The Circular Relationship between Inequality, Leverage, and Financial Crises

Online Appendix (not for publication)

Rémi Bazillier[*] and Jérôme Hericourt[◊]

[*] Univ.Orléans, LEO, CNRS UMR 7322, remi.bazillier@univ-orleans.fr

[◊] University of Western Brittany – ICI (EA 2652), University of Lille – LEM CNRS (UMR 9221), and CEPII, jerome.hericourt@univ-brest.fr

Appendix A: State of the Art

Table A1: The impact of Inequality on debt, financial crises and current account

Paper	Years	Number of Countries	DC	EC	LIC	Dependent Variable	Inequality Measure	Database	Result	Remarks	Impact Ineq.
Empirical											
Atkinson and Morelli (2011)	1911-2010	37 systemic banking crises	x	x		Banking Crisis	Gini, Top 1, bottom 60	AM2012	Inequality increases in 10 cases out of 25	Event method (no econometrics)	Positive (10/25)
Belletini and Delbono (2013)	1980-2010	OECD countries	x			Banking Crisis	Gini (Before and After tax)	AM2012, OECD2011, WIID	High level of inequalities in 9 banking crises out of 14	Event method. Focus on the level of inequality (and not evolutions)	Positive (9/14)
Berhinger and van Treeck (2013)	1982-2007	20	x			Net current account balance	Top income share / Gini / Labor share	WTID, WDI, SWIID	Top income share / Gini: Negative impact on CA Declining labor share: Positive impact on CA		Positive (labor share) and Negative (top income share and Gini)
Bordo and Meissner (2012)	1920-2008	14	x			Real Bank Loans to Private sector (in log)	Top 1 Percent	WTID	Not significant	yearly data or 5 years time span - do not deal about endogeneity	Not significant

Christen and Morgan (2005)	1980-2003	1 (The US)	x			Total Household Debt	Gini	CPS	Positive impact on debt (+0.36%)	Credit demand rather than supply	Positive
Coibion et al. (2014)	2000s	1 (The US)	x			household debt accumulation	Ranking in the local (county) income distribution / Ratio 90/10 local distribution	SCF	1. Debt accumulation over the course of the early to mid-2000s was, on average, greater for lower income households. 2. Households living in the more unequal areas within a county accumulated less debt over the early to mid-2000s than did those in lower inequality areas in the same county.	Second result is supposed to invalidate "Keeping up with the Joneses Hypothesis"	Mixed

Kumhof et al. (2012)	1960-2006	18	x			Net current account balance	Top income share	WTID	Short-term: Negative correlation of -0.1 with the top 5 % income share / -0.3 with the top 1 % income share. Medium-term: Negative correlation of -0.25 with the top 5 % income share / -0.6 with the top 1 % income share.	Different access to capital markets may explain heterogeneous impact of rising top income share between developed and developing/emerging countries (China)	Negative
Perugini, Holscher and Collie (2013)	1970-2007	18	x			Credit (% GDP)	Top 1, 5, 10Percent	WTID	Positive impact on credit, ranging between +0.4 and +1.1	IV: Internal and external (Labor and Product Market Regulation, Rule of Law, Trade Openness). Financial deregulation has a positive impact on credit. But no effect of the interaction term.	Positive
Theoretical											

Al-Hussami and Martin Remesal (2012)	1970-2007	22	x	x		Current Account			Rise Top Income Share: fall of CA	Simple model of CA with heterogeneous agents	Negative
Belabed et al. (2013)	1990-2007	3	x	x		Current Account			US: rise of income inequality and Negative impact on the CA. China and Germany : Fall of the labor share and Positive impact on the CA.	Stock-flow model.	Positive (labor share) and Negative (top income share and Gini)
Iacoviello (2008)	1963-2003	1 (The US)	x			Household Debt	Income Variance		Positive. Simulations of the model can replicate the dynamics of inequalities and debt in the US.	Theoretical model where the increased level of income volatility (temporary income shock) leads to an increase of household debt.	Positive

Kumhof et al. (2015)	1983 – 2030 (scenario)	1 (the US)	x			Household Debt and financial crisis	Top 5 percent income share		Bottom earners' debt-to-income ratio increases from 62.3% in 1983 to 143.2% in 2008, accompanied by an increase in crisis probability from initially around 1.5% in any given year, to 4.9% in 2008.	DSGE model. Top earners have a preference for wealth and benefit from a permanent positive income shock [increase in the top 5% income share from 21.8% in 1983 to 33.8% in 2008]	Positive
Kumhof et al. (2012)	NA	NA				Current Account			Rise Top Income Share: fall of CA	DSGE model.	Negative

DC: Developed countries

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Inequality Dataset:

DS96: Deininger and Squire (1996)

WIID: UN-WIDER World Income Inequality Database

SWIID: Standardized World Income Inequality Database

EHII-UTIP: Estimated Household Inequality (Galbraith and Kum 2003), University of Texas Inequality Project

HCES: Household consumption expenditure survey

ID: Income Data (national level)
CPS: Current Population Survey (US)
SCF: Survey of Consumer Finances (US)
WTID: World Top Income Database
AM2012: Atkinson and Morelli (2012)
OECD2011: OECD (2011, Overview, Fig. 2)
WDI: World Development Indicators (World Bank)

Table A2: From leverage to financial crises

Paper	Years	Number of Countries	DC	EC	LIC	Dependent Variable	Leverage Measure	Result	Remarks	Impact Financial crisis
Büyükkarabacak and Valev (2010)	1990-2007	37	x	x	x	Prob (banking crisis), ie, Binary indicator equal to 1 when a systemic banking crisis occurred	private credit /GDP, afterwards split between household and business credit	Increase in household credit/GDP ratio by 1% raises the conditional expectation of a crisis by 7.6% ; insignificant effect for business credit	Averaged panel logit proability model	Positive (not for business credit)
Bordo and Meissner (2012)	1920-2008	14	x			Prob (banking crisis), ie, binary indicator equal to 1 when a banking crisis occurred.	Real bank loans	Positive impact : probability of a banking crisis increases by 5% when real bank loans increase by 10%	Panel data analysis, both with linear and non-linear estimators	Positive

Gourinchas, Valdes and Landerretche (2001)	1960-1996	91	x	x	x	Descriptive approach focusing on the identification of credit booms and some stylized facts surrounding them.		Lending booms are not associated with a significant increase in banking and balance of payment vulnerability.	Focus on Latin America, where lending booms are often followed by a banking and/or a currency crisis.	No effect
Jordà, Schularick and Taylor (2011)	1870-2008	14	x			Log-odds ratio of a financial crisis event, with a binary, state variable taking the value 1 if a financial crisis occurred.	Loans/GDP, Money/GDP and Current Account/GDP	Credit better predictor of financial crises than Current Account	Standard panel data analysis; focus on the predictive power of the dependent variables	Positive
Jordà, Schularick and Taylor (2014)	1870-2012, distinction between pre and post-WWII period	14	x			Prob (fnancia crisis), ie, Binary indicator equal to 1 when a financial crisis occurred	Mortgage loans/GDP, House prices/income	Mortgage lending and house prices: information about the likelihood of FC, but not perfect predictor	Classification methods rather than evaluating model fit, careful handling of endogeneity of monetary conditions through the use of IVs.	Positive (but not perfect predictor)
Kaminsky and Reinhart (1999)	1970-1995	20 (+4 "out of sample")	x	x		Descriptive/classification approach, focused on Probabilities of crisis occurrence and key indicators (monetary aggregates, private credit…)		Banking and currency crises are closely linked in the aftermath of financial liberalization, with credit boom and bust dynamics at the root.	Huge majority of emerging countries in the sample: 15 vs 5 developed.	Positive

Mian and Sufi (2010)	2002-2009	1 (= top 450 US counties by pop.)	x			Indicators of economic outcomes (mortgage default rates, house price growth, auto sales, new housing building permits, and unemployment)	Various indicators of leverage, with a focus on household leverage (housing credit and short-term finance)	Household leverage early and powerful statistical predictor of cross-sectional county-level variation in household default, house price, unemployment, residential investment, and durable consumption from 2007 to 2009.	Standard cross-section regressions with IV for tackling endogeneity issues in Leverage.	Positive
Mendoza and Terrones (2008)	1960-2006	48	x	x	x	Banking/currency crises or sudden stops, defined on Appendix 2	Real credit per capita + firm-level measures	Credit booms are more likely to end in a financial crisis in emerging countries (55%, vs 15 % in developed countries)	Innovative features to identify credit booms, event study methods, frequency analyses	Positive (especially in EC)
Perugini, Holscher and Collie (2013)	1970-2007	18	x			Prob (banking crisis), ie, binary indicator equal to 1 when a banking crisis occurred.	Domestic credit to the private sector / GDP	Positive impact : probability of a banking crisis increases by 3.5-4.5% when private credit/GDP increases by 10%	Standard panel data analysis	Positive

Schularick and Taylor (2012)	1870-2008	14	x			Prob (financial crisis), ie, binary indicator equal to 1 when a financial crisis occurred.	Real bank loans	Positive impact : probability of a banking crisis increases by 3-4% when real bank loans increase by 10%	Panel data analysis, both with linear and non-linear estimators; various robustness checks, notably for omitted variable bias.	Positive
Theoretical Papers										
Martin et Philippon (2014)	2000-2012	11 EA countries	x			Structural model accounting for domestic credit, fiscal policy, and current account dynamics.		Private leverage boom: main factor of crisis (esp. In Spain and Ireland).	Calibration of a full theoretical model of open economies within a monetary union + counterfactual experiments with U.S. states as a control group that did not suffer from a sudden stop.	Positive

McKinnon and Pill (1997)	Various	5 emerging, 1 developed	x	x		Theoretical model enlightening the circumstances under which financial liberalization may lead to a fall of private saving, overborrowing and boom and bust dynamics.		A decline in private saving may result partly from a false euphoria regarding the eventual payoffs from the credible real-side reforms. Banks lend overly aggressively, which in turn sends a falsely optimistic signal to nonbank firms and households regarding the macroeconomic outcome of the reform process.	Pure theoretical approach. Experiences of some countries, mostly emerging, are used in an illustrative way: Chile, Mexico, Indonesia, Malaysia, Thailand… the UK is the only developed country mentioned.	Positive

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Table A3. Measuring the reverse impact of finance on inequality

NB: a positive (resp. negative) impact implies that finance increases (resp. decreases) the considered indicator of inequality.

Paper	Years	Number of Countries	DC	EC	LIC	Dependent Variable	FD measure	Inequality dataset	Result	Remarks	impact of finance on inequality
Ang (2010)	1951-2004	1 (India)		x		Log Gini coefficient	- FD: private credit/GDP, (M3-M1)/GDP etc. - FL: synthetic variable based on nine indicators of financial repressionist policies.	ID	An increase in FD by 1% decreases inequality by -0.3 to -0.04%; An increase in FL by 1% raises inequality by 0.02 to 0.07%.	Time-series analysis with an Error Correction Model	Negative impact of FD on inequality, positive (but quantitatively) impact of FL on inequality.
Arora (2012)	1999-2007	1 (India)		x		State Gini coefficient	Private credit/State Domestic Product (SDP), personal loans/SDP, population per bank branch	HCES	FD decreases inequality only in the urban areas	Analysis based subnational data for India	Mixed evidence

Beck, Demirgüç-Kunt and Levine (2007)	1960-2005 and 1980-2005	70 in average	x	x	x	(i) Growth of the Gini coefficient, (ii) growth of the income share of the lowest quintile (iii) growth of the percentage age of the population living on less than $ 1 (and $ 2) dollars per day.	Private Credit/GDP	DS96, WIID	Income growth poorest quintile: 40% explained by the inequality impact of FD, 60% by the growth impact of FD.	GMM dynamic panel estimator over 5-year periods.	negative
Beck, Levine and Levkov (2010)	1976-2006	1 (USA, State level analysis: 48 states + DC)	x			Ln/logistic Gini coefficient, Theil index, difference between 90th and 10th decile.	FL = suppression of restrictions on intrastate branching	CPS	Deregulation induced a reduction in inequality between 3 and 7% (10% when considering the 90/10 ratio).	Difference-in-differences specification	FL reduced inequality by by disproportionately raising incomes in the lower half of the income distribution.
Clarke, Xu and Zou (2006)	1960-1995	83	x	x	x	Log Gini coefficient	Private Credit/GDP, bank assets/GDP	DS96	A 1% increase in private credit decreases the Gini coefficient by 0.3%.	IV identifying the origin of the country's legal system	negative
Enowbi Batuo, Guidi and Mlambo (2010)	1990-2004	22		x	x	Gini coefficient	liquid liabilities/GDP, M2/GDP, Private Credit/GDP	WIID	A 1% increase in FD decreases the Gini coefficient by 0.02 to 0.05%.	GMM dynamic panel estimator.	negative (but quantitatively small)

Gimet and Lagoarde-Segot (2011)	1994–2002	49	x	x	x	VAR model = all variables endogenous. EHII = combination of GINI coef and Theil index	indicators of size and efficiency of both banking sector and capital market, proxies of financial integration and transaction costs,	EHII-UTIP	Increased banking credit and credit market imperfections tend to raise inequalities, while bigger and more efficient capital markets tend to reduce inequalities.	Bayesian panel Structural VAR model,	Impact of FD/FL depends crucially on characteristics (transparency and ability to allocate resources optimally) of the financial sector, more than its size.
Jauch and Watzka (2011)	1960-2008	138	x	x	x	Log Gini coefficient of gross and net income	Private Credit/GDP, Bank deposits/GDP	SWIID	An increase in FD by 1% leads to an increase in the Gini coefficient by 0.023% for the within estimation	Panel OLS, 2SLS, GMM estimates. IV = legal origin, lagged explanatory variables, GDP per capita.	Positive (but quantitatively small) impact of financial development on inequality.
Kapell (2010)	1960-2006	78	x	x	x	Gini coefficient	Private Credit/GDP, stock market capitalization/GDP	WIID	A 1% increase in FD decreases the Gini coefficient by 0.2 to 0.3%.	IV identifying the origin of the country's legal system + geographical latitude	negative

Kim and Lin (2011)	1960-2005	65	x	x	x	Annual growth rate of the Gini coefficient	Private Credit/GDP, Liquid Liabilities/GDP, Bank Assets/GDP	DS96, WIID	a 1% increase in FD = rise in inequality by 0.20–0.29% in the regime with less-developed financial intermediation, but a fall in inequality by 0.70–1.23% in the regime with better-developed financial intermediation	Cross-sectional IV threshold regression; IV = initial values of financial development and creditor rights + religious composition, ethnic fractionalization, legal origins	Non-linear effect of financial development on inequality
Law and Tan (2009)	1980Q1-2000Q4	1		x		Log Gini coefficient	Private Credit/GDP, stock market capitalization/GDP	EHII-UTIP	No impact of financial development on inequality	Pure time-series strategy (bound tests) focused on Malaysia	not significant
Law and Tan (2012)	1980-2000	35		x	x	Log Gini coefficient	Private Credit/GDP, Liquid Liabilities/GDP	EHII-UTIP, SWIID	- With UTIP: linear, negative impact of FD on inequality; - with SWIID: 1% increase in FD decrease inequality by -0,002-0,003, before increasing it by 0-0,0006.	GMM dynamic panel data estimator	Non-linear effect of financial development on inequality, but opposite to Kim and Lin (2011)'s one. However, very dependent on the DB and quantitatively negligible.

Mookerjee and Kalipioni (2010)	2000-2005	65	x	x	x	Gini coefficient	number of bank branches per 100,000 populations	WIID	an increase in the number of banks branches per 100,000 hab decreases inequality	IV (legal origin, initial endowment), Cross-sectional estimates (variables are averaged over the period 2000-2005)	negative (but quantitatively hard to interpret)
Philippon and Reshef (2012)	1909-2006	1	x			Relative annual wage percentile ratios (or differences of residual wages)	Index of financial deregulation (Bank branching restrictions; Separation of commercial and investment banks; Interest rate ceilings; Separation of banks and insurance companies)	BEA, CPS, DOT, various sources from different papers for specific series	An increase in the deregulation index raises relative wages inequality in favor of workers in financial industry.	Several approaches: stylized facts + regression analysis (time series + panel of subsectors).	positive
Roine et al. (2009)	1886-2004	16	x	x		Top Income share (top 1 and top 10 – 1)	the relative share of the banking and stock market sectors in the economy	WTID	Increasing total capitalization by one standard-deviation (50% of GDP) increases top 1% income share by 0.5 percentage points.	FDGLS estimations allowing for country specific AR(1) processes and heteroskedasticity in the error terms	Positive (top 1%)

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HCES: Household consumption expenditure survey
ID: Income Data (national level)
CPS: Current Population Survey (US)
BEA: Bureau of Economic Analysis (US)
DOT: Dictionary of Occupational Titles (US)

Table A4. The impact of financial crises on inequality

Paper	Years	Number of Countries	DC	EC	LIC	Dependent variable	Inequality Dataset	Crisis Measure	Result	Remarks	Impact on Inequality
Baldacci et al. 2002	?	65	x	x	x	Gini, Income by quintile, poverty headcount	DS96	Currency crises	Positive impact on poverty headcount and Gini. The second lowest income quintile are the most affected.	No Impact on formal unemployment. Fiscal retrenchment has a negative impact on inequality.	Positive
Baldacci et al. 2002	1992-1996	1 (Mexican case)		x		Poverty, Income by level	HCES	Mexican crisis	Increase in poverty and poverty gap but significant reduction on inequality	Possible influence of confounding factors neglected (NAFTA)	Negative
Bazillier and Najman (2012)	1970-2002	70	x	x	x	Labor Share	UN-NA, ANA	Currency and Banking Crises			Positive (fall of labor share) for CA crises. Mixed for banking crises
Cho and Newhouse (2013)	2007-2011	17		x		Income by category of workers	LFS, HCES	Financial Crisis 2007-2008	Female workers and low-skilled are not the most affected. Better educated workers more affected.		Negative
Diwan (2001)	1975-1995	133	x	x	x	Labor Share	UN-NA	Currency crises			Positive (fall of labor share)

Elsby et al. (2010)	2007-2011	1 (US)	x			Income by category of workers	CPS	Financial Crisis 2007-2008	Low-skilled workers are the most affected		Positive
Galbraith and Jiaquing (1999)	1970-1995	19	x	x	x	Theil indices (descriptive analysis, no regression)	EHII-UTIP	Currency crises	Mean increase in inequality in the two-year period after a crisis : +16,2 %	Possible influence of confounding factors neglected	Positive
Hoynes et al. (2012)	2007-2011	1 (US)	x			Income by category of workers	CPS	Financial Crisis 2007-2008	Low-skilled workers are the most affected		Positive
Jenkins et al. (2013)	2007-2009	21	x			Gross household disposable income	EU-SILC	Financial Crisis 2007-2008		Lack of effect explained by social spending.	No effect
Leung et al. (2009)	2007-2011	1 (South Africa)		x		Income by category of workers	LFS, HCES	Financial Crisis 2007-2008	Low-skilled workers are the most affected		Positive
Maarek and Orgiazzi (2013)	1963-2003	20	x			Labor Share	UNIDO data	Currency crises	Fall of the labor share by 2 percentage points		Positive (fall of labor share)
Meyer and Sullivan (2013)	2000-2011	1 (US)	x			90/10 ratio	CPS, CE	Financial Crisis 2007-2008	Rise of income inequalities and decrease of consumption inequalities		Positive (income inequality) - Negative (consumption inequality)
Morelli (2014)		1 (US)				Top Income Share	WTID	Systemic Banking Crises	Negative at the very top / Positive at the bottom of the decile / neutral for the entire decile		Mixed

Park et al. (2012)	2007-2011	1 (China)		x		Income by category of workers	LFS, HCED	Financial Crisis 2007-2008	Low-skilled workers are the most affected		Positive
Roine et al. (2009)	1886-2004	16	x	x		Top Income Share	WTID	Banking Crises – Currency Crises	Banking crises: negative for top 1%; not significant for top 10-1%. Currency crises: not significant		Mixed

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HCES: Household consumption expenditure survey

ID: Income Data (national level)

CPS: Current Population Survey (US)

SCF: Survey of Consumer Finances (US)

CE: Consumer Expenditure Interview Survey (US)

WTID: World Top Income Database

AM2012: Atkinson and Morelli (2012)

OECD2011: OECD (2011, Overview, Fig. 2)

WDI: World Development Indicators (World Bank)

EU-SILC: European Union Statistics on Income and Living Conditions

UN-NA: UN's National Accounts Table on use of GDP

ANA: ANA database (OECD), Sylvain (2008)

LFS: Labor Force Surveys