Asset bubbles in explaining top income shares

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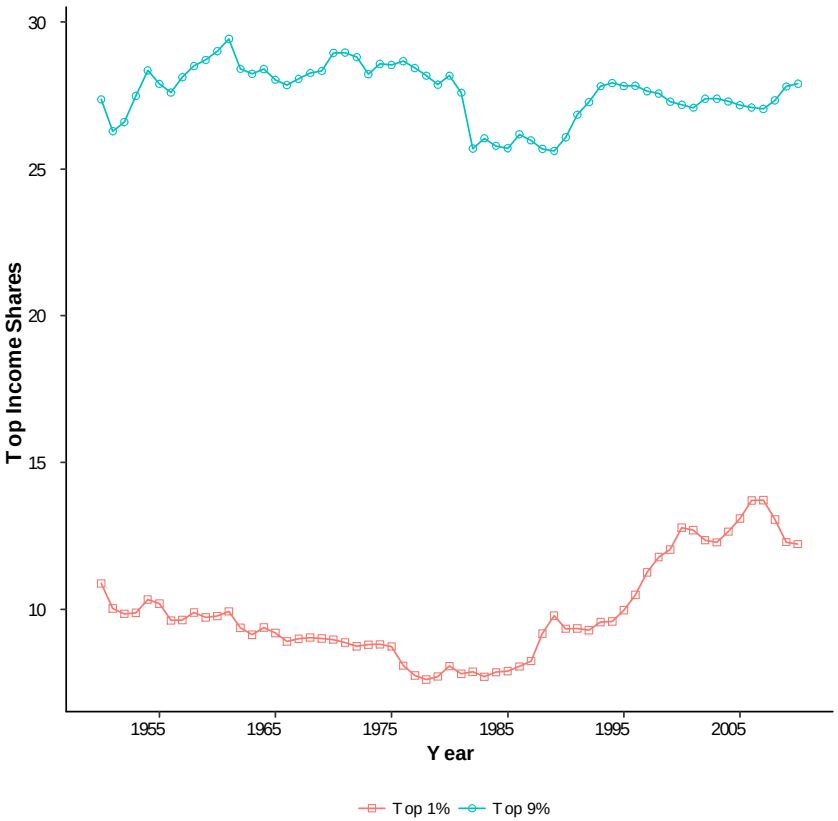
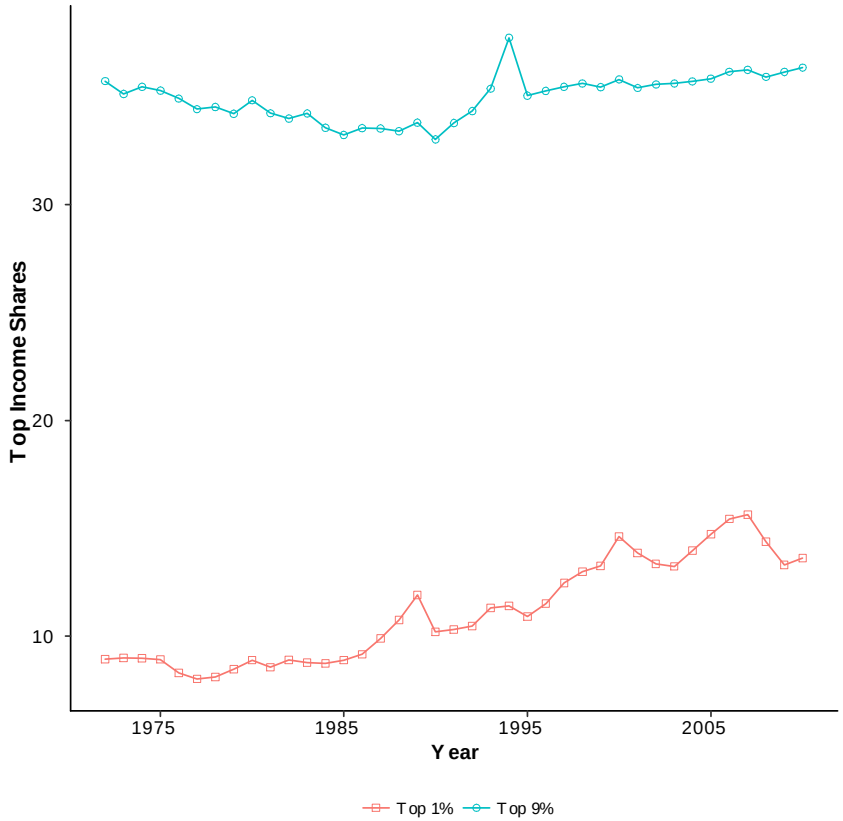
What is Top Income Share?

- Top income share measures of the income share held by the richest x% of the population, derived from tax return data.
- Top incomes represent a small share of the population but a very significant share of total income and total taxes paid.
- We concentrate on the upper part of the income distribution and define inequality in two different ways
  - Share of total income earned by those with the 1% highest incomes (P99-P100).
  - Share of total income earned by those with the 0.1% highest incomes (P99.9-P100).

Top Income Shares of CANADA (Source: The World Wealth and Income Database)

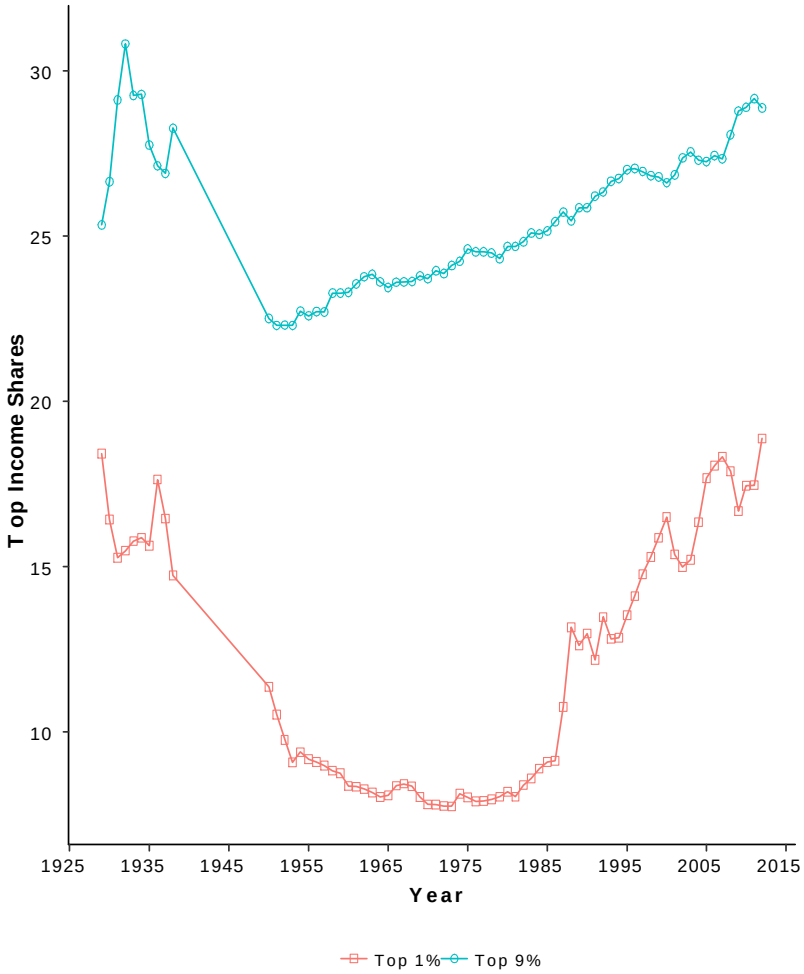


Excluding Capital gain

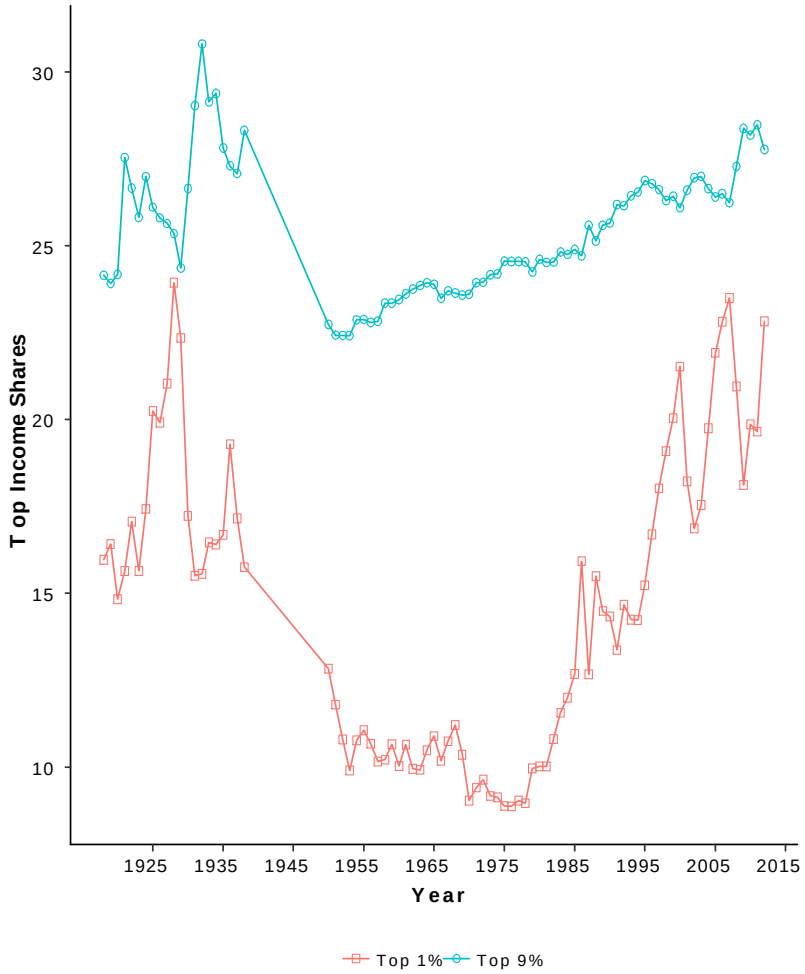


Including Capital Gain

Top Income Shares of USA (Source: The World Wealth and Income Database)



Excluding Capital gain



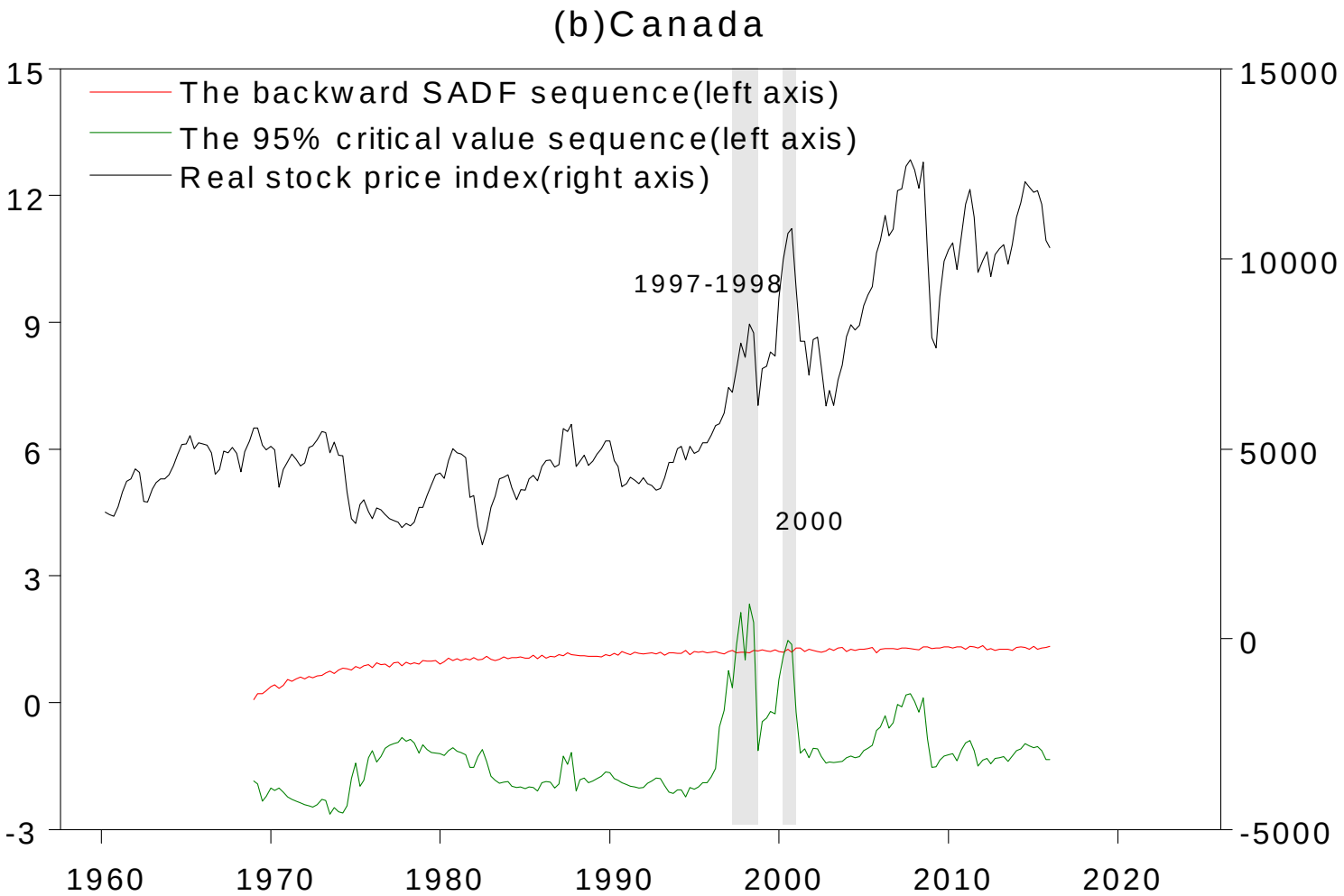
Including Capital Gain

Economic Factors and Top Income Shares

- Explain the recent surge in top income shares.
  - Innovation-based rents that contribute to increase the income share of the top income groups (Aghion et al (2019))
  - Economic growth rate and Financial development favour the rich (Roine, Vlachos and Waldenström (2009)).
  - Salaries in finance soared and causing a substantial part of explosion in top incomes (Philippon and Reshef (2012)).
  - Positive relationship between degree of openness and income inequality (Tallo (2003))
  - Top marginal tax rates may have a negative impact on the rise of income shares (Kuznets (1955), Piketty and Saez (2007)).
  - Central government expenditure seems to have negative impact on top income shares (Stack (1978)).

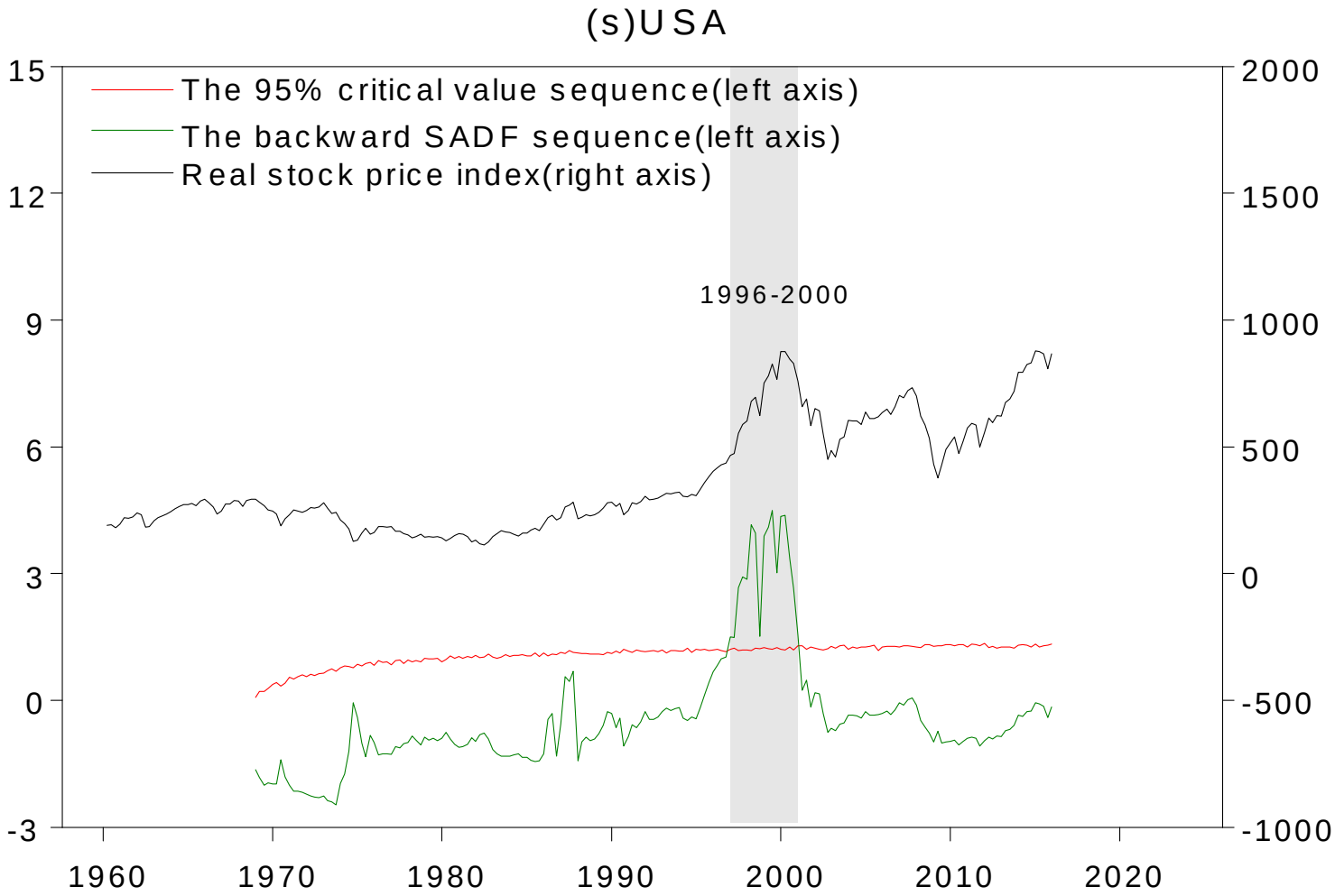
Explosive behaviour in the Canadian stock market

(GSADF model, Phillips et al. (2015)) (Data source: Global Financial database)



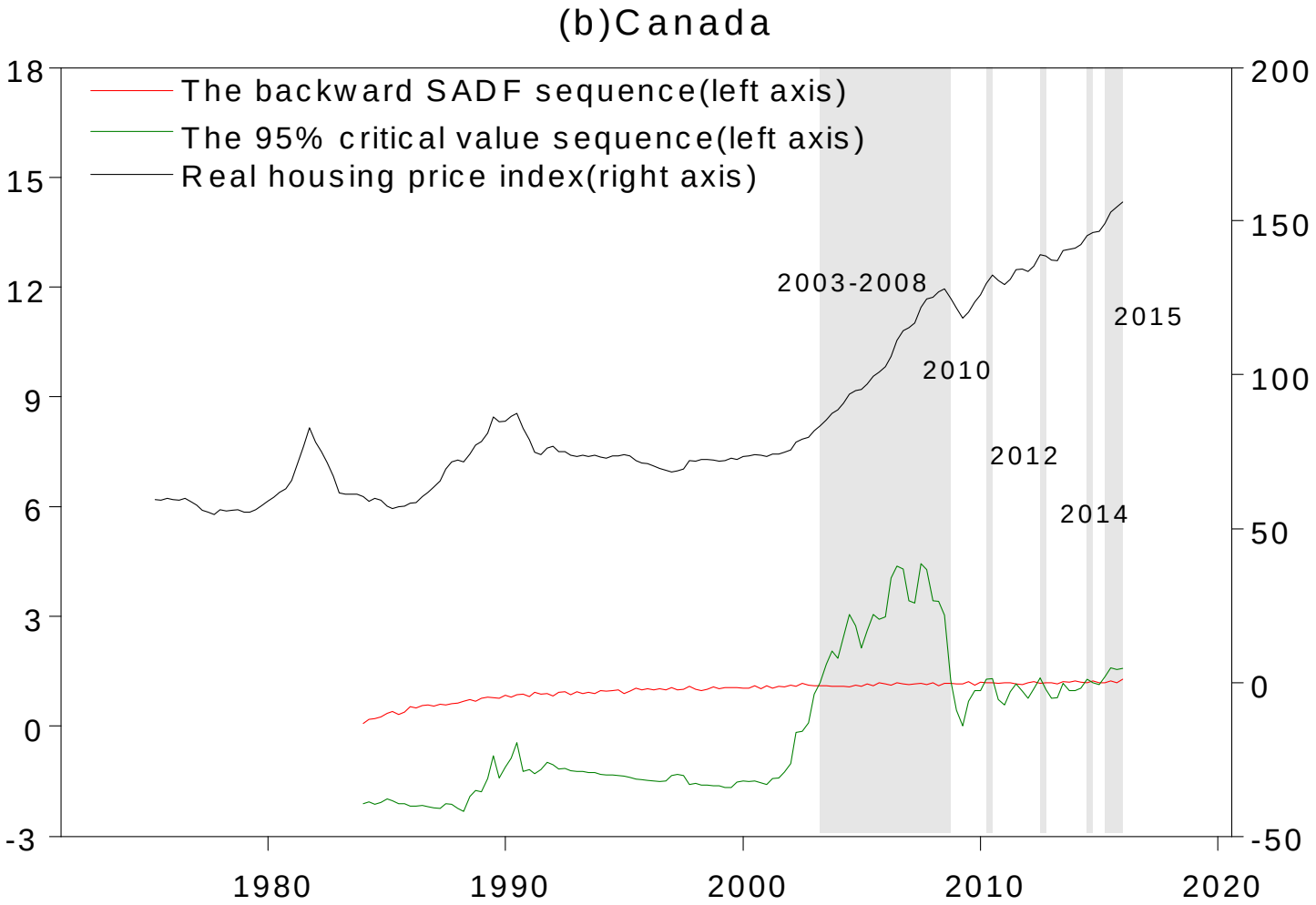
Explosive behaviour in the US stock market

(GSADF model, Phillips et al. (2015)) (Data source: Global Financial database)



Explosive behaviour in the Canadian housing market

(GSADF model, Phillips et al. (2015)), (Data source: Federal Reserve Bank of Dallas)



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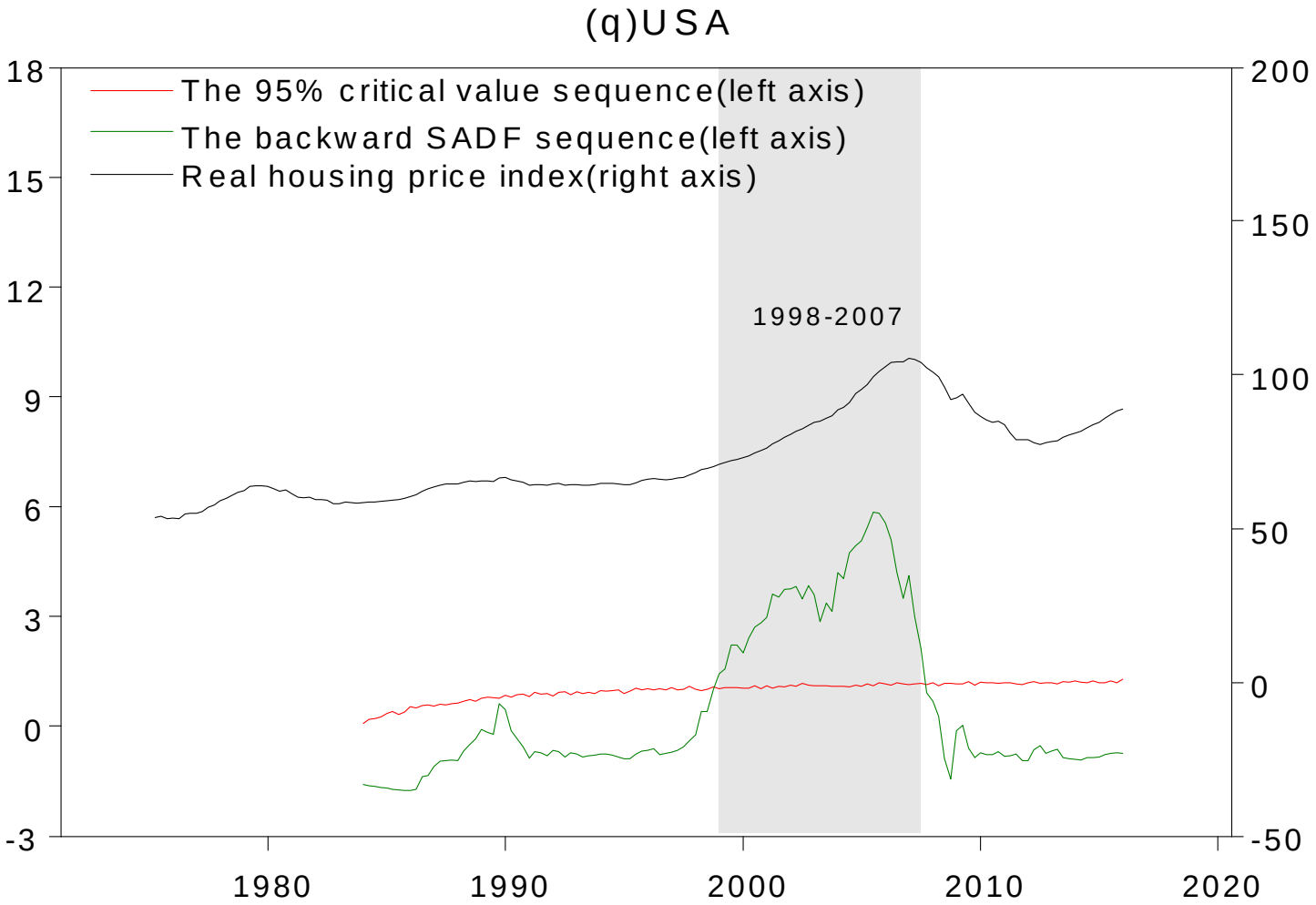
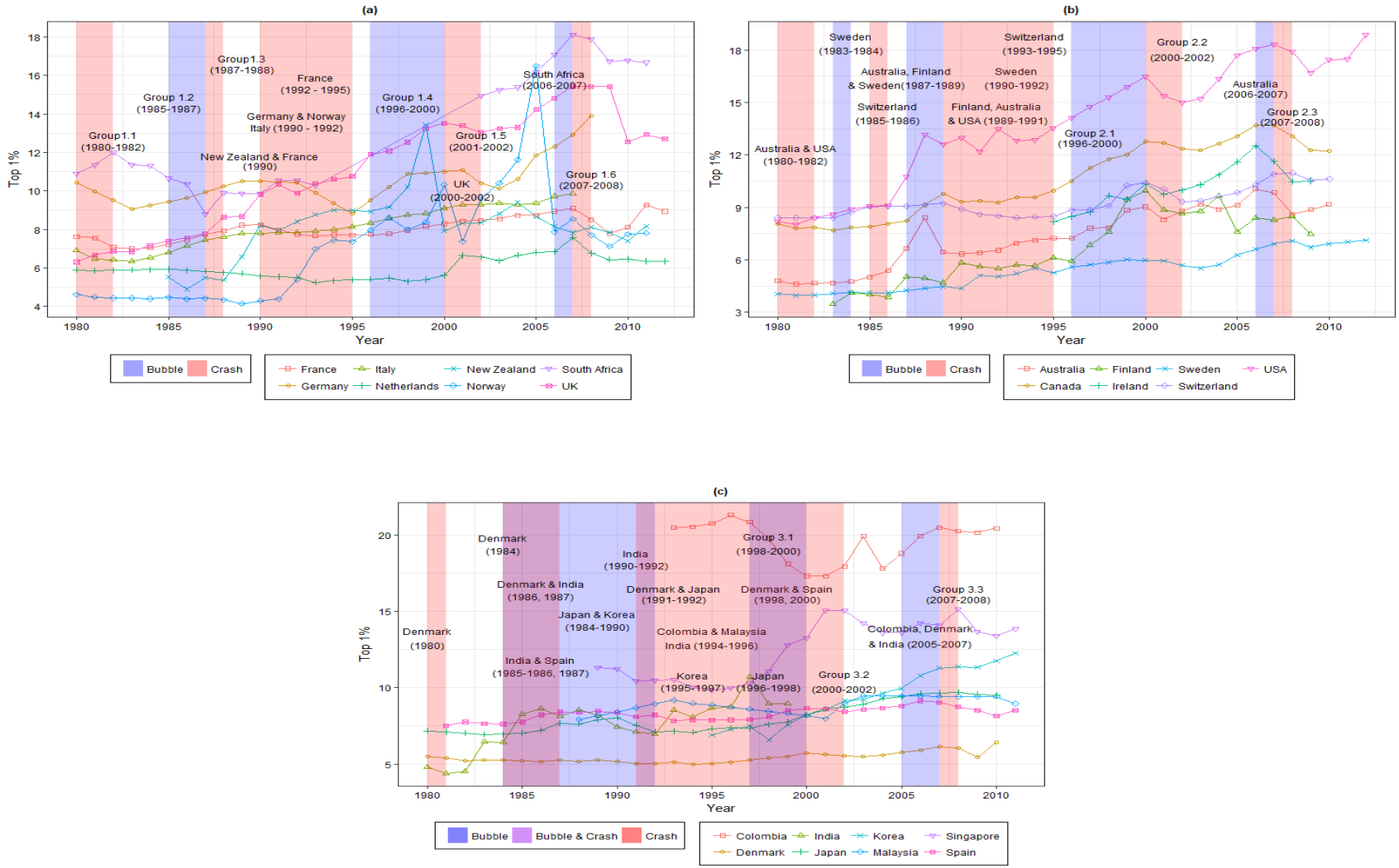
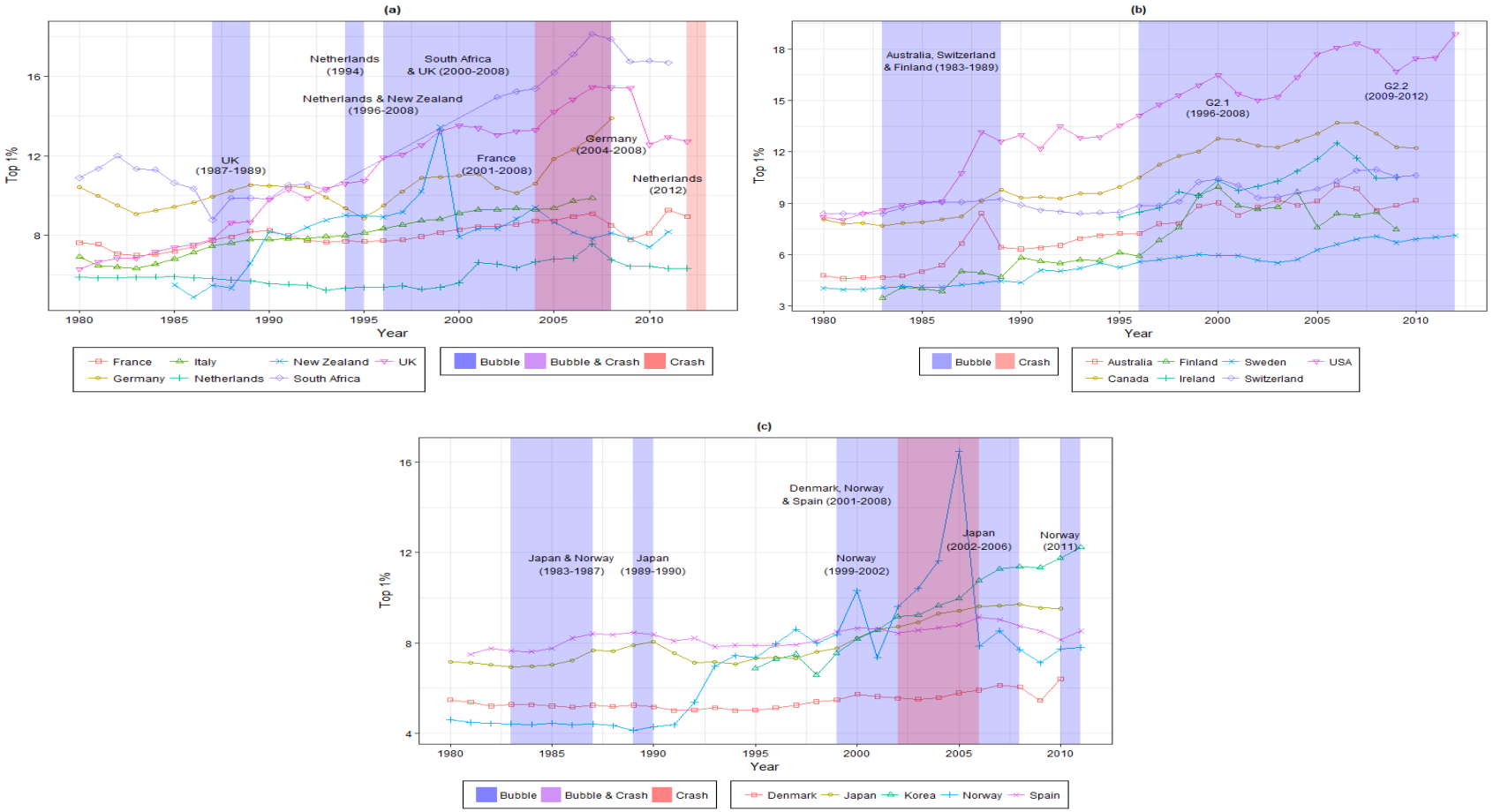


Explosive behaviour in the stock market and Top income shares



Explosive behaviour in the housing market and Top income shares



Explosive behaviour in the both asset markets and Top income shares

Table A2: Non-overlapping bubble and crash episodes for the period of 1980-2012.

Countries	Stock market		Housing market	
	Bubble period	Crash period	Bubble period	Crash period
Australia	1987, 2006-2007	1981-82, 1990, 2008	1988-89, 1999-2004 2006-08, 2009-2010	
Canada	1997-98, 2000	2001-02, 2008	2003-08, 2010, 2012	
Colombia	2005-2006	1994 -1996, 1998-2000 2007-08	Not available	Not available
Denmark	1998, 2000, 2006-07	1980, 1984, 1986-87 1992, 2001-02, 2008	2004-2008	
Finland	1987-89, 1997-2000	1990-91, 2001-02 2008	1983-89, 2003-07	
France	1986-87, 1998-2000	1980-82, 1990, 1992-95 2001-2002, 2008	2001-2008	
Germany	1985-86, 1998-2000	1980-81, 1987, 1990-92 2001-2002, 2008		2004-2008
India	1985-86, 1990-92, 2007	1987, 1995-96, 1998	Not available	Not available
Ireland	1997-1999	2001, 2002, 2007-08	1996-2007	
Italy	Statistically insignificant (GSADF test)	1981-82, 1987, 1990-92 2001-2002, 2007	Statistically insignificant (GSADF test)	
Japan	1984-1990	1991-92, 1996-98, 2000-02 2007-2008	1987, 1989-90	2002-2006
Korea(R)	1987-1989	1995-97, 2000, 2008	Statistically insignificant (GSADF test)	
Malaysia	Statistically insignificant (GSADF test)	1994-95, 1997-98, 2008	Not available	Not available
Netherlands	1985-87, 1996-2000	2001-2002, 2008	1994, 1996-2008	2012
NewZealand	1986	1987-88, 1990, 2008	1996-97, 2003-07	
Norway	Statistically insignificant (GSADF test)	1982, 1986-87, 1990-92, 1998, 2001-02, 2008	1983, 1985-87, 1999-02, 2005-08, 2011-12	
Singapore	Statistically insignificant (GSADF test)	1996-98, 2000-02, 2008	Not available	Not available
South Africa	2006-2007	1995-1998	2001, 2003-08	
Spain	1987, 1998, 2000	1997, 1999, 2008	2001-07	
Sweden	1983-84, 1987-89, 1996-2000	1990-92, 2001-02, 2008	2002-2008	
Switzerland	1997-2000	1985-86, 1993-95 2008	1987-89, 2010, 2011-12	
UK	1986-87, 1998	2000-2002, 2008	1987-89, 2000-08	
USA	1996-2000	1980-82, 1989-1991, 2001-2002, 2008	1998-2007	

Empirical model

We apply fixed effect panel regression equation described as follows

$$
\begin{aligned}
y_{it} \quad = \quad & \beta + \beta_0 y_{it-1} + \beta_1 \text{Stock bubble}_{it} + \beta_2 \text{Stock crash}_{it} + \beta_3 \text{House bubble}_{it} \\
& + \beta_4 \text{House crash}_{it} + \beta_5 \text{Innovation}_{it} + \beta_6 \text{GDPpc}_{it} + \beta_7 \text{Financial dev}_{it} \\
& + \beta_8 \text{Government expenditure}_{it} + \beta_9 \text{Openness}_{it} + \beta_{10} \text{Top tax rate}_{it} \\
& + \beta_{11} \text{Population}_{it} + \xi_i + t + \epsilon_{it} \qquad (1)
\end{aligned}
$$

where the variable ϵ_{it} is the error term and the variable i captures the country specific effect. Essentially, each individual has a different time-invariant intercept $(\xi_i + \beta)$. The variable t captures the time effect. The control variable includes gross domestic product per capita, financial development, innovation (patent), openness or globalization, top marginal tax rate, government expenditure, and population.

GLS estimates (Including capital gain)

Parameter	Top 1			Top 0.1		
Estimates	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
y_{it-1}	0.755***	0.559***	0.539***	0.737***	0.567***	0.553***
	(0.040)	(0.055)	(0.065)	(0.041)	(0.053)	(0.064)
Stock mrkt.	0.722***	0.501***	0.278	0.528***	0.432***	0.221*
bubble	(0.163)	(0.166)	(0.196)	(0.106)	(0.108)	(0.131)
Stock mrkt.	-0.311**	-0.330**	-0.208	-0.196**	-0.220**	-0.163
crash	(0.150)	(0.142)	(0.192)	(0.096)	(0.091)	(0.128)
Housing mrkt.	0.794***	0.611***	0.788***	0.562***	0.388***	0.512***
bubble	(0.160)	(0.188)	(0.215)	(0.102)	(0.117)	(0.143)
Housing mrkt.	0.638**	0.399	0.270	0.321*	0.168	0.144
crash	(0.267)	(0.266)	(0.296)	(0.165)	(0.159)	(0.189)
Innovation	0.072**	0.042	0.085**	0.047**	0.029	0.060**
	(0.033)	(0.037)	(0.041)	(0.021)	(0.023)	(0.027)
GDPpc		-1.825*	-0.738		-0.661	0.627
		(0.944)	(1.215)		(0.579)	(0.818)
Financial		0.832***	0.501*		0.511***	0.366**
development		(0.210)	(0.259)		(0.126)	(0.171)
Government		-0.126***	-0.012		-0.094***	-0.007
expenditure		(0.045)	(0.049)		(0.028)	(0.032)
Openness		0.014	0.035***		0.003	0.020**
		(0.009)	(0.012)		(0.006)	(0.008)
Tax rate		-1.720***	-2.144***		-1.206***	-1.512***
		(0.552)	(0.660)		(0.351)	(0.449)
Popupation		4.075**	11.135***		1.459	6.754***
		(2.046)	(3.155)		(1.221)	(2.082)

GLS estimates (Excluding capital gain)

Parameter	Top 1			Top 0.1		
Estimates	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
y_{it-1}	0.874***	0.768***	0.813***	0.860***	0.715***	0.759***
	(0.019)	(0.029)	(0.029)	(0.023)	(0.041)	(0.038)
Stock mrkt.	0.165***	0.063	0.085	0.092***	0.057**	0.094**
bubble	(0.038)	(0.045)	(0.064)	(0.021)	(0.028)	(0.037)
Stock mrkt.	-0.052*	-0.062*	-0.013	-0.018	-0.020	-0.003
crash	(0.030)	(0.032)	(0.057)	(0.017)	(0.021)	(0.033)
Housing mrkt.	0.154***	0.049	-0.091	0.089***	0.018	-0.060
bubble	(0.034)	(0.055)	(0.068)	(0.020)	(0.035)	(0.040)
Housing mrkt.	0.152	0.151	0.193	0.045	0.067	0.111
crash	(0.133)	(0.168)	(0.196)	(0.071)	(0.095)	(0.107)
Innovation	0.038**	0.025	0.017	0.028***	0.010	0.015
	(0.018)	(0.022)	(0.025)	(0.009)	(0.014)	(0.015)
GDPpc		0.735**	0.506		0.587**	0.593**
		(0.361)	(0.496)		(0.251)	(0.266)
Financial		0.471***	0.329***		0.183***	0.088*
development		(0.079)	(0.088)		(0.051)	(0.050)
Government		-0.042**	-0.035		-0.026**	-0.027**
expenditure		(0.018)	(0.022)		(0.012)	(0.013)
Openness		-0.006**	0.000		-0.003	-0.001
		(0.003)	(0.004)		(0.002)	(0.002)
Tax rate		-0.781***	-0.682***		-0.256*	-0.366***
		(0.190)	(0.241)		(0.133)	(0.135)
Popupation		-0.288	1.453		0.777	1.831***
		(0.933)	(0.940)		(0.627)	(0.615)
No of observations	472	447	447	400	377	377

Are the Anglo-Saxon countries different?

Parameter Est.	Top 1		Top 0.1	
y_{it-1}	0.841***	0.848***	0.817***	0.832***
	(0.025)	(0.025)	(0.029)	(0.029)
Stock mkrt.	0.251*		0.191**	
bubble X Anglo	(0.137)		(0.077)	
Stock mkrt.		-0.351***		-0.262***
crash X Anglo		(0.130)		(0.077)

Some robustness checking

- Consider alternative measures of the market bubble
- Choice of lags in detecting explosive behavior in the asset price index.
- Effect of Banking crisis on Top income shares

Estimates with continious bubble variables

Parameter	Top 1			Top 0.1		
Estimates	Model 1	Model 3	Model 4	Model 1	Model 3	Model 4
y_{it-1}	0.920***	0.845***	0.842***	0.922***	0.801***	0.802***
	(0.016)	(0.026)	(0.026)	(0.020)	(0.034)	(0.034)
(+) ve cumulative	0.197***	0.245***	0.242***	0.059**	0.078*	0.077*
return-stock index	(0.051)	(0.072)	(0.071)	(0.025)	(0.046)	(0.046)
(-) ve cumulative	0.346***	0.090	0.065	0.183***	0.020	0.026
return-stock index	(0.116)	(0.205)	(0.208)	(0.061)	(0.115)	(0.116)
(+) ve cumulative	0.082	-0.401	-0.403	0.050	-0.291*	-0.292*
return-housing index	(0.187)	(0.255)	(0.254)	(0.097)	(0.149)	(0.149)
(-) ve cumulative	0.617**	0.347	0.241	0.258*	0.245	0.250
return-housing index	(0.259)	(0.374)	(0.387)	(0.135)	(0.206)	(0.211)
Innovation	0.054***	0.028	0.027	0.030***	0.023*	0.022*
	(0.015)	(0.021)	(0.021)	(0.009)	(0.012)	(0.012)
GDPpc		0.743	0.704		0.553**	0.553**
		(0.480)	(0.480)		(0.262)	(0.265)
Financial		0.241***	0.247***		0.105**	0.103**
development		(0.081)	(0.082)		(0.043)	(0.044)
Government		-0.022	-0.021		-0.017	-0.017
expenditure		(0.020)	(0.019)		(0.011)	(0.011)
Openness		0.001	0.001		-0.000	-0.000
		(0.004)	(0.004)		(0.002)	(0.002)
Tax rate		-0.657***	-0.668***		-0.324***	-0.322***
		(0.217)	(0.219)		(0.110)	(0.111)
Popupation		1.177	1.097		1.279**	1.280**
		(0.814)	(0.814)		(0.520)	(0.522)
Banking			-0.054			0.006
crisis			(0.061)			(0.033)

Conclusion

- Innovation measured by the annual flow of patents has some power to explain the recent surge in top income inequality.
- The explosive behaviour stock market (i.e bubble or chash) seems to be an important driver of the observed increases in inequality.
- The effects of financial bubbles are different in Anglo-Saxon countries.

Thank you very much.