EUROJÄRJESTELMÄ
EUROSYSTEMET

Bank of Finland
RESEARCH NEWSLETTER

1 • 2016

Contents

Editor
Head of Research
Jouko Vilmunen
Monetary Policy and Research
Research Unit
research(at)bof.fi

Bank of Finland
PO Box 160
FI-00101 Helsinki
Phone +385 10 8311
http://www.suomenpankki.fi/en/

Head of Research (BOFIT)
Iikka Korhonen
http://www.suomenpankki.fi/bofit_en/

ISSN 1796-9131 (online)

EDITORIAL:

Growth, creative destruction and income inequality in the right tail of the income distribution

One of the consequences of the publication of Thomas Piketty's book *Capital in the 21st Century* is that the issue of income and wealth inequality is now high on the macroeconomic research agenda. The data clearly tell us that over the last 30+ years top-bracket income inequality, in particular, has risen sharply in some countries, for example in the United States.[1] Then again, there are differences between countries. In France and Japan, top-bracket inequality has risen only slightly. So the question is what economic forces could explain the heterogeneous development that we observe across countries?

In the search for an answer, it is useful to observe that the upper tail of income (or wealth) distribution follows a power law, eg a Pareto distribution for which $\Pr\{\text{Income} > y\} = (y/y_0)^{-\xi}$. As explained by Jones and Kim, the intuition for this is as follows. Income inequality is fractal in nature. In particular, we have essentially the same answer to each of the following questions: What fraction of income going to the top 10 % of earners accrues to the top 1%? What fraction of income going to the top 1% of earners accrues to the top 0.1%? What fraction of income going to the top 0.1% of earners accrues to the top 0.01%. The answer to all of these questions is a particularly simple function of the parameter of the Pareto distribution, ie. ξ. More specifically, define $\eta = 1/\xi$, so that the share of income going to the top p percentile is given by $(100/p)^{\eta-1}$. Consequently, the answer to the above three questions is $10^{\eta-1}$, which nicely illustrates the fractal structure under a Pareto distribution. Note also that if we are to explain the observed increase in

[1] See e.g. Figure 1 (p. 4) in the paper by Jones and Kim (2014) *A Schumpeterian Model of Top Income Inequality* (http://web.stanford.edu/~chadj/).

the share of income going to the top p% of earners that accrues to the top 0.1p%, we have to be able to explain why the Pareto parameter η has changed.

So what economic mechanism could lie behind changes in the Pareto parameter? A familiar explanation is that it is skill-biased technical change. But as shown by Jones and Kim,[2] this explanation is incomplete, since a skill-biased technical change that increases the return to skill merely shifts the Pareto distribution right; it does not change the Pareto parameter. Instead, the explanation needs to exploit the well-known tight link between exponential growth and the Pareto distribution. More specifically, assume that when a person first becomes a top earner, he earns income y_0, after which his income grows at rate μ as long as he remains a top earner. Hence, after x years of "entrepreneurial experience" his income is $y(x) = y_0 e^{\mu x}$. With a constant probability of δ per time unit (ie. a Poisson process), the top earner drops out of the top and is replaced by a new "fortunate one" who starts over with income y_0. Now, $x(y) = \frac{1}{\mu}\ln(\frac{y}{y_0})$ is the fraction of people in the economy with income greater than y, and assuming a Poisson replacement process, the distribution of experience for a given individual follows an exponential distribution,[3] that is Pr{Experience > x} = $e^{-\delta x}$. Straightforward calculation yields P{Income > y} = P{Experience >x(y)} = $e^{-\delta x(y)} = (y/y_0)^{-\delta/\mu}$, ie. a Pareto distribution with parameter ξ = δ/μ. Intuitively, top-bracket income inequality falls as the "death" probability δ increases or the rate of growth of top incomes, μ, increases.

All in all, then, exponential growth occurring over an exponentially distributed amount of time gives rise to a Pareto distribution. But one should not forget about luck: there is a chance (per time unit) that a person drops out of the top-bracket as well as a chance that someone becomes a top earner. This intriguing story presents a framework for thinking about drivers of increases in top-bracket income inequality and perhaps more generally about income (and wealth) inequality, since, arguably, much (most?) of the increase in overall income inequality has been driven by increases in top-bracket income inequality. Food for thought - and further research.

Jouko Vilmunen

Saving Wall Street or Main Street

In his classic paper "The Debt-Deflation Theory of Great Depression", *Econometrica,* October 1933 I(3), pp. 337 – 57, Irving Fisher argued for the importance of financial factors, such as borrower net worth, in business cycle fluctuations. Since then, many economists have

[2] Jones and Kim (ibid. p. 11)

[3] And assuming this is also the stationary distribution of experience across a population of top earners (see Jones and Kim, ibid. pp. 14-15)

Markus Haavio

Antti Ripatti

Tuomas Takalo

endorsed this view. The underlying idea is all too well known: To engage in investment opportunities, entrepreneurs must rely in part on external finance. But such borrowing is usually constrained by agency costs. An aggregate shock that redistributes wealth from entrepreneurs to lenders will reduce aggregate investment because it will increase the need for external finance and hence lead to an increase in agency costs. Furthermore, this shock can be propagated forward, because a lower level of investment today tends to lead to lower levels of capital, output and net worth in the future.[4]

Ben Bernanke and Mark Gertler[5] pursued this line of research by developing a general equilibrium model in which agency costs arise endogenously. As noted by Carlstrom and Fuerst (1997, p. 893) this is a nontrivial exercise, since these agency costs obtain only in a setting where the Modigliani – Miller theorem does not hold. One of the most important insights of Bernanke and Gertler is the theoretical possibility that agency costs will enhance the propagation of productivity shocks. Whereas Bernanke and Gertler provide a qualitative analysis of the effects of agency costs in a general equilibrium model of business cycle fluctuations, Carlstrom and Fuerst (1997) construct a calibrated, computable general equilibrium model that captures and quantifies these effects.

Whereas these earlier contributions focused on the balance sheets of non-financial firms and treated financial intermediaries as a veil, macroeconomic models have in recent years often included a banking sector.[6] However, many of these new macro-banking models abstract from the balance sheet of non-financial firms. In an interesting contribution “Saving Wall Street or Main Street”, recently published as Bank of Finland Discussion Paper No 12/2016, Haavio, Ripatti and Takalo (HRT) extend the relevant literature by constructing a DSGE model that allows for simultaneous analysis of the macroeconomic effects of both banks’ and non-financial firms’ balance sheets. Their framework builds on the Holmström – Tirole (1997) model of financial intermediation.[7] As the authors note (p. 2), in DSGE models that build on Holmström – Tirole (1997) entrepreneurs and banks can leverage their investments by using external finance, but his leverage creates moral hazard problems. Hence, sufficiently large own-stakes of banks and entrepreneurs – skin in the game – are needed to properly incentivize these projects, which implies that the aggregate amount of informed capital (sum of bank capital and entrepreneurial wealth) in the economy is critical for the propagation of various shocks. However, in

[4] Carlstrom C – Fuerst T (1997), ”Agency Costs, Net Worth, and Business Fluctuations: A Computable General Equilibrium Analysis”, *American Economic Review, Vol 87, No 5, pp. 893 – 910.*

[5] Bernanke – Gertler (1989), ”Agency Costs, Net Worth and Business Fluctuations”, *American Economic Review, Vol 79, No 1, pp. 14 – 31.*

[6] See e.g. Gertler M – Karadi P (2011), “A Model of Unconventional Monetary Policy”, *Journal of Monetary Economics, Vol 58, No 1, pp. 17 – 34* and Gertler M – Kiyotaki N (2011), “Financial Intermediation and Credit Policy in Business Cycle Analysis”, *forthcoming in Handbook of Monetary Economics.*

[7] Holmström B – Tirole J (1997), ”Financial Intermediation, Loanable Funds and the Real Sector”, *Quarterly Journal of Economics, Vol 112, No 3, pp. 663 – 691.*

this framework it is not straightforward to disentangle the quantitative implications of bank capital from those of entrepreneurial wealth. Furthermore, deposits (or short-term debt) cannot be genuinely distinguished from (outside) equity, because the models that incorporate the Holmström – Tirole mechanism require perfect correlation within a bank's asset portfolio.

HRT extend the framework by building on Holmström – Tirole (1997) to allow for separate roles for bank capital and entrepreneurial wealth as well as bank equity and bank deposits. In their model, monitoring investment (by banks) is continuous, so that the more the banks invest in costly monitoring, the lower the entrepreneurs' private benefit from unproductive projects but the less the banks can lend. Consequently, monitoring banks' investment varies over the business cycle such that not only the aggregate amount of informed capital, but also its composition, matters for shock propagation. Interestingly, the authors distinguish between banks and bankers: a bank is a balance sheet entity with a capital structure, but only the banker faces an incentive problem. Although realistic, this modelling feature allows the authors to relax the assumption of a bank's perfectly correlated investment portfolio, so that deposits can be meaningfully distinguished from bank equity.

Using their model, HRT seek to analyze and compare, from the perspective of stabilizing the economy, bank capitalization and direct public funding to non-financial firms in times of crisis. The key question is: if the government decides to provide funding to the private sector, how should this funding be allocated across banks and non-financial firms? Before providing an answer, the authors produce a set of interesting results from their modelling effort. First of all, in equilibrium, bank capital is scarce in the sense that the ratio of bank capital to entrepreneurial wealth is lower than that which would maximize investment and output. Secondly, a given change in bank capital affects aggregate investment more than a proportionate change in entrepreneurial wealth. Thirdly, bank capital is more vulnerable to aggregate investment shocks than is entrepreneurial capital. Finally and consequently, compared to entrepreneurial wealth, bank capital plays a more important role in the propagation of investment shocks and in macroeconomic dynamics.

As regards the policy experiment referred to above, the authors establish a pecking order for public interventions: the government should first capitalize banks, but if the scale of public programs is large enough, it should extend funding to non-financial firms. The underlying reasoning is as follows. Since bank capital is more important for macroeconomic dynamics, bank capitalization provides a more effective way to stabilize the economy than direct public funding of non-financial firms. This is especially the case when the size of public programs is at most moderate because, given the scarcity of bank capital and high bank leverage, a capital injection has a large proportional effect on banks' shock cushions. However, due to scarcity of bank capital, public funds also have adverse effects on incentives and distort the economy more when placed in banks. Weighing social

benefits (enhanced stability) and social costs (blunted incentives), the authors are able to define the pecking order for public interventions.

This is an important and highly interesting contribution to the existing and slowly growing literature on the interaction between financial intermediation and the macroeconomy. The modelling innovation that enables comparison of the contributions of bank capital versus entrepreneurial wealth to aggregate fluctuations is particularly interesting. No less interesting is the result on the pecking order of public interventions, which, due to scarcity of bank capital, really puts bank capital and leverage at the core of macroeconomic stabilization policy. Surely, the paper does not provide the final word on the role of financial intermediation in the stability of the macroeconomy and thus further research along these lines is clearly warranted. Robust, empirically motivated assumptions and modelling solutions are needed. But the paper makes a big contribution.

.

Jouko Vilmunen

Who trusts banks?

"Put not your trust in money, but put your money in trust"
– Oliver Wendell Holmes, Sr.

The 2008 financial crisis reminded us that well-functioning banks play an important role in economic growth and highlighted the importance of trust in banks on the part of economic agents. Authorities have aimed to preserve trust through these troubled times e.g. by providing liquidity support to banks and assuring that robust deposit insurance schemes remain in place to stave off bank runs and safeguard financial stability.

However, trust in banks is also important in trouble-free times. It contributes to financial inclusion and financial stability and thus helps foster economic growth. Without trust, banks cannot attract depositors or find households willing to borrow money to finance their businesses and housing. In a nutshell, trust in banks is a fundamental ingredient of a well-functioning economy.

Surprisingly little has been written about what shapes trust in banks. Only a handful of studies provide single-country evidence on trust in banks (for the US, Sapienza and Zingales, 2012; for Spain, Carbo-Valverde, Maqui-Lopez, and Rodriguez-Fernandez, 2013; for the Netherlands, Jansen, Mosch, and van der Cruisjen, 2014; and for Austria, Knell and Stix, 2015). Notably, these studies tend to investigate the dynamics of trust in banks during troubled times.

In a recent paper (Zuzana Fungáčová, Iftekhar Hasan and Laurent Weill, Trust in banks, BOFIT Discussion Paper 7/2016), we make a first attempt using a cross-country sample to investigate the level and determinants of trust in banks. To address this issue, we use the latest

Zuzana Fungáčová

result of the World Values Survey. It contains information on trust in banks for 52 countries during the period 2010–2014. The World Values Survey, which has been carried out regularly since 1981, now included a new question on confidence in banks in this latest wave. This addition allows us to investigate how individual and country characteristics contribute to trust in banks. (Table 1)

We provide a broad analysis, in order to enhance the understanding of trust in banks, starting with a country-level analysis of trust in banks. We examine the level of trust in banks by country and provide information on cross-country differences in trust in banks. We further study the determinants of trust in banks at the individual level and examine the impact of sociodemographic characteristics such as gender, age, income, education, and access to information sources. We use the unique information provided by the World Values Survey on individual values to investigate the influence of religious, political, and economic values on trust in banks. We complete the analysis by investigating what determines relative trust in banks, defined as the difference between trust in banks and trust in institutions, to identify whether certain potential determinants have a specific influence on trust in banks or affect trust in institutions in general.

Our discussion relates to three current strands of the literature. We start with the financial stability strand. Lack of trust in banks is a common cause of bank runs, and thus the factors shaping confidence are of prime concern to bank regulators. However, trust in banks also fosters financial stability by enhancing financial inclusion, i.e. greater use of formal financial services creates a more stable deposit base for banks in troubled times (Han and Melecky, 2013).

The role of trust in the economy is the second strand of literature to which our analysis relates. We expand the investigation of determinants of interpersonal trust (Alesina and La Ferrara, 2002; Bjornskov, 2006) and trust in institutions (Clausen, Kraay and Nyiri, 2011; Stevenson and Wolfers, 2011) to include trust in banks, so as to gain a better understanding of this dimension of economic confidence. We also consider whether the determinants of bank trust might somehow differ from other dimensions of confidence.

The third strand of literature incorporates the debate on the influence of religion on economic outcomes. Following Barro and McCleary (2002), there is a considerable body of literature on how religion shapes economic attitudes (Guiso, Sapienza, and Zingales, 2003; Kumar, Page, and Spalt, 2011). The impact of religion on trust in large organizations (La Porta et al., 1997) and the different views of religions on charging interest emphasize the potential influence of religious values on trust in banks. Our analysis contributes to the wider question of the impact of culture as the key force driving growth (Landes, 1998).

Our results show that sociodemographic indicators and religious, political, and economic values shape trust in banks at the individual level. Women trust banks more than men, and trust in banks tends to increase with income and decrease with age and education. Different media channels for information exert different influences on trust in

banks, notably a positive impact in the case of access to television and a negative impact in the case of internet access.

We find evidence that indicates individuals who hold religious values have greater trust in banks and further that trust in banks varies across religious denominations. Hindus trust banks more than Protestants, while Catholics and Orthodox Christians tend to have lower trust in banks than Protestants. We observe that political values associated with the importance of wealth and helping society bolster trust in banks, while people who hold pro-market economic values show distinctly greater trust in banks. We find that people who are more trusting of each other also tend to trust banks more. At the country level, we find evidence that a financial crisis erodes trust in banks.

Understanding what shapes trust in banks is crucial for designing effective policies to promote financial stability. Authorities seeking to foster the confidence of individuals in banks need to prevent financial crises, but they also need to understand that depositor protection schemes and bank concentration per se do not play a significant role in building that confidence. Moreover, the promotion of pro-market economic values increases trust in banks, and as such should be promoted by authorities seeking to influence this dimension of confidence.

Zuzana Fungáčová

.

Table 1.
Trust in banks by country

This table reports the descriptive statistics for trust in banks by country.

Country	Mean	S.D.	N	Country	Mean	S.D.	N
Algeria	2.38	1.04	1001	New Zealand	2.66	0.74	781
Armenia	2.60	0.95	1031	Nigeria	2.94	0.91	1759
Australia	2.34	0.80	1448	Pakistan	2.77	0.99	1148
Azerbaijan	2.64	0.98	1002	Palestine	2.15	0.91	926
Belarus	2.50	0.86	1519	Peru	2.25	0.91	1164
Chile	2.18	0.84	980	Philippines	3.00	0.80	1200
China	3.05	0.62	1975	Poland	2.37	0.75	894
Colombia	2.49	0.98	1496	Qatar	2.71	0.94	1045
Cyprus	2.72	0.87	990	Romania	2.23	0.90	1428
Ecuador	2.43	0.90	1201	Russia	2.23	0.87	2329
Egypt	2.53	1.02	1510	Rwanda	2.76	0.78	1527
Estonia	2.72	0.77	1506	Singapore	2.91	0.68	1971
Germany	1.96	0.80	2011	Slovenia	2.30	0.72	1041
Ghana	3.15	0.84	1552	South Korea	2.86	0.74	1197
Iraq	2.61	0.90	1090	Spain	1.77	0.75	1162
Japan	2.69	0.67	2158	Sweden	2.54	0.81	1185
Jordan	2.33	0.90	1135	Taiwan	2.91	0.58	1158
Kazakhstan	2.54	0.87	1500	Trinidad	2.54	0.86	962
Kuwait	2.75	1.03	1221	Tunisia	2.23	1.01	1026
Kyrgyzstan	2.81	0.92	1493	Turkey	2.25	0.97	1540
Lebanon	2.46	0.97	1144	Ukraine	2.09	0.82	1500
Libya	2.85	1.05	1977	USA	2.33	0.74	2177
Malaysia	3.03	0.75	1299	Uruguay	2.49	0.91	911
Mexico	2.40	0.97	1993	Uzbekistan	3.24	0.89	1398
Morocco	2.66	0.99	1078	Yemen	2.25	0.97	657
Netherlands	2.09	0.70	1796	Zimbabwe	2.90	0.91	1500

Bank of Finland Research Seminars

Research seminars organized by the Bank of Finland's research unit are held on the first Thursday of the month at 13.30–15 in Rauhankatu 19, 3rd floor big meeting room (unless indicated otherwise). Research seminars are open to all interested parties. Please register in advance at research@bof.fi by noon of the preceding day. For further information please visit the seminar site.

BOFIT seminars

BOFIT seminars, open to all interested parties, are held on Tuesdays at 10.30 in Rauhankatu 19, 3rd floor big meeting room (unless indicated otherwise). Please register in advance via Liisa Mannila (firstname.lastname@bof.fi). For further information please visit the seminar site.

Recent Bank of Finland research publications

Bank of Finland Research Discussion Papers

Available on our website at
http://www.suomenpankki.fi/en/julkaisut/tutkimukset/keskustelualoitteet/Pages/default.aspx

and also on our institutional repository at https://helda.helsinki.fi/bof/handle/123456789/8

BOFIT Discussion Papers

Available at http://www.suomenpankki.fi/bofit_en/tutkimus/tutkimusjulkaisut/dp/Pages/default.aspx

and https://helda.helsinki.fi/bof/handle/123456789/9

Subscriptions to electronic alerts for Bank of Finland research publications

Bank of Finland publications
http://www.bof.fi/en/julkaisut/sahkoisten_julkaisujen_tilaaminen/index.htm

SSRN (Social Science Research Network) Bank of Finland Research Paper Series Subscribe Free