Online Supplementary Material

Aggregate Wealth and Its Distribution as Determinants of Financial Crises

Thomas HAUNER

The Graduate Center

City University of New York (CUNY)

365 Fifth Ave, Room 5315

New York, NY 10016.

Contact: thauner@gradcenter.cuny.edu

The following supplementary material is intended to accompany the article "Aggregate Wealth and Its Distribution as Determinants of Financial Crises," submitted for initial review to the Journal of Economic Inequality.
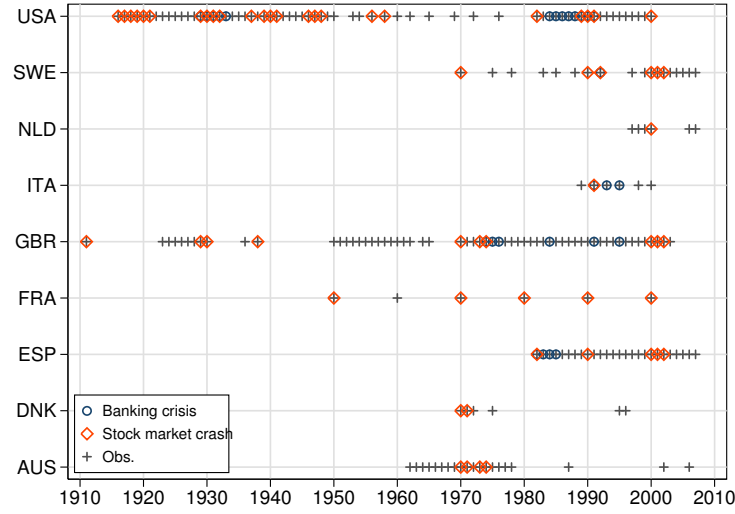
A   Data

Figure A.1: Crisis and Observations Timeline
Notes: Observations restricted to subsample of country-year observations
with top1% wealth shares, aggregate wealth-income ratios, and finance's share
of total income. Sources: Reinhart & Rogoff (2010)

Table A.1: Number of Crisis Episodes: 1870–2010, Subsample 1

	Banking Crisis	Stock Market Crash	Both
Australia	0	4	0
Denmark	0	2	0
France	0	5	0
Italy	3	1	1
Netherlands	0	1	0
Spain	4	5	1
Sweden	1	6	1
United Kingdom	6	10	1
United States	13	24	7
Total	27	58	11
Likelihood of crisis (213 Obs)	0.127	0.272	0.052

Notes: Subsample is restricted to country-year observations with top1% wealth
shares, aggregate wealth-income ratios, and finance's share of total income. Sources:
Reinhart & Rogoff (2010)

Table A.2: SUMMARY STATISTICS: FULL SAMPLE

Variable	Mean	Std. Dev.	Min.	Max.	Obs	Countries
Top 1% Shr Net Worth	0.275	0.126	0.063	0.690	401	13
Wealth-Income ratio	4.59	1.421	1.805	8.855	1,174	12
Finance Shr of Income	0.036	0.02	0.001	0.124	1,402	15
$\tilde{r}$	0.001	0.117	-1.415	0.799	731	15
$\hat{g}$	0.018	0.052	-0.509	0.659	2,702	15
Private Sector Credit	0.724	0.404	0.114	2.022	813	15
Top Marginal Tax Rate	58.366	20.704	2	97.5	714	10

NOTES: The full sample includes all observations on all available countries for a given variable, thus exceeding the number of countries in each of our sub-samples.

Table A.3: SUMMARY STATISTICS: SUBSAMPLE 1

Variable	Mean	Std. Dev.	Min.	Max.	Obs	Countries
Top 1% Shr Net Worth	0.246	0.12	0.063	0.690	213	9
Wealth-Income ratio	4.195	0.985	2.258	8.855	213	9
Finance Shr of Income	0.047	0.011	0.011	0.079	213	9

NOTES: Subsample is restricted to country-year observations with top 1% wealth shares, aggregate wealth-income ratios, and finance's share of total income.

B Results

B.1 Five Year Averages

Table B.4: FIVE YEAR AVERAGES: LIKELIHOOD OF BANKING CRISIS

Panel A	(1)	(2)	(3)
Top 1% Shr Net Worth	-3.452	-8.960	-20.488*
	(4.674)	(7.531)	(8.040)
Wealth-Income ratio	-0.020	-0.623	-1.837
	(0.424)	(0.648)	(0.973)
Top 1% Shr Net Worth $\times$ Wealth-Income ratio	0.987	3.882	8.186**
	(1.539)	(2.824)	(2.351)
Finance Shr of Income	-8.678	-17.527***	-9.406
	(7.582)	(5.035)	(11.715)
$\tilde{r}$		9.187**	7.806
		(3.347)	(4.480)
$\hat{g}$		-12.034	-1.229
		(7.285)	(10.969)
Private Sector Credit			-0.026
			(0.495)
Top Marginal Tax Rate			-0.009
			(0.009)
Panel B			
Marginal Effects of Top 1% Shr Net Worth			
at Mean of Wealth-Income ratio	0.699	7.129	11.613***
	(2.183)	(4.315)	(1.598)
at P25 of Wealth-Income ratio	0.135	5.401	7.564***
	(1.471)	(3.095)	(1.009)
Average Marginal Effect			
	0.699	7.129*	11.613***
	(2.183)	(4.315)	(1.598)
AIC	47.5	30.9	11.5
R^2	0.506	0.582	0.683
Countries	9	9	6
Obs	72	59	45

Clustered standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

NOTES: All variables are averaged over five year intervals. Dependent variable takes the value 1 if crisis type occurs in given country over five years. Linear probability model is estimated with two-way fixed effects (2FE), controlling for country and half-decade. Financial development is the sum of all bank deposits and stock market capitalization as a percentage of GDP, and a proxy for the rate of return on capital, r. A second proxy, $\tilde{r}$ is the difference in first-differences of financial development. The variable $\hat{g}$, a proxy for growth, is the annual percentage change in GDP per capita. Private sector credit is measured as a share of GDP and the top marginal tax rate is a percentage. Panel B depicts marginal effects of wealth inequality on the crisis type when evaluated at the mean and 25th percentile of aggregate wealth.
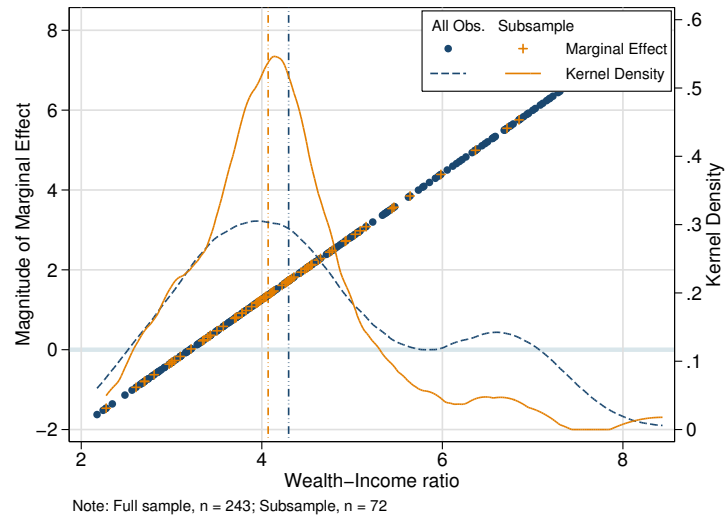
Table B.5: Five Year Averages: Likelihood of Stock Market Crash

Panel A

	(1)	(2)	(3)
Top 1% Shr Net Worth	-6.732	-9.218**	-5.906*
	(4.275)	(3.491)	(2.734)
Wealth-Income ratio	-0.720*	-0.996***	-0.417
	(0.368)	(0.296)	(0.275)
Top 1% Shr Net Worth × Wealth-Income ratio	2.805*	4.011**	3.245**
	(1.470)	(1.274)	(1.026)
Finance Shr of Income	-0.644	-0.326	3.136
	(6.435)	(4.770)	(15.122)
$\tilde{r}$		-3.294	-7.308
		(2.602)	(5.383)
$\hat{g}$		9.419	-23.691**
		(5.663)	(5.877)
Private Sector Credit			-0.563
			(0.587)
Top Marginal Tax Rate			-0.023**
			(0.009)

Panel B

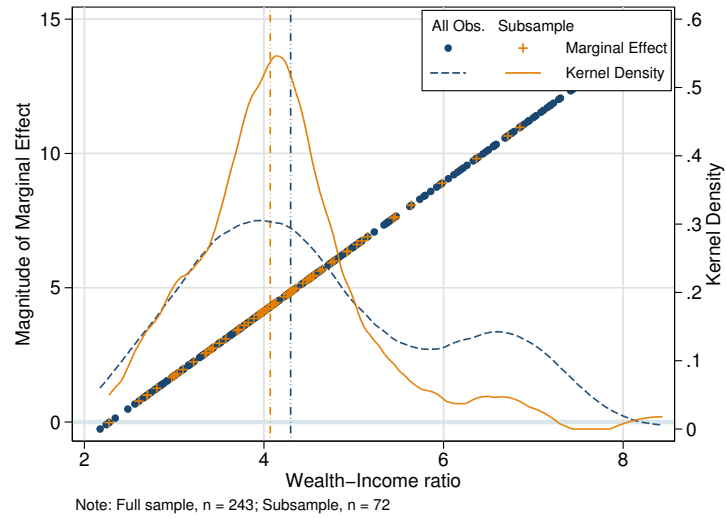| Marginal Effects of Top 1% Shr Net Worth			
at Mean of Wealth-Income ratio	5.074*	7.406***	6.819**
	(2.250)	(2.118)	(1.743)
at P25 of Wealth-Income ratio	3.470*	5.621***	5.214**
	(1.538)	(1.625)	(1.346)
Average Marginal Effect			
	5.074**	7.406***	6.819***
	(2.250)	(2.118)	(1.743)
AIC	30.4	31.3	8.8
R^2	0.638	0.615	0.698
Countries	9	9	6
Obs	72	59	45

Clustered standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

NOTES: All variables are averaged over five year intervals. Dependent variable takes the value 1 if crisis type occurs in given country over five years. Linear probability model is estimated with two-way fixed effects (2FE), controlling for country and half-decade. Financial development is the sum of all bank deposits and stock market capitalization as a percentage of GDP, and a proxy for the rate of return on capital, r. A second proxy, $\tilde{r}$ is the difference in first-differences of financial development. The variable $\hat{g}$, a proxy for growth, is the annual percentage change in GDP per capita. Private sector credit is measured as a share of GDP and the top marginal tax rate is a percentage. Panel B depicts marginal effects of wealth inequality on the crisis type when evaluated at the mean and 25th percentile of aggregate wealth.

Note: Full sample, n = 243; Subsample, n = 72

(a) Banking Crisis

Note: Full sample, n = 243; Subsample, n = 72

(b) Stock Market Crash

Figure B.2: Marginal Effect of Wealth Inequality on Likelihood of Financial Crisis: LPM Five Year Averages

6

B.2 Large Crisis or *Both* Banking Crisis and Stock Market Crash

Table B.6: Five Year Averages: Likelihood of Large Crisis

Panel A	(1)	(2)	(3)
Top 1% Shr Net Worth	-4.844	-7.292	-13.221**
	(3.616)	(5.866)	(4.871)
Wealth-Income ratio	-0.391	-0.791	-1.320*
	(0.338)	(0.538)	(0.621)
Top 1% Shr Net Worth × Wealth-Income ratio	1.604	3.326	5.831***
	(1.272)	(2.278)	(1.230)
Finance Shr of Income	1.339	-4.357	5.536
	(3.851)	(3.627)	(16.744)
$\tilde{r}$		1.933	-3.229
		(3.684)	(3.159)
$\hat{g}$		-3.224	-8.441
		(4.553)	(6.453)
Private Sector Credit			-0.290
			(0.436)
Top Marginal Tax Rate			-0.007
			(0.007)
Panel B			
Marginal Effects of Top 1% Shr Net Worth			
at Mean of Wealth-Income ratio	1.908	6.493	9.644***
	(2.122)	(3.912)	(1.585)
at P25 of Wealth-Income ratio	0.990	5.013	6.760***
	(1.517)	(2.969)	(1.620)
Average Marginal Effect			
	1.908	6.493*	9.644***
	(2.122)	(3.912)	(1.585)
AIC	24.4	16.4	-2.2
R^2	0.464	0.466	0.598
Countries	9	9	6
Obs	72	59	45

Clustered standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

NOTES: All variables are averaged over five year intervals. Dependent variable takes the value 1 if both crisis types occur in given country over five years. Linear probability model is estimated with two-way fixed effects (2FE), controlling for country and half-decade. Financial development is the sum of all bank deposits and stock market capitalization as a percentage of GDP, and a proxy for the rate of return on capital, r. A second proxy, $\tilde{r}$ is the difference in first-differences of financial development. The variable $\hat{g}$, a proxy for growth, is the annual percentage change in GDP per capita. Private sector credit is measured as a share of GDP and the top marginal tax rate is a percentage. Panel B depicts marginal effects of wealth inequality on the crisis type when evaluated at the mean and 25th percentile of aggregate wealth.
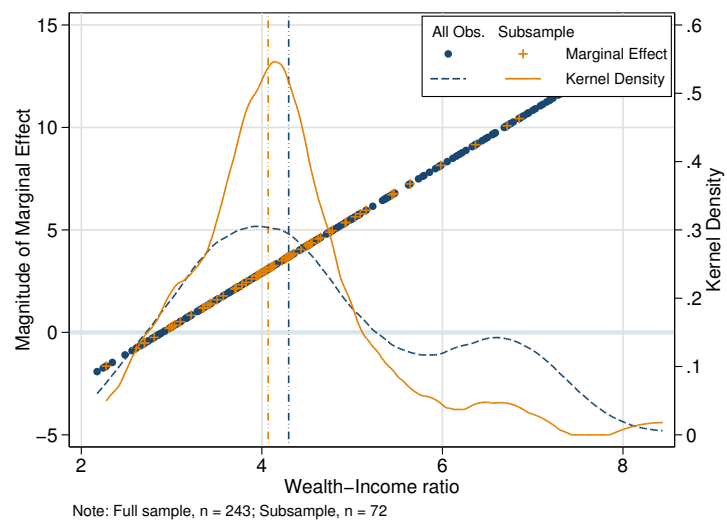
Figure B.3: Marginal Effect of Wealth Inequality on Likelihood of Large Crisis: LPM Five Year Averages

B.3 Aggregate Wealth and Instability

Table B.7: Test of Nonlinear Aggregate Wealth Effect on Likelihood of Financial Crisis

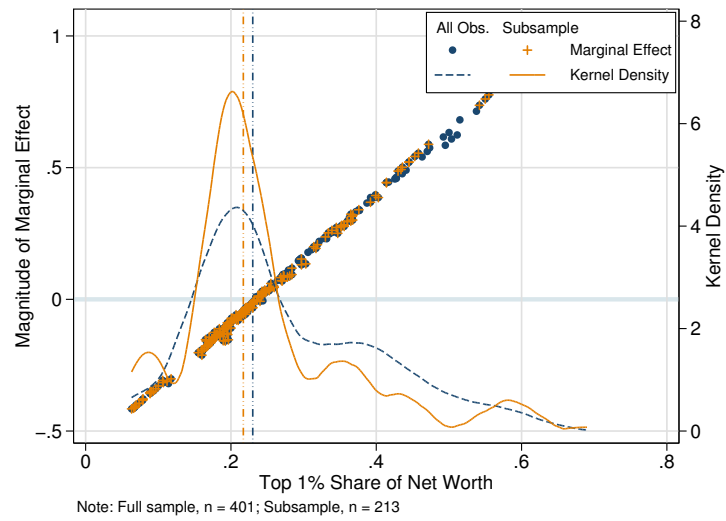|	Banking Crisis	Stock Market Crash	Large Crisis
Top 1% Shr Net Worth $_{t-2}$	-5.137**	-6.680***	-7.568***
	(1.969)	(1.031)	(1.261)
Wealth-Income ratio $_{t-2}$	-0.631*	-0.520**	-0.726***
	(0.299)	(0.197)	(0.176)
Wealth-Income ratio squared $_{t-2}$	0.033*	-0.006	0.015
	(0.015)	(0.011)	(0.010)
Top 1% Shr Net Worth × Wealth-Income ratio $_{t-2}$	2.060***	2.406***	2.479***
	(0.583)	(0.253)	(0.421)
Finance Shr of Income $_{t-2}$	-8.466	9.461**	2.766
	(6.373)	(3.477)	(2.328)
AIC	-24.2	-101.8	-189.7
R^2	0.582	0.825	0.517
Countries	9	9	9
Obs	213	213	213

Clustered standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

NOTES: Dependent variable is a binary indicator if a type of financial crisis occurs for a given country and year. Linear probability model is estimated with two-way fixed effects (2FE), controlling for country and year.
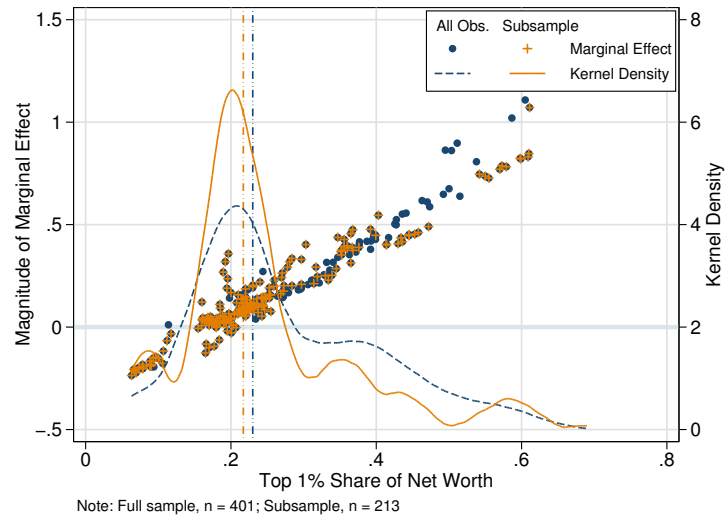
(a) Banking Crisis

(b) Stock Market Crash

Figure B.4: Marginal Effects of Nonlinear Aggregate Wealth on Likelihood of Financial Crisis

C   Fixed Effect Logit

Table C.8: FIXED EFFECT LOGIT: LIKELIHOOD OF BANKING CRISIS

Panel A	(1)	(2)	(3)
Top 1% Shr Net Worth $_{t-2}$	-6.966	-42.786	-75.463*
	(8.851)	(32.020)	(43.574)
Wealth-Income ratio $_{t-2}$	0.126	-2.827	-5.696**
	(0.495)	(2.052)	(2.884)
Top 1% Shr Net Worth $\times$ Wealth-Income ratio $_{t-2}$	1.111	10.772	22.956*
	(1.626)	(9.182)	(12.134)
Finance Shr of Income $_{t-2}$	34.281	22.723	-1.471
	(20.941)	(28.316)	(42.871)
$\tilde{r}$ $_{t-2}$		-1.104	-0.861
		(2.735)	(2.823)
$\hat{g}$ $_{t-2}$		-12.478	-13.896
		(13.092)	(13.916)
Private Sector Credit $_{t-2}$			-1.788
			(1.554)
Top Marginal Tax Rate $_{t-2}$			-0.068**
			(0.031)
Panel B			
Marginal Effects of Top 1% Shr Net Worth			
at Mean of Wealth-Income ratio	-0.322	4.8e-5	0.022
	(0.947)	(3.9e-4)	(0.015)
at P25 of Wealth-Income ratio	-0.441	-2.4e-5	0.011
	(1.133)	(3.9e-4)	(0.009)
Average Marginal Effect			
	-0.370	-2.1e-5	0.064*
	(0.811)	(3.1e-4)	(0.037)
AIC	140.5	102.3	94.3
Pseudo-R^2	0.072	0.055	0.116
Countries	7	6	5
Obs	201	141	130

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

NOTES: The dependent variable is a binary indicator equal to one if a crisis occurs for a country in a given year. Fixed effect logit model is estimated with country fixed effects. Coefficient estimates are reported. A proxy for the rate of return on capital, $\tilde{r}$ is the difference in first-differences of financial development (the sum of all bank deposits and stock market capitalization as a percentage of GDP). The variable $\hat{g}$, a proxy for growth, is the annual percentage change in GDP per capita. Private sector credit is measured as a share of GDP and the top marginal tax rate is a percentage. Panel B depicts marginal effects of wealth inequality on the crisis type when evaluated at the mean and 25th percentile of aggregate wealth.
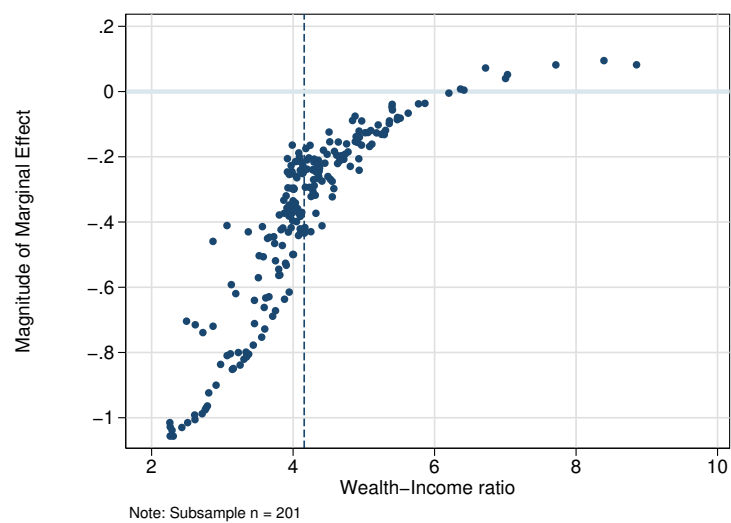
Table C.9: Fixed Effect Logit: Likelihood of Stock Market Crash

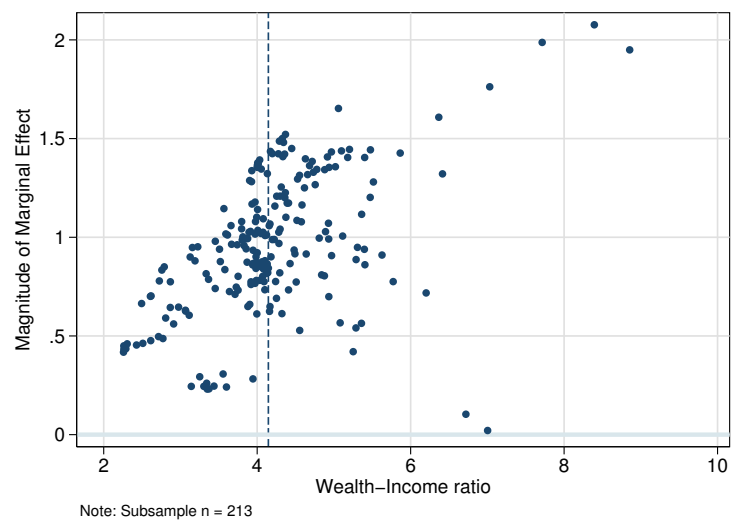| Panel A			
	(1)	(2)	(3)
Top 1% Shr Net Worth $_{t-2}$	-0.403	-154.572***	-118.591**
	(6.036)	(50.103)	(53.712)
Wealth-Income ratio $_{t-2}$	-0.246	-9.227***	-6.990**
	(0.501)	(2.751)	(2.939)
Top 1% Shr Net Worth $\times$ Wealth-Income ratio $_{t-2}$	1.505	46.240***	36.959***
	(1.495)	(13.410)	(14.330)
Finance Shr of Income $_{t-2}$	21.232	36.716	33.731
	(16.587)	(26.872)	(38.773)
$\tilde{r}_{t-2}$		-2.379	-1.370
		(2.226)	(2.341)
$\hat{g}_{t-2}$		12.543	8.275
		(12.778)	(13.401)
Private Sector Credit $_{t-2}$			-0.199
			(1.784)
Top Marginal Tax Rate $_{t-2}$			-0.005
			(0.025)
Panel B			
Marginal Effects of Top 1% Shr Net Worth			
at Mean of Wealth-Income ratio	0.929	0.030***	0.037**
	(1.129)	(0.011)	(0.015)
at P25 of Wealth-Income ratio	1.083	0.025**	0.020*
	(0.805)	(0.012)	(0.010)
Average Marginal Effect			
	0.957	0.117***	0.128***
	(1.023)	(0.037)	(0.049)
AIC	212.0	118.6	112.2
Pseudo-R^2	0.054	0.197	0.166
Countries	9	9	6
Obs	213	156	134

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

NOTES: The dependent variable is a binary indicator equal to one if a crisis occurs for a country in a given year. Fixed effect logit model is estimated with country fixed effects. Coefficient estimates are reported. A proxy for the rate of return on capital, $\tilde{r}$ is the difference in first-differences of financial development (the sum of all bank deposits and stock market capitalization as a percentage of GDP). The variable $\hat{g}$, a proxy for growth, is the annual percentage change in GDP per capita. Private sector credit is measured as a share of GDP and the top marginal tax rate is a percentage. Panel B depicts marginal effects of wealth inequality on the crisis type when evaluated at the mean and 25th percentile of aggregate wealth.

(a) Banking Crisis

(b) Stock Market Crash

Figure C.5: Marginal Effect of Wealth Inequality on Likelihood of Crisis: Logit Model

13

Table C.10: Fixed Effect Logit: Likelihood of Large Crisis

Panel A			
	(1)	(2)	(3)
Top 1% Shr Net Worth $_{t-2}$	2.264	-236.830*	-6011.834
	(11.211)	(127.471)	(2210388.052)
Wealth-Income ratio $_{t-2}$	-0.830	-23.836**	-1092.064
	(1.090)	(11.444)	(405450.635)
Top 1% Shr Net Worth × Wealth-Income ratio $_{t-2}$	1.793	90.916**	4933.949
	(2.106)	(44.482)	(1844686.373)
Finance Shr of Income $_{t-2}$	76.136**	184.791**	3469.885
	(34.972)	(93.213)	(4730344.580)
$\tilde{r}_{t-2}$		-12.249	-930.945
		(8.442)	(351738.545)
$\hat{g}_{t-2}$		17.678	-137.834
		(43.241)	(358416.950)
Private Sector Credit $_{t-2}$			-30.853
			(143921.207)
Top Marginal Tax Rate $_{t-2}$			-9.999
			(4362.300)
Panel B			
Marginal Effects of Top 1% Shr Net Worth			
at Mean of Wealth-Income ratio	0.487	0.164**	
	(1.997)	(0.075)	
at P25 of Wealth-Income ratio	1.068	0.584	
	(2.975)	(0.408)	
Average Marginal Effect			
	0.680	0.364***	
	(2.233)	(0.140)	
AIC	61.9	29.1	16.0
Pseudo-R^2	0.126	0.486	1.000
Countries	5	4	3
Obs	155	98	90

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

NOTES: The dependent variable is a binary indicator equal to one if a both a stock market crash and a banking crisis occur in a country in a given year. Fixed effect logit model is estimated with country fixed effects. Coefficient estimates are reported. A proxy for the rate of return on capital, $\tilde{r}$ is the difference in first-differences of financial development (the sum of all bank deposits and stock market capitalization as a percentage of GDP). The variable $\hat{g}$, a proxy for growth, is the annual percentage change in GDP per capita. Private sector credit is measured as a share of GDP and the top marginal tax rate is a percentage. Panel B depicts marginal effects of wealth inequality on the crisis type when evaluated at the mean and 25th percentile of aggregate wealth.
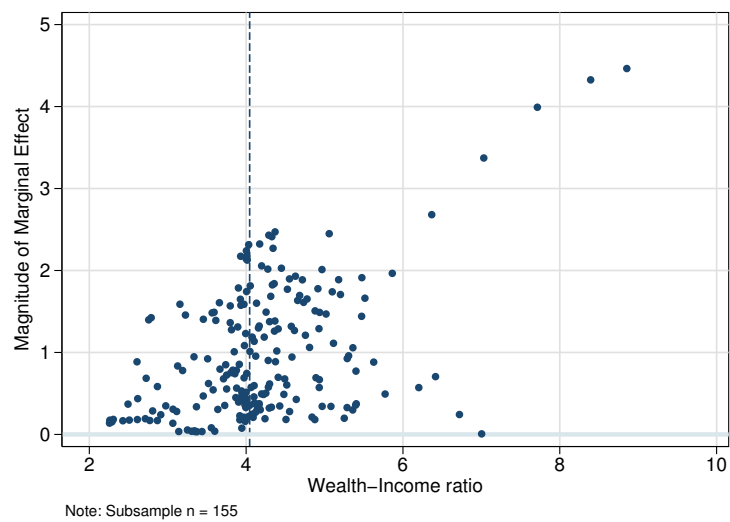
Note: Subsample n = 155

Figure C.6: Marginal Effect of Wealth Inequality on Likelihood of Large Crisis: Logit Model

D Income Inequality

Table D.11: Likelihood of Banking Crisis with Income Inequality

Panel A	(1)	(2)	(3)
Top 1% Shr Income $_{t-2}$	-5.288	1.623	2.492
	(7.879)	(6.373)	(10.819)
Wealth-Income ratio $_{t-2}$	-0.040	0.084	0.143
	(0.123)	(0.089)	(0.222)
Top 1% Shr Income $\times$ Wealth-Income ratio $_{t-2}$	1.940	0.233	-1.273
	(1.623)	(1.394)	(2.482)
Finance Shr of Income $_{t-2}$	-9.405**	-7.214**	-7.048
	(3.449)	(2.892)	(7.334)
$\tilde{r}_{\ t-2}$		-0.296*	-0.524***
		(0.139)	(0.126)
$\hat{g}_{\ t-2}$		-2.070	-2.793
		(2.122)	(1.646)
Private Sector Credit $_{t-2}$			0.571**
			(0.221)
Top Marginal Tax Rate $_{t-2}$			-0.013***
			(0.004)
Panel B			
Marginal Effects of Top 1% Shr Income			
at Mean of Wealth-Income ratio	2.895*	2.585	-2.653
	(1.449)	(1.485)	(2.402)
at P25 of Wealth-Income ratio	1.478	2.419	-1.665
	(2.403)	(2.029)	(3.394)
Average Marginal Effect			
	2.895**	2.585*	-2.653
	(1.449)	(1.485)	(2.402)
AIC	115.8	105.1	57.1
R^2	0.346	0.260	0.320
Countries	10	10	8
Obs	393	335	271

Clustered standard errors in parentheses in Panel A

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

NOTES: Dependent variable is a binary indicator of crisis type for given country and year. Linear probability model is estimated with two-way fixed effects (2FE), controlling for country and year. A proxy for the rate of return on capital, $\tilde{r}$ is the difference in first-differences of financial development (the sum of all bank deposits and stock market capitalization as a percentage of GDP). The variable $\hat{g}$, a proxy for growth, is the annual percentage change in GDP per capita. Private sector credit is measured as a share of GDP and the top marginal tax rate is a percentage. Panel B depicts marginal effects of wealth inequality on the crisis type when evaluated at the mean and 25th percentile of aggregate wealth.
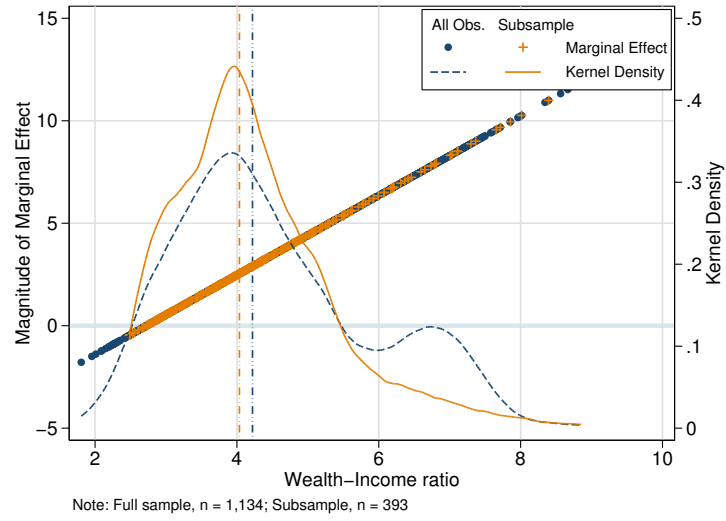
Table D.12: LIKELIHOOD OF STOCK MARKET CRASH WITH INCOME INEQUALITY

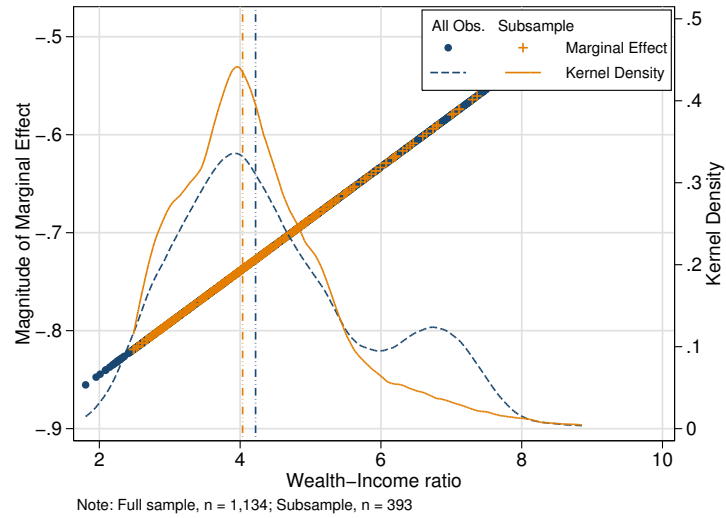| Panel A			
	(1)	(2)	(3)
Top 1% Shr Income $_{t-2}$	-0.951	-4.728	-7.596
	(4.074)	(5.942)	(9.811)
Wealth-Income ratio $_{t-2}$	0.023	0.000	-0.004
	(0.057)	(0.089)	(0.175)
Top 1% Shr Income × Wealth-Income ratio $_{t-2}$	0.053	0.812	1.654
	(0.900)	(1.297)	(2.009)
Finance Shr of Income $_{t-2}$	-1.464	-1.995	-6.405
	(3.039)	(3.751)	(7.277)
$\tilde{r}$ $_{t-2}$		-0.070	-0.207
		(0.195)	(0.278)
$\hat{g}$ $_{t-2}$		1.279	0.598
		(1.402)	(1.672)
Private Sector Credit $_{t-2}$			-0.023
			(0.219)
Top Marginal Tax Rate $_{t-2}$			-0.002
			(0.005)
Panel B			
Marginal Effects of Top 1% Shr Income			
at Mean of Wealth-Income ratio	-0.729	-1.376	-0.910
	(2.111)	(2.527)	(3.689)
at P25 of Wealth-Income ratio	-0.767	-1.958	-2.194
	(2.120)	(2.699)	(4.388)
Average Marginal Effect			
	-0.729	-1.378	-0.910
	(2.111)	(2.527)	(3.689)
AIC	166.2	185.8	155.9
R^2	0.531	0.438	0.396
Countries	10	10	8
Obs	393	335	271

Clustered standard errors in parentheses in Panel A

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

NOTES: Dependent variable is a binary indicator of crisis type for given country and year. Linear probability model is estimated with two-way fixed effects (2FE), controlling for country and year. A proxy for the rate of return on capital, $\tilde{r}$ is the difference in first-differences of financial development (the sum of all bank deposits and stock market capitalization as a percentage of GDP). The variable $\hat{g}$, a proxy for growth, is the annual percentage change in GDP per capita. Private sector credit is measured as a share of GDP and the top marginal tax rate is a percentage. Panel B depicts marginal effects of wealth inequality on the crisis type when evaluated at the mean and 25th percentile of aggregate wealth.
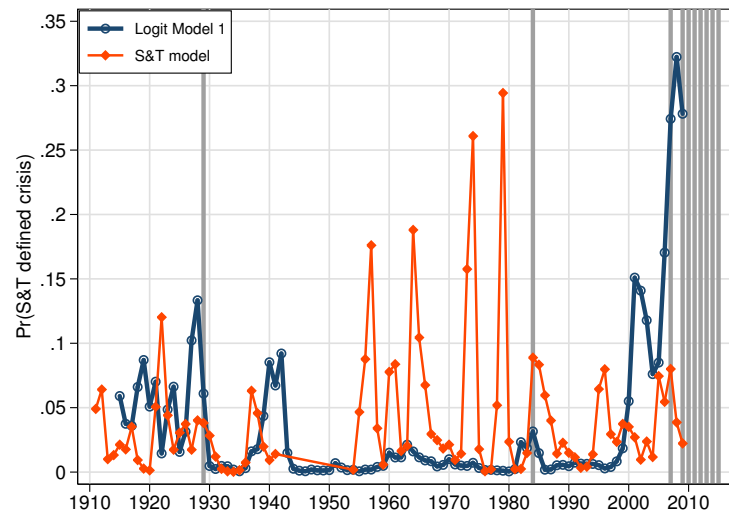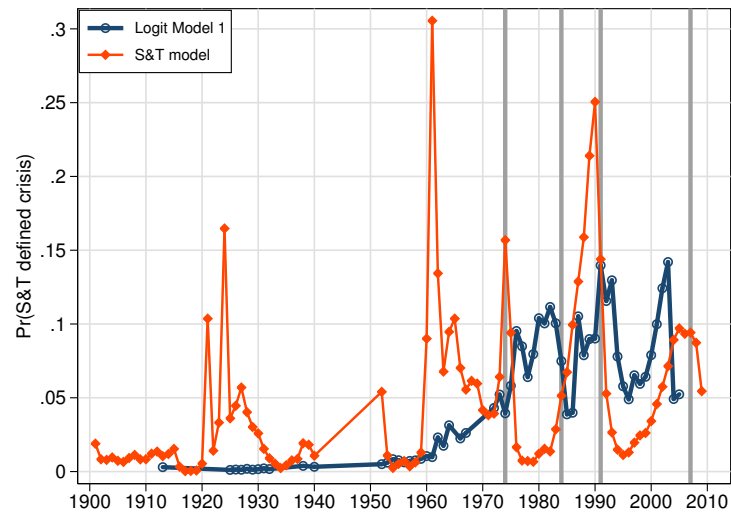
(a) Banking Crisis

(b) Stock Market Crash

Figure D.7: Marginal Effect of Income Inequality on Likelihood of Financial Crisis: LPM

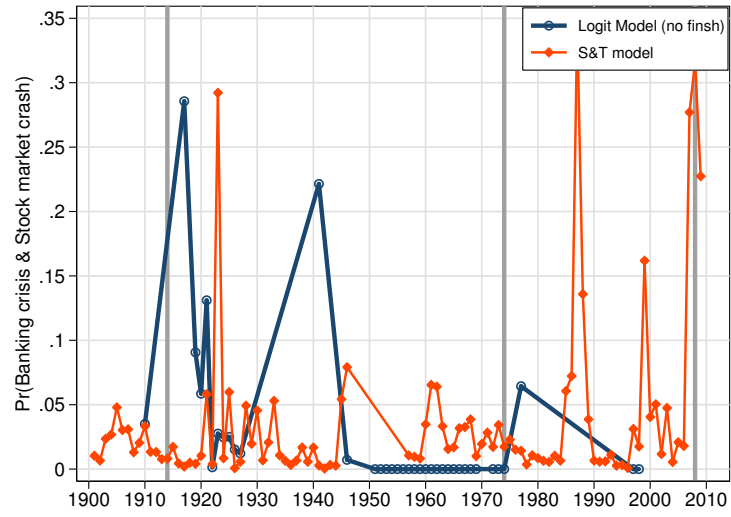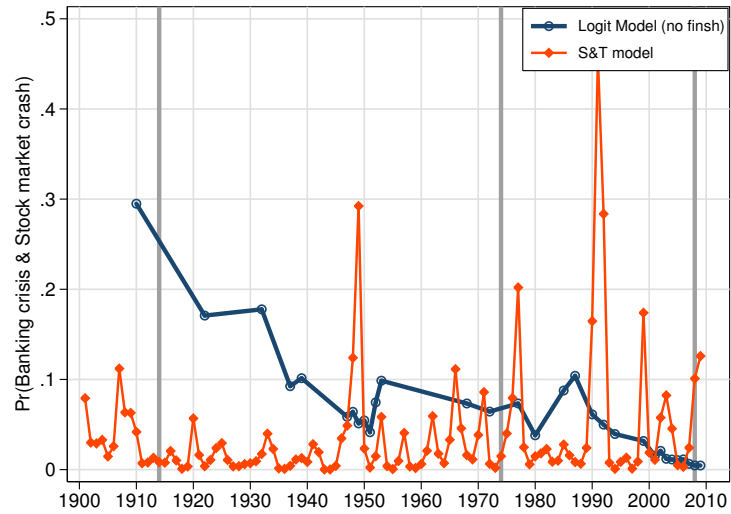# E   Predicted Probabilities of Crisis

(a) United States

(b) United Kingdom

Figure E.8: PREDICTED PROBABILITIES OF S&T DEFINED CRISIS

19

(a) Denmark

(b) Sweden

Figure E.9: Predicted Probabilities of Large Crisis

References

Reinhart, C. M., & Rogoff, K. S. (2010). From financial crash to debt crisis. NBER Working Paper 15795, National Bureau of Economic Research.