.425** (2.511)	8.014*** (2.453)
Saved last year (rural)	0.066 (0.077)	0.031 (0.079)	0.066 (0.077)
Government spending	-0.593* (0.304)	-0.758** (0.315)	-0.636** (0.313)
Public saving institutions	6.251** (2.665)	6.272** (2.634)	6.664** (2.758)
Dependency ratio	-6.344 (6.669)	-7.654 (6.635)	-7.088 (6.802)
OECD dummy		5.962* (3.397)	
East Asia Dummy			-3.662 (5.971)
Constant	17.438 (30.512)	30.267 (31.034)	20.246 (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 1 tested whether East Asian countries⁵ are exaggerating the positive relationship between PSIs and savings, as these are both high saving countries and have a long history with PSIs (Garon, 2011; 2016).

5.2 a) 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 does not contribute to total domestic savings. According to these results, I could only partially confirm H₂, 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 both have high savings and public saving institutions. Thus, the presumption that these countries exaggerate the positive results was incorrect.

The dependency ratio was uncorrelated with savings when public saving institutions were included, which goes against the theoretical prediction that high dependency ratio countries have a lower savings level. This is interesting, as the savings literature often mentions dependency ratio as one of the main determinants of savings. As expected, government spending is negatively correlated with domestic savings.

5.3 Time-series cross-section analysis

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

$$Y_i = a + bPSI_1 + bIR_2 + bGDP_3 + bWP_4 + \varepsilon$$

Where Y_{it} is household savings, and PSI_1 constitutes public savings institutions, IR_2 is short-term interest rates, GDP_3 equals GDP per capita, and WP_4 is the working age population. The relationship between the working age population and the savings rate was expected to be positive instead of negative, as is the case of the dependency ratio. The first model tested the impact of public saving

⁵ East Asia observations included in the dataset: China, Japan, Hong Kong, Mongolia and South Korea.

institutions on household savings, and the second model tested the relationship between PSIs and national savings. The results can be seen in Table 5.3.

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 5.3 The effect of public saving institutions on household savings and national savings (without fixed effects)

Regression Results

	Savings	
	Household savings (1)	National savings (2)
Public saving institutions	1.247*** (0.443)	3.872*** (0.474)
Short term interest rates	0.345 (0.210)	1.497*** (0.224)
GDP per capita	0.00001 (0.00002)	0.0001*** (0.00002)
Working age population	-0.135 (0.107)	0.095 (0.115)
Constant	12.732* (7.397)	-7.392 (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		

5.3 a) Time series – cross sectional model using fixed effects

In this model, I tested Hypothesis III, whether countries with PSIs have a higher percentage of savings (as a percentage 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.

I started by creating 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 is likely to be the effect of the financial crisis and the European debt crisis.

5.3 b) Interpretation of results

In Table 5.1, I found that public saving institutions are positively correlated with household savings and 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 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 5.2), 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 that individual country characteristics are more important in determining the domestic savings level than the variables included here.

6. PUBLIC SAVING INSTITUTIONS IN PRACTISE: THE CASE OF RWANDA'S UMURENGE SACCO POLICY

In this chapter, I investigate the case study of the SACCO policy in Rwanda in the period 2008 – 2016. It is a selective and descriptive case study, chosen to deepen understandings about how PSIs affect financial inclusion and savings by comparing these variables prior to and following the introduction of a PSI. The SACCO policy in Rwanda was a valuable case as comparable data on savings and financial inclusion was available both prior to and following the introduction of the programme, making it possible to test my hypotheses in a contemporary context. In addition, this is also an interesting case within which to study alternative forms of PSI, the SACCO being a policy been carried out in cooperation with cooperatives. The analysis was based on three data sources: information collected through a literature review of government publications and research articles, data from the World Bank (2016), and data from FinScope (2008; 2012; 2016).

6.1 Case background: Savings and financial inclusion in Rwanda

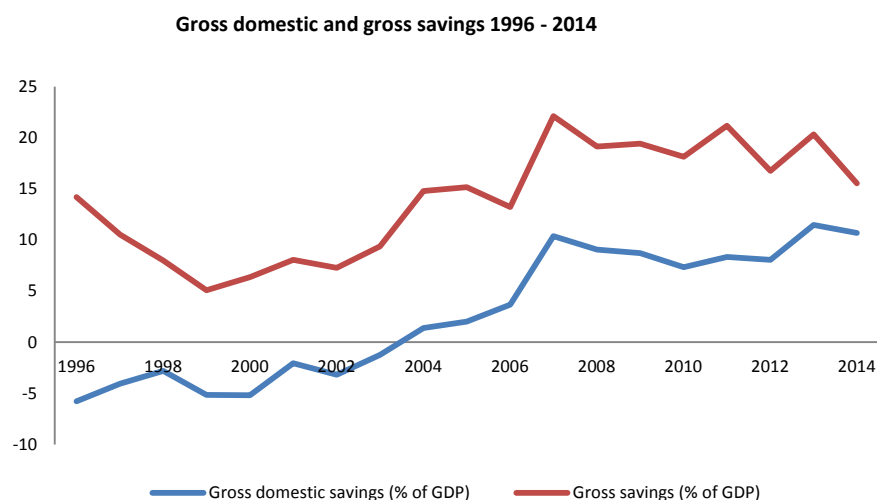
Rwanda has been one of the fastest growing economies in Africa over the last ten years, with GDP per capita nearly doubling between 2001 and 2014, but remains a low-income country (WDI, 2016; see Table 6.1 for more socio-economic indicators). Rwanda has a history of ethnic and political conflict, and has a high dependency ratio (84 per cent) with a large percentage of the population living in rural areas. Going just a few years back, access to financial services and the level of domestic savings was low, even by comparison with neighbouring countries. 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 6.1 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 6.1). Indeed, the high growth rates experienced in the 1990s and 2000s, took 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 (MINECOFIN, 2013b).

Figure 6.1 Gross domestic and gross savings, 1996 - 2014

Source: Own elaboration using WDI data (2016)

In 2009, the Rwandan cabinet passed the National Savings Strategy (the NSS; MINECOFIN, 2013b), which identified a number of policy actions to increase savings, both in the private and the public sector. Following from this, the Umurenge SACCO policy was passed 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

educative communication campaign on the benefits both of the programme and of savings in general (Nahayo, et.al., 2013).

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. Additionally, because the members own and administer the SACCO and get equal voting rights regardless of their contribution, the SACCO's main aim is to benefit members through provision of loans and insurance services within the community, not to increase profits (Nahayo, et. al., 2013). This was important for ensuring that the SACCO remained affordable 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, and 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 ensuring sound management practices within the SACCOs. In addition, SACCO managers and employees are also offered different types of on-going training in business and management.

A number of regulations have been established particularly for SACCOs. No local political official can sit on a SACCO board, and the capital requirement is higher than for normal banks. An external audit is supposed to be carried out every second year, and includes a review of the Board of Director members' accounts. The SACCOs were limited to providing saving and deposit accounts, and could not give out loans in the first period. It was also 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.

6.2 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). Numbers in the second report (2013) were even higher (355 out of 416). The government would gradually phase out subsidies for those achieving a balanced budget. These would also 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 that 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 for SACCOs than for regular bank accounts.

The table and figures below illustrate how savings and financial inclusion have evolved in the period 2008 – 2016, based on three FinScope surveys that were carried out in Rwanda between 2008 and 2016, asking people about their access and use of financial services. 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 that is limited to a few years. It should be noted that the Government promoted a range of saving products in this period, and that not all the variation is due to the SACCO policy.

Table 6.2 demonstrates the evolution of the financially excluded, as well as the percentage that use different financial products, and the percentage reporting 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 not regulated by central or local government (FinScope, 2016).

From Table 6.2, it can be observed that the financial exclusion ratio has been drastically reduced in the period 2008 – 2016. Usage has increased across the range of financial products, with formal products experiencing the highest increase. The increase in formal products may reflect the increase in the usage of SACCOs, as well as mobile banking services and MFIs, which have become widespread in the period. Informal products remain the most used product, and banking services are still not widely accessible. Interestingly, the percentage of the population reporting to have saved in the last year has increased by 20 percentage points between 2012 and 2016, from 25 to 45 per cent.

Table 6.2 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 %	-

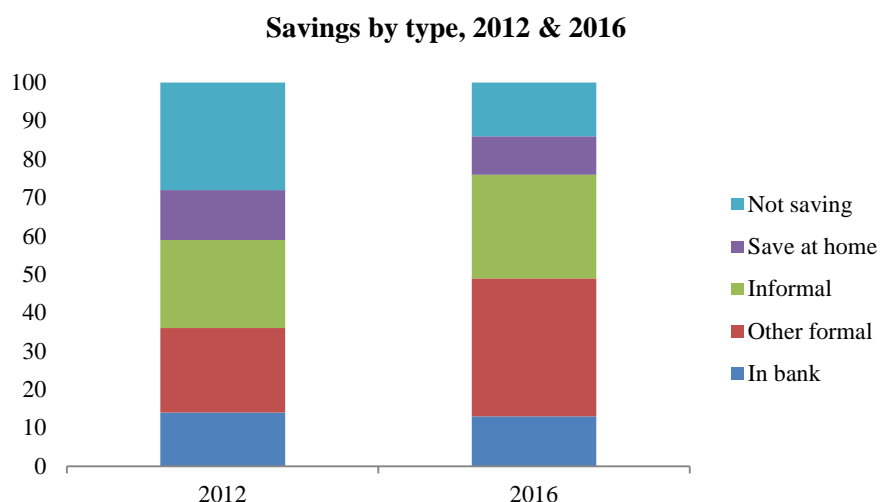
Note: Own elaboration using Finscope, 2008; 2016; this graph demonstrates all types of accounts, including saving accounts; totals are larger than 100 because some use various services.

The FinScope data reveals that not only has saving become more common; the increase in savings between 2012 and 2016 has been through formalised mechanisms (see Graph 6.2). Indeed, in the period, the use of informal savings has not changed much (and actually increased by 1 percentage point).

It is reasonable to assume that SACCOs stood for most of the increase in the percentage of the population reporting to save. Few of the other formal service providers offer saving accounts (microfinance institutions (MFIs) only occasionally provide saving services). In addition, the number reporting to be saving in banks has decreased from 13 to 12 per cent, despite the fact that a number of saving schemes, including homeownership schemes, monthly, and periodical saving schemes (helpful

for those with seasonal earnings), have been implemented. This assumption is supported by 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 Figure 6.1; WDI data).

Figure 6.2 Savings by type, 2012 and 2016

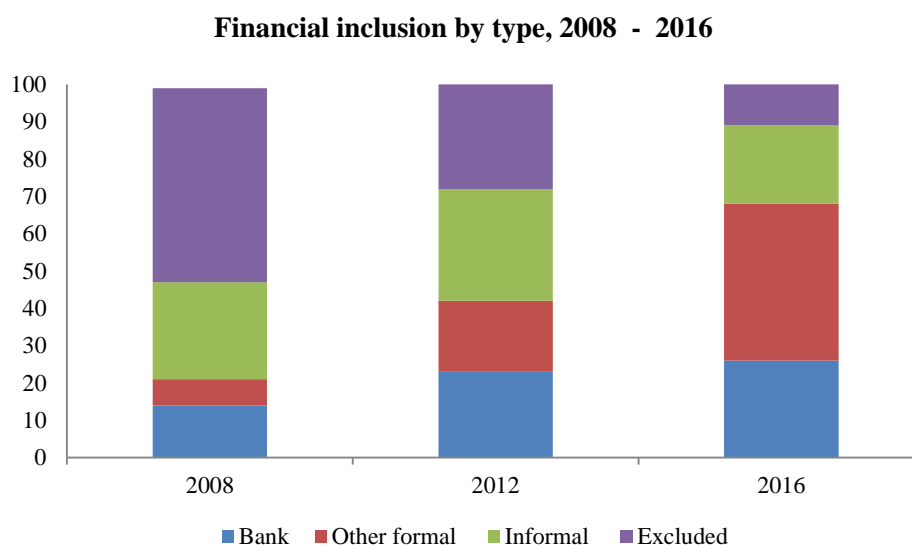


Source: Own elaboration using FinScope data (2016). 36 & 37

The financially excluded decreased sharply in number between 2008 and 2016, as evidenced in Figure 6.3. The number has decreased by 41 percentage points, from 52 per cent prior to the SACCO programme to 11 per cent in 2016. The largest increase has been in the category "other formal services", also observed in Table 6.2. 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.

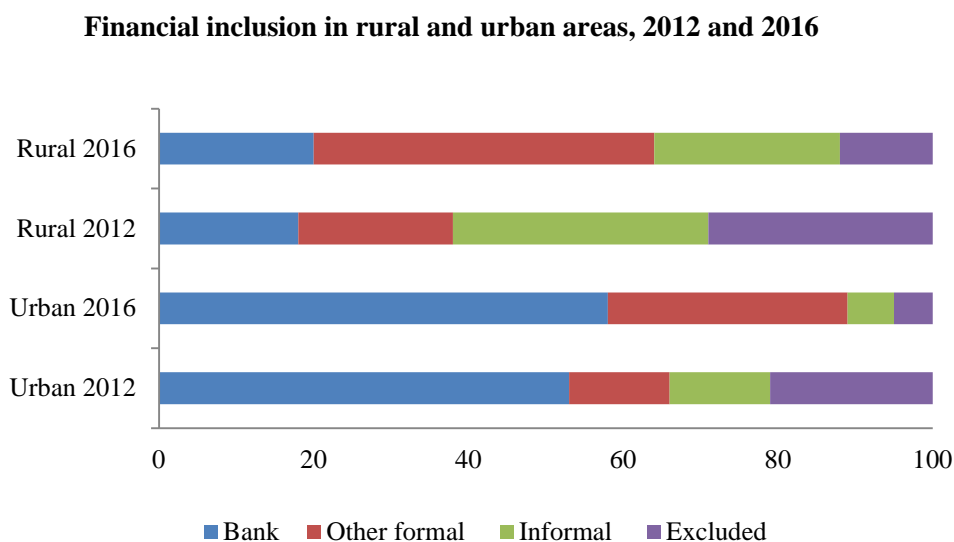
There has been an improvement in financial inclusion both in absolute and in relative terms. Formally ranking 12th out of the 15 African countries on which FinScope publishes data, Rwanda now ranks 2nd on financial inclusion, and it is in 6th place for formally served population (FinScope, 2016: 42-44). However, in terms of banked population, Rwanda is still lagging behind other countries, and remains among the lowest performing bracket. Thus, bank access is still limited, and the improvement is due to the increase in the use of other formal services.

Figure 6.3 Financial inclusion by type, 2008 - 2016



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

Figure 2.4 Financial inclusion in rural and urban areas, 2012 - 2016



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

Both rural and urban areas have experienced an increase in access to financial services in the time-period studied, but the inequality in access between rural and urban areas remains in place. Graph 6.4 demonstrates the difference between rural and urban areas in terms of the financially excluded and the services that they use in 2012 and 2016. Formal financial services have had the largest increase in both groups, and the increase has been greatest in rural areas. Nevertheless, in terms of bank access, inequalities remain. Whereas only 21 per cent of the rural population have access to bank services,

more than 50 per cent of the population in the cities have access to banks. Informal financial services are more common in rural than in urban areas.

6.3 Discussion

This case study investigated how PSIs influence financial inclusion and savings by comparing data on these variables prior to and following the introduction of subsidised saving institutions in Rwanda.

The data demonstrate an increase in financial inclusion following the introduction of the SACCO programme, both relative to other countries and in absolute terms. Additionally, there has been an increase in the numbers reported as saving, and in national savings overall. Close to half of the adult population report to be saving either formally or informally. An uptake in use of formal mechanisms has been particularly evident, while the number of savers using informal mechanisms has shown only a slight increase. This indicates that formal institutions other than banks are likely to account for this marked rise in savings.

Evidently, formal institutions also include mobile telephone banks and MFIs, which have become widespread in the period studied, 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).

During the period under investigation, the Government has introduced a range of other saving-products which may also have impacted on domestic savings, for instance ‘house saving’ schemes, in which people become eligible for a mortgage when they have reached a certain threshold, and education and pension saving schemes. Nevertheless, the relatively small increase in the number of bank accounts demonstrates that these have not attracted many users, despite increased saving promotion and new saving products. Also, as these saving-schemes are usually offered only through banks, and are therefore targeted at the relatively well-off, and considering that numbers of bank accounts has not experienced significant growth, it is unlikely that these have contributed much to the increase in the number of savers or in savings overall. Rather, the increase in use has been outside the private banking system.

An alternative reason for the increase in savings is that a number of additional policies were put in place alongside the SACCO programme, including a national communication strategy and efforts to increase economic and financial literacy, which are likely to have played a role in encouraging people to save (MINECOFIN, 2013a). However, increased financial literacy would have had little impact on private savings had there not been any channels through which to engage in savings. In the latest report on the programme, a quarter of the population report that they are part of at least one SACCO,

providing them access to saving accounts. It is therefore reasonable to assume that a large part of the increase in the percentage reported to be saving is due to the expansion of SACCO accounts.

Some remarks should be made about the external validity of this case study, and in particular, the context-specific conditions that made it possible for the SACCO-programme to accomplish an increase in savings. The SACCO policy was accompanied by a strong national commitment, constructed around rhetoric of national development and an element of patriotism. 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. Additionally, several safeguards were put in place to ensure good governance and avoid corruption, including monthly reporting and external audits every two years, and the initial operational subsidies had an end-date and could be revoked.

7. DISCUSSION AND CONCLUSIONS

In this paper, I have assessed the relationship between public saving institutions and levels of domestic savings using regression analysis with cross sectional and panel data, 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, as well as the percentage reporting to have saved the last year 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 population, 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 supports Dupas and Robinson's findings (2011), namely that access is the most important factor in determining whether or not people save.

In addition, the case study on Rwanda illustrated how PSIs affect financial inclusion and savings. The information analysed in this chapter indicates that the government's SACCO policy has been key to the observed increase in financial inclusion over the period studied. This case also reveals that public interventions in the banking sector can take numerous forms, but suggests that these are likely to work best 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 reporting 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 variables are mentioned prominently throughout both the academic and the policy literature as preconditions to savings. The analysis presented here also demonstrates that the relationship is far more ambiguous than has 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 goes 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 close to complete or complete access to financial services, and the variation between countries is therefore 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 none of the regression models were able to explain more than 30 per cent of the variation between countries 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 indicated 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 their limitations, the results from this study may still prove valuable, when we consider that savings has been debated 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 employed a qualitative case study 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 inform 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 policymakers that public saving institutions can work to increase deposits by mobilising savings from within the population. The case study demonstrated that the SACCO policy played a role in channelling informal savings into the formal sector, 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. In turn, this suggests that there is much potential to mobilise domestic resources and that a range of policy options are available for governments interested in increasing DRM.

Following from these findings, it seems 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 challenging to argue for the introduction of such a policy. However, this study shows that public savings institutions do contribute to expanding access in areas 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 between types of banking institutions. Such a study may say more about which specific kinds of institutions may be most 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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9. 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	