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Money Demand and Income Inequality: International Evidence using a Century of Data

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Money Demand and Income Inequality: International Evidence using a Century of Data

Guillermo Gallacher*

November 19, 2021

Abstract

Transactions and precautionary theories of money demand imply that aggregate money demand declines as income becomes more unequally distributed. In this paper I test this prediction using money demand regressions and find mixed results. Focusing first in the USA for the 1913-2016 period, I find support of the theory (a statistically significant and negative coefficient on top 1% and top 10% income shares) under the specification in levels for the whole period. For the regression in first difference, I find a statistically significant relationship for the Bretton Woods period (1945-1973), but not for the entire sample nor other historical periods such as the war and inter-war period (1914-1944) and the great moderation (1985-2007). Bootstrap regressions furthermore also provide support under some specifications in levels, but suggest a lack of relationship in the first difference form. I then explore the international evidence, using an unbalanced panel of 18 countries for the 1913-2016 period. The panel regression in levels supports the theory but the first difference specification contradicts it. Furthermore, there is considerable country heterogeneity. I argue that the link between money demand and inequality have important implications for the distributional impact of monetary policy. This is mainly due to the fact non-linearities in money demand imply that the inflation tax is regressive.

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1 Introduction

Laidler [1985] points out that the "key prediction of transactions and precautionary theories (of money demand) is that there should exist economies of scale in money holding, particularly where narrow money is concerned". Because transactions theories imply that high-income households hold less money relative to income than do low-income households, such theories imply that money demand declines as aggregate income becomes more unequally distributed (Cover and Hooks [1993]).[1] The theory thus predict a negative relationship between inequality and aggregate money demand.

In this paper I test this prediction using money demand regressions and find mixed results. Focusing first in the USA for the 1913-2016 period, I find support of the theory (a statistically significant and negative coefficient on top 1% and top 10% income shares) under the specification in levels for the whole period. For the regression in first difference, I find a statistically significant relationship for the Bretton Woods period (1945-1973), but not for the entire sample nor other historical periods such as the war and inter-war period (1914-1944) and the great moderation (1985-2007). Bootstrap regressions furthermore also provide support under some specifications in levels, but suggest a lack of relationship in the first difference form.

I then explore the international evidence, using an unbalanced panel of 18 countries for the 1913-2016 period. The panel regression in levels supports the theory but the first difference specification contradicts it. Furthermore, there is considerable country heterogeneity. I argue that the link between money demand and inequality have important implications for the distributional impact of monetary policy. This is mainly due to the fact non-linearities in money demand imply that the inflation tax is regressive.

Related Literature The literature on money demand is vast (see Lucas and Nicolini [2015]; Ireland [2015] and references therein). However only Cover and Hooks [1993] have empirically studied the relationship between money demand and income inequality before: using data for USA for the 1947-1988 period they find that the Gini Coefficient is statistically significant but that the correlation with real money balances is opposite of what theory predicts. Relative to Cover and Hooks [1993] my paper includes several countries and a longer time period (I use top income share to proxy income inequality). Contrary to them, I find partial support of the monetary theory prediction on the link between aggregate money demand and inequality.

My paper complements micro-data studies of money holdings, such as (Lippi and Secchi [2009] for Italian data and and Ragot [2014] in the USA. Furthermore, my findings are relevant for heterogeneus agent macroeconomic models, particularly pointing to the relevance of including non-homotheticities in

[1] A formal proof can be found in Pfähler and Wiese [1990]. In general, anytime individual demand functions are nonlinear, the aggregate demand is a function of the distribution of income (Bertola et al. [2014]).

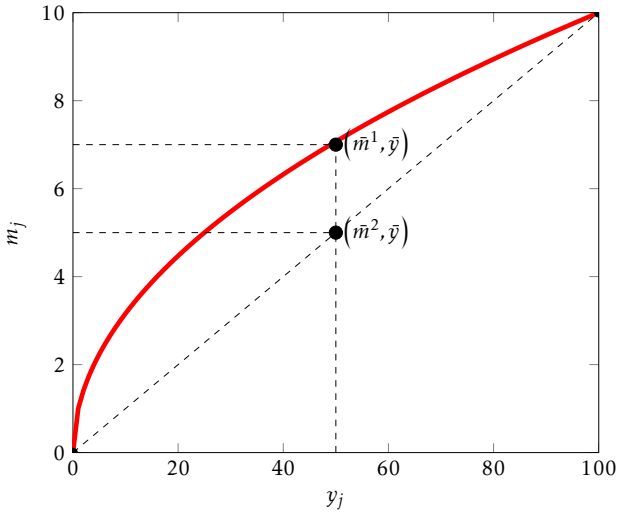


Figure 1: Mean Preserving Spread and (Average) Aggregate Money Demand

money demand functions, as in Algan et al. [2013].

The rest of the paper proceeds as follows: in Section (2) I provide a brief overview on the theoretical prediction on the link between monetary aggregates and inequality. In Section (3) I describe the data sources and perform the empirical analysis. I then conclude.

2 Money Demand and Income Inequality

Consider an economy with agents/households labeled $j = 1, 2, ..., N$ who demand money according to the Baumol-Tobin function (Baumol [1952]; Tobin [1956]). Therefore, real money demand for agent j at time t is:

$$m_t^j = \sqrt{\frac{by_t^j}{2i_t}} \tag{1}$$

where y_t^j is real income of household j, i_t is the nominal interest rate and b is a transaction cost. Now, consider aggregation: let $M_t = \sum_{j=1}^{N} m_t^j$ be the aggregate level of real money balances,

$$M_t = \sum_{j=1}^{N} \left(\frac{by_t^j}{2i_t} \right)^{.5} = \left(\frac{b}{2i_t} \right)^{.5} \sum_{j=1}^{N} \left(y_t^j \right)^{.5} \tag{2}$$

By Jensen's Inequality, it follows that for a given aggregate income, higher income inequality leads to lower aggregate money demand: in particular, aggregate money demand reaches a maximum in a "perfectly equal" society and a minimum in a "perfectly unequal" society.

To see this, consider a simple two agent example, illustrated in Figure (1). Consider a simplified concave money demand function $m_t^j = \sqrt{y_t^j}$ with $j = poor, rich$. Consider two cases (or periods, $t = 1, 2$). In the first, $\left(y_1^{poor}, y_1^{rich}\right) = (50, 50)$ while in the second $\left(y_2^{poor}, y_2^{rich}\right) = (0, 100)$. Observe that aggregate (and thus average) income has not changed $\bar{y}_1 = \bar{y}_2 = \frac{100}{2} = 50$ but income inequality (standard deviation, for instance) has increased $\sigma_1 < \sigma_2$. Crucially, aggregate (and thus average) money demand decreases, $M_1 = \sqrt{50} + \sqrt{50} = 14 > 10 = \sqrt{0} + \sqrt{100} = M_2$. Thus, inequality and aggregate money demand move in opposite directions: a higher inequality reduces aggregate money demand (conditional on the aggregate output and the interest rate).

The equilibrium relationship between the quantity of money and inequality, however, will depend on the nature of monetary policy, as I illustrate in Figure (2). Let M_t^D be aggregate money demand, M_t^S be money supply and M_t be the equilibrium quantity of money. As before, assume that inequality increased $\sigma_1 < \sigma_2$, and thus that aggregate money demand shifted inwards from $M^D(\sigma_1)$ to $M^D(\sigma_2)$: for a given interest rate, there is a lower demand for money. What is the equilibrium quantity of money? Assuming an exogenous money supply ($M_t^S = \bar{M}$) would imply that higher inequality is associated with a lower interest rate, but the same quantity of money (moving from point A to B). If on the other hand monetary policy follows an interest rate rule ($i_t = \bar{i}$) a higher inequality would result in a lower aggregate quantity of money but the same interest rate (moving from point A to C).

In equilibrium, then the nominal aggregate quantity of money (M_t) increases with nominal aggregate income (Y_t), decreases with the interest rate (i_t), and decreases with income inequality (σ_t). We can summarize the signs of this relationship with the following implicit function:

$$M_t = f\left(\underset{+}{Y_t}, \underset{-}{i_t}, \underset{-}{\sigma_t}\right) \tag{3}$$

3 Empirical Analysis

3.1 Data Source

The most relevant definition of money for this study is M1. For the USA, I construct the historical monetary aggregate time series by merging the pre-1960 data available in Anderson [2003] (estimates by Friedman and Schwartz [1963] and Rasche [1987]) with more recent data from the FRED St. Louis Fed database.

I also use data from the Macrohistory Database (Jordà et al. [2017]). There is however some discrepancy with the monetary aggregates definitions in the Macrohistory database. According to the Macrohistory documentation, narrow money is defined as the monetary base in some countries (USA, Norway, Sweden), M1

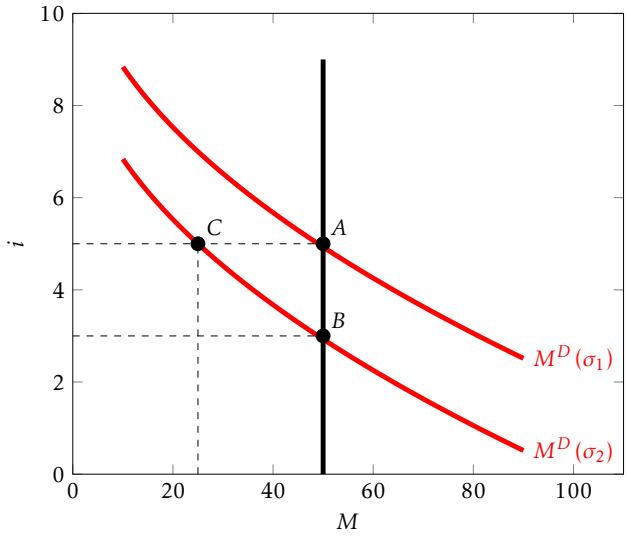


Figure 2: Interest Rates, Money Demand and Inequality

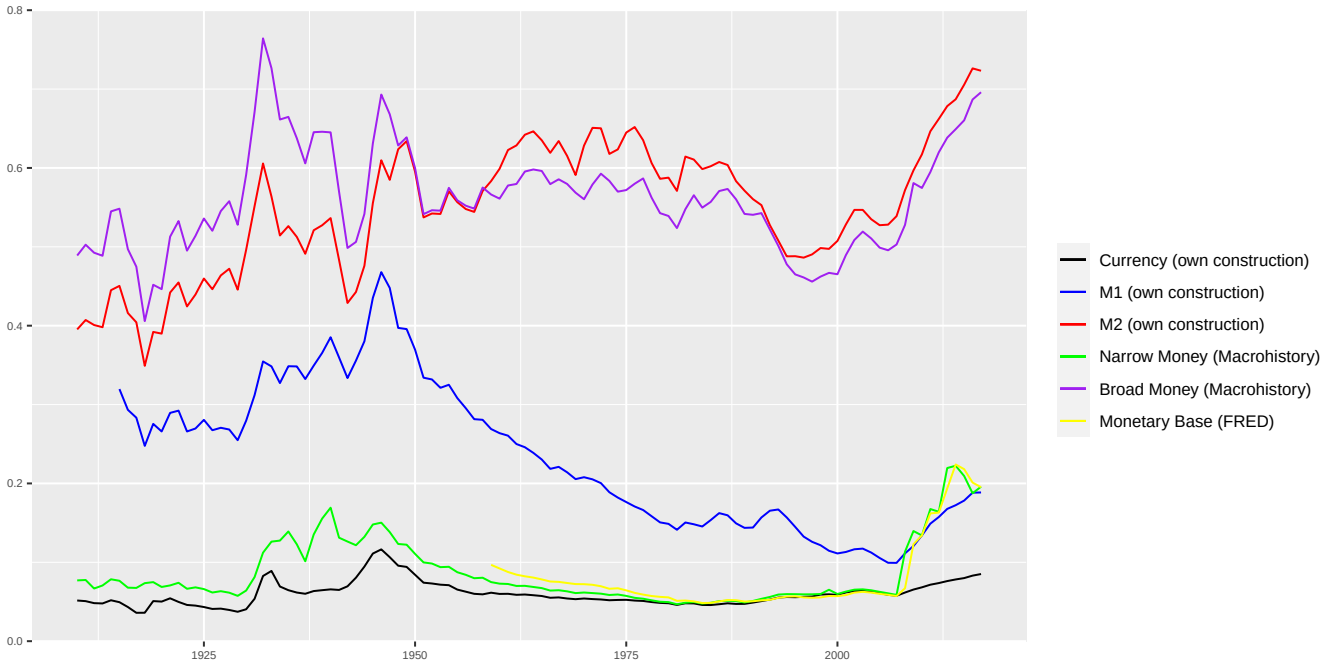
in others (Australia, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, Portugal, Spain, Switzerland) and currency in circulation in others (UK). Furthermore, the broad money variable in the Macrohistory database also shows inconsistencies, as it can be -depending on the country- either M2, M3 or M4. Hence the reason for my own construction of M1 in the USA. From the Macrohistory database, I also use nominal data for narrow money, broad money, GDP and short term nominal interest rates, long term interest rates. I also use data for real consumption per capita and population.

In Figure (3) I plot the different money estimates for the USA, as a fraction of GDP. As observed, the narrow money from Macrohistory is similar to the monetary base reported at FRED (hence different from the M1 stock I constructed). M1 averaged 23% of GDP in this period, and since the 1950's and until the 2008 financial crisis had a declining trend. The monetary base was 8% of GDP on average, and increased sharply in 2008 due to the increase in bank reserves with the appearance of the non-conventional monetary policy implemented in the crisis. The broad money variable from Macrohistory is very similar to the M2 money stock I constructed.

Distributional data is from two sources. I first obtain top income shares from the World Inequality Database (WID). I proxy income inequality by using both the income share of the top 10% and top 1%. For the USA, I also use Gini coefficient estimates, since Cover and Hooks [1993] use survey data estimates of inequality. I obtain Gini coefficient data for the USA from the World Income Inequality Database (WIID).[2] In Figure (4) I plot the inequality data for the USA. An overall U-shaped evolution of inequality is observed. The Gini coefficient is consistent with the evolution of the top 1 and top 10 income shares.

[2]The WIID database provides many types of income source. I use gross income at the household level with no adjustment and drop one of the 2013 observations since it is repeated. See the replication package for subsetting details.

Figure 3: USA: Monetary Aggregates over GDP



Source: see subsection (3.1).

The international data is constructed by merging the Macrohistory aggregate data with the WID distributional data. In the Appendix (A) I plot, for each country, the four time series used in the international analysis: narrow money and broad money as a fraction of GDP in Figure (A1), short and long term interest rates in Figure (A2), and inequality (top 1% and top 10% income shares) in Figure (A3) shows the evolution of the top 1 and top 10 income shares (note that data for inequality is incomplete for several countries and that for the international comparison I only use top income shares, not the Gini coefficient). Figure (A4) and Figure (A5) show the money demand function for each country (short term interest rates on the vertical axis, money over GDP in the horizontal axis).

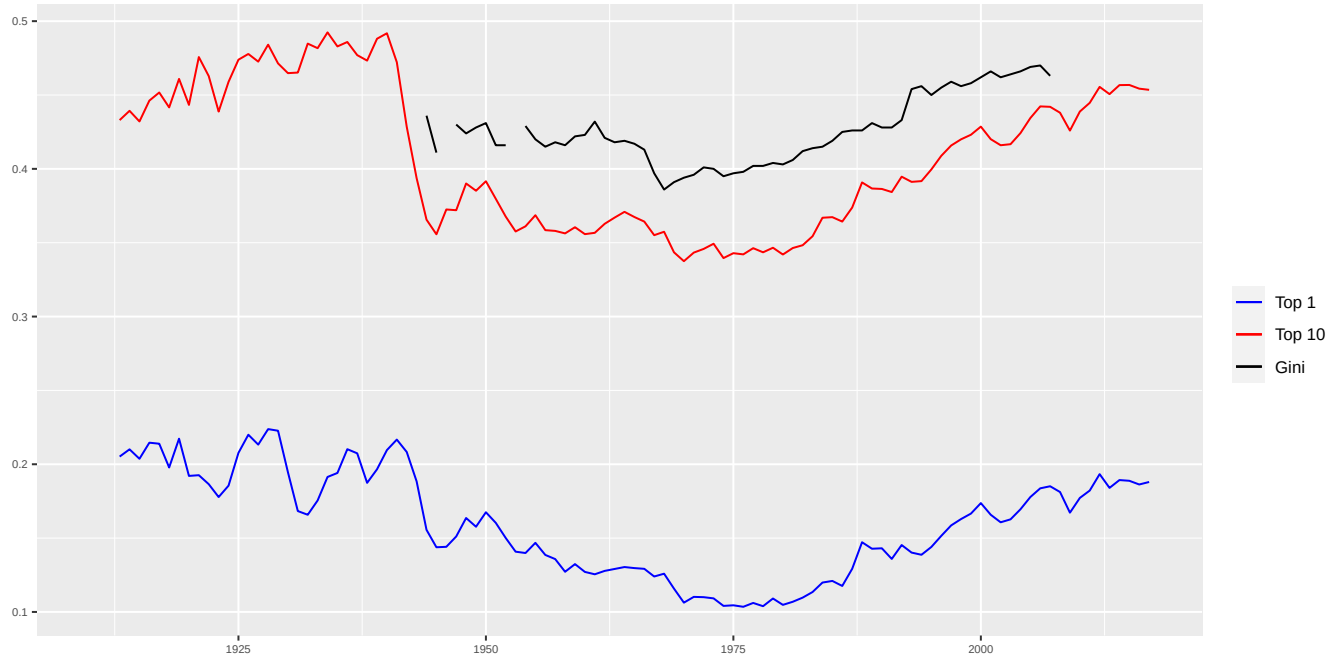
3.2 Regression Specification

In logs, an empirical counterpart of Equation (3) could be:

$$\log(M_t) = \beta_0 + \beta_1 \log(X_t) + \beta_2 \log(i_t) + \beta_3 \log(\sigma_t) + \varepsilon_t \tag{4}$$

where X_t can be either income (GDP) or consumption, and where ε_t is the error term. Note that ex-ante we would expect: $\beta_1 > 0, \beta_2 < 0, \beta_3 < 0$. We would also expect such signs under a first-difference specification.

Figure 4: USA: Income Inequality



Source: see subsection (3.1).

Following the specification in Cover and Hooks [1993], in first difference the regression is:

$$\triangle \log(M_t) = \gamma_0 + \gamma_1 \triangle \log(X_t) + \gamma_2 \triangle \log(i_t) + \gamma_3 \triangle \log(M_{t-1}) + \gamma_4 \triangle \log(\sigma_t) + \varepsilon_t \tag{5}$$

where $\triangle$ is the yearly difference and M_{t-1} is the lagged real money balances.

3.3 USA Estimates

I first run the regression in levels. In Table (1) I report the OLS results for regression (4) for the case of the USA. The independent variable is log of real M1 money balances (I deflate nominal variables using the Consumer Price Index), GDP is the log of real income, Consumption is the log of real consumption, Interest Rate is the log of nominal short-term interest rate and the Top 10 and Top 1 Income Share are the log of income shares of top 10% and top 1%, respectively.

Column 1 omits inequality and is a “traditional" money demand regression, with nominal output and interest rates being the only covariates. Column 2 includes inequality (top 10% income share), and the coefficient is statistically significant and negative, as theory predicts. The coefficient is also significant when using consumption data instead of income, as column 4 indicates. It is also significant when using

Table 1: USA: M1 Money Demand and Inequality

	Dependent variable:							
	M1							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GDP	0.64***	0.57***			0.57***		0.35***	
	(0.02)	(0.01)			(0.02)		(0.03)	
Cons.			0.62***	0.53***		0.53***		0.31***
			(0.03)	(0.02)		(0.02)		(0.03)
Int. Rate	−0.09***	−0.17***	−0.08***	−0.18***	−0.16***	−0.17***	−0.07***	−0.07***
	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)
Top 10		−1.55***		−2.10***				
		(0.13)		(0.15)				
Top 1					−0.70***	−0.95***		
					(0.09)	(0.11)		
Gini							−0.04	−0.17
							(0.28)	(0.32)
Constant	−0.28***	−1.36***	−7.98***	−8.47***	−1.28***	−8.25***	0.99	−2.25**
	(0.07)	(0.10)	(0.41)	(0.24)	(0.14)	(0.32)	(1.00)	(0.88)
Observations	102	102	102	102	102	102	62	62
R^2	0.92	0.97	0.86	0.95	0.95	0.92	0.88	0.86
Adjusted R^2	0.92	0.96	0.85	0.95	0.95	0.92	0.88	0.86

Note: *p<0.1; **p<0.05; ***p<0.01

the top 1% income share, as indicated in columns 5 and 6. The R^2 thus increases in all specifications that include income shares, albeit slightly in some.

The coefficient on both income and consumption declines and the coefficient on the interest rate increases when adding the distributional data. Omitting inequality thus seems to overestimate the income/consumption elasticity of money demand and underestimate the interest rate elasticity of money demand, as reported by Cover and Hooks [1993]. However, the Gini coefficient is not statistically significant. Recall that the Gini coefficient time series start in 1944, and thus have only 62 observations here.

Table 2: USA: M1 Money Demand and Inequality, First Difference Regression

	Dependent variable:							
	FD Log M1							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FD Log GDP	0.31***	0.32***			0.31***		0.16	
	(0.08)	(0.08)			(0.08)		(0.15)	
FD Log Cons.			0.25*	0.27**		0.24*		0.46**
			(0.13)	(0.13)		(0.14)		(0.22)
FD Int. Rate	−0.01***	−0.01***	−0.01***	−0.01***	−0.01***	−0.01***	−0.01***	−0.01***
	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.002)	(0.002)
Lagged FD Log M	0.54***	0.54***	0.59***	0.56***	0.54***	0.59***	0.56***	0.51***
	(0.07)	(0.07)	(0.07)	(0.08)	(0.07)	(0.08)	(0.09)	(0.09)
FD Top 10		0.12		−0.41				
		(0.36)		(0.36)				
FD Top 1					0.05	0.06		
					(0.39)	(0.44)		
FD Gini							−0.001	−0.001
							(0.01)	(0.01)
Constant	0.002	0.002	0.002	0.002	0.002	0.002	0.0003	−0.01
	(0.004)	(0.005)	(0.01)	(0.01)	(0.004)	(0.01)	(0.01)	(0.01)
Observations	101	101	101	101	101	101	59	59
R^2	0.55	0.55	0.49	0.50	0.55	0.49	0.58	0.60
Adjusted R^2	0.53	0.53	0.48	0.48	0.53	0.47	0.54	0.57
Note:								*p<0.1; **p<0.05; ***p<0.01

I then run the regression in first difference, as in Equation (5). The regression results are in Table (2). As observed, the coefficient on inequality (top income shares and Gini coefficient) are no longer statistically significant. The interpretation on the rest of the variables is similar to the ones before.

As a robustness check, I run the regression in first differences for three different historical subsamples:

1. War and interwar period: 1913-1945. As seen in Table (A1), the coefficient on income shares are not statistically significant. I omit columns 7 and 8 since there are no Gini index estimates for this period.

2. Bretton Woods Period: 1945-1973. As seen in Table (A2), the top 10 income share on the consumption specification (Column 4) is statistically significant. So are the coefficients on top 1 income share, either using GDP or consumption (Columns 6 and 7). The Gini index is not statistically significant, as reported in the last two columns.

3. The Great moderation: 1985-2007. As seen in Table (A3), the coefficients on income shares nor Gini index are statistically significant.

4. Cover and Hooks [1993] period: Cover and Hooks [1993], using 1944-1988, find the evidence against the monetary prediction. For this subsample, as reported in Table (A4), the coefficient on income shares are not statistically significant, but the coefficient on the Gini index is positive and statistically significant. Although there are differences in point estimates in the different coefficients, the signs and interpretation is consistent with the findings in Cover and Hooks [1993] and is opposite of what the theory predicts.

Thus, the results for the first difference specification change for different time periods. Note that there is an element of arbitrariness in the sub-period I chose. Randomness, on the other hand, is impartial to historical labels. I thus proceed with a bootstrap estimation for the whole 1913-2016 period and another one for the 1944-2016 subset (the period in which there is Gini coefficient data availability). For both periods, I perform 1000 bootstrap regressions using samples of 25 years. In Tables (A5) and (A6) I report the estimates and p-values for the different combinations of inequality variable and transaction variable (GDP or Consumption) for the regression in levels, while in Tables (A5) and (A6) I do the same for the specification in first difference.

The bootstrap regression in levels suggest that top income shares are indeed negatively correlated with aggregate money demand, however only statistically significant when using GDP as a the transaction variable. The coefficients on the Gini coefficients are not statiscally significant.

As observed, for the first difference specification, none of these coefficients are statistically significant (p-values>.1). Thus, the findings in Cover and Hooks [1993] seem to be driven by the time period but are not robust to averaging across different sub-samples.

3.4 International Estimates

I proceed to use the international data. The results here should be interpreted with the caveat described in subsection (3.1) regarding the differences in the definitions of narrow money in the Macrohistory database. Table (A9) reports the estimates of an OLS regression in levels with country fixed effects. As observed, the coefficient on inequality is negative and statistically significant, which is consistent with the theoretical prediction (for the international analysis, I only use top income shares, not the Gini coefficient).

Lastly, I run a first difference panel regression. Surprisingly, the coefficient on the top 10% income share using consumption as the transaction variable now has a positive relationship with money demand, as reported in Table (A10).

There is considerable country heterogeneity in these findings. In Figures (A6) and (A7) I plot the estimated coefficients and confidence intervals for the inequality variable ($\hat{\beta}_3$ for the regression in levels and $\hat{\gamma}_4$ for the regression in first differences).

4 Conclusion

In this paper I show that there is partial evidence of a negative relationship between inequality and aggregate money demand. This project has policy implications. It provides a link between monetary policy and inequality, and thus a channel for which the distributional concerns of central bankers could be better understood (Yellen [2014]).

Furthermore, future work could explore related topics, for instance, the regressive nature of the inflation tax (since lower income households demand proportionally a larger amount of real money balances), using micro data or theoretical models.

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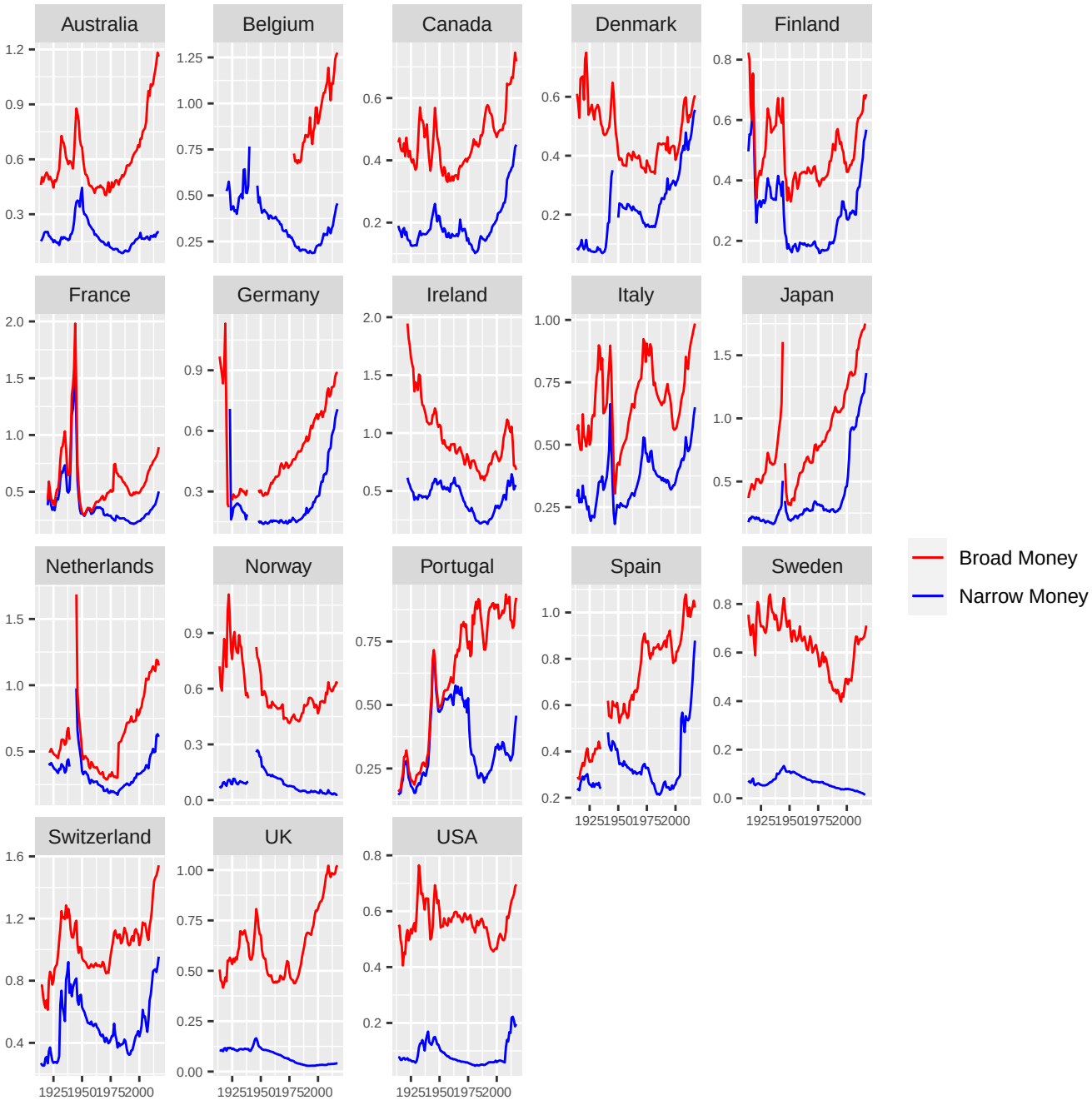
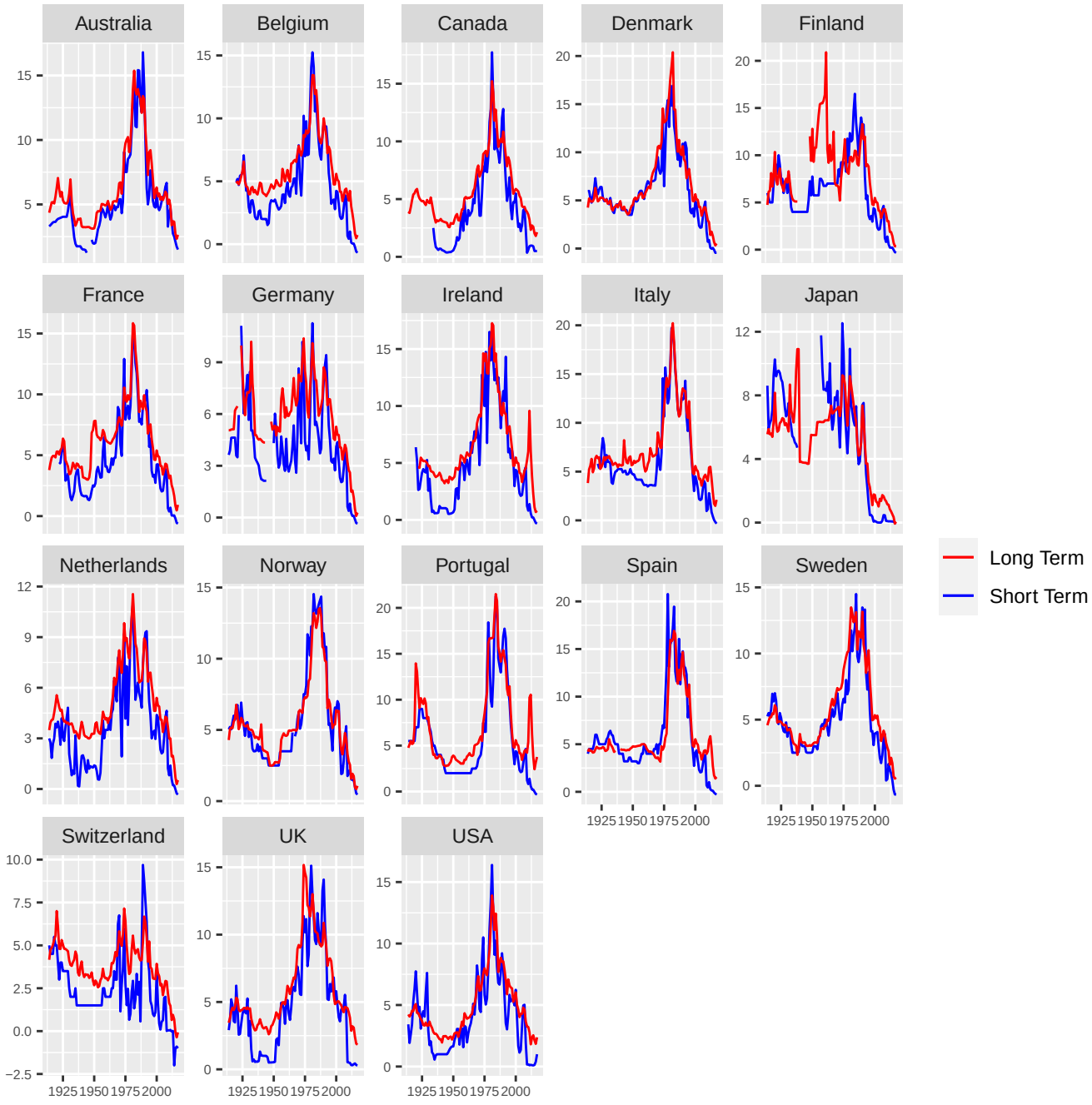
A Figures and Tables

Figure A1: Money over GDP



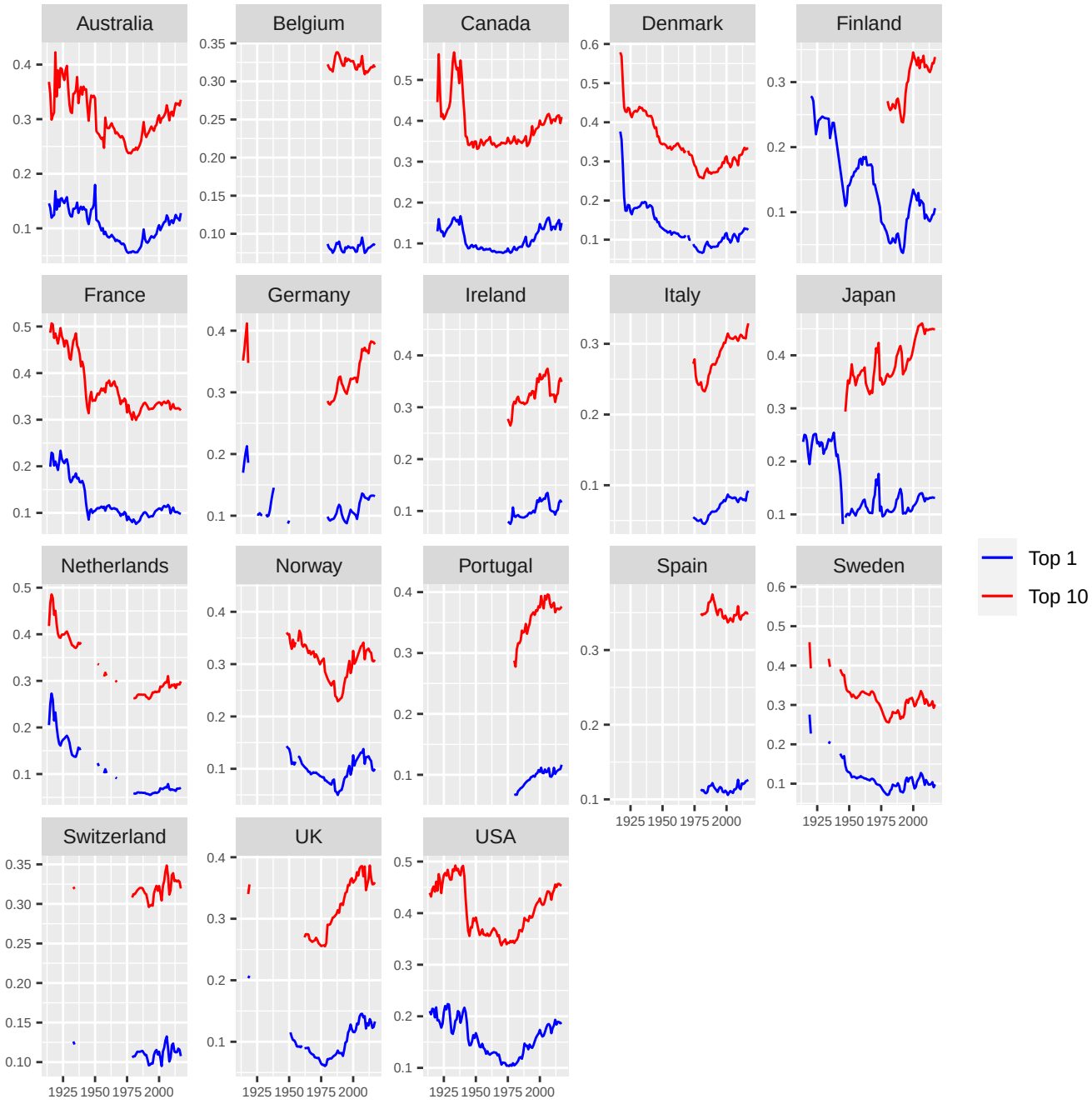
Source: see subsection (3.1).

Figure A2: Interest Rates



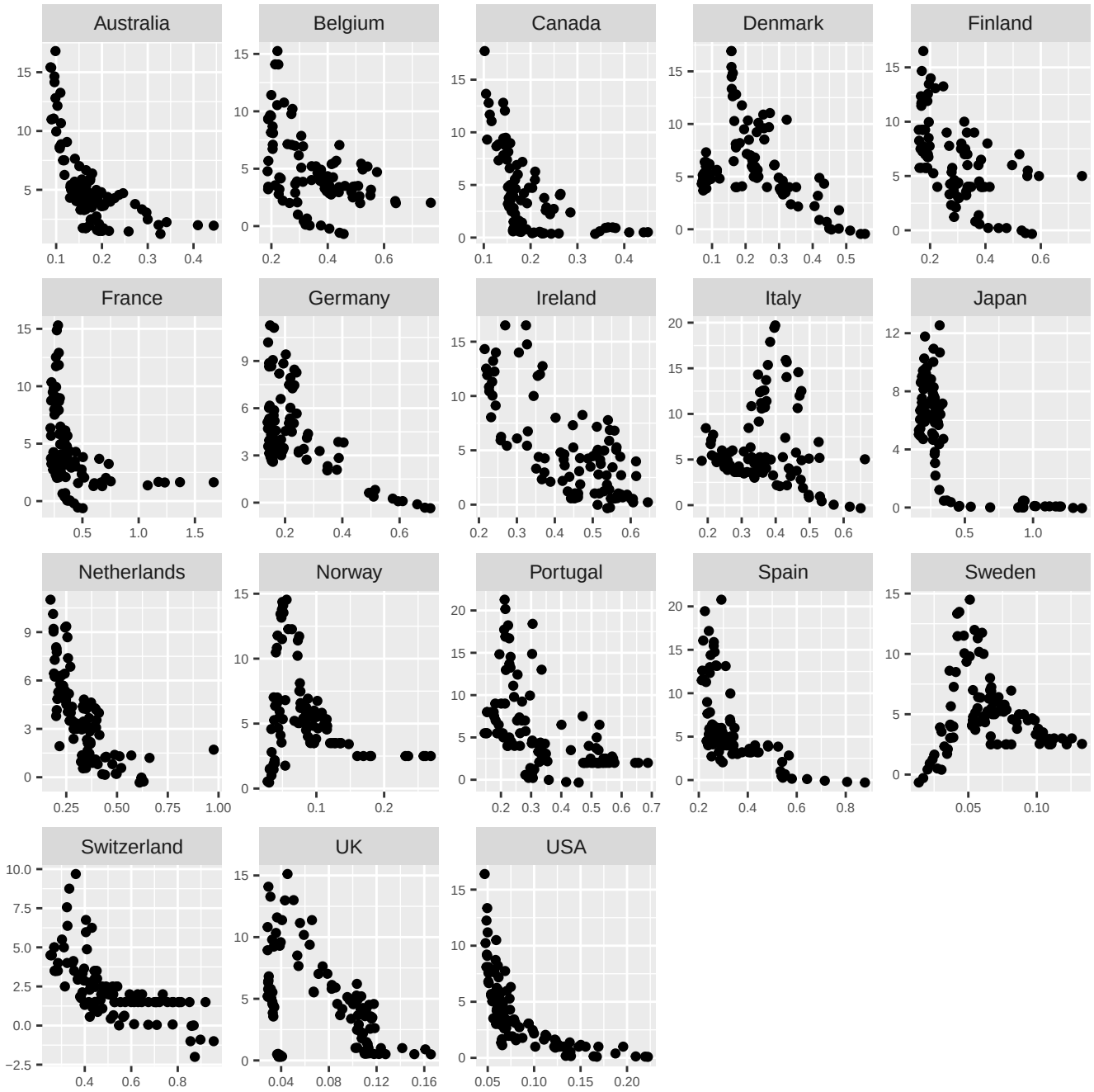
Source: see subsection (3.1).

Figure A3: Income Inequality (Top Income Shares)



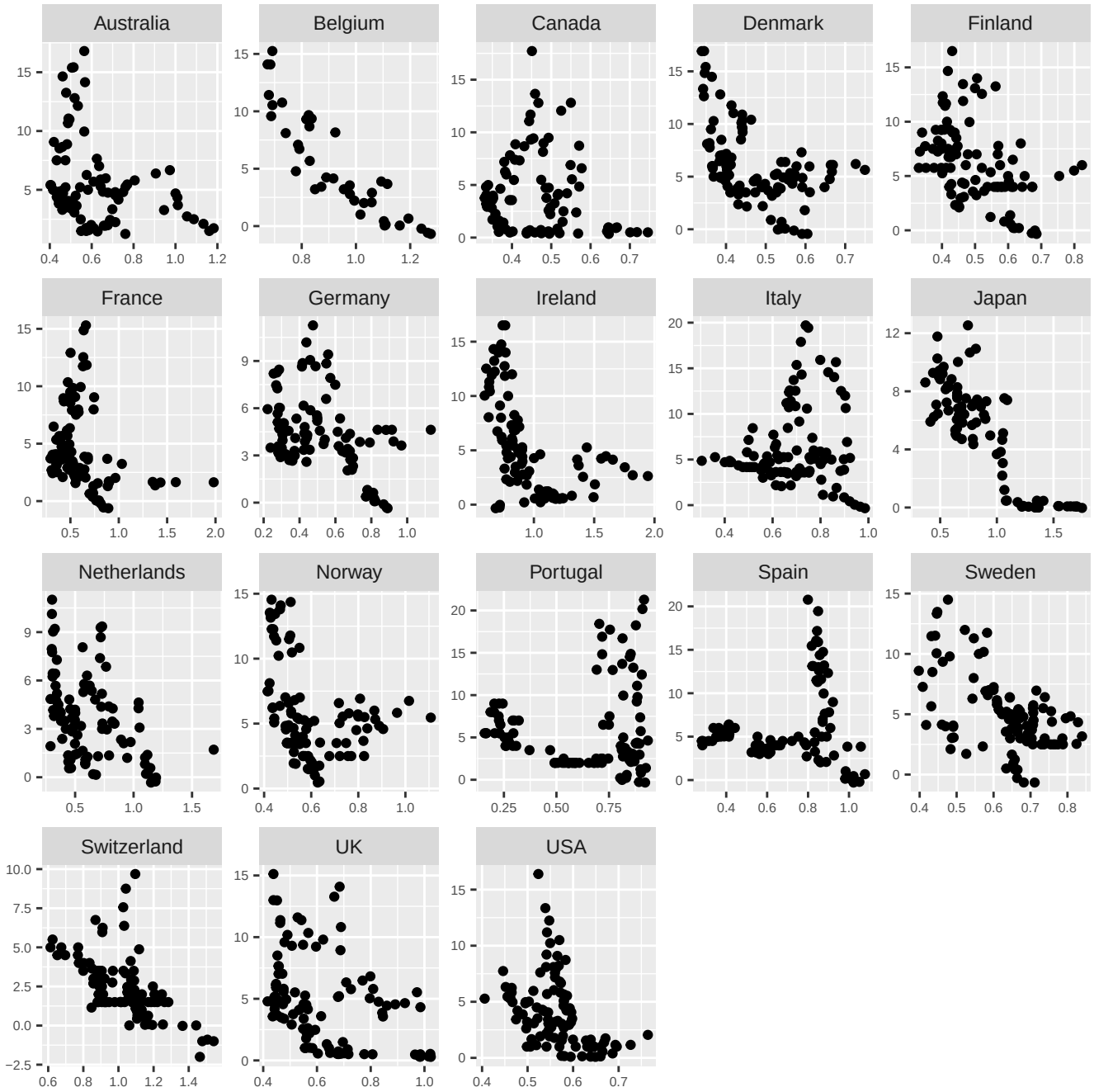
Source: see subsection (3.1).

Figure A4: Money Demand and Interest Rates



Source: see subsection (3.1).

Figure A5: Broad Money Demand and Interest Rates



Source: see subsection (3.1).

Table A1: USA (Subsample 1914-1944): M1 Money Demand and Inequality, First Difference Regression

	Dependent variable:					
	FD Log M1					
	(1)	(2)	(3)	(4)	(5)	(6)
FD Log GDP	0.41**	0.47***			0.38**	
	(0.15)	(0.16)			(0.15)	
FD Log Cons.			0.59**	0.59**		0.56**
			(0.23)	(0.23)		(0.26)
FD Int. Rate	−0.01*	−0.01*	−0.01	−0.01	−0.01*	−0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
FD FD Lagged Log M	0.29	0.34*	0.41**	0.38*	0.33	0.42**
	(0.19)	(0.19)	(0.17)	(0.20)	(0.19)	(0.19)
FD Top 10		0.67		−0.20		
		(0.68)		(0.65)		
FD Top 1					0.56	0.19
					(0.67)	(0.77)
Constant	0.02	0.01	0.02	0.02	0.02	0.02
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Observations	28	28	28	28	28	28
R^2	0.50	0.52	0.48	0.48	0.52	0.48
Adjusted R^2	0.44	0.44	0.42	0.39	0.43	0.39
Note:						*p<0.1; **p<0.05; ***p<0.01

Table A2: USA (Subsample 1945-1972): M1 Money Demand and Inequality, First Difference Regression

	Dependent variable:							
	FD Log M1							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FD Log GDP	0.50***	0.48***			0.55***		0.35	
	(0.14)	(0.14)			(0.13)		(0.24)	
FD Log Cons.			0.48	1.03***		0.88**		0.86**
			(0.35)	(0.37)		(0.37)		(0.30)
FD Int. Rate	−0.01**	−0.01**	−0.01	−0.01**	−0.01**	−0.01	−0.01**	−0.01**
	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
FD FD Lagged Log M	0.34**	0.36***	0.12	−0.01	0.33**	−0.03	0.39**	0.33**
	(0.13)	(0.13)	(0.19)	(0.18)	(0.12)	(0.19)	(0.18)	(0.15)
FD Top 10		−0.76		−2.23**				
		(0.64)		(0.81)				
FD Top 1					−1.65**	−2.27**		
					(0.78)	(1.05)		
Gini							0.01	0.01
							(0.01)	(0.01)
Constant	−0.01*	−0.01*	−0.02	−0.04**	−0.02**	−0.03**	−0.005	−0.02*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)
Observations	28	28	28	28	28	28	24	24
R^2	0.45	0.48	0.21	0.41	0.54	0.34	0.42	0.54
Adjusted R^2	0.38	0.39	0.11	0.30	0.46	0.23	0.30	0.45
Note:								*p<0.1; **p<0.05; ***p<0.01

Table A3: USA (Subsample 1985-2007): M1 Money Demand and Inequality, First Difference Regression

	Dependent variable:							
	FD Log M1							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FD Log GDP	0.04	0.29			0.33		0.04	
	(0.52)	(0.54)			(0.55)		(0.54)	
FD Log Cons.			−0.19	−0.04		0.03		−0.19
			(0.51)	(0.52)		(0.54)		(0.53)
FD Int. Rate	−0.02***	−0.02***	−0.02***	−0.02***	−0.02***	−0.02***	−0.02***	−0.02***
	(0.005)	(0.005)	(0.004)	(0.005)	(0.005)	(0.005)	(0.01)	(0.005)
FD FD Lagged Log M	0.38**	0.37**	0.39***	0.39***	0.37**	0.39***	0.38**	0.39**
	(0.14)	(0.14)	(0.13)	(0.13)	(0.14)	(0.13)	(0.15)	(0.15)
FD Top 10		−1.42		−1.21				
		(1.04)		(1.01)				
FD Top 1					−1.37	−1.14		
					(1.00)	(0.99)		
Gini							−0.001	0.0001
							(0.01)	(0.01)
Constant	0.001	−0.001	0.01	0.01	−0.003	0.005	0.001	0.01
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Observations	23	23	23	23	23	23	23	23
R^2	0.72	0.74	0.72	0.74	0.74	0.74	0.72	0.72
Adjusted R^2	0.67	0.69	0.68	0.68	0.69	0.68	0.66	0.66

Note: *p<0.1; **p<0.05; ***p<0.01

Table A4: USA (Subsample 1949-1988): M1 Money Demand and Inequality, First Difference Regression

	Dependent variable:							
	FD Log M1							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FD Log GDP	0.39**	0.40**			0.43***		0.45***	
	(0.15)	(0.16)			(0.16)		(0.16)	
FD Log Cons.			0.78***	0.86***		0.89***		0.79***
			(0.21)	(0.22)		(0.22)		(0.21)
FD Int. Rate	−0.01***	−0.01***	−0.01***	−0.01***	−0.01***	−0.01***	−0.01***	−0.01***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
FD FD Lagged Log M	0.29**	0.30**	0.25**	0.25**	0.30**	0.26**	0.29**	0.26**
	(0.12)	(0.12)	(0.11)	(0.11)	(0.12)	(0.11)	(0.12)	(0.11)
FD Top 10		−0.21		−0.57				
		(0.58)		(0.54)				
FD Top 1					−0.56	−0.87		
					(0.66)	(0.61)		
Gini							0.01*	0.01
							(0.01)	(0.01)
Constant	−0.004	−0.005	−0.02**	−0.02**	−0.01	−0.02***	−0.01	−0.02**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Observations	40	40	40	40	40	40	38	38
R^2	0.49	0.49	0.57	0.58	0.50	0.59	0.53	0.59
Adjusted R^2	0.45	0.43	0.53	0.53	0.44	0.54	0.48	0.54

Note: *p<0.1; **p<0.05; ***p<0.01

Table A5: USA: Bootstrap for Regression in Levels for 1914-2016

Inequality Measure	Transacion Measure	Regression Estimate	P-Value
Top 10	GDP	-0.17	0.00
Top 1	GDP	-0.17	0.00
Top 10	Consumption	-0.27	0.12
Top 1	Consumption	-0.29	0.10

Table A6: USA: Bootstrap for Regression in Levels for 1944-2016

Inequality Measure	Transacion Measure	Regression Estimate	P-Value
Top 10	GDP	-0.10	0.03
Top 1	GDP	-0.11	0.02
Top 10	Consumption	-0.02	0.42
Top 1	Consumption	-0.07	0.27
Gini	GDP	-0.08	0.18
Gini	Consumption	0.14	0.06

Table A7: USA: Bootstrap for Regression in First Difference for 1914-2016

Inequality Measure	Transacion Measure	Regression Estimate	P-Value
Top 10	GDP	0.14	0.41
Top 1	GDP	0.07	0.41
Top 10	Consumption	-0.29	0.38
Top 1	Consumption	-0.02	0.41

Table A8: USA: Bootstrap for Regression in First Difference for 1944-2016

Inequality Measure	Transacion Measure	Regression Estimate	P-Value
Top 10	GDP	-0.64	0.37
Top 1	GDP	-0.89	0.34
Top 10	Consumption	-0.54	0.40
Top 1	Consumption	-0.65	0.39
Gini	GDP	0.00	0.45
Gini	Consumption	0.00	0.49

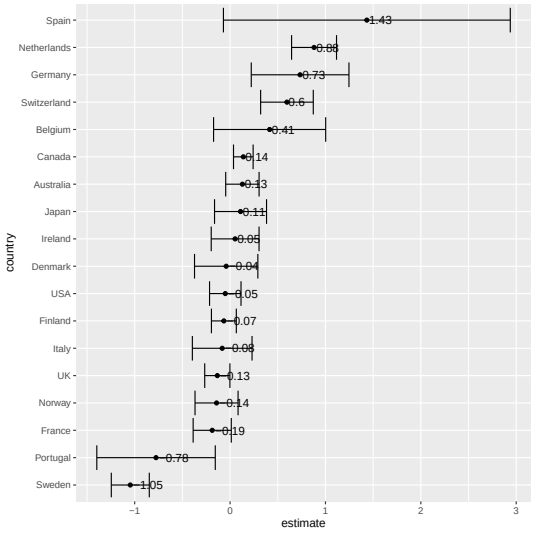
Table A9: Panel (Country Fixed Effect) Regression in Levels: Money Demand and Inequality

	Dependent variable:					
	Narrow Money					
	(1)	(2)	(3)	(4)	(5)	(6)
GDP	0.93***		0.90***		0.92***	
	(0.01)		(0.01)		(0.01)	
Cons		1.00***		0.96***		0.99***
		(0.01)		(0.01)		(0.01)
Int. Rate	−0.20***	−0.19***	−0.20***	−0.18***	−0.20***	−0.18***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Top 10			−0.34***	−0.37***		
			(0.10)	(0.09)		
Top 1					−0.11***	−0.12***
					(0.04)	(0.04)
Constant	−0.99***	−7.31***	−1.16***	−7.25***	−1.15***	−7.50***
	(0.07)	(0.12)	(0.12)	(0.17)	(0.10)	(0.15)
Observations	1,707	1,722	1,141	1,149	1,243	1,251
R^2	0.99	0.99	0.99	0.99	0.99	0.99
Adjusted R^2	0.99	0.99	0.99	0.99	0.99	0.99
Note:						*p<0.1; **p<0.05; ***p<0.01

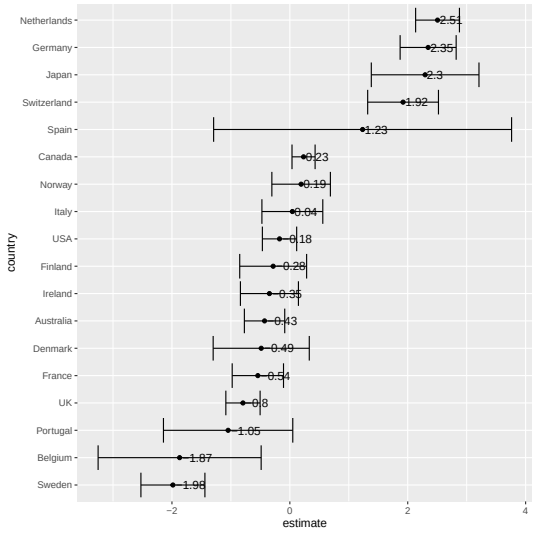
Table A10: First Difference Panel Regression: M1 Money Demand and Inequality

	Dependent variable:							
	FD Log M1							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FD Log GDP	0.20***	0.32***			0.20***	0.30***		
	(0.05)	(0.05)			(0.05)	(0.05)		
FD Log Cons.			−0.06	0.22***			−0.07	0.22***
			(0.05)	(0.06)			(0.05)	(0.06)
FD Int. Rate	−0.02***	−0.01***	−0.02***	−0.01***	−0.02***	−0.01***	−0.02***	−0.01***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)
FD FD Lagged Log M	0.25***	0.01	0.26***	0.01	0.22***	0.01	0.23***	0.01
	(0.03)	(0.01)	(0.03)	(0.01)	(0.03)	(0.01)	(0.03)	(0.01)
FD Top 10	−0.02		0.003		−0.06		−0.03	
	(0.17)		(0.17)		(0.17)		(0.17)	
FD Top 1		0.03		0.81***		0.01		0.80***
		(0.25)		(0.27)		(0.25)		(0.27)
Constant	0.02***	0.03***	0.03***	0.03***	0.02***	0.03***	0.03***	0.03***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.01)	(0.01)	(0.01)	(0.01)
Country Fixed effects?	No	No	No	No	Yes	Yes	Yes	Yes
Observations	1,128	1,227	1,135	1,235	1,128	1,227	1,135	1,235
R^2	0.13	0.06	0.12	0.05	0.16	0.11	0.15	0.08
Adjusted R^2	0.13	0.06	0.12	0.04	0.14	0.09	0.13	0.06
Note:								*p<0.1; **p<0.05; ***p<0.01

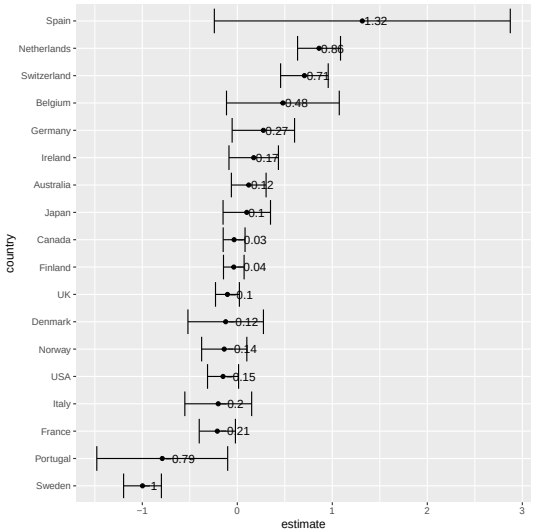
Figure A6: Regressions in Levels: coefficient for $\hat{\beta}_3$.



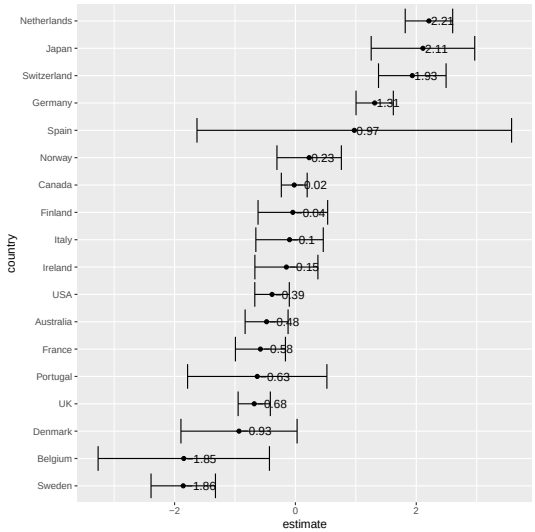
(a) X_t=GDP, σ_t=Top 1%



(b) X_t=GDP, σ_t=Top 10%



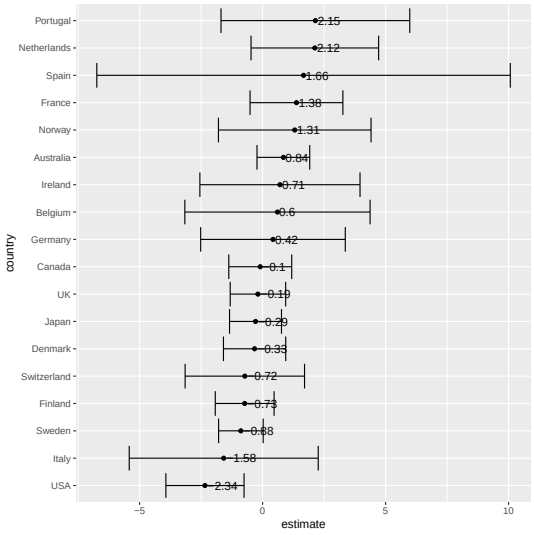
(c) X_t=Consumption, σ_t=Top 1%



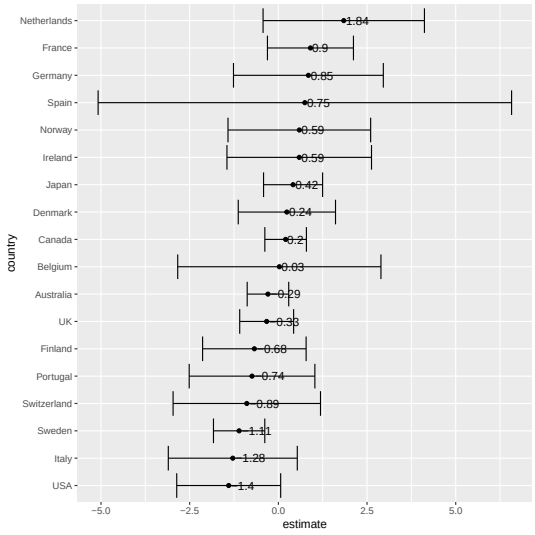
(d) X_t=Consumption, σ_t=Top 10%

Source: see subsection (3.1).

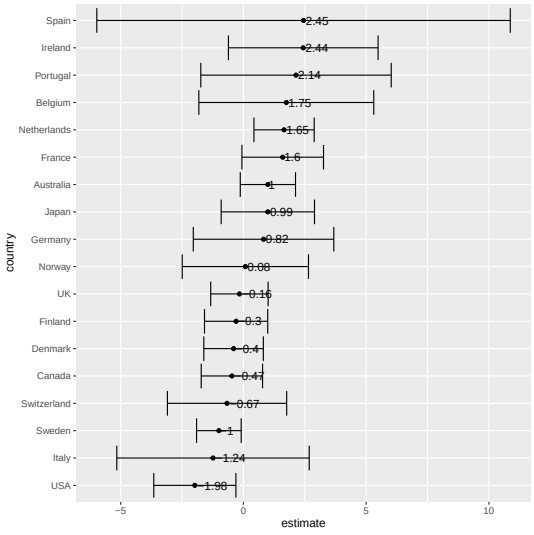
Figure A7: First Difference Regressions: coefficient for $\hat{\gamma}_4$.



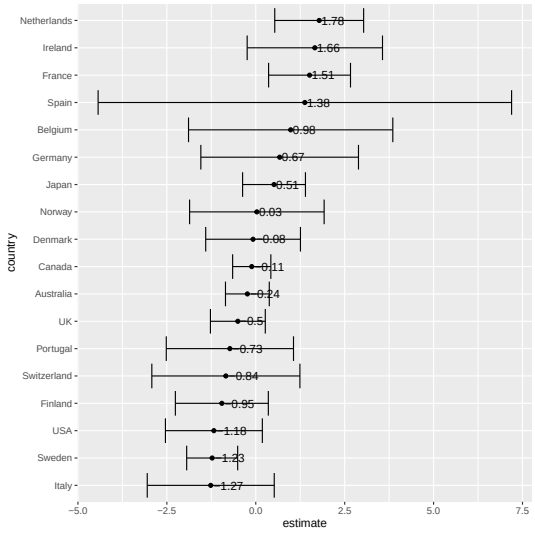
(a) X_t=GDP, σ_t=Top 1%



(b) X_t=GDP, σ_t=Top 10%



(c) X_t=Consumption, σ_t=Top 1%



(d) X_t=Consumption, σ_t=Top 10%

Source: see subsection (3.1).