ERASMUS UNIVERSITY ROTTERDAM

Erasmus School of Economics

Master thesis

MSc Policy Economics

Inflation and saving

A panel data analysis of the OECD countries

Author

Guntars Ūpis

April 30, 2023

Student ID: **457360**

Supervisor: **Dr. Lorenzo Pozzi**

Second assessor: **Dr. Aksel Erbahar**

Abstract

Understanding the ambiguous relationship between inflation and saving is of macroeconomic importance. Furthermore, inflation has rarely been the focus of panel saving studies in the context of developed countries. This paper attempts to reconcile those issues by looking at the nature of this relationship, as well as its statistical and economic significance, and the sign and magnitude of its coefficients. It employs a dynamic fixed effects panel data model of 26 OECD countries from 1980 to 2021 with more than 700 observations, focusing on private saving and inflation, while controlling for frequently explored saving determinants such as income and income growth, demographics, the real interest rate, fiscal policy and external factors. The baseline results, as well as robustness checks and extensions in terms of potential endogeneity and heterogeneous slope coefficients, indicate a negative and statistically insignificant relationship in most specifications, confirming the previously ambiguous results. However, adding a squared inflation term leads to statistically significant negative linear and positive squared coefficients. In addition, when splitting the sample into two time periods: 1980 to 2000 and 2001 to 2021, the inflation coefficient is positive and statistically significant for the earlier period and negative and statistically significant for the latter period. It is negative and significant as well with added interaction between the real interest rate and inflation and extended sample including the 1970s. Despite the results not indicating a meaningful impact of inflation on saving, considering potential time, country and functional form aspects might be important for further research.

Keywords – inflation, saving, dynamic fixed effects, OECD, panel data

Contents

List of Figures

List of Tables

I Introduction

The level of investment, largely driven by savings, is one of the main determinants of long-term economic growth. It plays a fundamental role in enabling the production of additional goods and services with the same amount of labour and materials, subsequently boosting productivity and living standards. Moreover, savings are not only an important driver of economic growth but also an important cushion in economic downturns. Hence, saving is a fundamental macroeconomic variable to study as it largely determines the level of investment in the economy and the financial situation in the wider economy and in the public, corporate and household sectors.

Many different saving determinants, such as income and income growth, demographics, the real interest rate, fiscal policy and external factors, have been extensively studied empirically, both in time series and panel format. However, the role of inflation has rarely been the focus of empirical studies on saving, even though there has been a rich theoretical literature developed, describing several impact channels.

Generally, the inflation and saving relationship has been studied with a focus on developing country time series, rarely as the focal point in the context of developed countries. This is surprising, as inflation is also an important macroeconomic variable to pay attention to in developed economies. The episodes of the 1970s and 2020s have shown that excessive inflation can threaten macroeconomic stability and have a real economic impact on the decisions of households, corporations and policymakers.

The existing theoretical literature has no consensus concerning the role inflation plays in the context of saving. Therefore, it ultimately remains an empirical question to understand the nature, sign and magnitude of the coefficients and the statistical and economic significance of this relationship. However, also empirically, the difficulty of comparing studies arises because of different saving and inflation definitions; time series or panel approaches; various econometric estimation methods; developed versus developing country focus; inflation being the main independent variable or among other saving determinants, and different coefficient sign and magnitude estimates.

This paper is an attempt to address those considerations and add another data

point to the relatively scarce literature on the effect of private saving on inflation with a developed country focus in a dynamic fixed effects panel setting. It uses an extensive data set from 1980 to 2021 for 26 member countries of the Organisation for Economic Co-operation and Development (OECD). The data has more than 700 observations, when controlling for other saving determinants frequently explored in the literature, such as real Gross Domestic Product (GDP) growth, real per capita GDP, the real interest rate, the old-age dependency ratio, financial liberalisation, social expenditure and public saving.

Furthermore, this research employs a wide range of robustness checks to test the validity of the results. It considers first differences, lag effects, interaction between inflation and the real interest rate, nonlinearity and endogeneity, different saving variables, such as the gross national and household saving rate, and an alternative inflation variable, the GDP deflator, as well as several sample considerations across temporal and spatial dimensions.

The main results indicate that, in most specifications, inflation has a negative and statistically insignificant relationship with private saving for the panel of OECD countries. In some specifications, the relationship between saving and inflation is statistically significant. First, adding a squared inflation term leads to a negative linear coefficient at the 5% level and a positive squared coefficient at the 10% level. Second, by splitting the sample into two time periods: 1980 to 2000 and 2001 to 2021, the inflation coefficient is positive at the 5% level in the earlier period and negative at the 1% level in the later period. Third, including the 1970s, albeit with limited data for other saving determinants, the inflation coefficient is negative and significant at the 10% level. Lastly, the interaction term between inflation and the real interest rate makes both variables negative and their interaction term positive and statistically significant as well.

Nevertheless, despite some evidence of a statistically significant relationship, this research overwhelmingly concludes that the inflation-saving relationship remains ambiguous. However, there might be time period, country and functional form aspects that are worth paying attention to in future research.

II Literature Review

2.1 Overview of the main variables of interest

2.1.1 Types of saving

The saving rate is usually defined as the share of income not consumed. Studies focus on different forms of saving, depending on the point of view of a particular economic agent. On an individual level, the personal saving rate is the share of disposable income not consumed. On a microeconomic level, the household saving rate measures the share of household income after consumption. Households save to provide for retirement and bequests, finance large lifetime expenses, mitigate unexpected reductions in income and smooth consumption over time (Callen et al., 1997; Bouyon, 2016). Household savings, especially in developed countries, play a significant macroeconomic role (Bouyon, 2016).

The corporate or business saving rate equals profits less dividend payments and is also known as retained earnings (Chen et al., 2017). Globally, since the 1980s, the corporate saving rate as a share of GDP has increased by around 5 percentage points, while the household saving rate has decreased by 6 percentage points (Chen et al., 2017). Both of these measures can also offset one another (Dean et al., 1989), because households tend to own businesses, either directly as shareholders or through mutual or pension funds (de Serres and Pelgrin, 2002).

On a macroeconomic level, the sum of household and corporate savings encompass private savings. Furthermore, private savings and government or public savings comprise national savings, which tend to be expressed in either gross or net terms as a percentage share of GDP, as well as with different inflation or tax adjustment measures. As observed by Loayza et al. (2000), there are quite high correlations between the different saving measures in practice, as well as differences between countries and regions in terms of the amount and distribution of savings. For example, from 1970 to 2000, developing countries in East Asia, especially China, experienced a notable increase in saving rates (Horioka and Wan, 2006). However, countries in Latin America stagnated, and those in sub-Saharan

Africa even saw declining saving rates (Loayza et al., 2000). In the same time period, even among countries of similar development, such as the OECD, significant variation in saving rates could be observed (de Serres and Pelgrin, 2002).

2.1.2 Inflation

The inflation rate measures the change in prices of a given set of goods and services over time. In practice, several measures of inflation, such as the Consumer Price Index (CPI), the Personal Consumption Expenditures Price Index (PCE) and the GDP deflator, are used. Policymakers usually distinguish between headline and core inflation rates, and the latter has been the focus of central banks to understand inflationary trends. However, it is not entirely clear whether households and policymakers share the same understanding of inflation determinants (Mishkin, 2007), and which inflation components primarily impact household inflation expectations (Mankiw et al., 2003). Studies use inflation as a proxy measure for price (Deaton, 1977) or macroeconomic uncertainty (Fischer, 1993; Loayza et al., 2000). In addition, although research generally considers the rate of inflation, such as the change in the CPI, some studies also consider the variability (change in the rate) of inflation (Dayal-Gulati and Thimann, 1997).

2.2 The inflation-saving relationship is ambiguous

The economic research on savings used to ignore inflation effects, claiming that spending and saving decisions are unaffected by the price level (Mose and Thomi, 2022; Wachtel, 1977). Although that might be the case in the long run (Chaturvedi et al., 2008; Heer and Süssmuth, 2006), this assumption seems too stringent for the short run (Wachtel, 1977). In addition, central bankers have disagreed with the neutrality of money theory in practice (Patinkin and Steiger, 1989), by paying disproportionate attention to inflation as a prerequisite for stable economic growth (Gylfason and Herbertsson, 2001). Recent inflationary episodes in the 2020s have shown that inflation cannot be ignored. Therefore, as in the 1970s, it is again of interest to study the interplay between inflation and saving.

Nevertheless, the difficulty arises because of an *a priori* expected ambiguous effect

that inflation might have on saving (Weber et al., 2015). To illustrate this conundrum, several arguments foresee either a positive, negative or ambiguous impact.

2.3 Theoretical arguments for a positive effect

2.3.1 Real income uncertainty

In general, people tend to dislike inflation and associate its presence with increased pessimism and macroeconomic uncertainty (Chaturvedi et al., 2008; Katona, 1975). Inflationary periods usually precede or coincide with economic uncertainty, such as rising unemployment, which has been shown to have a strong negative effect on saving (Juster and Wachtel, 1972; Mody et al., 2012; Wachtel, 1977). Moreover, inflation forecasts have a wider range, further contributing to the uncertainty (Wachtel, 1977). In such instances, the employed increase savings for precautionary reasons (Kimball, 1990), while the unemployed decrease savings to maintain their consumption level (Wachtel, 1977). The buffer stock model (Carroll et al., 1992) also shows that consumers mainly consume from their current income (Peersman and Pozzi, 2008).

In addition to this, it is not only the rate but also the volatility of inflation that might be more prominent during high inflation times (Dayal-Gulati and Thimann, 1997). Rapidly rising inflation increases the variance and uncertainty of expected real income. That impacts households, which prefer unplanned additions to savings rather than withdrawals, therefore boosting saving rates (Howard, 1978; Weber et al., 2015).

Furthermore, the impact that inflation has on consumer decisions also depends on the origin of inflationary episodes: whether they are anticipated or unanticipated. Even if anticipated inflation is addressed by indexation or wage inflation, unanticipated inflation might still raise the saving rate (Campbell and Lovati, 1979; Chaturvedi et al., 2008). This unanticipated inflation effect seems to be pronounced empirically (Fredriksson and Staal, 2021), especially in developing countries (Athukorala and Sen, 2004; Loayza et al., 2000). Overall, it is expected that given real income uncertainty, inflation will raise savings.

2.3.2 Disequilibrium hypothesis

The disequilibrium hypothesis, offered by Deaton (1977), states that households struggle to distinguish between relative and general price changes. They might perceive a rise in relative prices, especially for goods and services frequently consumed, as unanticipated inflation (Deaton, 1977; Patra et al., 2015). Extremely rational consumers would temporarily postpone a purchase until confirming that the prevailing nominal price has indeed changed, but not to such an extent compared to alternatives as to completely abandon the consumption decision (Howard, 1978). This would be a lengthy process, causing personal consumption to fall and savings to rise (Deaton, 1977).

According to this theory, the saving rate is determined by correctly assumed relative prices that households update frequently (Fredriksson and Staal, 2021). Generally, if prices are not perfectly flexible, rising prices might indicate excess demand, subsequently increasing demand for substitutes. Households might then opt not to consume the more expensive goods and services, saving the extra income. Likewise, saving can be a substitute for present consumption (Howard, 1978). Hence, the disequilibrium hypothesis predicts that inflation would increase saving (Fredriksson and Staal, 2021).

2.3.3 Mismeasurement issues and statistical mirage theory

A more nuanced argument is proposed by von Ungern-Sternberg (1981), and Davidson and MacKinnon (1983). During times of pronounced inflation, measured income and savings, even if deflated by a price index, tend to overestimate real income and real savings as perceived by consumers (Davidson and MacKinnon, 1983). Income, as measured in national accounts, includes interest payments on financial assets. The higher the rate of inflation, the higher the fraction of such payments that serve as compensation for the decline in the real value of assets.

If the asset holders act accordingly, they would not consume this 'income' to maintain real wealth but consider it negative income from a fall in the real value of net monetary assets (von Ungern-Sternberg, 1981). Hence, the measured savings, as the difference between income and consumption, would rise (Davidson and MacKinnon, 1983).

2.3.4 Real wealth effect

The real wealth argument considers the reallocation of portfolios among different types of assets. Because the real value of household financial wealth is eroded during inflationary periods, individuals might seek to maintain the purchasing power of their stock of financial assets, leading to higher savings (Aghevli and Boughton, 1990; Fortune, 1981). This effect might not be as pronounced if there is an adequate inflation premium and incomes are indexed (Chaturvedi et al., 2008; Deaton, 1977). In the long run, the rates of return either adjust to an inflation premium or consumers reallocate their portfolios. Therefore, the long-term real wealth effect might be less pronounced (Wachtel, 1977), while in the short term it would be expected to have a positive impact on saving.

2.4 Theoretical arguments for a negative impact

2.4.1 Inflation and capital income taxation

Feldstein (1982) argues that many countries with nominal tax systems struggle to adjust their tax rates in high-inflation periods. Even though savers tend to earn more nominally during such times, they also have to pay more in taxes on this 'fictitious income' (Feldstein, 1982). Hence, there is a mismatch between the effective capital income tax rate before and after an increase in inflation. As governments are sluggish to adjust the nominal capital income tax rate with inflation, the real capital income tax rate increases and the return on saving decreases, discouraging saving (Heer and Süssmuth, 2006). For borrowers, if some interest expenses are deductible, a higher inflation rate would lead to a lower real after-tax interest rate and encourage borrowing while discouraging saving (Aghevli and Boughton, 1990; Heer and Süssmuth, 2006).

2.4.2 Money illusion

Money illusion occurs when inflation causes consumers to overstate the purchasing power of their nominal income and raise real consumption (Bouyon, 2016; Wachtel, 1977), likely due to unanticipated inflation (Burch and Werneke, 1975). The magnitude of this

effect would depend on how much consumers pay attention to inflation. In periods of low inflation, errors in perception are small in magnitude and of little consequence. Therefore, consumers have marginal incentives to pay attention to price information. However, when inflation becomes more pronounced, rational consumers become more aware of it and are less likely to mistakenly increase consumption (Wachtel, 1977).

Empirically, Branson and Klevorick (1968) find support for the money illusion argument in the United States (US). Felici et al. (2022) observe that microdata overwhelmingly suggest that consumers do not take their saving decisions in purely real terms. Although expectations about future inflation influence saving, nominal interest rates appear to be even more relevant on average.

2.4.3 Output effect

Inflation might also impact savings through output. Because inflation often contributes to either stagnation in output or a recession, that would most likely directly reduce savings (Schmidt-Hebbel et al., 1992). However, Bruno and Easterly (1998) noticed that this effect might not be as straightforward, especially for crises with relatively lower inflation. Only during high-inflation times (more than 40%) income growth falls sharply initially, only to sharply recover soon after. In addition, in the presence of fixed nominal interest rates, higher inflation expectations might decrease real interest rates (Fisher equation)[1], which reduce the return to saving, encouraging consumption (Euler equation)[2] and raising aggregate demand and consequently growth (Weber et al., 2015).

2.5 Theoretical arguments for ambiguous effect

2.5.1 Interest rate effect

Inflation affects saving behaviour indirectly through real interest rates and the real wealth of households (Temple, 2000; Wachtel, 1977). The impact of real interest rates on saving is ambiguous due to offsetting income and substitution effects. On

[1] $(1+i) = (1+r)*(1+\pi)$, where i is the nominal, r the real interest rate and π is the inflation rate.

[2] $U'(C_{today}) = \beta(1+R)\ U'(C_{future})$, where $U'(C_{today})$ is the marginal utility of consumption today and $U'(C_{future})$ is the marginal utility of future consumption.

the one hand, high inflation, which tends to coincide with rising interest rates, might encourage preserving real wealth. On the other hand, because higher inflation leads to more uncertainty, it gives a lower utility of holding wealth (Chaturvedi et al., 2008) and a more uncertain rate of return (Aghevli and Boughton, 1990). That would depress the desire to save and incentivise substitution from financial to other assets (Schmidt-Hebbel et al., 1992). Gylfason and Herbertsson (2001) observed that lower real deposit rates indeed lead to less saving (Temple, 2000).

2.5.2 Durable goods consumption

If inflation is anticipated, consumers might decide to reduce their financial assets and buy durable goods (Fortune, 1981; Temple, 2000). The real wealth of consumers would remain constant because of the accumulation of real assets (durable goods) and the reduction of financial assets (savings) (Chaturvedi et al., 2008; Fortune, 1981). If inflation is expected to persist, then expenditures on durables and dissaving would be more pronounced, while for transitory inflation, saving might increase to preserve real balances (Burch and Werneke, 1975; Howard, 1978).

Wachtel (1977) notes, however, that such intertemporal substitution might be relatively rare. High inflation would increase the opportunity cost of holding money and the rewards for shopping around, reducing savings (Chaturvedi et al., 2008). However, rational consumers would only react with advancing planned consumption if the price increases were expected to be large enough and they had sufficient inventory capacity.

2.5.3 Credit rationing

Assuming that inflation reduces the return on saving, people will increasingly look to borrow. That would make credit rationing more likely, as lenders might be tempted to wait and lend at a later stage when interest rates might be higher and uncertainty lower (Boyd et al., 1996). Some borrowers would then be discouraged by a lower supply of loans and be forced to save again. This process of inflation leading to less saving and more borrowing until credit is available might repeat until a new equilibrium is reached (Temple, 2000). Hence, the net effect seems to be ambiguous. Boyd et al. (1996) observe

that there might be threshold effects where this happens with high enough inflation rates.

2.5.4 Creditor-debtor income redistribution

Through changing the distribution of incomes among households, inflation might also impact aggregate savings. For example, unanticipated inflation would redistribute income from creditors, who will now receive less real income, to debtors, whose real debt will be reduced. Each group would have new incentives to save and spend, respectively. Therefore, the overall effect is ambiguous and would depend on the creditor and debtor distribution in the economy and each group's propensity to save (Howard, 1978).

2.6 Empirical evidence

Because the theoretical arguments leave us in a conundrum, as noted by Weber et al. (2015), understanding the impact of inflation on saving might ultimately be an empirical question. However, empirically, it is also unclear what the consensus is. The difficulty of comparing studies arises because of: different savings and inflation definitions; a time series or panel approach; various econometric estimation methods; a developed versus developing country focus; inflation being the main independent variable or among other savings determinants; and different coefficient sign and magnitude estimates.

2.6.1 Different measures of saving in focus

First, studies can be grouped by saving measures. Some look at national level saving, such as gross domestic saving as a percentage of GDP (Chaturvedi et al., 2008; Dash and Kumar, 2018; Khawaja, 2022; Krishnamurty and Saibaba, 1981; Patra et al., 2015), volume of gross national savings (Andrejovská and Buleca, 2016) and national saving as the sum of private and public saving (Ahmad and Mahmood, 2013; Jilani et al., 2013; Lahiri, 1989; Loayza et al., 2000; Osundina and J.A, 2014).

A large group of studies also focus on private saving (Bandiera et al., 2000; Dayal-Gulati and Thimann, 1997; de Serres and Pelgrin, 2002; Edwards, 1996; Ertac et al., 2003; Haque et al., 1999; Hondroyiannis, 2006; Lahiri, 1989; Masson et al., 1998; Loayza et al.,

2000; Sarantis and Stewart, 2001). Edwards (1996) and Lahiri (1989) consider public saving, while Howard (1978), and Campbell and Lovati (1979) personal saving.

Alternatively, many studies investigate household saving (Athukorala and Sen, 2004; Bouyon, 2016; Callen et al., 1997; Fredriksson and Staal, 2021; Horioka and Wan, 2006; Krishnamurty and Saibaba, 1981; Ostry and Levy, 1995; Samantaraya and Patra, 2014; Schmidt-Hebbel et al., 1992; Opoku, 2019).

2.6.2 Inflation definitions

Second, studies can also be grouped according to inflation definitions. Most of them include the conventional approach of the CPI (Andrejovská and Buleca, 2016; Callen et al., 1997; Chaturvedi et al., 2008; Edwards, 1996; Haque et al., 1999; Hondroyiannis, 2006; Horioka and Wan, 2006; Jilani et al., 2013; Lahiri, 1989; Masson et al., 1998; Patra et al., 2015; Loayza et al., 2000).

Some studies, however, consider different measures. Dayal-Gulati and Thimann (1997) use the CPI variance. Athukorala and Tsai (2003), de Serres and Pelgrin (2002), and Fredriksson and Staal (2021) employ the consumption deflator. Ertac et al. (2003) use the logarithm of the gross national product deflator.

In general, the inflation-saving relationship seems to be more studied in the context of developing countries, both from a panel and individual country perspective, as it might have been a more prevalent policy issue there. Moreover, there is a considerable variation in the coefficient signs and magnitudes among countries in general (Lahiri, 1989), but also between developed and developing countries (Masson et al., 1998). Because the focus of this research is the OECD economies, developed country studies are primarily considered.

2.6.3 Overview of the core empirical studies

Many empirical studies focus primarily on other saving determinants, and inflation tends to be included just as a control variable (Loayza et al., 2000). Nevertheless, there are a large variety of studies that have attempted, at least to some extent, to explain the relationship between inflation and saving. During the 1970s, there were several time series studies, mostly on the US, that found a positive inflation-saving relationship (Deaton,

1977; Juster and Wachtel, 1972; Juster and Taylor, 1975). Similarly, positive coefficients were observed by Howard (1978) for Canada, Germany, the US, the United Kingdom (UK) and Japan; by Ostry and Levy (1995) for France; and by Bayoumi (1993) for the UK. Likewise, Hüfner and Koske (2010) find the inflation rate to have a positive effect on household saving in G7 countries, except for Germany and the UK.

Furthermore, some studies also found ambiguous estimates. Heer and Süssmuth (2006) observe that the inflation-saving relationship differed significantly per Federal Reserve Chairman era: it was negative during the Greenspan and Pre-Volcker eras and positive during the Volcker era. Similarly, Campbell and Lovati (1979) for the US and Davidson and MacKinnon (1983) for Canada and the US find an inconclusive relationship. Lately, a panel approach has been the standard to study inflation and saving (see Table 1).

Table 1: Summary of selected panel studies on inflation and saving

Study	Main dependent variable	Sample	Method	Inflation coefficient*
Schmidt-Hebbel et al. (1992)	HS	10 developing countries (1970-1985)	FE+IV	NEG
Edwards (1996)	PS	36 countries: 11 industrial and 25 developing (1970-1992)	FE+IV	INSIG
Callen et al. (1997)	HS	21 OECD countries (1975-1995)	FE	POS
Dayal-Gulati and Thimann (1997)**	PS	14 developing countries (1975-1995)	FE+IV	NEG
Masson et al. (1998)	PS	61 countries: 21 industrial (1971-1993) and 40 developing (1982-1993)	FE	POS
Haque et al. (1999)	PS	21 OECD countries (1971-1993)	PMG	INSIG
Loayza et al. (2000)	PS	69 countries (1970-1995): 20 industrial and 49 developing	System-GMM	POS
Bandiera et al. (2000)	PS	8 developing countries (1970-1994)	Dynamic GLS	POS
De Serres and Pelgrin (2002)	PS	15 OECD countries (1970-2000)	PMG	INSIG
De Mello et al. (2004)	PS	21 OECD countries (1970-2002)	Difference-GMM	INSIG
Hondroyiannis (2006)	PS	13 EU countries (1961-1998)	FMOLS*	POS
Horioka and Wan (2006)	HS	Chinese provinces (1995-2004)	System-GMM	POS
Chaturvedi et al. (2008)	GDS	13 developing countries (1989-2003)	FE+2SLS	INSIG
Grigoli et al. (2014)	PS	165 countries (1981-2012)	System-GMM	POS
Patra et al. (2015)	GDS	8 Asian countries (1981-2011)	FE	POS
Bouyon (2016)***	HS	15 EU countries (2007-2013)	FE	INSIG
Opoku (2019)	HS	19 OECD countries (1995–2018)	PMG	NEG
Fredriksson and Staal (2021)****	HS	14 OECD countries (2000–2018)	FE+2SLS	POS

Savings variable definitions: GDS - gross domestic saving, PS - private savings rate, HS - household savings rate, all % of GDP.
Other explanatory variables tend to differ, but generally are: per capita GDP growth rate, real interest rate, old-age dependency ratio, changes in the terms of trade and proxies for financial liberalisation.
*Either positive, negative or insignificant.
**Focuses on inflation volatility.
***Looks at household saving growth.
****Considers specifically unanticipated inflation.

For the OECD countries, Masson et al. (1998), Loayza et al. (2000), Callen et al. (1997), Hondroyiannis (2006), and Fredriksson and Staal (2021) obtain a positive coefficient for inflation on saving, while Opoku (2019) finds a negative estimate. Moreover, Edwards (1996) and Grigoli et al. (2014) for industrial countries and Haque et al. (1999), Salotti (2010), de Serres and Pelgrin (2002) and de Mello et al. (2004) for the OECD countries conclude that inflation does not have a significant effect on saving.

Furthermore, studies can be grouped into static and dynamic panels. Patra et al.

(2015), Callen et al. (1997), Masson et al. (1998), Edwards (1996) and Hondroyiannis (2006) only consider static panels. Other studies, such as Loayza et al. (2000), Dayal-Gulati and Thimann (1997), Chaturvedi et al. (2008), Grigoli et al. (2014) and Edwards (1996), incorporate dynamics, lags and account for potential endogeneity and simultaneity.

In terms of econometric methods, most panel data studies, such as Dayal-Gulati and Thimann (1997), Edwards (1996), Callen et al. (1997), Grigoli et al. (2014) and Chaturvedi et al. (2008), only consider homogeneous parameters. Loayza et al. (2000), Haque et al. (1999), de Serres and Pelgrin (2002), and Sarantis and Stewart (2001) include slope coefficient heterogeneity.

In terms of estimation procedures, most studies use fixed effects. Some also use panel cointegration techniques (Hondroyiannis, 2006; Sarantis and Stewart, 2001; Salotti, 2010; Hüfner and Koske, 2010). Loayza et al. (2000), Grigoli et al. (2014), Aizenman et al. (2019), de Mello et al. (2004), and Horioka and Wan (2006) use a generalised method of moments (GMM) for dynamic models, while Haque et al. (1999), de Serres and Pelgrin (2002) and Opoku (2019) perform a pooled mean group (PMG) estimation.

While most studies look at the relationship between inflation and saving linearly, Dash and Kumar (2018) add a squared term to explore nonlinearity. Kremer et al. (2013) and Thanh (2015) use threshold models, albeit between inflation and growth.

2.7 Hypothesis

After analysing the theoretical and empirical literature, it seems that there is indeed some theoretical and empirical ambiguity. This study tests the hypothesis whether inflation has a *linear*, *ambiguous*, and *statistically* and *economically significant* effect on saving. Those four aspects, namely the statistical significance, magnitude, direction of effect and linearity, are assessed.

III Other saving determinants

Besides inflation, income level and growth, other factors such as the real interest rate, demographics, government saving and fiscal policy, financial liberalisation, social security, public saving and terms of trade, among others, have been empirically considered to be important saving determinants (Dayal-Gulati and Thimann, 1997; de Serres and Pelgrin, 2002; Fredriksson and Staal, 2021; Haque et al., 1999; Hondroyiannis, 2006; Loayza et al., 2000; Grigoli et al., 2014; Masson et al., 1998; Hüfner and Koske, 2010; Sarantis and Stewart, 2001). However, only a few of those variables seem to be consistently significant across different studies (Loayza et al., 2000).

3.1 Income and income growth

The permanent income hypothesis (PIH) (Friedman, 1957) states that individuals save and consume with their lifetime earnings expectations in mind. By saving during their prime earning years, people maintain a stable consumption level in retirement, when they have less labour income. Extrapolating, increased income growth would imply higher anticipated future income, which might incentivize people to dissave against their future earnings, leading to a negative link between growth and savings (Dayal-Gulati and Thimann, 1997; Ertac et al., 2003). Empirically, the PIH has been questioned, as around 50% of consumers seem to spend from their current, rather than permanent, income (Campbell and Mankiw, 1990, 1991). In addition, Zeldes (1989) finds borrowing constraints, which were not accounted for in the PIH, to be important for consumers.

A related theory to the PIH, the life-cycle hypothesis (LCH), states that people consume at each age based on their wealth (Deaton, 2005). By saving while young and dissaving in old age, people adjust their consumption patterns to different needs during their lifetime. As in PIH, this missing link between current saving and current income assumes that individuals are forward-looking and base saving decisions on lifetime income instead of current income (Athukorala and Sen, 2004). The LCH also does not include liquidity constraints (Jappelli and Pagano, 1994).

The LCH empirically predicts that national savings depend primarily on GDP growth and that the level of wealth in the economy is related to the length of the retirement span (Deaton, 2005). Tobin (Fisher, 1967) and Bosworth et al. (1991) criticise this notion that economic growth must necessarily increase saving rates. If people expect their incomes to grow throughout their lives, according to the LCH, they would also be expected to consume more when young, financed by saving in middle age. With high enough growth rates, that might lead to a negative relationship between growth and saving, at least for some consumers, such as young couples (Deaton, 2005). In practice, it is an unresolved question if higher saving rates precede increases in GDP or whether higher GDP growth comes mainly from other factors, and more saving is a by-product.

Nevertheless, there seems to be a strong positive correlation between saving and GDP growth (Dayal-Gulati and Thimann, 1997; Loayza et al., 2000). Modigliani (2005) predicts that faster-growing countries should have higher aggregate saving rates (Ertac et al., 2003). Bosworth et al. (1991) observe that among major industrial countries, rates of both saving and income growth had been simultaneously declining during the 1970s. Carroll et al. (1994) find that, at the aggregate level, periods of high income growth follow periods of high saving. As households with higher income growth save more, they stipulate that growth causes saving and not vice versa. A similar argument was proposed by Ogaki et al. (1996), indicating that growth and higher incomes raise more households above the subsistence level, permitting more saving (Dayal-Gulati and Thimann, 1997), especially in developing countries (Loayza et al., 2000).

Attanasio et al. (2000) for a panel of 123 countries find a weakly positive causal relationship between GDP growth and saving. Similarly, Chaturvedi et al. (2008) observe a positive bi-directional relationship between real GDP growth and saving in Asia. Edwards (1996) and Grigoli et al. (2014) conclude that both the level of GDP and GDP growth are the major determinants of saving. In addition, Masson et al. (1998) find a positive growth-saving relationship among industrial and developing countries, Hondroyiannis (2006) for 13 European countries and Callen et al. (1997), and Sarantis and Stewart (2001) for the OECD countries.

3.2 Real interest rate

Wachtel (1977) observes that the effect of changes in the real interest rate on saving is complicated to assess because of offsetting income and substitution effects. The income effect implies that rising interest rates would raise the future income and wealth of households. Older households, in particular, might realise that their existing wealth is sufficient for higher than anticipated consumption in retirement (Bosworth et al., 1991). Hence, the income effect would stimulate present consumption and diminish the need to save (Aghevli and Boughton, 1990).

However, from the substitution effect, higher rates of interest make saving and postponing consumption more attractive (Aghevli and Boughton, 1990). This might be especially true for younger households, which tend to have less wealth. Hence, the net effect between substitution and income effects might depend, among other aspects, on the household age composition (Bosworth et al., 1991). Interest rates might also impact savings through investment. Especially in developing countries, an increase in the real interest rate should encourage saving through higher real deposit rates and expand the availability of credit to domestic investors (Ogaki et al., 1996; Temple, 2000).

Nevertheless, empirically, the real interest rate and saving relationship seems to be ambiguous (Ogaki et al., 1996; Temple, 2000; Aizenman et al., 2019). That may also be attributable to difficulties in specifying the appropriate interest rate (Callen et al., 1997). Opoku (2019) finds that the income effect outweighs the substitution effect in the short run and vice versa in the long run. Aizenman et al. (2019) observe different threshold effects for various groups of countries. A positive effect was found by Masson et al. (1998), and Hüfner and Koske (2010) for industrial countries and by Hondroyiannis (2006) for European countries. For the OECD countries de Serres and Pelgrin (2002) obtained negative estimates. Bandiera et al. (2000) for eight developing countries, Schmidt-Hebbel et al. (1992) for 13 developing countries and Loayza et al. (2000) for 69 countries all observe an insignificant effect. Recently, in many advanced economies, real interest rates have been either very low or even negative. Fredriksson and Staal (2021) do not find evidence for interest rates impacting saving ratios in the OECD countries until 2018.

3.3 Demographics

According to the LCH, the age distribution of a population has an influence on saving (Hondroyiannis, 2006). Economies with a higher share of retirees, who tend to be dissavers, over the labour force would have lower saving rates. The aggregate saving rate should then fall in response to an increase in either the youth or old-age dependency ratios (Aghevli and Boughton, 1990; Deaton, 2005). Horioka (1990) predicted that savings would fall significantly in the coming decades because of a correlation between the private saving rate and the rising share of the elderly in Japan.

Several studies indeed observe that higher proportions of younger and elderly people relative to the working-age population are associated with lower saving rates (Dayal-Gulati and Thimann, 1997; de Serres and Pelgrin, 2002; Hondroyiannis, 2006; Masson et al., 1998; Sarantis and Stewart, 2001). Loayza et al. (2000) confirm the predictions of the LCH, finding that the negative impact on saving of an increase in the old-dependency ratio is twice as big as that of the young-dependency ratio. Similar conclusions are drawn by Ferrucci and Miralles (2007) and Grigoli et al. (2014), who find demographics to be an important saving determinant.

Nevertheless, studies such as Bosworth et al. (1991) and Haque et al. (1999) question this effect. They argue that retirees in practice do not dissave as predicted by the LCH because of reasons such as unexpected expenses and bequests (Callen et al., 1997; Hondroyiannis, 2006). Moreover, population change is too slow to show a clear direct impact on savings (Bosworth et al., 1991) and might only explain the long-term and not the short-term trends (Dayal-Gulati and Thimann, 1997). Additionally, the data on the UK and Canada during the 1970s and 1980s show a positive relationship instead of the predicted negative relationship between private saving and the rising share of elderly or young people (Bosworth et al., 1991). Bosworth et al. (1991) also noted that there is significant variability in saving rates even between comparable demographic groups. Fredriksson and Staal (2021) find an insignificant effect of the old-age dependency ratio on saving for the OECD countries.

3.4 Public saving and fiscal policy

The Ricardian equivalence (RE) predicts a negative relationship between private and public saving rates (government surplus or deficit to GDP ratio) (Sarantis and Stewart, 2001), as well as fiscal policy, such as income redistribution and tax systems and revenues (Callen et al., 1997; de Serres and Pelgrin, 2002; de Mello et al., 2004). It anticipates that households will internalise tax cuts and increases in government debt by either saving fully or partially equivalent amounts, anticipating future tax increases to finance the present debt increase (Aghevli and Boughton, 1990).

Empirically, Haque et al. (1999) note that fiscal variables, such as the government surplus as a share of GDP and the ratio of government consumption to GDP, have been the main determinants of private savings rates in developed countries since the 1940s. Sarantis and Stewart (2001) reject the degree of RE observed in Haque et al. (1999). Hondroyiannis (2006) notices the mixed effects of government saving for European countries depending on their debt-to-GDP ratio. Dayal-Gulati and Thimann (1997) and Masson et al. (1998) find that fiscal policy is effective in raising national savings. Loayza et al. (2000) observe that an increase in public saving by 4% would raise national saving by 2.8% in the short run and 1.2% in the long run, finding evidence for a partial RE, similar to Grigoli et al. (2014) and Salotti (2010).

Lopez et al. (2000) conclude that there are substantial differences between developing and developed countries in terms of the degree of RE because, in developing countries, a larger share of consumers are constrained and they tend to internalise to a lower degree the government budget constraint. Similarly, other studies observe around 0.5 (Schmidt-Hebbel et al., 1992), 0.7 (de Serres and Pelgrin, 2002) or 0.9 (Haque et al., 1999) as the RE coefficients.

3.5 Financial liberalisation

The degree of financial liberalisation, such as increased household access to credit and mortgages, and the degree of borrowing constraints might also impact savings, although the effect is *a priori* ambiguous (Bandiera et al., 2000; Bayoumi, 1993; Dayal-Gulati and

Thimann, 1997; Ostry and Levy, 1995). In the short term, a competitive financial system might improve household saving opportunities by having higher deposit interest rates; a wider range of saving mediums with different risk-return options; and more banks, bank branches and other financial intermediaries (Bandiera et al., 2000). In addition, it might induce larger capital inflows, leading to credit booms and impacting the volume of saving. In the long term, financial liberalisation would impact saving by improving rates of return and lowering credit restrictions (Bandiera et al., 2000).

In general, the development of financial markets, such as the volume of total assets, employees or financial institutions, the geographical density of banks, or the share of value added in the economy, is difficult to quantify (Dayal-Gulati and Thimann, 1997). It also might have interaction effects with the real interest rates (Masson et al., 1998). Empirically, financial liberalisation tends to be proxied by the volume of consumer credit (Hondroyiannis, 2006) or the degree of monetization of the economy, captured by the ratio of broad money to GDP (Dayal-Gulati and Thimann, 1997).

In practice, the effect of financial liberalisation is ambiguous. Bandiera et al. (2000), and Ferrucci and Miralles (2007) for developing countries in different regions notice a negative impact, while Dayal-Gulati and Thimann (1997) observe especially positive coefficients in Southeast Asia and Edwards (1996) in Latin America. Among developed countries, Ostry and Levy (1995) for France, Bayoumi (1993) for the UK, Hondroyiannis (2006) for European countries, Jappelli and Pagano (1994), and Sarantis and Stewart (2001) for the OECD countries and Loayza et al. (2000) for both developed and developing countries find a negative relationship between the degree of financial liberalisation and saving. Loayza et al. (2000) observe that enhanced credit availability reduces private saving rates, while larger financial depth or higher real interest rates do not raise savings. Jappelli and Pagano (1994) conclude that the financial deregulation of the 1980s has contributed to the declining national saving and growth rates among the OECD countries.

3.6 Social expenditure

The coverage and generosity of social security and government benefits may also impact saving (Callen et al., 1997). On the one hand, social security might decrease saving

as expanded benefits reduce the need for savings, such as for retirement or precautionary reasons (Callen et al., 1997; Dayal-Gulati and Thimann, 1997; Koskela and Viren, 1983). Furthermore, public goods, such as education and health care, might also reduce the need to save (Callen et al., 1997).

On the other hand, public pension schemes might even increase saving by raising awareness about the need to provide for retirement (Dayal-Gulati and Thimann, 1997). Dayal-Gulati and Thimann (1997) observe that cross-country data show empirically little correlation between the size and rate of the pension system and saving rates. In general, economies that might lack institutional quality or social security provision schemes might see inflation leading to more saving (Chaturvedi et al., 2008). Koskela and Viren (1983) note, however, that the relationship between social security and saving is ambiguous in theory and is an empirical question. They argue that social security does not depress saving (Fredriksson and Staal, 2021). However, Fredriksson and Staal (2021) specifically looking at a similar approach for much more recent data, find support for a negative social security spending and saving relationship.

This matches Feldstein (1980)'s findings that increased spending on social security significantly reduces private saving: in the US, an increase in the benefit-to-earnings ratio by 10 percentage points reduced the saving rate by approximately 3 percentage points. Similarly, Edwards (1996) and Dayal-Gulati and Thimann (1997) for developing countries and Callen et al. (1997) for OECD countries observe a negative relationship between increased social security spending and private saving rates.

Interestingly, a negative relationship between social security spending and household saving leads to a conundrum for policymakers, who face a trade-off between social security spending and raising household savings (Fredriksson and Staal, 2021). On the one hand, household savings can be a cushion during economic downturns and a source of investment, while on the other hand, governments want to have appropriate social security spending for reasons of equity and the general well-being of citizens.

3.7 Terms of trade and external factors

Dayal-Gulati and Thimann (1997), Edwards (1996) and Masson et al. (1998) find that foreign saving can be a substitute for domestic saving, positively affecting private domestic saving rates. This effect might also be overstated because of national accounting procedures in calculating private savings (Dayal-Gulati and Thimann, 1997). Another external factor that can impact savings are terms of trade shocks. Studies support the idea that positive terms of trade shocks increase saving through positive effects on wealth and income (Dayal-Gulati and Thimann, 1997; Masson et al., 1998).

3.8 Individual specific factors

Carroll et al. (1994), studying immigrants in Canada from different cultural backgrounds, find that the tendency to attribute inexplicable variation in saving to cultural differences is unfounded, as cultural traits seem to have no effect on saving. However, Borowski and Jaworski (2023) when looking at forced saving during the COVID-19 pandemic, noticed that not only the intensity of government restrictions, degree of financial support and GDP per capita but also saving culture and personality traits related to pandemic compliance were linked with an increase in savings. Other lifestyle-related individual specific factors (Chaturvedi et al., 2008; Deaton and Paxson, 1994) and habit formation (Carroll et al., 1994; Sommer, 2007), as well as irrationality during periods of economic downturn (Kapounek et al., 2016) might also impact saving.

IV Empirical specification

Generally, panel estimation instead of cross-sectional or time-series approaches is preferred as it provides more variation and observations while also controlling for time-invariant country characteristics (Callen et al., 1997; Hondroyiannis, 2006). In addition, taking into consideration the studies mentioned in the literature review and in Table 1, a fixed effects model with both country and time fixed effects is used as the baseline estimation method.

4.1 Baseline model specification

The initial equation (1) models the relationship between private saving and inflation, without any additional control variables but including country and time fixed effects.

$$S_{it} = \beta_0 + \alpha_i + \gamma_t + \beta_1 I_{it} + \epsilon_{it}, \tag{1}$$

where S_{it} and I_{it} are private saving and inflation rates for country i at time t, respectively, α_i and γ_t are country and time fixed effects and ϵ_{it} are the mean zero error terms that capture unobserved heterogeneity.

Furthermore, to incorporate dynamic effects, equation (2) adds the first lag of the private saving rate as one of the regressors. It approximates the desired saving rate under correct price information and indicates that consumers update prices in each period (Fredriksson and Staal, 2021). This is an important addition, as changes in private savings generally occur over longer time periods. The observed private saving rate for a country in a given year might change because of consumption habits, adjustment costs, consumption smoothing or the lagged effects of other saving determinants (Grigoli et al., 2014). Therefore, as lagged savings are expected to positively impact contemporaneous savings there may be serial correlation and inertia (Loayza et al., 2000; Fredriksson and Staal, 2021).

$$S_{it} = \beta_0 + \rho S_{i,t-1} + \alpha_i + \gamma_t + \beta_1 I_{it} + \epsilon_{it}, \tag{2}$$

where $\rho S_{i,t-1}$ is added as the dynamic term to the aforementioned variables.

Equation (3) describes the main static model with empirically commonly used control variables as saving determinants. Those are the real GDP growth, real GDP per capita, real interest rate, old-age dependency ratio, terms of trade, social spending, broad money as a proxy for financial liberalisation and public saving.

$$S_{it} = \beta_0 + \alpha_i + \gamma_t + \beta_1 I_{it} + \boldsymbol{X_{it}}\beta_2 + \epsilon_{it}, \tag{3}$$

where, in addition to the parameters mentioned in equation (1), $\boldsymbol{X_{it}}$ is a vector with k control variables and β_2 is a vector of coefficients for those variables.

Similar to Grigoli et al. (2014), I use natural logarithms[3] for real GDP per capita and terms of trade variables. In addition, as in Loayza et al. (2000), I include public saving as a regressor in the specifications with either private or household saving as the dependent variables, but not in the regressions with national saving. Lastly, equation (4), in addition to the control variables in the static model, also adds lagged private saving. This is the baseline dynamic fixed effects model specification used.

$$S_{it} = \beta_0 + \alpha_i + \gamma_t + \rho S_{i,t-1} + \beta_1 I_{it} + \boldsymbol{X_{it}}\beta_2 + \epsilon_{it} \tag{4}$$

4.2 Diagnostic tests and robust standard errors

After establishing the main specification, I perform several diagnostic tests: the Breusch-Godfrey/Woolridge test to assess serial correlation, the Breusch-Pagan test for the presence of heteroskedasticity, and the Breusch-Pagan Lagrange multiplier and Pasarans CD tests for cross-sectional dependence (Ammari, 2007).

Furthermore, I perform several panel unit root tests to check for non-stationarity. Initially, I conduct the panel unit root tests that assume the absence of cross-sectional

[3]Throughout this paper, 'log' refers to the natural logarithm.

dependence in the data: the Im et al. (2003) test, known also as the IPS test, and the Maddala and Wu (1999) test. Then, to account for cross-sectional dependence, I implement the cross-sectionally augmented IPS test, as in Pesaran (2007). The stationarity tests confirmed that none of the variables were non-stationary in the first differences; while in level terms, the log real GDP per capita, log terms of trade, financial liberalisation, social expenditure and public saving were non-stationary (see Appendix A4.1).

Based on Millo (2017) and after testing for cross-sectional dependence, heteroskedasticity and autocorrelation, I use the Driscoll and Kraay (1998) robust standard errors. As an adaptation of the Newey-West estimator to panel data, these errors take into account heteroskedasticity, serial correlation between residuals from the same individual over varying time periods, cross-serial correlation between different individuals over different time periods and also contemporaneous cross-sectional correlation (Millo, 2017). Hence, the Driscoll and Kraay (1998) standard errors are robust to general forms of cross-sectional and time dependence when the number of time periods (T) and the number of individuals (N) are sufficiently large. This fits well with the panel data set properties in this paper, with N= 26 and T= 42 at most, which also satisfy the recommended panel structure for those errors (Driscoll and Kraay, 1998). As a robustness check, I also use the Arellano (1987) robust standard errors (see Appendix A5.2), which are fit for panel data with heteroskedasticity and autocorrelation (Ammari, 2007).

4.3 Extensions

4.3.1 Nonlinearity

Many studies on inflation and saving do not include a nonlinear term in the specifications. Temple (2000) notes that this might be a neglected issue, especially in times of very high inflation. Therefore, I extend the baseline model by adding a squared inflation term (equation (5)), similar to Dash and Kumar (2018).

$$S_{it} = \beta_0 + \alpha_i + \gamma_t + \rho S_{i,t-1} + \beta_1 I_{it} + \boldsymbol{X_{it}}\beta_2 + \beta_3 I_{it}^2 + \epsilon_{it}, \tag{5}$$

where in addition to the linear inflation effect in β_1, β_3 now captures the nonlinear effect. Another approach is to consider potential panel threshold effects, as in Felici et al. (2022), Kremer et al. (2013) and Thanh (2015). However, this method is not employed.

4.3.2 Endogeneity

There are several sources of endogeneity, such as measurement error, simultaneity and omitted variables, that can typically arise in panel regressions (Ullah et al., 2018). Measurement error is not treated as an issue because the data is suspected to be of good quality. Furthermore, simultaneity is also not considered to be a significant problem, as it is unlikely from a theoretical point of view that saving would impact inflation. In addition, if, for example, it might be that the lagged private saving affects contemporaneous variables, such as real GDP growth and vice versa, then such feedback should at least partially be accounted for in the dynamic model (Grigoli et al., 2014).

Nevertheless, two issues related to omitted variables are worth paying more attention to in this case. First, even though adding the lagged private saving rate addresses some of the omitted variable concerns, this term also tends to create the so-called 'Nickell bias'. It arises because of the fixed effects demeaning process, when the error term is correlated with the lagged dependent variable (Nickell, 1981; Grigoli et al., 2014). However, this bias is assumed to be of the order of $\frac{1}{T}$, which tends to be more problematic in shorter panels. In the present data set, the time dimension is reasonably large, with T equal up to 41. Hence, the 'Nickell bias' is deemed not to be a concern.

Difference GMM and system GMM estimation approaches (Judson and Owen, 1999), which assume that the additional lags (second and higher order) of the endogenous variables are not correlated with current errors, allowing them to be used as instruments, are conventionally used to address this issue (Grigoli et al., 2014). As a robustness check, the results of those estimates are included in the Appendix (see Appendix A5.5) .

An additional issue is the potential joint endogeneity of explanatory variables with the saving rate (Loayza et al., 2000). As noted by Loayza et al. (2000) and Grigoli et al. (2014), variables such as real GDP per capita, real GDP growth rate, public saving,

inflation, the real interest rate and financial liberalisation are suspect of joint endogeneity and can be correlated with error terms at different time periods. This would violate the 'strict exogeneity' assumption for consistent estimates in panel data.

However, by adding lagged versions of the independent variables as instruments in a two-stage least squares (2SLS) estimation framework, this issue can be resolved, and the 'strict exogeneity' assumption can be relaxed to 'weak exogeneity' (Grigoli et al., 2014; Loayza et al., 2000). It means that the independent variables can be affected by current and past private saving rate observations but must be uncorrelated with future error terms (Loayza et al., 2000).

4.3.3 Heterogeneous slope coefficients

Another concern that can arise in conventional estimation procedures is the assumption of homogeneous slope coefficients. Although this might be less of an issue among the OECD countries (Loayza et al., 2000), it is still important to check whether there might be cross-country differences in how inflation impacts saving (Adema and Pozzi, 2015; de Serres and Pelgrin, 2002; Haque et al., 1999).

I use three different estimators to incorporate possible parameter heterogeneity. First, the mean group (MG) estimator that obtains country-specific coefficients, which are then combined to get average effects. Second, the demeaned mean group (DMG) estimator, which, by demeaning the data cross-sectionally, reduces the influence of common factors, akin to a standard country and time fixed effects approach. Lastly, the common correlated effects mean group (CCEMG) estimator that captures the influence of common unobserved factors by adding the cross-sectional averages of the dependent variable and the regressors to the model (Croissant and Millo, 2008).

V Data and preliminary evidence

5.1 Sample choice and description

Previous empirical studies have noted that working with saving data can be challenging because of different definitions, data sources and errors in measurement (Wachtel, 1977). For example, high inflation periods can lead to problems in national account statistics (Loayza et al., 2000). Therefore, using data from international organisations, such as the OECD, that have standardised the data gathering and have comparable definitions is a good approach. In addition, as a sample, the OECD countries seem to have sufficient homogeneity and quality in the data (Fredriksson and Staal, 2021). These countries have also been chosen because of the characteristics of their economies, which have more stable saving and inflation rates with sufficient variation. Moreover, as developed countries are less studied with inflation and saving in mind, it is interesting to look at the OECD countries in particular.

5.2 Data

The data for this study come from the World Bank, the OECD, the International Monetary Fund's World Economic Outlook database, the European Commission's Directorate-General for Economic and Financial Affairs AMECO database and the Jordà-Schularick-Taylor (JST) macrohistory database. The data set spans the years from 1980 to 2021. The main sample includes 26 OECD countries,[4] and was selected with the aim of having as many countries included as possible while maintaining sufficient data quality and availability for some of the control variables. Overall, the unbalanced panel data set used for the main regressions is well represented and as close to balanced as possible. It includes 26 countries, 41 years and about 740 total observations. For all variables, the frequency of data is annual, as in the original data sources, in order to avoid arbitrary averages that

[4]These countries are Australia, Belgium, Canada, Chile, Czechia, Denmark, Finland, France, Germany, Hungary, Iceland, Ireland, Israel, Italy, Japan, South Korea, Netherlands, New Zealand, Norway, Poland, Portugal, Spain, Sweden, Switzerland, the United Kingdom and the United States. Turkey was dropped from the sample because of insufficient data coverage.

could distort the available information (Loayza et al., 2000). The variable definitions and sources are available in Appendix A1 and the summary statistics in Table 2.

Table 2: Summary statistics for the main variables

	N	Mean	St.Dev.	Median	Min	Max
Private saving rate (% of GDP)	1,077	25.4	5.8	25.1	1.5	48.1
Inflation (Consumer Price Index % change per annum)	1,080	6.7	26.0	2.5	−4.5	567.9
GDP growth (in % per annum based on 2015 US dollar prices)	1,007	1.9	2.9	1.9	−12.3	23.2
GDP level per capita (based on 2015 US dollar prices)	1,014	34,268.1	17,098.5	33,029.8	4,047.8	88,966.7
Real interest rate (in % per annum for 10-year government bonds)	891	5.5	3.7	4.8	−0.5	17.7
Old-age dependency (older than 65 to the working-age population (15-64)	1,092	24.3	6.3	23.8	7.5	52.5
Terms of trade (ratio of export to import prices)	1,055	98.4	14.8	99.0	54.1	157.4
Social expenditure (public social spending in % of GDP)	953	19.7	5.7	19.6	2.8	34.9
Financial liberalisation (broad money in % of GDP)	1,015	72.2	27.7	67.2	19.8	203.0
Public saving rate (% of GDP)	925	−2.2	4.4	−2.4	−32.1	18.5

The data come from the OECD, the World Bank, the International Monetary Fund's World Economic Outlook, the European Commission's DG ECFIN AMECO and the Jordà-Schularick-Taylor Macrohistory databases.

5.3 Missing observations and excluded countries

Other OECD countries were not included in the main sample for reasons related to data availability. Estonia, Costa Rica, Mexico and Turkey are excluded because of either low or no real interest rate data. Furthermore, Austria, Estonia, Greece, Latvia, Lithuania, Luxembourg, Slovakia and Slovenia are missing broad money data. Colombia, Costa Rica and Slovakia either had low or missing social expenditure variable observations. All countries were missing data from 1990 to 1991 for social expenditure. Lastly, from the regressions with household saving, Chile, South Korea, Iceland and Israel were excluded because of low or missing observations. GDP deflator data is missing for all countries before 1990, therefore, in those regressions, the time dimension of the panel data set is shorter. Most of the post-communist countries in the sample tend to have data starting from 1990. The Appendix has data coverage for both countries (A3.1) and years (A3.2).

Loayza et al. (2000) state that excessively high inflation can severely distort measured public and private saving rates and national account statistics. In the full OECD country sample, some observations even have inflation rates reaching 800% annually. Therefore, following Loayza et al. (2000), Grigoli et al. (2014) and Aizenman et al. (2019) from all plots and estimations I exclude observations for which inflation is above 50%.

5.4 Preliminary evidence

Tables 3 and 4 show the mean private saving rate and inflation rate country rankings, respectively (country name abbreviations are available in Appendix A2.1).

Table 3: Country rankings of average private saving rates from 1980 to 2021

	Country	Mean private saving rate
1	CHE	34.9
2	KOR	33.9
3	JPN	33.9
4	CZE	30.4
5	NLD	29.3
6	BEL	28.5
7	SWE	27.1
8	DEU	26.2
9	FRA	26.2
10	NOR	25.5
11	ESP	25.3
12	HUN	25.0
13	DNK	24.6
14	FIN	24.5
15	ITA	24.3
16	ISR	24.1
17	IRL	24.1
18	PRT	24.1
19	CAN	23.6
20	AUS	23.1
21	USA	22.1
22	POL	21.9
23	GBR	20.2
24	ISL	20.0
25	CHL	19.9
26	NZL	19.4

Table 4: Country rankings of average inflation rates from 1980 to 2021

	Country	Mean inflation rate
1	ISR	34.4
2	POL	34.1
3	ISL	12.8
4	HUN	9.7
5	CHL	9.6
6	PRT	6.5
7	KOR	4.6
8	ITA	4.5
9	ESP	4.5
10	NZL	4.5
11	CZE	4.4
12	AUS	3.9
13	IRL	3.7
14	NOR	3.7
15	GBR	3.6
16	SWE	3.4
17	USA	3.2
18	CAN	3.1
19	FIN	3
20	DNK	3.0
21	FRA	2.9
22	BEL	2.7
23	NLD	2.2
24	DEU	2.1
25	CHE	1.6
26	JPN	0.9

It can be observed that although there is a reasonable variation in mean private savings rates for the countries in the sample, the variation in the inflation rate is much larger. In addition, many countries in the sample that are at the top of the rankings for private saving rates tend to be at the bottom for inflation rates, and vice versa.

Furthermore, country-year observations of private saving and inflation rates are plotted in a pooled manner in Figure 1 and per country without (Figure 2) and with (Figure 3) individual regression lines.

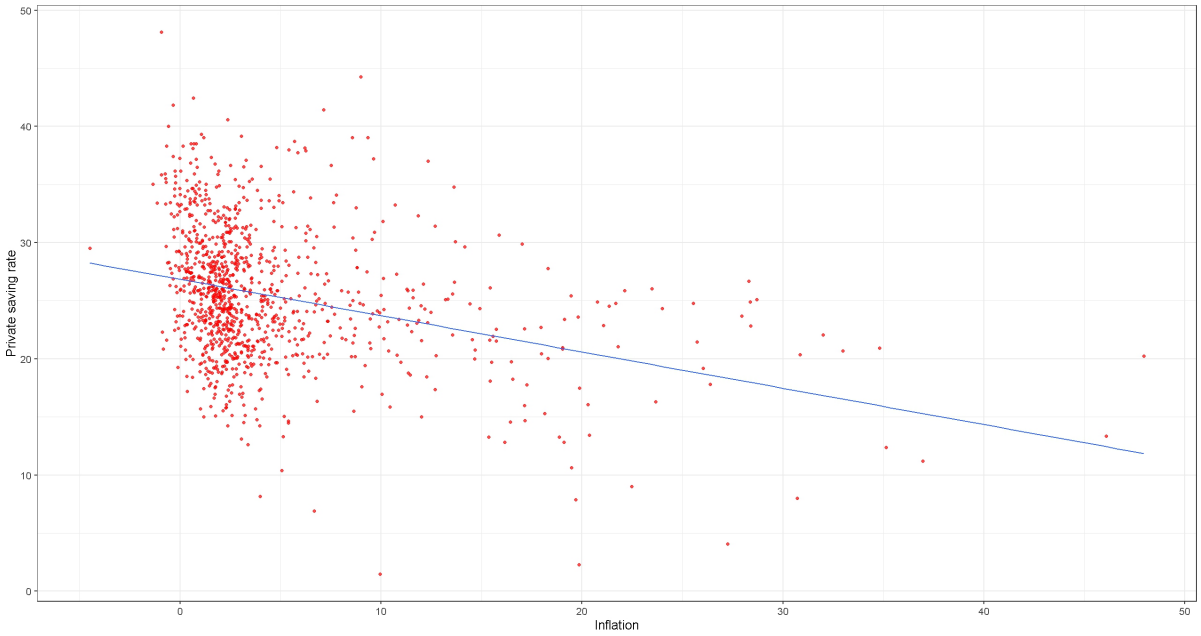

Figure 1: Pooled private saving rate and inflation rate observations

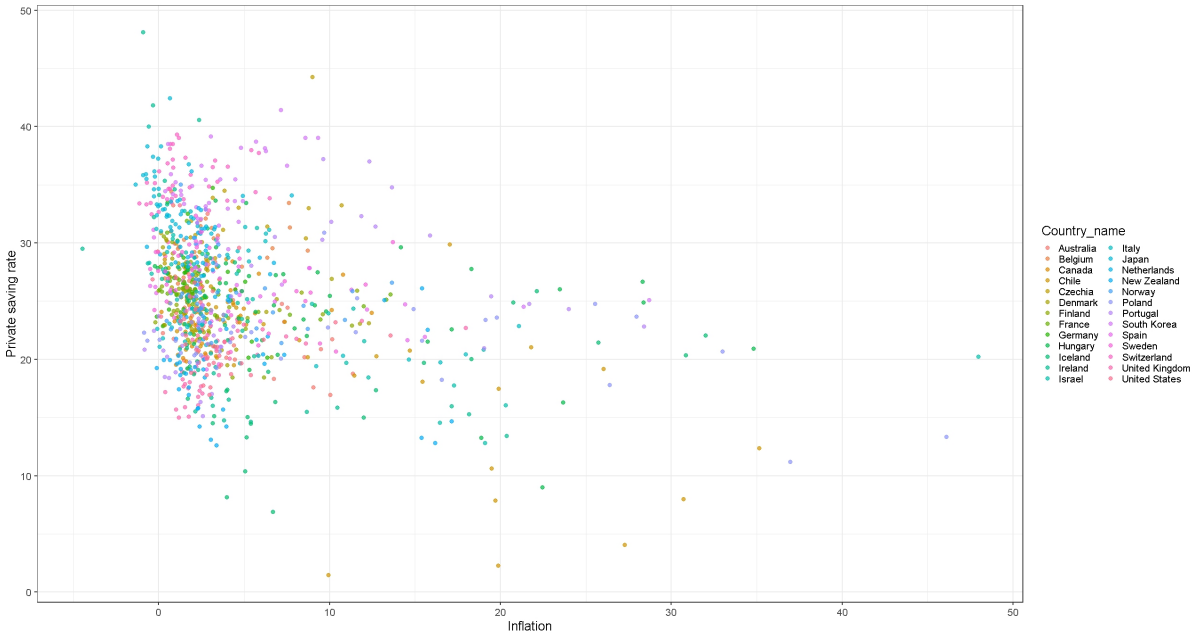

Figure 2: Private saving rate and inflation rate observations per country

It seems that in both pooled and individual country cases, there is a tendency towards a slightly negative relationship, although some countries also have positively sloping regression lines. Several countries have some variation in inflation and private saving rates, but mostly this relationship seems quite stable. The per-country private saving rate and inflation rate observations are also visible in Figure 4.

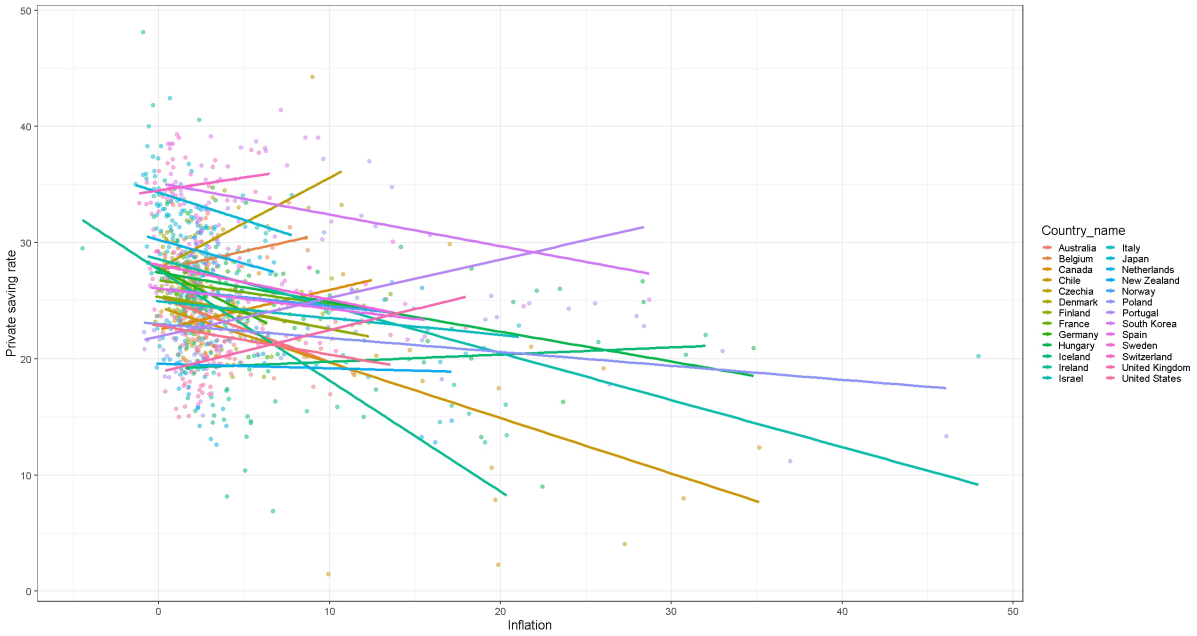

Figure 3: Private saving and inflation rates per country with regression lines

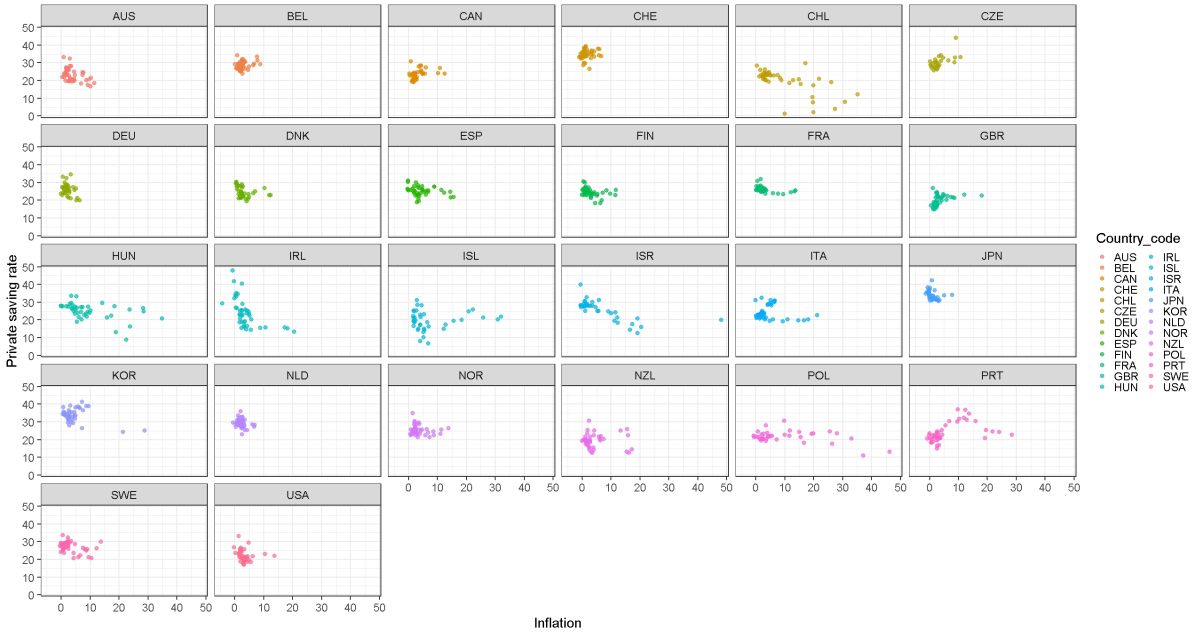

Figure 4: Private saving rate and inflation rate country subplots

In addition, the private saving rates seem quite stable overall (Figure A6.1 in the Appendix). Some countries experienced slight changes during the sample period, generally coinciding with periods of economic downturns. The inflation rate plots, also available in the Appendix (Figure A6.2), indicate a clear downward trend from the start of the sample to being quite stable until a slight uptick very recently. The other variable time series plots for all countries are visible in the Appendix as well (A6.3).

VI Results

6.1 Baseline estimates

Table 5 reports the results for the baseline estimates. Model (1) only regresses inflation on private saving. The obtained relationship is negative and statistically significant at the 1% level, albeit the R^2 is very low. Next, a private saving lag variable is added in model (2). Now the inflation-saving relationship loses statistical significance while remaining negative. Furthermore, with added control variables and either withholding the dynamic term in model (3) or including it in model (4), the inflation term, while still negative, remains insignificant. In addition, the observations drop slightly from around 1062 to 747, which is still deemed sufficient. Hence, although initially the inflation-saving relationship appears negative and statistically significant, that changes when adding other control variables and the dynamic saving term.

Table 5: Baseline model estimates

	Dependent variable:			
	Private saving			
	(1)	(2)	(3)	(4)
Inflation	-0.152^{***}	-0.009	-0.080	-0.060
	(0.049)	(0.038)	(0.094)	(0.076)
Lag private saving		0.765^{***}		0.498^{***}
		(0.042)		(0.080)
Real GDP growth			0.098^{**}	0.097^{**}
			(0.045)	(0.041)
Log real GDP per capita			4.061^{**}	2.450^{**}
			(1.891)	(0.965)
Real interest rate			0.015	-0.079
			(0.104)	(0.086)
Old-age dependency			0.026	0.007
			(0.038)	(0.034)
Log terms of trade			2.649^{*}	1.837^{*}
			(1.408)	(1.115)
Financial liberalisation			-0.081^{***}	-0.038^{***}
			(0.010)	(0.010)
Social expenditure			-0.292^{***}	-0.164^{**}
			(0.075)	(0.069)
Public saving			-0.604^{***}	-0.437^{***}
			(0.054)	(0.067)
Observations	1,062	1,034	747	742
R^2	0.029	0.603	0.394	0.595
Adjusted R^2	-0.036	0.576	0.329	0.551
F Statistic	29.809^{***} (df = 1; 994)	734.107^{***} (df = 2; 966)	48.699^{***} (df = 9; 674)	98.251^{***} (df = 10; 669)

Note: *p<0.1; **p<0.05; ***p<0.01
Driscoll and Kraay (1998) standard errors in parentheses.

The coefficient estimates for the other regressors seem to follow those in the literature. Real GDP growth is positive and significant at the 5% level. Similarly, Grigoli et al. (2014), Callen et al. (1997), Loayza et al. (2000), Edwards (1996), and de Serres and Pelgrin (2002) find real GDP growth to be positive and statistically significant. Grigoli et al. (2014), Dayal-Gulati and Thimann (1997), Edwards (1996) and Loayza et al. (2000) also observe real GDP per capita to be positive and significant, as is the case in the baseline estimates at the 5% level.

The real interest rate is statistically insignificant, similar to Grigoli et al. (2014). However, it is negative and significant in some specifications of de Serres and Pelgrin (2002) and positive and significant in Masson et al. (1998), Callen et al. (1997) and Haque et al. (1999). The old-age dependency term is not significant and positive, while it is negative and insignificant in Dayal-Gulati and Thimann (1997), and Fredriksson and Staal (2021), but negative and significant in Callen et al. (1997), and de Serres and Pelgrin (2002). The terms of trade estimate is significant and positive, similar to de Serres and Pelgrin (2002), Masson et al. (1998), Haque et al. (1999), Dayal-Gulati and Thimann (1997) and Loayza et al. (2000).

The financial liberalisation coefficient is negative and significant, contrary to Dayal-Gulati and Thimann (1997), who find it to be negative and significant. Social expenditure term is negative and significant, as in Dayal-Gulati and Thimann (1997). Lastly, the public saving coefficient is negative and significant, confirming some degree of Ricardian equivalence, as shown also in Dayal-Gulati and Thimann (1997), Edwards (1996), Callen et al. (1997), de Serres and Pelgrin (2002) and Grigoli et al. (2014).

Adding the dynamic private saving term does not change the coefficient signs and magnitudes substantially for the other saving determinants, but it does noticeably improve the R^2. In addition, the high coefficient estimate for the lag in private saving confirms the presence of strong persistence and inertia in saving.

6.2 Robustness checks

To assess the validity of the baseline results, several robustness checks were done.

6.2.1 First differences

The first robustness check changes the level structure of the baseline model to one with first differences in Table 6. By doing so, it eliminates all possible stationarity concerns that were discussed with stationarity tests, for the log real GDP per capita, log terms of trade, financial liberalisation, social expenditure and public saving variables.

Table 6: First difference baseline model estimates

	Dependent variable:
	FD private saving
Lag FD private saving	-0.050^{**}
	(0.025)
FD inflation	-0.023
	(0.061)
FD real GDP growth	0.044
	(0.060)
FD log real GDP per capita	12.304^{**}
	(6.028)
FD real interest rate	-0.164
	(0.119)
FD old-age dependency	0.314^{**}
	(0.157)
FD log terms of trade	9.053^{***}
	(1.392)
FD financial liberalisation	-0.010
	(0.011)
FD social expenditure	-0.231^{*}
	(0.122)
FD public saving	-0.850^{***}
	(0.057)
Observations	701
R^2	0.594
Adjusted R^2	0.549
F Statistic	92.062^{***} (df = 10; 630)

Note: *p<0.1; **p<0.05; ***p<0.01
Driscoll and Kraay (1998) standard errors in parentheses.
FD stands for first difference.

Now the lag of the first difference in private saving is negative but still significant at the 5% level. The first difference of log real GDP per capita and the first difference of log terms of trade are positive and significant, as in the baseline estimates. However, the

first difference in the old-age dependency ratio is now positive and significant. The first differences in social expenditure and in public saving are negative and significant, as in the baseline estimates. Financial liberalisation is not significant anymore. In addition, the real interest rate and inflation terms are not significant, even in their first differences.

6.2.2 Lagged independent variables

Another robustness check adds to the contemporaneous and level control variable versions their lags in Table 7. In the contemporaneous version, interestingly, the lagged real interest rate term now becomes positive and statistically significant. The same case is true for the lagged social expenditure coefficient. The old-age dependency and log terms of trade estimates are positive and significant, while their lags are negative and significant.

On the other hand, the public saving contemporaneous version is negative and significant, while the lag is positive and significant. Other variables that were highly significant in previous specifications, such as real GDP growth and log real GDP per capita, are insignificant in both contemporaneous and lagged versions. In addition, the inflation term is also insignificant in both versions. Lastly, the adjusted R^2 of 0.723 is higher than in other specifications, indicating that perhaps there are some lag relationships that should be considered. However, there might be endogeneity issues with using lagged regressors, especially if they are a factor in explaining short-run dynamics in saving rates (de Serres and Pelgrin, 2002; Haque et al., 1999).

When performing the same exercise as previously but with first difference versions instead of level versions in Table 8, also for the dependent variable, the lag of the first difference of private saving is not significant anymore. Similarly, most other variables are insignificant. Only the first difference of the log terms of trade is positive and significant, while the first difference of social expenditure and its lag, as well as the first difference of public saving, are significant.

Table 7: Baseline model with lagged independent variables

	Dependent variable:
	Private saving
Lag private saving	0.769***
	(0.051)
Inflation	−0.089
	(0.062)
Lag inflation	0.033
	(0.053)
Real GDP growth	−0.020
	(0.284)
Lag real GDP growth	0.019
	(0.052)
Log real GDP per capita	22.483
	(27.394)
Lag log real GDP per capita	−20.699
	(27.388)
Real interest rate	−0.160
	(0.118)
Lag real interest rate	0.221**
	(0.104)
Old-age dependency	0.432**
	(0.193)
Lag old-age dependency	−0.467**
	(0.197)
Log terms of trade	8.674***
	(1.416)
Lag log terms of trade	−8.136***
	(1.444)
Financial liberalisation	−0.020
	(0.013)
Lag financial liberalisation	0.010
	(0.011)
Social expenditure	−0.163
	(0.102)
Lag social expenditure	0.196**
	(0.090)
Public saving	−0.822***
	(0.064)
Lag public saving	0.704***
	(0.056)
Observations	706
R^2	0.755
Adjusted R^2	0.723
F Statistic	101.237*** (df = 19; 625)

Note: *p<0.1; **p<0.05; ***p<0.01
Driscoll and Kraay (1998) standard errors in parentheses.

Table 8: Baseline model in first differences with lagged independent variables

	Dependent variable:
	FD private saving
Lag FD private saving	−0.058
	(0.046)
FD inflation	−0.013
	(0.070)
Lag FD inflation	0.061
	(0.064)
FD real GDP growth	−0.455
	(0.547)
Lag FD real GDP growth	0.079
	(0.049)
FD log real GDP per capita	67.204
	(54.957)
Lag FD log real GDP per capita	−60.856
	(52.575)
FD real interest rate	−0.195
	(0.148)
Lag FD real interest rate	0.142
	(0.095)
FD old-age dependency	0.230
	(0.235)
Lag FD old-age dependency	0.004
	(0.262)
FD log terms of trade	10.452***
	(1.407)
Lag FD log terms of trade	−2.162
	(1.917)
FD financial liberalisation	−0.010
	(0.014)
Lag FD financial liberalisation	0.018
	(0.031)
FD social expenditure	−0.208*
	(0.108)
Lag FD social expenditure	−0.170**
	(0.067)
FD public saving	−0.867***
	(0.051)
Lag FD public saving	−0.018
	(0.045)
Observations	667
R^2	0.605
Adjusted R^2	0.552
F Statistic	47.339*** (df = 19; 588)

Note: *p<0.1; **p<0.05; ***p<0.01
Driscoll and Kraay (1998) standard errors in parentheses.
FD stands for first difference.

6.2.3 Other saving and inflation variables

This robustness check in Table 9 first looks at different saving variables as alternatives for private saving. In model (3) with gross national saving, the public saving variable is not included as per Loayza et al. (2000). This specification also has a higher R^2 than the baseline model (1). As was the case with private saving, the lagged versions of household and gross national saving also confirm the persistence in different forms of saving. GDP growth, social expenditure and financial liberalisation are not significant for household saving. Other variables' significance and coefficient estimates correspond to the private saving model (1).

Table 9: Estimates with different saving variables

	Dependent variable:		
	Private saving	Household saving	Gross national saving
	(1)	(2)	(3)
Lag private saving	0.498***		
	(0.080)		
Lag household saving		0.754***	
		(0.038)	
Lag gross national saving			0.783***
			(0.042)
Inflation	−0.060	−0.045	−0.058
	(0.076)	(0.096)	(0.042)
Real GDP growth	0.097**	−0.036	0.223***
	(0.041)	(0.049)	(0.031)
Log real GDP per capita	2.450**	4.732***	1.905***
	(0.965)	(1.534)	(0.628)
Real interest rate	−0.079	0.101	0.024
	(0.086)	(0.151)	(0.044)
Old-age dependency	0.007	0.026	0.029
	(0.034)	(0.051)	(0.033)
Log terms of trade	1.837*	1.351*	1.219*
	(1.115)	(0.726)	(0.731)
Financial liberalisation	−0.038***	0.007	−0.017***
	(0.010)	(0.012)	(0.006)
Social expenditure	−0.164**	−0.090	−0.066*
	(0.069)	(0.084)	(0.037)
Public saving	−0.437***	−0.132***	
	(0.067)	(0.047)	
Observations	742	597	797
R^2	0.595	0.649	0.765
Adjusted R^2	0.551	0.602	0.742
F Statistic	98.251*** (df = 10; 669)	97.108*** (df = 10; 526)	262.115*** (df = 9; 725)

Note: *p<0.1; **p<0.05; ***p<0.01
Driscoll and Kraay (1998) standard errors in parentheses.
Household saving regression excludes Iceland and Israel because of missing data.

Conducting the same estimates but with the GDP deflator instead of the CPI as the inflation variable in Table 10, the results do not change much, and the inflation term is still insignificant in all three specifications.

Table 10: Estimates with different saving variables and the GDP deflator for inflation

	Dependent variable:		
	Private saving	Household saving	Gross national saving
	(1)	(2)	(3)
Lag private saving	0.477***		
	(0.086)		
Lag household saving		0.738***	
		(0.040)	
Lag gross national saving			0.738***
			(0.049)
Inflation	0.009	−0.002	0.035
	(0.072)	(0.062)	(0.042)
Real GDP growth	0.100**	−0.021	0.217***
	(0.042)	(0.050)	(0.041)
Log real GDP per capita	3.063***	4.375***	1.610**
	(0.994)	(1.606)	(0.756)
Real interest rate	−0.131	0.034	0.053
	(0.105)	(0.127)	(0.060)
Old-age dependency	0.039	0.028	0.056
	(0.046)	(0.058)	(0.039)
Log terms of trade	3.489***	1.814**	1.898*
	(1.200)	(0.808)	(0.977)
Financial liberalisation	−0.038***	0.016	−0.027***
	(0.012)	(0.010)	(0.009)
Social expenditure	−0.179**	−0.128	−0.105**
	(0.083)	(0.088)	(0.048)
Public saving	−0.487***	−0.145***	
	(0.070)	(0.047)	
Observations	669	577	684
R^2	0.592	0.640	0.741
Adjusted R^2	0.549	0.597	0.715
F Statistic	87.721*** (df = 10; 605)	91.575*** (df = 10; 515)	197.434*** (df = 9; 621)

Note: *p<0.1; **p<0.05; ***p<0.01
Driscoll and Kraay (1998) standard errors in parentheses.
Household saving regression excludes Iceland and Israel because of missing data.

6.2.4 Interaction term

I also consider a model with an interaction term between inflation and the real interest rate in Table 11.

Table 11: Baseline model with inflation and real interest rate interaction term

	Dependent variable:
	Private saving rate
Lag private saving	0.499***
	(0.080)
Inflation	−0.294***
	(0.092)
Real interest rate	−0.227**
	(0.104)
Real GDP growth	0.089**
	(0.041)
Log real GDP per capita	2.672***
	(0.947)
Old-age dependency	0.013
	(0.032)
Log terms of trade	2.249**
	(1.025)
Financial liberalisation	−0.034***
	(0.010)
Social expenditure	−0.144**
	(0.064)
Public saving	−0.429***
	(0.066)
Inflation*Real interest rate	0.026***
	(0.008)
Observations	742
R^2	0.600
Adjusted R^2	0.556
F Statistic	91.155*** (df = 11; 668)
Note:	*p<0.1; **p<0.05; ***p<0.01
	Driscoll and Kraay (1998) standard errors in parentheses.

Interestingly, now inflation and the real interest rate variables both have a negative and statistically significant coefficient as standalone variables, and their interaction term is. This result might imply that with higher real interest and inflation rates, which tend to coincide with more uncertainty, the effect on saving increases, with higher inflation and interest rates eroding savings. The other saving determinants are similar to other regressions.

6.2.5 Different sample estimates

The next robustness check considers several samples in terms of countries and time periods. First, when considering different countries, two models are estimated to compare with the baseline in Table 12. Model (1) looks at the full sample, which has some missing values for some of the control variables (see Appendix A3.1), while model (2) looks at a sample that could achieve the highest number of observations by including most countries and control variables. In both cases, the results are similar, and the coefficient estimates and significance do not change substantially.

Table 12: Estimates with an expanded country sample

	Dependent variable:	
	Private saving	
	Full sample	Full sample maximum data coverage
	(1)	(2)
Lag private saving	0.498***	0.545***
	(0.080)	(0.074)
Inflation	−0.049	−0.024
	(0.073)	(0.054)
Real GDP growth	0.107***	0.126***
	(0.039)	(0.039)
Log real GDP per capita	2.516**	3.700***
	(0.988)	(1.027)
Real interest rate	−0.087	−0.005
	(0.084)	(0.061)
Old-age dependency	0.009	−0.025
	(0.033)	(0.024)
Log terms of trade	1.897*	1.405
	(1.099)	(0.995)
Social expenditure	−0.161**	
	(0.069)	
Financial liberalisation	−0.037***	
	(0.010)	
Public saving	−0.438***	−0.387***
	(0.066)	(0.043)
Observations	764	996
R^2	0.592	0.553
Adjusted R^2	0.548	0.512
F Statistic	99.997*** (df = 10; 688)	141.112*** (df = 8; 911)
Note:	*p<0.1; **p<0.05; ***p<0.01	
	Driscoll and Kraay (1998) standard errors in parentheses.	

However, when looking at different time periods in Table 13 the results show some degree of difference.

Table 13: Estimates for two time periods

	Dependent variable:	
	Private saving	
	1980-2000	2001-2021
	(1)	(2)
Lag private saving	0.332***	0.387***
	(0.081)	(0.104)
Inflation	0.179**	−0.355***
	(0.083)	(0.072)
Real GDP growth	0.147**	0.068
	(0.069)	(0.050)
Log real GDP per capita	−3.744	4.484***
	(3.749)	(1.120)
Real interest rate	−0.110	−0.155*
	(0.114)	(0.093)
Old-age dependency	0.169	0.170***
	(0.124)	(0.064)
Log terms of trade	−0.187	3.922***
	(1.360)	(0.944)
Social expenditure	−0.155***	−0.206***
	(0.057)	(0.075)
Financial liberalisation	−0.040***	−0.052**
	(0.008)	(0.021)
Public saving	−0.525***	−0.543***
	(0.086)	(0.073)
Observations	229	488
R^2	0.675	0.568
Adjusted R^2	0.591	0.515
F Statistic	37.627*** (df = 10; 181)	57.107*** (df = 10; 434)
Note:	*p<0.1; **p<0.05; ***p<0.01	
	Driscoll and Kraay (1998) standard errors in parentheses.	

The lag private saving estimate is positive and significant in both time periods. The real GDP growth is only significant from 1980 to 2000, while the log real GDP per capita is positive and significant from 2001 to 2021 and negative and insignificant from 1980 to 2000. The real interest rate is negative and significant from 2001 to 2021, the old-age dependency is also positive and significant in this period. Social expenditure,

financial liberalisation and public saving are negative and significant in both time periods. Interestingly, now the inflation coefficient is significant in both periods, while the coefficient sign is positive from 1980 to 2000 and negative from 2001 to 2021.

This result seems to confirm the previous empirical ambiguity regarding the inflation estimates and suggests that the country and time dimension of the sample might change the outcome. It might indeed be that the pre-2000 positive estimates 'cancel out' the post-2000 negative coefficient, leading to an ambiguous result. Splitting the sample into two time periods might make the coefficient results more vulnerable to Nickell bias. Nevertheless, if we assume the previously mentioned $\frac{1}{T}$ bias term, that would be around a 0.05 difference in coefficient estimates, which is only a minor change.

In addition, there are a couple of different avenues that could explain the time period differences. First, because of the data coverage and economic history, the sample pre-2000 is dominated by the OECD core countries that joined around 1961. Most of them are considered advanced, more developed and stable economies, which can also be seen in the less volatile private saving and inflation rates. That could be an indicator of why inflation has a positive coefficient, as citizens might be less used to high inflation. Therefore, when it does happen, saving increases for precautionary reasons, for example. Moreover, the period starting in the mid-1980s was characterised as 'the Great Moderation', with lower macroeconomic volatility and consequently less inflation. Hence, it might be that the particular time period also has an impact on the results. Furthermore, the fact that the sample, because of a lack of data, excludes the 1970s, which was a period of high inflation globally, could change the outcome.

Similarly, the 2000 to 2021 sample period includes newer OECD member states, such as many post-communist countries, that experienced more economically volatile conditions. As inflation became more prevalent, people might have seen it as eroding their savings and chosen to consume, for example, durable goods, rather than save.

To assess those arguments, I repeat the same procedure of splitting the sample into two periods but including all countries available. The inflation sign and coefficient correspond to the baseline country estimates, as can be seen in Table A5.4 in the Appendix. Only the inflation coefficient estimate for the 2001 to 2021 period slightly changes.

Additionally, I also attempt to capture the 1970s in Table 14, by combining the World Bank's saving data with the IMF World Economic Outlook 2023 data, which only start from the 1980s. For this estimation, I use the gross national saving rate, because of data availability. The estimates change, as the inflation coefficient now turns positive and slightly statistically significant. However, it is worth keeping in mind that most of the control variables only have data starting from 1980 because of data availability.

Table 14: Baseline model estimates including the 1970s

	Dependent variable:
	Gross national saving
Lag gross national saving	0.663^{***}
	(0.052)
Inflation	-0.127^{*}
	(0.065)
Real GDP growth	0.203^{***}
	(0.036)
Log real GDP per capita	0.054
	(0.989)
Real interest rate	0.043
	(0.050)
Old-age dependency	0.005
	(0.036)
Log terms of trade	1.648^{***}
	(0.603)
Financial liberalisation	-0.026^{***}
	(0.007)
Social expenditure	-0.097^{***}
	(0.031)
Public saving	0.176^{***}
	(0.043)
Observations	678
R^2	0.779
Adjusted R^2	0.753
F Statistic	213.139^{***} (df = 10; 605)
Note:	*p<0.1; **p<0.05; ***p<0.01
	Driscoll and Kraay (1998) standard errors in parantheses.

6.2.6 Nonlinearity

The next extension in Table 15 adds a squared inflation term to the baseline specification. Interestingly, now the linear term is negative and significant at the 5% level, while the squared term is positive and significant at the 10% level. This possibly indicates a negative linear relationship and a convex quadratic relationship. It echoes the approach in Grigoli et al. (2014), where the authors indicate that high inflation might generate additional effects on private savings. However, they find the coefficient of squared inflation to not be significant.

The obtained result implies that as inflation increases, private savings decrease initially, while when inflation reaches a certain level, savings start to increase again. This might support the precautionary motive argument that when inflation starts to 'get out of control', it might coincide with worsening macroeconomic conditions, such as a recession and rising unemployment. Thus, the precautionary saving motive starts to dominate. In addition, perhaps at lower levels of inflation, theoretical arguments, such as the money illusion, could play a larger role.

Table 15: Estimates with square inflation term

	Dependent variable:
	Private saving
Lag private saving	0.501^{***}
	(0.080)
Inflation	-0.208^{**}
	(0.086)
Inflation squared	0.015^{*}
	(0.008)
Real GDP growth	0.094^{**}
	(0.041)
Log real GDP per capita	2.564^{***}
	(0.923)
Real interest rate	-0.105
	(0.089)
Old-age dependency	0.015
	(0.033)
Log terms of trade	2.104^{**}
	(1.010)
Financial liberalisation	-0.037^{***}
	(0.010)
Social expenditure	-0.158^{**}
	(0.067)
Public saving	-0.428^{***}
	(0.066)
Observations	742
R^2	0.598
Adjusted R^2	0.554
F Statistic	90.187^{***} (df = 11; 668)
Note:	*p<0.1; **p<0.05; ***p<0.01
	Driscoll and Kraay (1998) standard errors in parentheses.

6.2.7 Endogeneity

To check for potential endogeneity, I consider the real interest rate, real GDP growth, log real GDP per capita, financial liberalisation proxy, social expenditure and public saving variables as jointly endogenous with private saving. Therefore, they are instrumented with the first lag version of each endogenous variable in a 2SLS framework, similar to (Grigoli et al., 2014), who also use the first lag of the independent variables. The results essentially coincide with the baseline estimates in terms of coefficient sign and magnitude, and the inflation term is again statistically not significant and negative.

Table 16: Baseline model 2SLS estimates

	Dependent variable:
	Private saving
Lag private saving	0.496***
	(0.088)
Inflation	−0.092
	(0.136)
GDP growth	0.110**
	(0.045)
Log GDP per capita	2.874***
	(1.091)
Real interest rate	−0.099
	(0.100)
Old-age dependency	0.011
	(0.043)
Log terms of trade	2.165**
	(1.060)
Financial liberalisation	−0.032***
	(0.012)
Social expenditure	−0.164**
	(0.076)
Public saving	−0.431***
	(0.074)
Observations	706
R^2	0.581
Adjusted R^2	0.534
F Statistic	877.530***

Note: *p<0.1; **p<0.05; ***p<0.01
Driscoll and Kraay (1998) standard errors in parantheses.
Inflation, real GDP growth, log real GDP per capita, real interest rate, financial liberalisation, social expenditure and public saving treated as endogenous and instrumented with their first lags.

6.2.8 Heterogeneous slope coefficients

The final extension looks at a different estimation approach that allows for heterogeneous country slope coefficients, namely by considering the MG, DMG and CCEMG estimators in Table 17. For all three models, the inflation coefficient is statistically insignificant, although it is now positive. In addition, the real interest rate coefficient is significant in the MG model. The coefficient estimates for all other variables are comparable to the baseline estimates, although many variables lose statistical significance when considering slope heterogeneity.

Table 17: Baseline model MG, DMG and CCEMG estimates

	Dependent variable private saving		
	MG	DMG	CCEMG
Constant	−45.289	−2.187	−231.378
	(41.911)	(2.776)	(207.774)
Lag private saving	0.093**	0.159***	−0.006
	(0.042)	(0.047)	(0.070)
Inflation	0.091	0.117	0.374
	(0.067)	(0.111)	(0.267)
Real GDP growth	0.075	0.174***	0.283*
	(0.050)	(0.057)	(0.145)
Log real GDP per capita	4.171	3.201	8.436
	(3.060)	(3.250)	(13.922)
Real interest rate	−0.264**	−0.222	−0.282
	(0.122)	(0.138)	(0.396)
Old-age dependency	0.010	0.203	1.057
	(0.260)	(0.285)	(0.868)
Log terms of trade	5.974	6.791	5.599
	(4.956)	(5.445)	(7.811)
Financial liberalisation	0.014	−0.013	0.049
	(0.031)	(0.033)	(0.151)
Social expenditure	−0.304	−0.464**	0.032
	(0.185)	(0.193)	(0.560)
Public saving	−0.888***	−0.768***	−0.955***
	(0.074)	(0.071)	(0.208)
Private saving CSA			0.833*
			(0.446)
Lag private saving CSA			−0.105
			(0.186)
Inflation CSA			−0.626*
			(0.371)
Real GDP growth CSA			−0.294*
			(0.174)
Log real GDP per capita CSA			12.585
			(8.825)
Real interest rate CSA			
Log terms of trade CSA			
Financial liberalisation CSA			
Social expenditure CSA			
Public saving CSA			
Num. obs.	742	742	742

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$. CSA - cross-sectional average. MG - mean group, DMG - demeaned mean group, CCEMG - common correlated effects mean group.

6.2.9 Other robustness checks

Other robustness checks, such as log transformation, iterative controls, different standard errors, difference GMM and system GMM models to test for Nickell bias, are available in the Appendix A5.

6.3 Limitations

It is worth discussing several limitations that the estimates might have. First, even though the sample is 26 OECD countries with up to 42 years of data, and OECD countries tend to have high data quality, due to the nature of the countries included and the required control variables for the model, there are some missing observations.

Second, there are other potential savings determinants for panel data, such as the share of urban population (Grigoli et al., 2014), whose inclusion might have altered the results. Nevertheless, it is doubtful that the inclusion of other controls would have meaningfully impacted the results for the inflation term as most of the standard saving determinants were considered.

For control variables, there are also alternative forms that could have been considered, such as real GDP growth and real per capita GDP in purchasing power parity terms, as in Grigoli et al. (2014), using total or youth instead of old-age dependency ratio and other measures for social expenditure or financial liberalisation. In addition, there are other aspects of inflation, such as inflation volatility, inflation expectations, or distinguishing between core and headline measures, that were not considered and could have different effects.

Third, both the sample and the time period considered countries that had relatively low levels of inflation. The sample does not fully account for the period of the 1970s and early 2020s because of a lack of data availability, when inflation picked up in large parts of the world. Hence, including a wider time period and more countries could be considered.

VII Conclusions

This research has attempted to shed light on the theoretically and empirically ambiguous relationship between inflation and saving. It considered a vast array of theoretical arguments that could explain the empirical ambiguity as well as the fact that, unlike most other panel studies on saving determinants, it focused primarily on the inflation-saving relationship. To that end, a dynamic country and time fixed effects model was employed for a panel data set for 26 OECD countries for the years from 1980 to 2021.

The baseline model estimated the relationship between private saving and inflation, controlling for lagged saving, real GDP growth, real GDP per capita, the real interest rate, the old-age dependency ratio, social expenditure, financial liberalisation and public saving. The variables and model were tested for cross-sectional dependence, serial correlation, heteroskedasticity and stationarity, and robust standard errors were used in all estimates.

Moreover, several robustness checks were performed. First, altering the variables to be in first differences to limit stationarity concerns. Second, the inclusion of lagged independent variables to incorporate more dynamic effects. Third, using different saving variables, such as gross national saving and household saving, as well as the GDP deflator as the inflation measure. Additionally, considering the interaction between inflation and the real interest rate. Lastly, several sample configurations, such as expanding the sample and splitting it into two time periods.

Furthermore, the baseline model was extended by adding a squared inflation term to incorporate potential nonlinearity effects. In addition, to check for potential endogeneity concerns, the baseline model was estimated in a 2SLS framework, instrumenting the suspected variables with their lagged versions. Lastly, slope parameter heterogeneity was also considered with the MG, DMG and CCEMG models.

The results show that in most specifications, inflation had a negative and statistically insignificant relationship with private saving. Therefore, the results remain inconclusive. This seems to be in accordance with studies, such as Haque et al. (1999), de Serres and Pelgrin (2002) and de Mello et al. (2004) that also consider a panel of OECD countries and find similar results. In some specifications, the relationship between saving

and inflation was statistically significant. First, adding the squared inflation term leads to a negative linear coefficient at the 5% level and a positive squared coefficient at the 10% level. Second, by splitting the sample into two time periods: 1980 to 2000 and 2001 to 2021, the inflation coefficient was positive at the 5% level in the earlier period and negative at the 1% level in the later period. Third, including the 1970s, albeit with limited data for other saving determinants, the inflation coefficient is negative and significant. Lastly, the interaction term between inflation and the real interest rate makes both variables negative and statistically significant, and their interaction term positive and statistically significant as well.

Nevertheless, despite some evidence of a statistically significant relationship, this research concludes that the inflation-saving relationship indeed remains ambiguous, as predicted by the relevant economic theory. Future research might consider a microdata approach and threshold models or nonlinearities. In addition, from a macroeconomic perspective, perhaps including a panel with more countries and time periods with higher inflation might be useful.

References

Adema, Y. and Pozzi, L. (2015). Business cycle fluctuations and household saving in OECD countries: A panel data analysis. *European Economic Review*, 79(C):214–233. Publisher: Elsevier.

Aghevli, B. B. and Boughton, J. M. (1990). National Saving and the World Economy. *Finance & Development*, 27(002). ISBN: 9781451952476 Publisher: International Monetary Fund Section: Finance & Development.

Ahmad, K. and Mahmood, H. (2013). Macroeconomic Determinants of National Savings Revisited: A Small Open Economy of Pakistan.

Aizenman, J., Cheung, Y.-W., and Ito, H. (2019). The Interest Rate Effect on Private Saving: Alternative Perspectives. *Journal of International Commerce, Economics and Policy (JICEP)*, 10(01):1–37. Publisher: World Scientific Publishing Co. Pte. Ltd.

Ammari, A. (2007). *Panel Data Analysis; Fixed and Random Effects using Stata (Oscar Torres-Reyna version).*

Andrejovská, A. and Buleca, J. (2016). Regression Analysis of Factors Influencing Volume of Households' Savings in the V4 Countries. *Mediterranean Journal of Social Sciences*, 7(1):213. Number: 1.

Arellano, M. (1987). Computing Robust Standard Errors for Within-Groups Estimators. *Oxford Bulletin of Economics and Statistics*, 49(4):431–34. Publisher: Department of Economics, University of Oxford.

Athukorala, P.-c. and Sen, K. (2004). The Determinants of Private Saving in India. *World Development*, 32(3):491–503. Publisher: Elsevier.

Athukorala, P.-c. and Tsai, P.-L. (2003). Determinants of Household Saving in Taiwan: Growth, Demography and Public Policy. *The Journal of Development Studies*, 39:65–88.

Attanasio, O. P., Picci, L., and Scorcu, A. E. (2000). Saving, Growth, and Investment: A Macroeconomic Analysis Using a Panel of Countries. *The Review of Economics and Statistics*, 82(2):182–211. Publisher: The MIT Press.

Bandiera, O., Caprio, G., Honohan, P., and Schiantarelli, F. (2000). Does Financial Reform Raise or Reduce Saving? *The Review of Economics and Statistics*, 82(2):239–263. Publisher: The MIT Press.

Bayoumi, T. (1993). Financial Deregulation and Household Saving. *The Economic Journal*, 103(421):1432–1443. Publisher: [Royal Economic Society, Wiley].

Borowski, J. and Jaworski, K. (2023). Economic and behavioral determinants of forced household savings during the COVID-19 pandemic. *Empirica*, 50(1):237–253.

Bosworth, B., Burtless, G., Sabelhaus, J., Poterba, J. M., and Summers, L. H. (1991). The Decline in Saving: Evidence from Household Surveys. *Brookings Papers on Economic Activity*, 1991(1):183.

Bouyon, S. (2016). Policy Options for European Household Saving. *Journal of Economic Integration*, 31(1):134–165. Publisher: Center for Economic Integration, Sejong University.

Boyd, J. H., Choi, S., and Smith, B. (1996). Inflation, financial markets and capital formation. *Review*, 78(May):9–35. Publisher: Federal Reserve Bank of St. Louis.

Branson, W. H. and Klevorick, A. K. (1968). Money Illusion, Price Expectations, and the Aggregate Consumption Function. *Cowles Foundation Discussion Papers*. Number: 253 Publisher: Cowles Foundation for Research in Economics, Yale University.

Bruno, M. and Easterly, W. (1998). Inflation crises and long-run growth. *Journal of Monetary Economics*, 41(1):3–26. Publisher: Elsevier.

Burch, S. W. and Werneke, D. (1975). The Stock of Consumer Durables, Inflation, and Personal Saving Decisions. *The Review of Economics and Statistics*, 57(2):141–154. Publisher: MIT Press.

Callen, T., TCallen@imf.org, Thimann, C., and CThimann@imf.org (1997). Empirical Determinants of Household Saving: Evidence From OECD Countries. *IMF Working Papers*, 97(181):1.

Campbell, C. and Lovati, J. (1979). Inflation and Personal Saving: An Update. *Review*, 61:3–9.

Campbell, J. Y. and Mankiw, N. G. (1990). Permanent Income, Current Income, and Consumption. *Journal of Business & Economic Statistics*, 8(3):265–279. Publisher: Taylor & Francis _eprint: https://www.tandfonline.com/doi/pdf/10.1080/07350015.1990.10509798.

Campbell, J. Y. and Mankiw, N. G. (1991). The response of consumption to income: A cross-country investigation. *European Economic Review*, 35(4):723–756.

Carroll, C., Rhee, B.-K., and Rhee, C. (1994). Are There Cultural Effects on Saving? Some Cross-Sectional Evidence. *The Quarterly Journal of Economics*, 109(3):685–699. Publisher: Oxford University Press.

Carroll, C. D., Hall, R. E., and Zeldes, S. P. (1992). The Buffer-Stock Theory of Saving: Some Macroeconomic Evidence. *Brookings Papers on Economic Activity*, 1992(2):61–156. Publisher: Brookings Institution Press.

Chaturvedi, V., Dholakia, R. H., and Kumar, B. (2008). Inter-Relationship between Economic Growth, Savings and Inflation in Asia.

Chen, P., Karabarbounis, L., and Neiman, B. (2017). The Global Rise of Corporate Saving.

Croissant, Y. and Millo, G. (2008). Panel Data Econometrics in R: The plm Package. *Journal of Statistical Software*, 27:1–43.

Dash, S. K. and Kumar, L. (2018). Does Inflation Affect Savings Non-linearly? Evidence from India. *Margin: The Journal of Applied Economic Research*, 12(4):431–457. Publisher: SAGE Publications India.

Davidson, R. and MacKinnon, J. G. (1983). Inflation and the savings rate. *Applied Economics*, 15(6):731–743. Publisher: Routledge _eprint: https://doi.org/10.1080/00036848300000062.

Dayal-Gulati, A. and Thimann, C. (1997). Saving in Southeast Asia and Latin America Compared: Searching for Policy Lessons. IMF Working Paper 1997/110, International Monetary Fund.

de Mello, L., Kongsrud, P., and Price, R. (2004). Saving Behaviour and the Effectiveness of Fiscal Policy.

de Serres, A. and Pelgrin, F. (2002). The Decline in Private Saving Rates in the 1990s in OECD Countries: How Much Can Be Explained by Non-Wealth Determinants?

Dean, A., Durand, M., Fallon, J., and Hoeller, P. (1989). Saving Trends and Behaviour in OECD Countries. OECD Economics Department Working Paper 67, OECD Publishing.

Deaton, A. (1977). Involuntary Saving Through Unanticipated Inflation. *The American Economic Review*, 67(5):899–910. Publisher: American Economic Association.

Deaton, A. and Paxson, C. (1994). Saving, Growth, and Aging in Taiwan. NBER Chapters, National Bureau of Economic Research, Inc.

Deaton, A. S. (2005). Franco Modigliani and the Life Cycle Theory of Consumption. *SSRN Electronic Journal*.

Driscoll, J. C. and Kraay, A. C. (1998). Consistent Covariance Matrix Estimation with Spatially Dependent Panel Data. *The Review of Economics and Statistics*, 80(4):549–560. Publisher: The MIT Press.

Edwards, S. (1996). Why are Latin America's savings rates so low? An international comparative analysis. *Journal of Development Economics*, 51(1):5–44. Publisher: Elsevier.

Ertac, S., Metin Ozcan, K., and Günay, A. (2003). Determinants of private savings behaviour in Turkey. *Applied Economics*, 35:1405–1416.

Feldstein, M. (1980). International differences in social security and saving. *Journal of Public Economics*, 14(2):225–244.

Feldstein, M. (1982). Inflation, Capital Taxation, and Monetary Policy. *NBER Chapters*, pages 153–168. Publisher: National Bureau of Economic Research, Inc.

Felici, M., Kenny, G., and Friz, R. (2022). Consumer Savings Behaviour at Low and Negative Interest Rates. *European Economy - Discussion Papers 2015 -*. Number: 172 Publisher: Directorate General Economic and Financial Affairs (DG ECFIN), European Commission.

Ferrucci, G. and Miralles, C. (2007). Saving behaviour and global imbalances: the role of emerging market economies. Working Paper Series 842, European Central Bank.

Fischer, S. (1993). The role of macroeconomic factors in growth. *Journal of Monetary Economics*, 32(3):485–512. Publisher: Elsevier.

Fisher, I. F. (1967). *Ten economic studies in the tradition of Irving Fisher*. J. Wiley,.

Fortune, J. N. (1981). Voluntary (Dis) Saving and Expected Inflation. *Southern Economic Journal*, 48(1):134–143. Publisher: Southern Economic Association.

Fredriksson, C. and Staal, K. (2021). Determinants of Household Savings: A Cross-Country Analysis. *International Advances in Economic Research*, 27(4):257–272.

Friedman, M. (1957). The Permanent Income Hypothesis. In *A Theory of the Consumption Function*, pages 20–37. Princeton University Press.

Grigoli, F., Herman, A., and Schmidt-Hebbel, K. (2014). World Saving.

Gylfason, T. and Herbertsson, T. T. (2001). Does inflation matter for growth? *Japan and the World Economy*, 13(4):405–428.

Haque, N. U., Pesaran, M. H., and Sharma, S. (1999). Neglected Heterogeneity and Dynamics in Cross-country Savings Regressions. *Cambridge Working Papers in Economics*. Number: 9904 Publisher: Faculty of Economics, University of Cambridge.

Heer, B. and Süssmuth, B. (2006). The Savings-Inflation Puzzle.

Hondroyiannis, G. (2006). Private saving determinants in European countries: A panel cointegration approach. *The Social Science Journal*, 43(4):553–569.

Horioka, C. (1990). Why is Japan's household saving rate so high? A literature survey. *Journal of the Japanese and International Economies*, 4(1):49–92. Publisher: Elsevier.

Horioka, C. Y. and Wan, J. (2006). The Determinants of Household Saving in China: A Dynamic Panel Analysis of Provincial Data.

Howard, D. H. (1978). Personal Saving Behavior and the Rate of Inflation. *The Review of Economics and Statistics*, 60(4):547–554. Publisher: The MIT Press.

Hüfner, F. and Koske, I. (2010). Explaining Household Saving Rates in G7 Countries: Implications for Germany. *OECD, Economics Department, OECD Economics Department Working Papers*.

Im, K. S., Pesaran, M., and Shin, Y. (2003). Testing for unit roots in heterogeneous panels. *Journal of Econometrics*, 115(1):53–74. Publisher: Elsevier.

Jappelli, T. and Pagano, M. (1994). Saving, Growth, and Liquidity Constraints. *The Quarterly Journal of Economics*, 109(1):83–109. Publisher: Oxford University Press.

Jilani, S., Shaikh, S., Cheema, F.-E., and Shaikh, A.-U.-H. (2013). Determinants of National Savings in Pakistan: an Exploratory Study. *Asian Social Science*, 9:254–262.

Judson, R. A. and Owen, A. L. (1999). Estimating dynamic panel data models: a guide for macroeconomists. *Economics Letters*, 65(1):9–15.

Juster, F. and Taylor, L. (1975). Towards a Theory of Saving Behavior. *American Economic Review*, 65(2):203–09. Publisher: American Economic Association.

Juster, F. T. and Wachtel, P. (1972). A Note on Inflation and the Saving Rate. *Brookings Papers on Economic Activity*, 1972(3):765–778. Publisher: Brookings Institution Press.

Kapounek, S., Korab, P., and Deltuvaite, V. (2016). (Ir)rational Households' Saving Behavior? An Empirical Investigation. *Procedia Economics and Finance*, 39:625–633.

Katona, G. (1975). *Psychological economics*. Psychological economics. Elsevier, Oxford, England. Pages: x, 438.

Khawaja, M. J. (2022). Determinants of savings behaviour in Saudi Arabia. *International Journal of Social Economics*, ahead-of-print(ahead-of-print).

Kimball, M. S. (1990). Precautionary Saving in the Small and in the Large. *Econometrica*, 58(1):53–73. Publisher: [Wiley, Econometric Society].

Koskela, E. and Viren, M. (1983). Social Security and Household Saving in an International Cross Section. *American Economic Review*, 73(1):212–17. Publisher: American Economic Association.

Kremer, S., Bick, A., and Nautz, D. (2013). Inflation and growth: new evidence from a dynamic panel threshold analysis. *Empirical Economics*, 44(2):861–878.

Krishnamurty, K. and Saibaba, P. (1981). Determinants of Saving Rate in India. *Indian Economic Review*, 16(4):225–249. Publisher: Department of Economics, Delhi School of Economics, University of Delhi.

Lahiri, A. K. (1989). Dynamics of Asian Savings: The Role of Growth and Age Structure. *Staff Papers (International Monetary Fund)*, 36(1):228–261. Publisher: Palgrave Macmillan Journals.

Loayza, N., Schmidt-Hebbel, K., and Servén, L. (2000). What Drives Private Saving across the World? *The Review of Economics and Statistics*, 82(2):165–181. Publisher: The MIT Press.

Lopez, J. H., Schmidt-Hebbel, K., and Servén, L. (2000). How Effective is Fiscal Policy in Raising National Saving? *The Review of Economics and Statistics*, 82(2):226–238. Publisher: The MIT Press.

Maddala, G. S. and Wu, S. (1999). A Comparative Study of Unit Root Tests with Panel Data and a New Simple Test. *Oxford Bulletin of Economics and Statistics*, 61(S1):631–652.

Mankiw, N. G., Reis, R., and Wolfers, J. (2003). Disagreement about Inflation Expectations.

Masson, P. R., Bayoumi, T., and Samiei, H. (1998). International Evidence on the Determinants of Private Saving. *The World Bank Economic Review*, 12(3):483–501.

Millo, G. (2017). Robust Standard Error Estimators for Panel Models: A Unifying Approach. *Journal of statistical software*, 82.

Mishkin, F. S. (2007). Inflation Dynamics*. *International Finance*, 10(3):317–334. _eprint: https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1468-2362.2007.00205.x.

Modigliani, F. (2005). *The Collected Papers of Franco Modigliani*. The MIT Press.

Mody, A., Ohnsorge, F., and Sandri, D. (2012). Precautionary Savings in the Great Recession. *IMF Economic Review*, 60(1):114–138. Publisher: Palgrave Macmillan Journals.

Mose, N. and Thomi, J. (2022). Inflation and Saving: A puzzle.

Nickell, S. (1981). Biases in Dynamic Models with Fixed Effects. *Econometrica*, 49(6):1417–1426. Publisher: [Wiley, Econometric Society].

Ogaki, M., Ostry, J. D., and Reinhart, C. M. (1996). Saving Behavior in Low- and Middle-Income Developing Countries: A Comparison. *Staff Papers (International Monetary Fund)*, 43(1):38–71. Publisher: Palgrave Macmillan Journals.

Opoku, P. K. (2019). The Short-Run and Long-Run Determinants of Household Saving:Evidence from OECD countries. *Working Papers REM*. Number: 2019/0110 Publisher: ISEG - Lisbon School of Economics and Management, REM, Universidade de Lisboa.

Ostry, J. D. and Levy, J. (1995). Household Saving in France: Stochastic Income and Financial Deregulation. *IMF Staff Papers*, 42(2):375–397. Publisher: Palgrave Macmillan.

Osundina, K. and J.A, O. (2014). Capital Accumulation, Savings and Economic Growth of a Nation – Evidence from Nigeria.

Patinkin, D. and Steiger, O. (1989). In Search of the "Veil of Money" and the "Neutrality of Money": A Note on the Origin of Terms. *The Scandinavian Journal of Economics*, 91(1):131–146. Publisher: [Wiley, The Scandinavian Journal of Economics].

Patra, S., Murthy, D. S., and Biswal, D. A. (2015). Savings-Growth-Inflation nexus in Asia: Panel Data Approach.

Peersman, G. and Pozzi, L. (2008). Business Cycle Fluctuations and Excess Sensitivity of Private Consumption. *Economica*, 75(299):514–523. _eprint: https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1468-0335.2007.00624.x.

Pesaran, M. H. (2007). A Simple Panel Unit Root Test in the Presence of Cross-Section Dependence. *Journal of Applied Econometrics*, 22(2):265–312. Publisher: Wiley.

Salotti, S. (2010). Global imbalances and household savings: The role of wealth. *The Social Science Journal*, 47(1):21–44.

Samantaraya, A. and Patra, S. (2014). Research Article Determinants of Household Savings in India: An Empirical Analysis Using ARDL Approach. *Economics Research International*, 2014.

Sarantis, N. and Stewart, C. (2001). Saving Behaviour in OECD Countries: Evidence from Panel Cointegration Tests. *The Manchester School*, 69(s1):22–41. _eprint: https://onlinelibrary.wiley.com/doi/pdf/10.1111/1467-9957.69.s1.2.

Schmidt-Hebbel, K., Webb, S. B., and Corsetti, G. (1992). Household Saving in Developing Countries: First Cross-Country Evidence. *The World Bank Economic Review*, 6(3):529–47. Publisher: World Bank Group.

Sommer, M. (2007). Habit Formation and Aggregate Consumption Dynamics. *The B.E. Journal of Macroeconomics*, 7(1). Publisher: De Gruyter.

Temple, J. (2000). Inflation and Growth: Stories Short and Tall. *Journal of Economic Surveys*, 14(4):395–426. _eprint: https://onlinelibrary.wiley.com/doi/pdf/10.1111/1467-6419.00116.

Thanh, S. D. (2015). Threshold effects of inflation on growth in the ASEAN-5 countries: A Panel Smooth Transition Regression approach. *Journal of Economics, Finance and Administrative Science*, 20(38):41–48.

Ullah, S., Akhtar, P., and Zaefarian, G. (2018). Dealing with endogeneity bias: The generalized method of moments (GMM) for panel data. *Industrial Marketing Management*, 71:69–78.

von Ungern-Sternberg, T. (1981). Inflation and Savings: International Evidence on Inflation-Induced Income Losses. *The Economic Journal*, 91(364):961–976. Publisher: [Royal Economic Society, Wiley].

Wachtel, P. (1977). Inflation, Uncertainty, and Saving Behavior. *NBER Chapters*, pages 558–578. Publisher: National Bureau of Economic Research, Inc.

Weber, M., Hoang, D., and D'Acunto, F. (2015). Inflation Expectations and Consumption Expenditure. *2015 Meeting Papers*. Number: 1266 Publisher: Society for Economic Dynamics.

Zeldes, S. P. (1989). Consumption and Liquidity Constraints: An Empirical Investigation. *Journal of Political Economy*, 97(2):305–346. Publisher: The University of Chicago Press.

Appendix

A1 Variable definitions

A1.1 Private saving

The private saving rate as a percentage of GDP is the main dependent variable. It is derived residually from the gross national saving rate (GNS) and the gross public saving rate (GPS).[5] Both the GNS and GPS are also reported as a percentage of GDP. GNS comes from the IMF WEO April 2023 database, while GPS is constructed by taking two other measures from the same database: the general government revenue (GGR) minus the general government total expenditure (GGTE).[6] GGR as a revenue measure is the difference between the government's assets and liabilities, and it consists of taxes, social contributions, grants receivable and other revenue. GGTE consists of total expenses and the net acquisition of nonfinancial assets.

A1.2 Inflation

Inflation is the main independent variable, and it is captured by the inflation rate as the annualised percentage change in the CPI, obtained from the World Bank's data. It reflects the annual percentage change in the cost to the average consumer of acquiring a given basket of goods and services, which may be adjusted over time.

A1.3 Control variables

Other conventional saving determinants are used as control variables:

- Real GDP growth rate, in annual percentage, obtained from the World Bank's data. It is based on constant 2015 prices and expressed in US dollars.

[5]Private saving rate = GNS − GPS. When calculating the private saving rate, if country-year observations are missing the GPS observation, only the corresponding GNS observation is used.

[6]GPS = GGR - GGTE.

- Real GDP per capita, in US dollars, was also obtained from the World Bank's data and based on 2015 constant prices. GDP measures the total gross value added by all resident producers in the economy and product taxes, minus subsidies not included. The calculation is done without making any deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.

- The real interest rate comes from OECD data and is expressed as an annual average of 10-year government bond interest rates. The rates are mainly determined by the price charged by the lender, the risk from the borrower and the fall in the capital value. They are averages of daily rates, measured as a percentage. These interest rates are implied by the prices at which the government bonds are traded on financial markets, not the interest rates at issuance.

- The old-age dependency ratio is from the OECD and notes the number of individuals aged 65 and over per 100 working-age individuals, aged 20 to 64. It is impacted by factors such as mortality and fertility rates and migration.

- The terms of trade measure also comes from the OECD, and it is the ratio between the index of export prices and the index of import prices. A positive terms of trade ratio implies that the export prices increase more than the import prices, as for the same amount of exports, a country can purchase more imports.

- Social expenditure notes total gross public social spending as a percentage of GDP, obtained from the OECD Social Expenditure Database.

- Financial liberalisation is proxied by broad money as a percentage of GDP. It expresses the money circulating in the economy in the form of currency, demand deposits and other financial instruments other than from the central government. This variable is constructed as a combination of broad money series from the World Bank's and JST's databases, as each data source had missing data for some countries.

- The public saving rate is noted as a percentage of GDP, and its construction and data source are discussed above.

A1.4 Other saving and inflation measures

- The gross national saving rate is used as an alternative saving measure in robustness checks. It is obtained from the IMF WEO 2023 database and is expressed as a ratio of gross national savings in current local currency and GDP in current local currency. Gross national saving is gross disposable income less final consumption expenditure after adjusting for pension funds.
- The household gross saving rate is used as another saving measure. It is expressed as household saving as a percentage of household disposable income, measuring the proportion of disposable income that is not consumed. It is obtained from the AMECO database. It covers households and non-profit institutions serving households. In addition, it includes the adjustment for the change in net equity of households in pension fund reserves.
- Lastly, an inflation measure from the World Bank's linked GDP deflator series, expressed as the annual growth rate of the implicit GDP deflator in percentage terms, is used as an alternative inflation variable in the robustness checks.

A2 Country abbreviation codes

Table A2.1: Country code abbreviations

	Country	Country code
1	Australia	AUS
2	Austria	AUT
3	Belgium	BEL
4	Canada	CAN
5	Chile	CHL
6	Colombia	COL
7	Costa Rica	CRI
8	Czechia	CZE
9	Denmark	DNK
10	Estonia	EST
11	Finland	FIN
12	France	FRA
13	Germany	DEU
14	Greece	GRC
15	Hungary	HUN
16	Ireland	IRL
17	Iceland	ISL
18	Israel	ISR
19	Italy	ITA
20	Japan	JPN
21	South Korea	KOR
22	Latvia	LVA
23	Lithuania	LTU
24	Luxembourg	LUX
25	Mexico	MEX
26	Netherlands	NLD
27	New Zealand	NZL
28	Norway	NOR
29	Poland	POL
30	Portugal	PRT
31	Slovakia	SVK
32	Slovenia	SVN
33	Spain	ESP
34	Sweden	SWE
35	Switzerland	CHE
36	United Kingdom	GBR
37	United States	USA

A3 Sample coverage

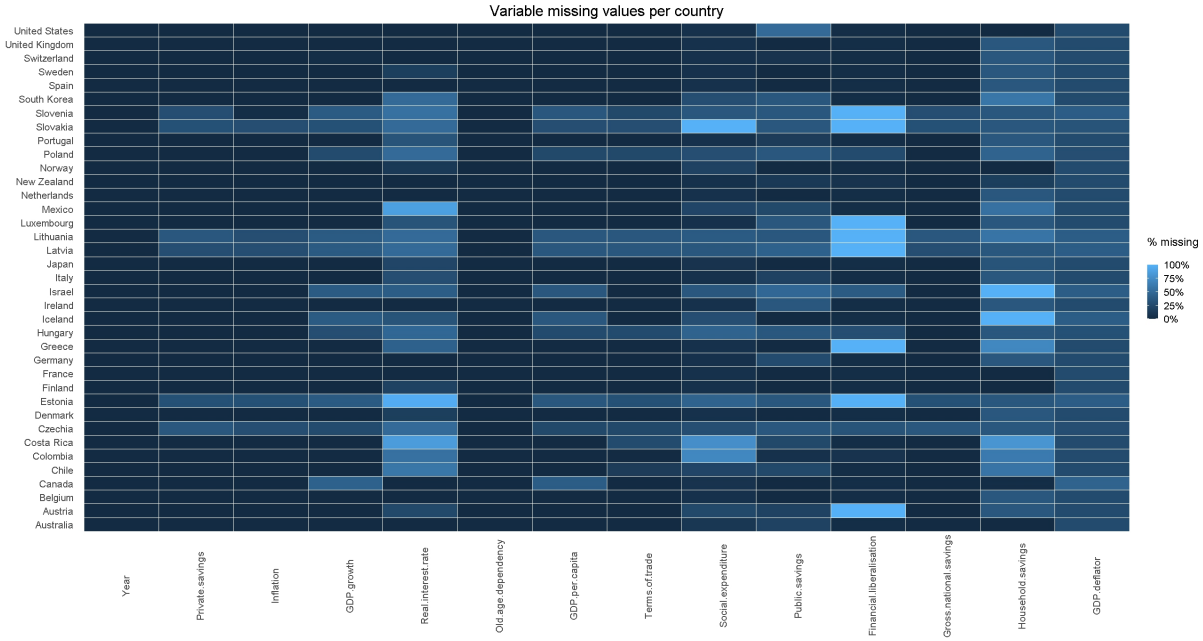

Figure A3.1: Sample coverage by countries

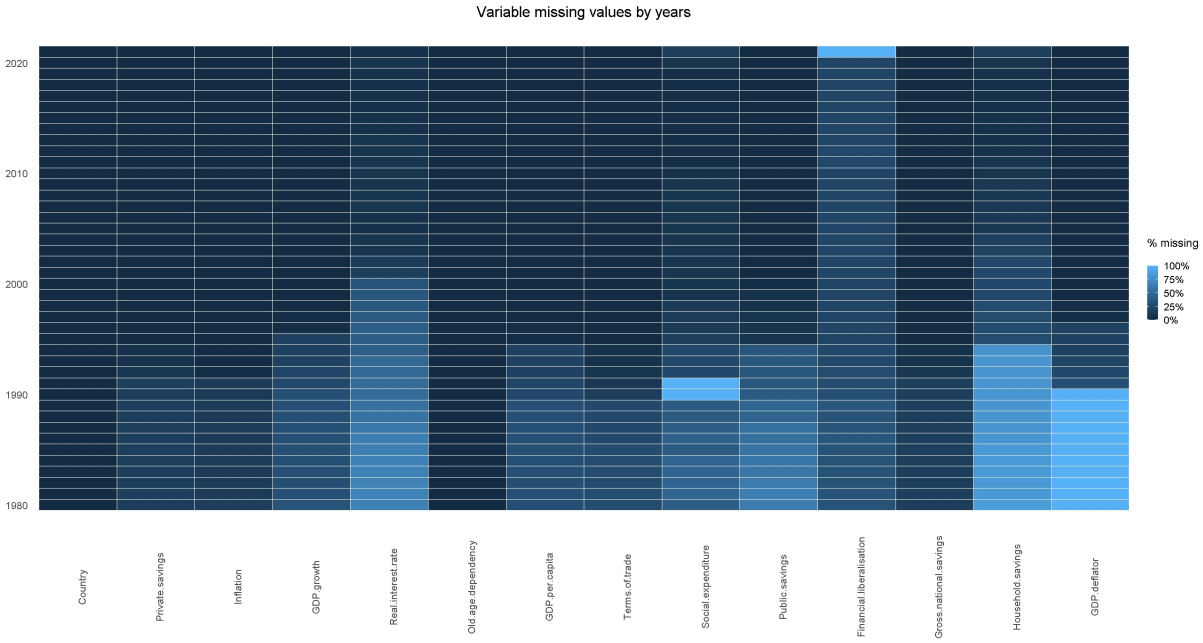

Figure A3.2: Sample coverage by years

A4 Stationarity tests

Panel unit root tests

Variable	Test	Constant in levels statistic	Constant in 1st diff. statistic	Constant and trend in levels statistic	Constant and trend in 1st diff. statistic
Private saving	Im et al. (2003)	-4.089 * * *	-21.173 * * *	-7.91 * * *	-21.957 * * *
Private saving	Maddala and Wu (1999)	110.176 * * *	615.876 * * *	114.813 * * *	528.442 * * *
Private saving	Peseran (2007)	-2.614 .	-4.818 * *	-2.614 .	-4.818 * *
Inflation, CPI	Im et al. (2003)	-13.953 * * *	-22.632 * * *	-13.711 * * *	-24.813 * * *
Inflation, CPI	Maddala and Wu (1999)	367.534 * * *	682.659 * * *	264.037 * * *	641.586 * * *
Inflation, CPI	Peseran (2007)	-3.665 * *	-5.287 * *	-3.665 * *	-5.287 * *
Real GDP growth	Im et al. (2003)	-13.857 * * *	-28.971 * * *	-16.616 * * *	-28.92 * * *
Real GDP growth	Maddala and Wu (1999)	338.536 * * *	971.519 * * *	331.747 * * *	823.743 * * *
Real GDP growth	Peseran (2007)	-3.599 * *	-5.708 * *	-3.599 * *	-5.708 * *
Log real GDP per capita	Im et al. (2003)	-1.173	-13.751 * * *	-2.466 * *	-17.14 * * *
Log real GDP per capita	Maddala and Wu (1999)	84.426 * *	338.504 * * *	40.422	354.254 * * *
Log real GDP per capita	Peseran (2007)	-1.279 .	-3.627 * *	-1.279 .	-3.627 * *
Real interest rate	Im et al. (2003)	-1.19	-20.871 * * *	-9.374 * * *	-22.273 * * *
Real interest rate	Maddala and Wu (1999)	72.492 *	626.089 * * *	141.035 * * *	562.277 * * *
Real interest rate	Peseran (2007)	-3.004 * *	-4.711 * *	-3.004 * *	-4.711 * *
Old-age dependency	Im et al. (2003)	9.848	-3.103 * * *	-1.766 *	-7.443 * * *
Old-age dependency	Maddala and Wu (1999)	17.558	123.902 * * *	97.782 * * *	121.423 * * *
Old-age dependency	Peseran (2007)	-2.78 *	-2.717 *	-2.78 *	-2.717 *
Log terms of trade	Im et al. (2003)	-2.17 *	-19.231 * * *	-7.365 * * *	-20.506 * * *
Log terms of trade	Maddala and Wu (1999)	100.663 * * *	537.448 * * *	103.091 * * *	473.426 * * *
Log terms of trade	Peseran (2007)	-2.314 .	-4.161 * *	-2.314 .	-4.161 * *
Financial liberalisation	Im et al. (2003)	10.934	-10.184 * * *	0.314	-13.131 * * *
Financial liberalisation	Maddala and Wu (1999)	9.825	272.782 * * *	42.954	250.066 * * *
Financial liberalisation	Peseran (2007)	-2.07 .	-3.876 * *	-2.07 .	-3.876 * *
Social expenditure	Im et al. (2003)	2.497	-14.355 * * *	-4.662 * * *	-16.044 * * *
Social expenditure	Maddala and Wu (1999)	42.224	380.639 * * *	67.673 .	337.499 * * *
Social expenditure	Peseran (2007)	-1.722 .	-3.4 * *	-1.722 .	-3.4 * *
Public saving	Im et al. (2003)	-7.232 * * *	-18.015 * * *	-8.649 * * *	-18.547 * * *
Public saving	Maddala and Wu (1999)	155.476 * * *	496.028 * * *	130.029 * * *	404.385 * * *
Public saving	Peseran (2007)	-2.239 .	-4.377 * *	-2.239 .	-4.377 * *
Gross national saving	Im et al. (2003)	-4.982 * * *	-20.261 * * *	-7.809 * * *	-20.939 * * *
Gross national saving	Maddala and Wu (1999)	132.432 * * *	586.876 * * *	131.329 * * *	495.676 * * *
Gross national saving	Peseran (2007)	-2.338 .	-4.683 * *	-2.338 .	-4.683 * *
Inflation, GDP deflator	Im et al. (2003)	-12.29 * * *	-22.543 * * *	-11.764 * * *	-24.542 * * *
Inflation, GDP deflator	Maddala and Wu (1999)	320.772 * * *	703.645 * * *	235.496 * * *	658.969 * * *
Inflation, GDP deflator	Peseran (2007)	-3.081 * *	-4.835 * *	-3.081 * *	-4.835 * *
Household saving	Im et al. (2003)	-2.07 *	-11.613 * * *	-3.784 * * *	-14.323 * * *
Household saving	Maddala and Wu (1999)	75.663 * *	280.1 * * *	75.138 * *	275.276 * * *
Household saving	Peseran (2007)	-2.476 .	-3.846 * *	-2.476 .	-3.846 * *

.p < 0.1; *p < 0.05; **p < 0.01, ***p < 0.001 denote
rejection of the null hypothesis of a unit root at the 10%, 5%, 1% and 0.1% signifcance levels.
All tests use one lag. Maddala and Wu (1999) test uses Chi-square statistic.
Im et al. (2003) and Peseran (2007) use Ztbar. Household saving tests exclude Iceland and Israel because of missing data.

Figure A4.1: Panel unit root tests

A5 Other robustness checks

Another robustness check adds different control variables iteratively to the base model of lag private saving and inflation while employing Driscoll and Kraay (1998) robust standard errors in Table A5.1 and Arellano (1987) standard errors in Table A5.2. The main difference is that in the case of Arellano (1987) standard errors, now in the model without social expenditure and public saving, the inflation term is negative and significant at the 5% level, while it is negative and significant for the models with fewer controls (models (3) to (6)).

Table A5.1: Baseline estimates with controls added iteratively, and Driscoll and Kraay (1998) standard errors

	Dependent variable:								
	Private saving								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Lag private saving	0.765***	0.751***	0.743***	0.697***	0.689***	0.689***	0.684***	0.670***	0.498***
	(0.042)	(0.044)	(0.045)	(0.059)	(0.060)	(0.059)	(0.055)	(0.058)	(0.080)
Inflation	−0.009	0.014	0.021	−0.109	−0.104	−0.106	−0.107	−0.077	−0.060
	(0.038)	(0.045)	(0.044)	(0.082)	(0.083)	(0.081)	(0.079)	(0.077)	(0.076)
Real GDP growth		0.108*	0.110*	−0.0002	0.007	0.006	−0.006	0.039	0.097**
		(0.061)	(0.062)	(0.044)	(0.044)	(0.044)	(0.046)	(0.051)	(0.041)
Log real GDP per capita			0.899	3.848***	3.234***	3.063***	3.350***	4.541***	2.450**
			(0.609)	(1.095)	(1.011)	(1.041)	(1.046)	(1.325)	(0.965)
Real interest rate				0.046	0.053	0.048	0.065	0.089	−0.079
				(0.093)	(0.092)	(0.094)	(0.096)	(0.102)	(0.086)
Old-age dependency					−0.078**	−0.092***	−0.075**	−0.128***	0.007
					(0.036)	(0.030)	(0.035)	(0.036)	(0.034)
Log terms of trade						−0.694	−0.461	−0.253	1.837*
						(0.752)	(0.748)	(0.890)	(1.115)
Financial liberalisation							−0.015	−0.012	−0.038***
							(0.010)	(0.010)	(0.010)
Social expenditure								0.138***	−0.164**
								(0.049)	(0.069)
Public saving									−0.437***
									(0.067)
Observations	1,034	981	981	860	860	860	832	797	742
R^2	0.603	0.591	0.592	0.560	0.563	0.564	0.562	0.562	0.595
Adjusted R^2	0.576	0.561	0.562	0.521	0.524	0.524	0.521	0.519	0.551
F Statistic	734.107*** (df = 2; 966)	440.041*** (df = 3; 912)	331.022*** (df = 4; 911)	200.891*** (df = 5; 789)	169.301*** (df = 6; 788)	145.211*** (df = 7; 787)	121.784*** (df = 8; 759)	103.386*** (df = 9; 725)	98.251*** (df = 10; 669)
Note:	*p<0.1; **p<0.05; ***p<0.01								
	Driscoll and Kraay (1998) standard errors in parantheses.								

Table A5.2: Baseline estimates with controls added iteratively and Arellano (1987) standard errors

	Dependent variable:								
	Private saving								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Lag private saving	0.765***	0.751***	0.743***	0.697***	0.689***	0.689***	0.684***	0.670***	0.498***
	(0.023)	(0.020)	(0.019)	(0.035)	(0.036)	(0.037)	(0.042)	(0.043)	(0.068)
Inflation	−0.009	0.014	0.021	−0.109*	−0.104*	−0.106*	−0.107**	−0.077	−0.060
	(0.023)	(0.026)	(0.028)	(0.057)	(0.056)	(0.056)	(0.054)	(0.050)	(0.089)
Real GDP growth		0.108**	0.110**	−0.0002	0.007	0.006	−0.006	0.039	0.097***
		(0.046)	(0.045)	(0.042)	(0.044)	(0.044)	(0.047)	(0.044)	(0.037)
Log real GDP per capita			0.899	3.848**	3.234*	3.063*	3.350**	4.541***	2.450*
			(1.296)	(1.907)	(1.858)	(1.732)	(1.649)	(1.741)	(1.418)
Real interest rate				0.046	0.053	0.048	0.065	0.089	−0.079
				(0.080)	(0.081)	(0.080)	(0.087)	(0.084)	(0.114)
Old-age dependency					−0.078**	−0.092**	−0.075	−0.128**	0.007
					(0.033)	(0.045)	(0.052)	(0.052)	(0.072)
Log terms of trade						−0.694	−0.461	−0.253	1.837
						(1.152)	(1.207)	(1.109)	(1.483)
Financial liberalisation							−0.015	−0.012	−0.038**
							(0.009)	(0.010)	(0.016)
Social expenditure								0.138***	−0.164**
								(0.036)	(0.070)
Public saving									−0.437***
									(0.076)
Observations	1,034	981	981	860	860	860	832	797	742
R^2	0.603	0.591	0.592	0.560	0.563	0.564	0.562	0.562	0.595
Adjusted R^2	0.576	0.561	0.562	0.521	0.524	0.524	0.521	0.519	0.551
F Statistic	734.107*** (df = 2; 966)	440.041*** (df = 3; 912)	331.022*** (df = 4; 911)	200.891*** (df = 5; 789)	169.301*** (df = 6; 788)	145.211*** (df = 7; 787)	121.784*** (df = 8; 759)	103.386*** (df = 9; 725)	98.251*** (df = 10; 669)

Note: *p<0.1; **p<0.05; ***p<0.01
Arellano (1987) standard errors in parantheses.

Table A5.3: Baseline estimates with and without log transformations

	Dependent variable:	
	Private saving	
	(1)	(2)
Lag private saving	0.477***	0.498***
	(0.080)	(0.080)
Inflation	−0.088	−0.060
	(0.078)	(0.076)
Real GDP growth	0.070*	0.097**
	(0.039)	(0.041)
Real GDP per capita	0.0001***	
	(0.00003)	
Log real GDP per capita		2.450**
		(0.965)
Real interest rate	−0.114	−0.079
	(0.080)	(0.086)
Old-age dependency	0.065*	0.007
	(0.039)	(0.034)
Terms of trade	0.021**	
	(0.010)	
Log terms of trade		1.837*
		(1.115)
Financial liberalisation	−0.037***	−0.038***
	(0.010)	(0.010)
Social expenditure	−0.140**	−0.164**
	(0.056)	(0.069)
Public saving	−0.444***	−0.437***
	(0.067)	(0.067)
Observations	742	742
R^2	0.605	0.595
Adjusted R^2	0.562	0.551
F Statistic (df = 10; 669)	102.255***	98.251***

Note: *p<0.1; **p<0.05; ***p<0.01
Driscoll and Kraay (1998) standard errors in parantheses.

Table A5.4: Estimates for two time periods with full sample

	Dependent variable:	
	Private saving	
	1980-2000	2001-2021
	(1)	(2)
Lag private saving	0.332***	0.390***
	(0.081)	(0.105)
Inflation	0.179**	−0.312***
	(0.083)	(0.063)
Real GDP growth	0.147**	0.078*
	(0.069)	(0.046)
Log real GDP per capita	−3.744	4.625***
	(3.749)	(1.146)
Real interest rate	−0.110	−0.155
	(0.114)	(0.102)
Old-age dependency	0.169	0.164***
	(0.124)	(0.064)
Log terms of trade	−0.187	3.689***
	(1.360)	(1.055)
Social expenditure	−0.155***	−0.199**
	(0.057)	(0.078)
Financial liberalisation	−0.040***	−0.051**
	(0.008)	(0.021)
Public saving	−0.525***	−0.542***
	(0.086)	(0.075)
Observations	229	510
R^2	0.675	0.562
Adjusted R^2	0.591	0.508
F Statistic	37.627*** (df = 10; 181)	58.084*** (df = 10; 453)
Note:	*p<0.1; **p<0.05; ***p<0.01	
	Driscoll and Kraay (1998) standard errors in parentheses.	

Table A5.5: Baseline model difference GMM estimates

	Dependent variable private saving
	Model 1
Lag private saving	0.017
	(0.108)
Inflation	−0.050
	(0.171)
Real interest rate	−0.285
	(0.191)
Real GDP growth	0.063
	(0.090)
Old-age dependency	0.225
	(0.300)
Log terms of trade	7.778
	(12.501)
Financial liberalisation	0.028
	(0.080)
Social expenditure	−0.367
	(0.524)
Public saving	−0.800***
	(0.145)
n	26
T	42
Num. obs.	1065
Num. obs. used	701
Sargan Test: chisq	17.299
Sargan Test: df	289.000
Sargan Test: p-value	1.000
Wald Test Coefficients: chisq	228.065
Wald Test Coefficients: df	10
Wald Test Coefficients: p-value	0.000

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$. Second to ninth lags used for private saving. Inflation, real GDP growth, log real GDP per capita, real interest rate, financial liberalisation, social expenditure and public saving are treated as endogenous and instrumented with their first lags. Time fixed effects are not included.

Table A5.6: Baseline model system GMM estimates

	Dependent variable private savings
	Model 1
Lag private saving	0.559***
	(0.209)
Inflation	−0.170
	(0.219)
Real interest rate	−0.024
	(0.286)
Real GDP growth	−0.029
	(0.159)
Old-age dependency	−0.470
	(0.393)
Log terms of trade	−5.335
	(6.087)
Financial liberalisation	0.077
	(0.049)
Social expenditure	0.340
	(0.306)
Public saving	−0.235**
	(0.118)
n	26
T	42
Num. obs.	1065
Num. obs. used	1443
Sargan Test: chisq	18.845
Sargan Test: df	336.000
Sargan Test: p-value	1.000
Wald Test Coefficients: chisq	16963.103
Wald Test Coefficients: df	10
Wald Test Coefficients: p-value	0.000

$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$. Second to ninth lags used for private saving. Inflation, real GDP growth, log real GDP per capita, real interest rate, financial liberalisation, social expenditure and public saving are treated as endogenous and instrumented with their first lags. Time fixed effects are not included.

A6 Variable time series plots

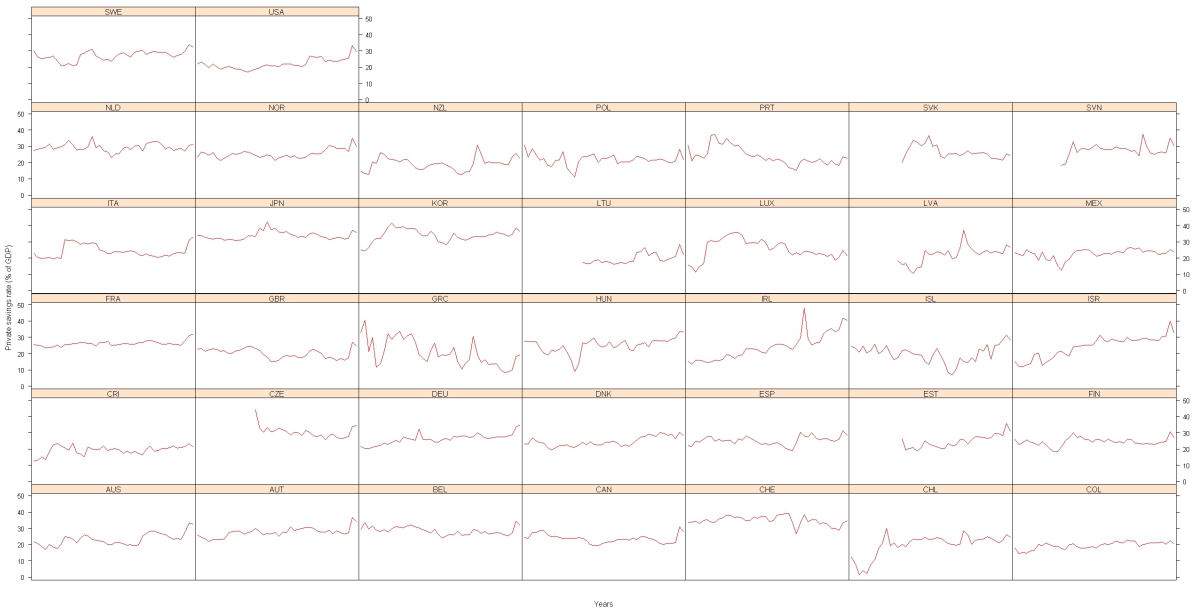

Figure A6.1: Private saving rate per country from 1980 to 2021

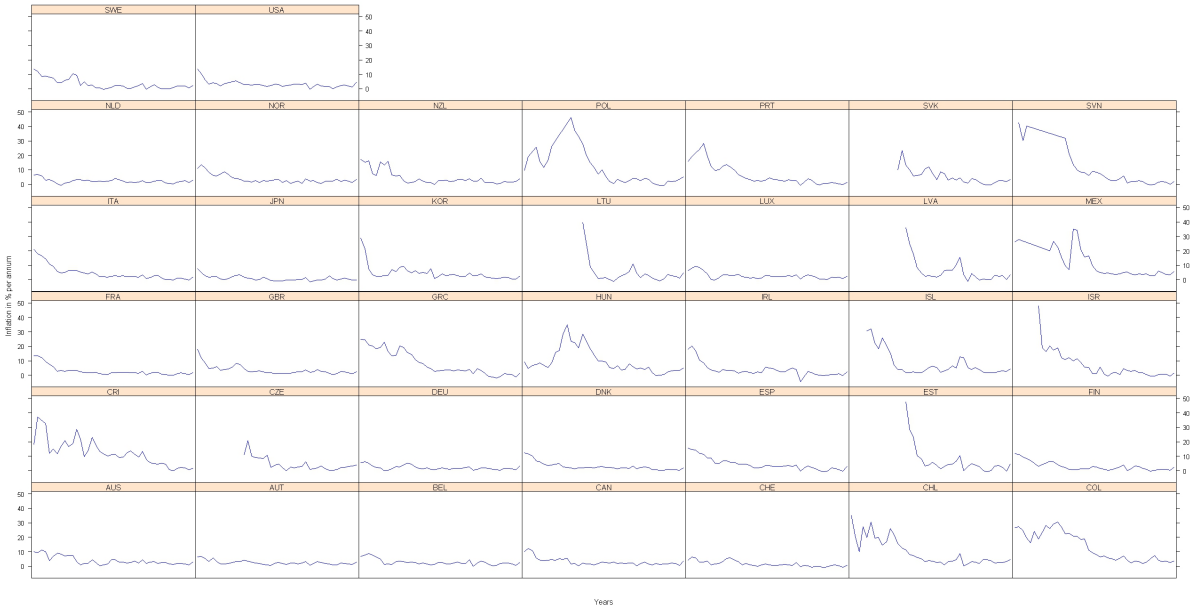

Figure A6.2: Inflation per country from 1980 to 2021

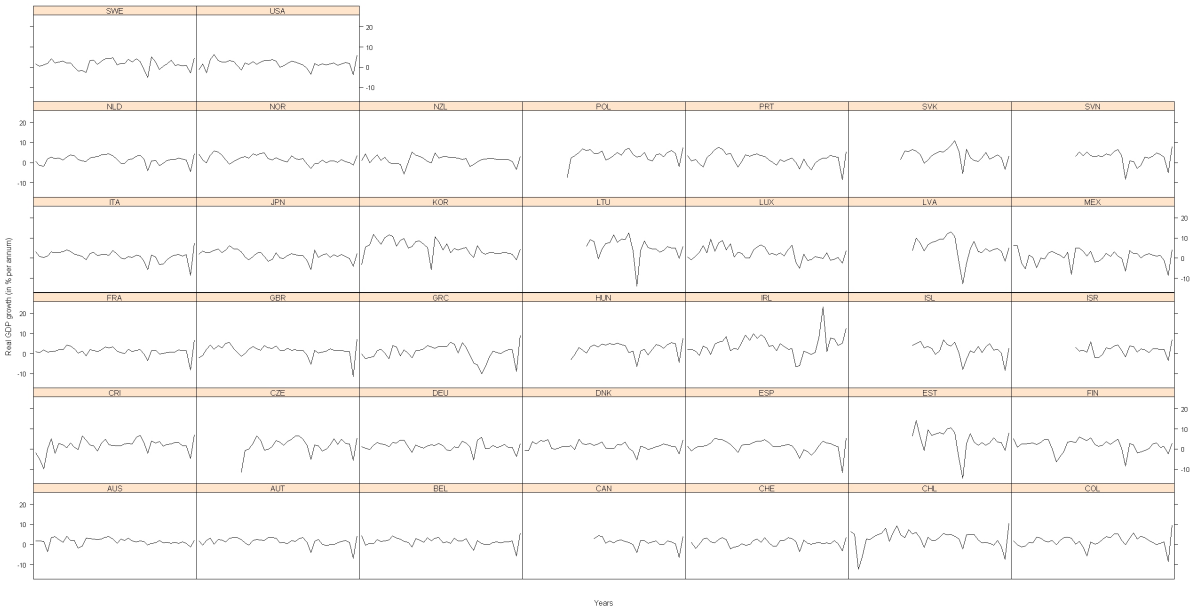

Figure A6.3: Real GDP growth per country from 1980 to 2021

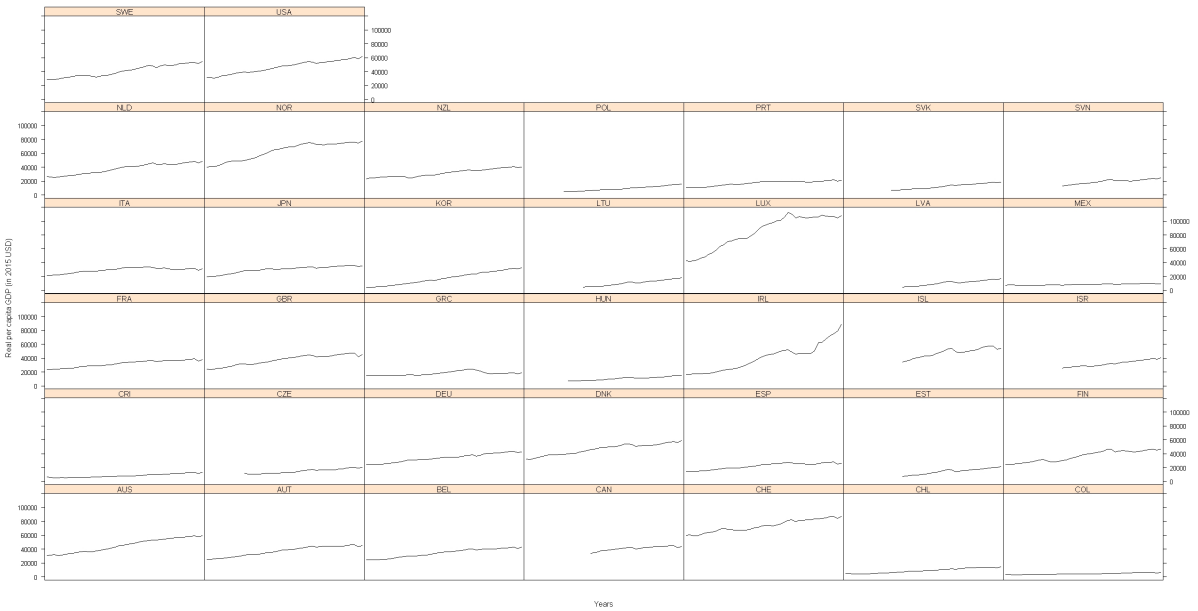

Figure A6.4: Real GDP per capita per country from 1980 to 2021

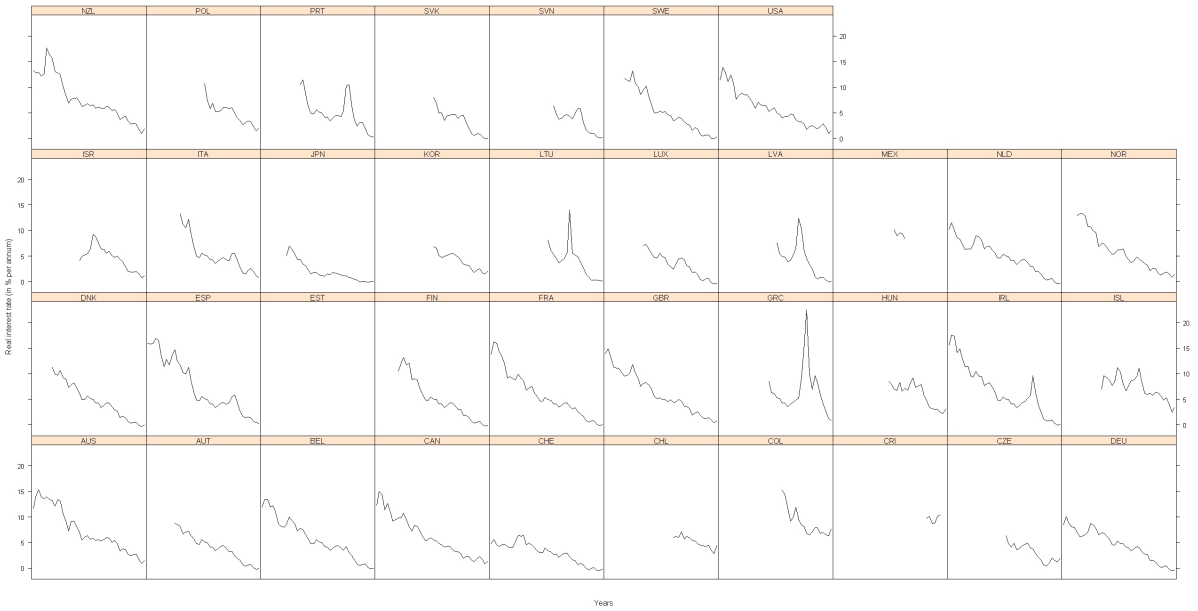

Figure A6.5: Real interest rate per country from 1980 to 2021

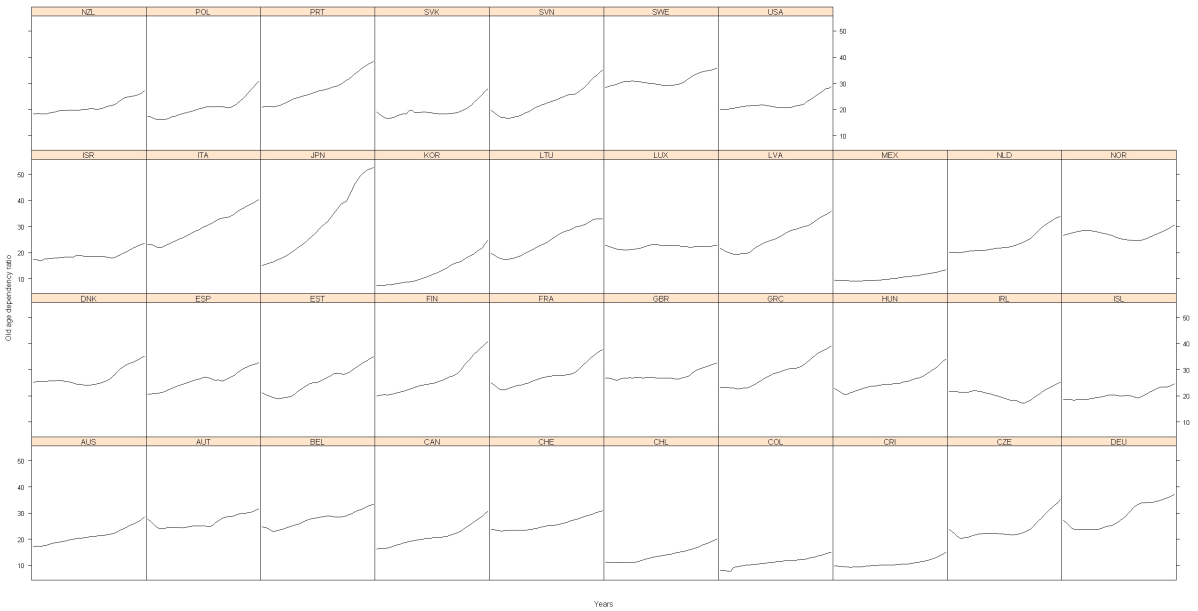

Figure A6.6: Old-age dependency ratio per country from 1980 to 2021

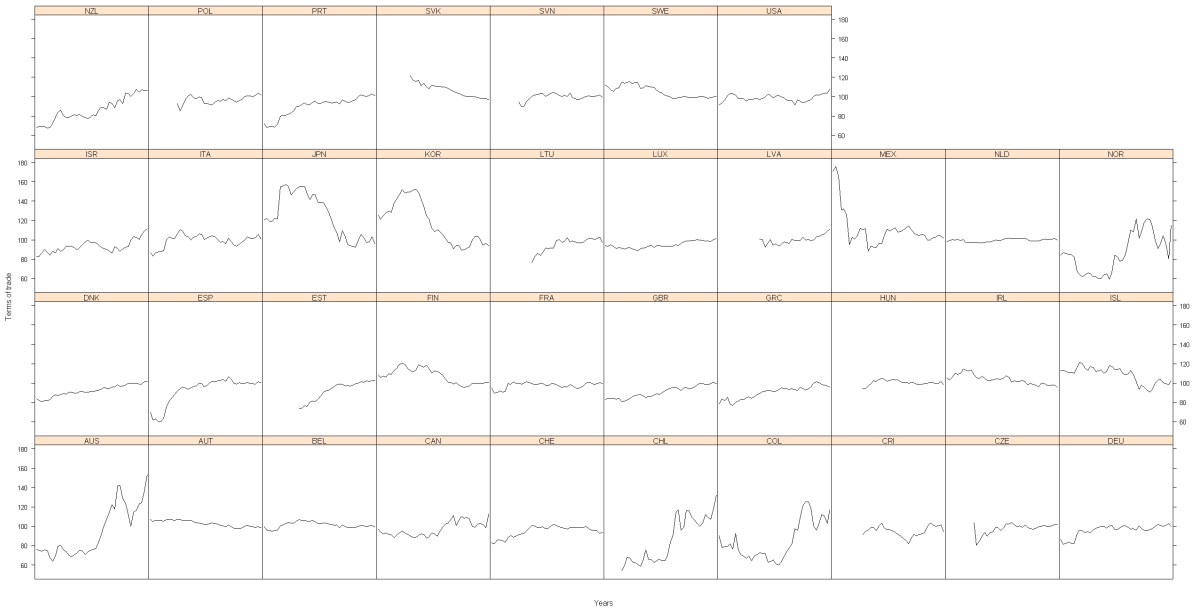

Figure A6.7: Terms of trade per country from 1980 to 2021

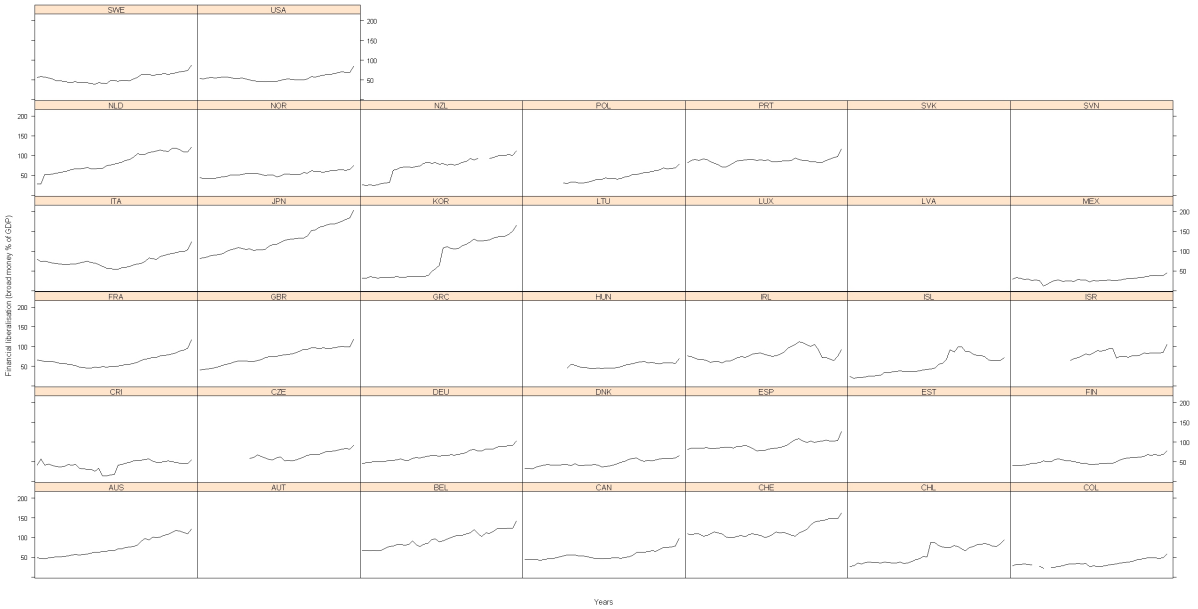

Figure A6.8: Broad money per country from 1980 to 2021

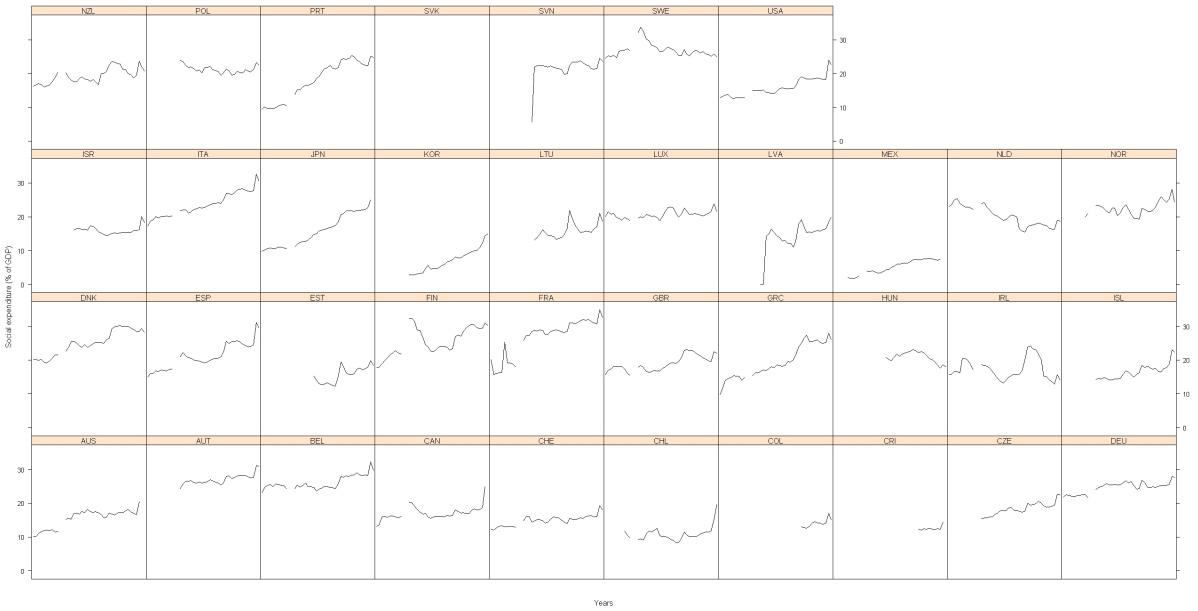

Figure A6.9: Social expenditure per country from 1980 to 2021

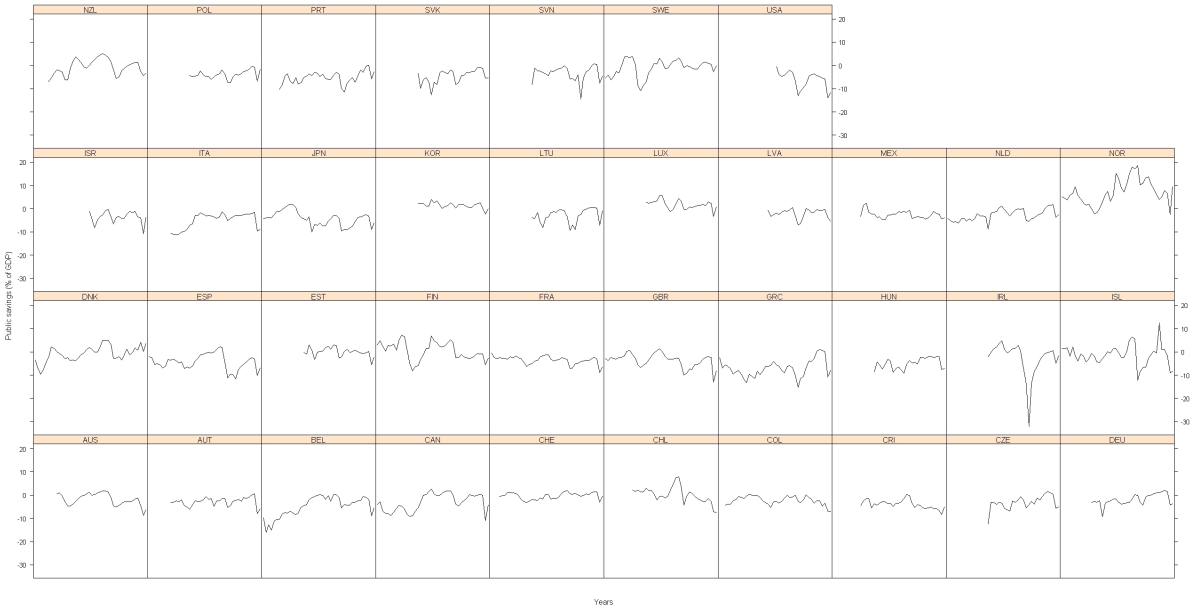

Figure A6.10: Public saving per country from 1980 to 2021

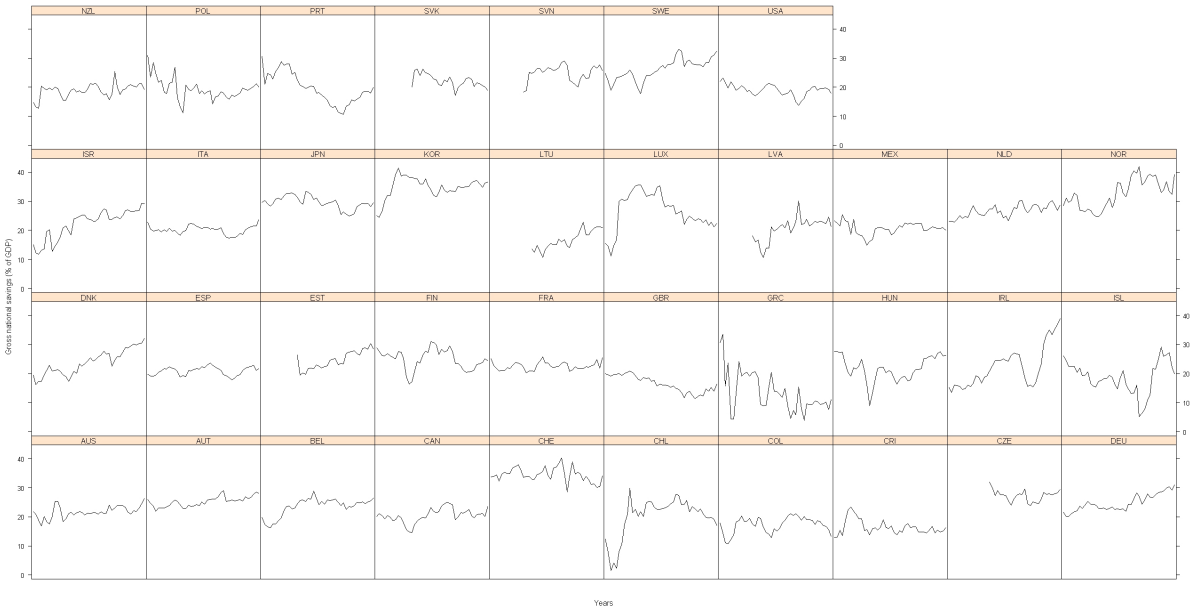

Figure A6.11: Gross national saving per country from 1980 to 2021

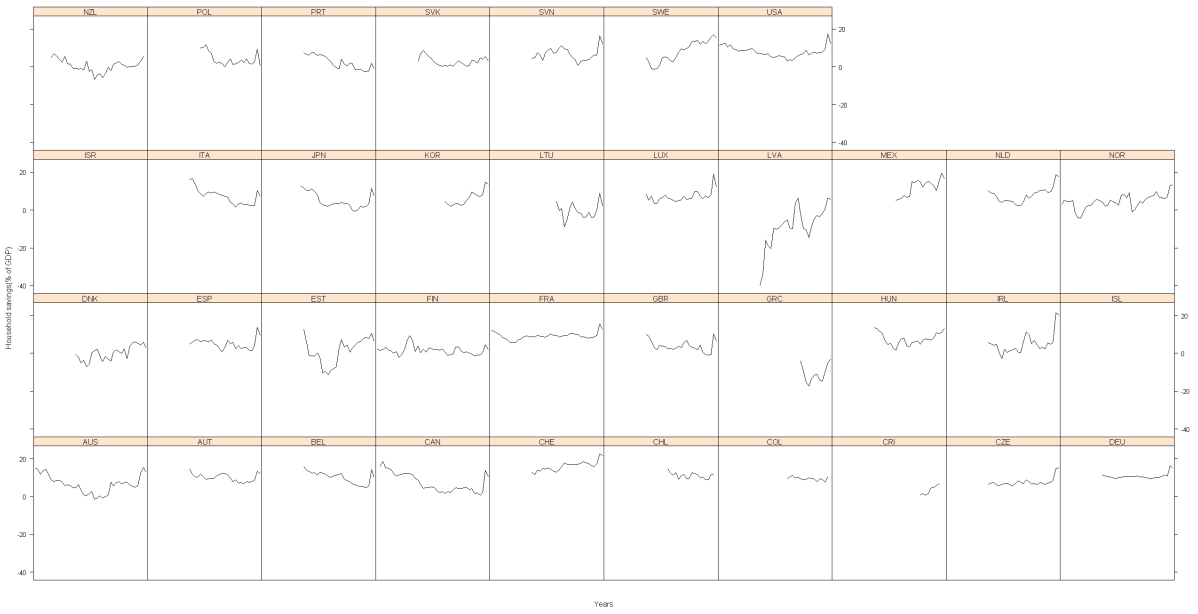

Figure A6.12: Household saving per country from 1980 to 2021

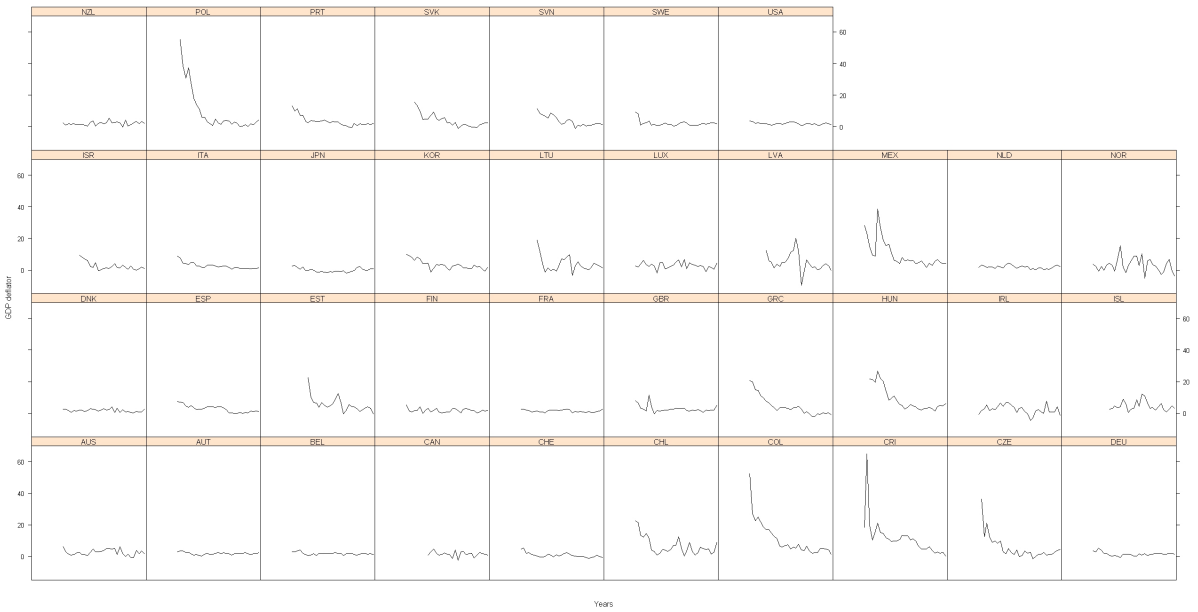

Figure A6.13: GDP deflator per country from 1980 to 2021