

QUADERNI DEL PREMIO «GIORGIO ROTA»

N. 5, 2017

ECONOMIC CONSEQUENCES
OF INEQUALITY



Con il sostegno di





Centro
di Ricerca e
Documentazione
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Iniziativa realizzata con il sostegno di



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INDICE

| | |
|--|-----|
| Il Premio «Giorgio Rota» | 5 |
| Chi era Giorgio Rota | 7 |
| Andrea Brandolini | |
| Preface. <i>The unusual concern for inequality</i> | 9 |
| Alica Ida Bonk | |
| Capital account liberalization and inequality. The role of skill levels and financial depth | 27 |
| 1. Introduction | 27 |
| 2. Review of related literature | 29 |
| 3. Two analytical frameworks | 30 |
| 4. Empirical analysis and results | 37 |
| 5. Conclusion | 44 |
| 6. References | 45 |
| Madina Kurmangaliyeva | |
| Criminal justice and wealth in equality: How much freedom can money buy in Russia? | 47 |
| 1. Introduction | 47 |
| 2. Judicial process and data | 52 |
| 3. Selection into the sentencing stage | 61 |
| 4. Results | 66 |
| 5. Conclusion | 76 |
| 6. References | 78 |
| Clara Martínez-Toledano Toledano | |
| Wealth inequality in Spain (1984-2013) | 81 |
| 1. Introduction | 81 |
| 2. Wealth, concept, data and aggregate trends | 86 |
| 3. The mixed capitalization-survey approach (1984-2013) | 89 |
| 4. Trends in the distribution of wealth (1984-2013) | 97 |
| 5. Offshore assets and wealth inequality | 99 |
| 6. Reconciliation and test of the capitalization method with other sources | 99 |
| 7. Conclusion | 106 |
| 8. References | 106 |
| 9. Appendix A | 109 |
| 10. Appendix B | 120 |



IL PREMIO «GIORGIO ROTA»

L'intento del Premio «*Giorgio Rota*» *Best Paper Award* è di riprendere l'attività di ricerca annualmente condotta dal Comitato / Fondazione Giorgio Rota prima della sua inclusione nel Centro Einaudi, sulla relazione tra il pensiero e l'agire economico e un aspetto (ogni anno diverso) del vivere in società, mantenendo vivo il ricordo e l'insegnamento dell'economista Giorgio Rota, uno dei primi animatori del Centro, prematuramente scomparso.

Dal 2012 il Centro Einaudi ha dunque raccolto questa eredità rinnovando la formula della ricerca: è stato perciò istituito questo premio annuale dedicato a giovani ricercatori, con una qualificazione accademica nei campi dell'economia, sociologia, geografia, scienza politica o altre scienze sociali. I paper possono essere presentati sia in italiano che in inglese, e non devono essere stati pubblicati prima della data della Conferenza Rota, l'evento pubblico nel quale i vincitori hanno modo di presentare il loro lavoro.

La prima edizione 2012 aveva per tema *Contemporary Economics and the Ethical Imperative* e la Conferenza Giorgio Rota 2013/Giorgio Rota Conference 2013, si è tenuta presso il Centro Einaudi il 25 marzo 2013 con keynote speech di Alberto Petrucci, LUISS Guido Carli, Roma.

La seconda edizione, nel 2013, è stata su *Creative Entrepreneurship and New Media* con Conferenza Giorgio Rota 2014 presso il Centro Einaudi, 14 aprile 2014 e keynote speech di Mario Deaglio, Università di Torino.

La terza edizione, del 2014, ha analizzato il tema *The Economics of Illegal Activities and Corruption*, con Conferenza Giorgio Rota 2015 presso il Centro Einaudi, 15 giugno 2015. Keynote speech di Friedrich Schneider, Johannes Kepler University (Linz, Austria).

La quarta edizione, 2016, verteva su *The Economics of Migration*. Il 20 giugno 2016 si è tenuta la Conferenza Giorgio Rota 2016, presso il Campus Luigi Einaudi. Keynote speech di Alessandra Venturini, Università di Torino.

I paper vincitori della quinta edizione del Premio, Alica Ida Bonk, Madina Kurmangaliyeva e Clara Martínez-Toledano Toledano sono riportati in questo volume.

CHI ERA GIORGIO ROTA



GIORGIO ROTA (1943-1984) è stato professore di Economia politica presso l'Università di Torino, e consulente economico. Per il Centro Einaudi, è stato coordinatore agli studi e membro del comitato di direzione di «Biblioteca della libertà».

Le sue pubblicazioni scientifiche abbracciano diversi temi: l'economia dei beni di consumo durevoli, l'economia del risparmio, il mercato monetario e finanziario, l'inflazione e la variazione dei prezzi relativi, il debito pubblico. Ricordiamo tra esse: *Struttura ed evoluzione dei flussi finanziari in Italia: 1964-73* (Torino, Editoriale Valentino, 1975); *L'inflazione in Italia 1952/1974* (Torino, Editoriale Valentino, 1975); nei «Quaderni di Biblioteca della libertà», *Passato e futuro dell'inflazione in Italia* (1976) e *Inflazione per chi?* (1978); *Che cosa si produce come e per chi. Manuale italiano di microeconomia*, con Onorato Castellino, Elsa Fornero, Mario Monti, Sergio Ricossa (Torino, Giappichelli, 1978; seconda

edizione 1983); *Investimenti produttivi e risparmio delle famiglie* (Milano, Il Sole 24 Ore, 1983); *Obiettivi keynesiani e spesa pubblica non keynesiana* (Torino, 1983).

Tra le sue ricerche va particolarmente citato il primo *Rapporto sul risparmio* e sui risparmiatori in Italia. Rilevazione relativa all'anno 1982, risultato di un'indagine sul campo condotta da BNL-Doxa-Centro Einaudi, le cui conclusioni riscossero notevole attenzione da parte degli organi di stampa. Da allora il *Rapporto sul risparmio* continua a essere pubblicato ogni anno.

ANDREA BRANDOLINI¹

PREFACE. THE UNUSUAL CONCERN FOR INEQUALITY

HEIGHTENED CONCERNS

Currently, there is an unusual concern for the inequality of income and wealth. Not one day passes without the report of an international organisation, a journalist's investigation, a blog article emphasising the high level of inequality or its relentless tendency to grow, globally or in advanced countries. A good example is the worldwide attention of mass media for the headline message of the Oxfam report "An economy for the 1%": "In 2015, just 62 individuals had the same wealth as 3.6 billion people – the bottom half of humanity".² The expression "1%" has entered the everyday language to indicate the very rich, as opposed to the much poorer mass of those making up the remaining 99% of the population. The widespread success of the monumental volume of Thomas Piketty *Capital in the Twenty-First Century* is perhaps the most significant example of an attention which would have been unthinkable until few years ago.³

Unquestionably, there are great economic disparities within and between countries around the world. The Oxfam estimate is based on heroic calculations and fragmentary statistical sources, but its economic and moral significance would not change if the number of the wealthiest individuals was 100 or 1,000 times that indicated.⁴ Estimates of the distribution of income among the world's inhabitants,

¹ Bank of Italy, DG Economics, Statistics and Research. Paper prepared for the Giorgio Rota Conference 2017 "Economic consequences of inequality", Centro di Ricerca e Documentazione Luigi Einaudi and Dipartimento di Economia e Statistica Cagnetti de Martiis, Turin, 4th May 2017. The views expressed here are mine and do not necessarily reflect those of the Bank of Italy or the Eurosystem.

² Oxfam, *An economy for the 1%. How privilege and power in the economy drive extreme inequality and how this can be stopped*, Oxford, Oxfam Briefing Paper 210, 2016, p. 2.

³ T. Piketty, *Capital in the Twenty-First Century*, Cambridge, Belknap, 2014.

⁴ For estimates of the global distribution of net wealth among adults, see J.B. Davies, R. Lluberas and A.F. Shorrocks, *Estimating the Level and Distribution of Global Wealth, 2000-2014*, «Review of Income and Wealth», 63, pp. 731-759.



which are also to be taken with caution, indicate that global inequality is much higher than that observed in any single nation. Christoph Lakner and Branko Milanovic calculate that for the distribution of income or expenditure per capita in 2008 the Gini index, an inequality measure that varies between 0 and 1 for positive values, was equal to 70.5% for the world as a whole compared to 41.9 in high-income economies, 42.7 in China, or 58.3 in Sub-Saharan Africa.⁵

It is not a new fact, however. Global income inequality peaked around the early 1990s. It has declined ever since. The improvement has been even more significant for poverty. According to World Bank estimates, the number of people in extreme poverty, that is, living with less than \$1.90 per day (at 2011 purchasing power parities) more than halved between 1990 and 2012, from 1,959 to 897 millions; their share in the world population decreased from 37.1 to 12.7%.⁶

Hence, why did the concern for inequality heighten only recently? Why did it not happen before?

THE GREAT RECESSION

The prime suspect is the Great Recession of 2008-2009, and the difficulty of many economies to return to sustained growth afterwards. Some authors have seen growing income inequality as contributing to the sub-prime crisis in the United States and more generally as a factor depressing aggregate demand.⁷ Even abstracting from this causal explanation, there is little doubt that the downturn and

⁵ C. Lakner and B. Milanovic, *Global Income Distribution: From the Fall of the Berlin Wall to the Great Recession*, «World Bank Economic Review», 30, pp. 203-232, Table 3 at p. 212. See also F. Bourguignon, *The Globalization of Inequality*, Princeton, Princeton University Press, 2015, Figure 1 at p. 27.

⁶ F.H.G. Ferreira, S. Chen, A. Dabalen, Y. Dikhanov, N. Hamadeh, D. Jolliffe, A. Narayan, E.B. Prydz, A. Revenga, P. Sangraula, U. Serajuddin and N. Yoshida, *A global count of the extreme poor in 2012: data issues, methodology and initial results*, «Journal of Economic Inequality», 14, pp. 141-172.

⁷ R. Rajan, *Fault Lines: How Hidden Fractures Still Threaten the World Economy*, Princeton, Princeton University Press, 2010; J.E. Stiglitz, *Macroeconomic fluctuations, inequality, and human development*, «Journal of Human Development and Capabilities», 13, pp. 31-58; M. Kumhof, R. Rancière and P. Winant, *Inequality, leverage, and crises*, «American Economic Review», 105, pp. 1217-1245; see also P. Lucchino and S. Morelli, *Inequality, debt and growth*, London, Resolution Foundation, 2012; A. Jayadev, *Distribution and crisis: Reviewing some of the linkages*, in *The Handbook of the Political Economy of Financial Crises*, ed. by G. Epstein and M. Wolfson, Oxford, Oxford University Press, 2013, pp. 95-112; T. van Treeck, *Did inequality cause the U.S. financial crisis?*, «Journal of Economic Surveys», 28, pp. 421-448.



subdued subsequent growth have increased the concern for economic disparities within advanced countries. In the aftermath of the Great Recession Martin Wolf, an influential commentator at the «Financial Times», wrote that reducing inequality is one of the seven challenges that capitalism faces in order to survive.⁸ A few months later, the Managing Director of the International Monetary Fund (IMF), Christine Lagarde, listed inequality and quality of growth among the three priorities for world economic policy: “Growth is essential for the future global economy, but it must be a different kind of growth. A growth that is not simply the fallout from unfettered globalization. A growth that is inclusive”.⁹ This revision of the IMF policy priorities seems not to have vanished as the economic climate improved. Indeed, Lagarde remarked at the 2017 Annual Meetings: “Nor should we miss this opportunity to address more decisively – and more directly – the issue which has so damaged our peoples and societies. I am talking about excessive inequality. It hinders growth, erodes trust, and fuels political tensions”.¹⁰

The Great Recession was “the first contraction in the global world economy since the Second World War”.¹¹ Yet, despite the unprecedented trade collapse, the output drop, and the extensive job losses across OECD countries, it had a relatively modest impact on income inequality.¹² This still holds, with few exceptions, when one includes the years of the Sovereign Debt Crisis which hit some European countries in 2011-2013. For instance, between 2007 and 2013 GDP fell by 26.5% in Greece, but the Gini index increased by 1.1 percentage points, more or less like in Luxembourg where GDP rose instead by 5.5%. The weak relationship between macroeconomic and inequality changes is shown in Figure 1 which plots the absolute difference in the Gini index against the percentage variation in GDP between 2007 and 2013. Each point represents a country. The points are scattered around the four quadrants. In several countries the drop in GDP was associated

⁸ M. Wolf, *Seven ways to fix the system's flaws*, «Financial Times», 22th January 2012.

⁹ C. Lagarde, *The Road Ahead. A Changing Global Economy, A Changing IMF*, Annual Meetings Speech, Tokyo, 12 October 2012, <https://www.imf.org/en/News/Articles/2015/09/28/04/53/sp101212a>.

¹⁰ C. Lagarde, *Towards a More Secure Recovery Shared by All*, 2017 Annual Meetings Plenary Speech, Washington, 13 October 2017, <http://www.imf.org/en/news/articles/2017/10/13/sp101317-md-am-plenary>.

¹¹ B. Keeley and P. Love, *From Crisis to Recovery. The Causes, Course and Consequences of the Great Recession*, Paris, OECD, 2010, p. 11.

¹² For an early assessment see S.P. Jenkins, A. Brandolini, J. Micklewright and B. Nolan, *The Great Recession and the Distribution of Household Income*, Oxford, Oxford University Press, 2013.



with rising inequality, but the intensity of the increase was different; in other countries it was instead associated with a decline in inequality. A negative relationship is found by fitting a simple linear regression to the data, but the goodness of fit is rather poor ($R^2 = 0.06$). The economic downturn did raise, however, absolute poverty levels. In the euro area as a whole, the proportion of people at risk of poverty, calculated by “anchoring” the poverty line at the 2008 real level, rose by over a fourth from 2007 to 2013, from 16.1 to 20.7%. The increase exceeded a half in Cyprus, Greece, Ireland and Spain, but also in Iceland.

The economic mess of the past decade caused widespread suffering in several countries, but did not lead to substantially higher inequality levels. We are then back to the initial question. Why did the concern for inequality surge recently?

INEQUALITY TRENDS IN ADVANCED COUNTRIES

By observing long-term tendencies, income inequality appears to have been growing in most advanced countries for some decades.¹³ This emerges by looking at both tax returns and sample surveys.¹⁴

Tax returns are the source used by Tony Atkinson, Piketty and co-authors to estimate the income shares going to the top of the distribution in a great number of countries around the world. These estimates provided the basis for Piketty’s *Capital*.¹⁵ They show that the share of before-tax income of the top 1% of the

¹³ A. Brandolini and T.M. Smeeding, *Income inequality in richer and OECD countries*, in *The Oxford Handbook of Economic Inequality*, ed. by W. Salverda, B. Nolan and T.M. Smeeding, Oxford, Oxford University Press, 2009, pp. 71-100; S. Morelli, T.M. Smeeding and J. Thompson, *Post-1970 trends in within-country inequality and poverty: Rich and middle-income countries*, in *Handbook of Income Distribution*, vol. 2A, ed. by A.B. Atkinson and F. Bourguignon, Amsterdam, Elsevier, 2015, pp. 593-696.

¹⁴ Information on income distribution is imperfect and incomplete: only the joint analysis of all available sources can lead to reliable conclusions. Neither survey data nor tax data are free from shortcomings. The former are affected by respondents’ reticence, especially for financial incomes, suffer from discontinuities due to changes in survey methods and often fail to adequately represent the tails of the distribution, particularly the top one. On the other hand, tax returns depend on administrative rather than economic criteria: they can exclude important components such as the financial incomes subject to separate taxation and do not cover people exempt from paying taxes; values are distorted by tax evasion; changes in tax law introduce breaks in historical series. For a reconciliation of the two types of evidence for the United Kingdom, see R.V. Burkhauser, N. Hérault, S.P. Jenkins and R. Wilkins, *What has Been Happening to UK Income Inequality Since the Mid-1990s? Answers from Reconciled and Combined Household Survey and Tax Return Data*, National Bureau of Economic Research, Working Papers 21991, 2016.

¹⁵ *Top Incomes Over the 20th Century. A Contrast Between Continental European and English-Speaking Countries*, ed. by A.B. Atkinson and T. Piketty, Oxford, Oxford University Press, 2007, and *Top*



population decreased from the inter-war years until the end of the 1970s (Figure 2, top panels). In the United States, the United Kingdom and Canada, this downward trend abruptly reversed in the 1980s and today the top 1% share is back to the levels prevailing before the Second World War. Even in Italy and Sweden the dynamics changed during the 1980s, but the subsequent increase was smaller. In Germany, the trend reversal occurred later, in the early 2000s. In France, there is a barely perceptible ascending tendency.

Sample surveys provide information at the level of the household rather than the tax unit. They account for resource sharing within the family, allowing also for the adjustment of income to economies of scale in consumption (for example, heating costs) and differences in needs within the household. The “equivalised” income is a better proxy of living standards as it is derived by adjusting incomes including transfers and net of taxes for differences in household size and composition. Despite the many conceptual differences, the indications about long-run movements provided by the Gini index for equivalised disposable income are qualitatively similar to those provided by top income shares (Figure 2, bottom panels). Detailed examination reveals, however, that there are also noticeable differences. For instance, in Canada the increase in inequality appears to occur later and to be lasting shorter for the Gini index than for the top 1% income share, most likely as a reflection of public redistribution.

In the seven rich countries considered in Figure 2, the movements in inequality share a U profile. This hints at the influence of common factors which have attracted considerable attention in the literature: de-industrialisation, skill-biased technological progress, globalisation, demography. However, at a closer look the U shape differs from country to country: there are differences in the timing of changes and the intensity of inequality growth; the profiles are not smooth but segmented. Large variations may take place in relatively short times, with little change occurring over lengthy periods. National factors, such as changes in tax and social protection systems, labour market institutions or ownership structure, also play a role, sometimes offsetting, sometimes amplifying market forces. As Atkinson observed, “... it is misleading to talk of ‘trends’ when describing the postwar evolution of the

Incomes. A Global Perspective, ed. by A.B. Atkinson and T. Piketty, Oxford, Oxford University Press, 2010.



income distribution. [...] It may be better for a number of countries to think in terms of ‘episodes’ when inequality fell or increased”.¹⁶

Even though national experiences vary and there is no overarching common story, over the last three decades income inequality did rise in many advanced countries. As inequality tended to fall at the global level, it often increased at the national level. These divergent patterns may help to explain the growing concern for inequality.

INTERNALIZING INEQUALITY AND THE TUNNEL EFFECT

During the last three decades, the integration of real and financial markets and the revolution in information and communication technologies have radically transformed the functioning of the global economy.¹⁷ This transformation has brought about an improvement in living standards in many regions of the world, particularly in Asia – the large fall in extreme poverty rates being a clear manifestation of this progress. The convergence process that saw emerging economies growing much faster than mature economies contributed to reducing the level of the global inequality at the same time as inequality was rising within many countries. According to Lakner and Milanovic’s estimates, the Gini index fell from 72.2% in 1988 to 70.5 in 2008 in the world as a whole, but rose from 38.2 to 41.9 in mature economies, from 32.0 to 42.7 in China, and from 31.1 to 33.1 in India. François Bourguignon suggests that we may be facing “a process of ‘internalizing’ global inequality within national communities”, in which “inequality between Americans and Chinese would be partly replaced by more inequality between the rich and the poor in America and China”.¹⁸

This “internalizing” is the other face of the changes triggered by globalisation and technological progress. The Golden Age of capitalism – the thirty years of rapid economic growth experienced by Western countries after the Second World War – had led to a profit squeeze and a strengthening of unions’ bargaining power that

¹⁶ A.B. Atkinson, *Bringing income distribution in from the cold*, «Economic Journal», 107, 1997, pp. 297-321, citation at p. 303. See also A.B. Atkinson, *The distribution of income in the UK and OECD countries in the twentieth century*, «Oxford Review of Economic Policy», 15, 1999, pp. 56-75.

¹⁷ R. Baldwin, *The Great Convergence Information Technology and the New Globalization*, Cambridge, Belknap, 2016.

¹⁸ F. Bourguignon, *The Globalization of Inequality*, cit., p. 38.



challenged the autonomy of businesses to decide over investments and work organisation.¹⁹ Businesses responded by outsourcing activities, by off-shoring and gradually shifting production to “emerging” countries, by adopting labour-saving technologies. Globalisation and technological revolution are not only the outcome of scientific progress and improved international relations after the fall of the Berlin Wall, but also of corporate strategic choices that allowed businesses to regain bargaining power.²⁰ In mature economies, these changes progressively weakened the ability of unions to oppose a shift in the division of the surplus to managers and shareholders, at the expense of low- and middle-skilled workers.²¹ Automation hit many manual and clerical middle-skill jobs performing routine tasks that could be easily substituted by computers.²²

Confronted with high capital mobility and growing financialisation, governments liberalised goods markets, deregulated the labour market, reduced marginal tax rates, and rolled back the welfare state in order to regain competitiveness. These trends were more pronounced in the United States and the United Kingdom, where economic forces interacted with a pro-market revival associated with the anti-Keynesian reaction in economics and culminated in the electoral victories of Ronald Reagan and Margaret Thatcher.²³ In both countries, the impact of widening earning disparities on the distribution of household incomes was amplified by government policies aimed at reducing social spending and taxes on top incomes.²⁴ In continental European countries, these tendencies developed more slowly and in

¹⁹ A. Glyn, *Capitalism Unleashed. Finance, Globalization, and Welfare*, Oxford, Oxford University Press, 2006, pp. 1-2.

²⁰ On the interaction between technological change, unionisation and inequality see D. Acemoglu, P. Aghion, and G.L. Violante, *Deunionization, technical change and inequality*, «Carnegie-Rochester Conference Series on Public Policy», 55, pp. 229-264.

²¹ F. Jaumotte and C. Osorio Buitron, *Inequality and Labor Market Institutions*, IMF Staff Discussion Note SDN/15/14, 2015.

²² D.H. Autor, L.F. Katz and M.S. Kearney, *The polarization of the US labor market*, «American Economic Review Papers & Proceedings», 96, pp. 189-194; M. Goos and A. Manning, *Lousy and lovely jobs: The rising polarization of work in Britain*, «Review of Economics and Statistics», 89, pp. 118-133; M. Goos, A. Manning and A. Salomons, *Job Polarization in Europe*, «American Economic Review Papers & Proceedings», 99, pp. 58-63.

²³ A change in the intellectual climate had been actively pursued for years by many conservative think-tanks. The self-celebratory account of the story of the Institute for Economic Affairs in London given by its director John Blundell in a lecture at the Heritage Foundation in 1989 is revealing of the systematic worldwide effort of pro-market activists. See J. Blundell, *Waging the war of ideas: Why there are no shortcuts*, in J. Blundell, *Waging the War of Ideas*, London, The Institute of Economic Affairs, 3rd ed., 2007, pp. 33-46.

²⁴ A.B. Atkinson, *Income Inequality in OECD Countries: Data and Explanations*, «CESifo Economic Studies», 49, pp. 479-513.



different forms, possibly due to the diverse productive structure and to the resilience of their corporatist social model. However, they pushed unions to assume increasingly defensive positions, mostly aimed at defending their membership rather than pursuing objectives of general interest. Also for this reason, the costs of social security and labour market reforms mainly fell on new entrants and were largely borne by younger cohorts.²⁵

These changes in the functioning of capitalist economies during the last three decades generated winners and losers. It took a major economic and social disruption such as the Great Recession to expose the surge in inequality and the fundamental unfairness of the growth process. As Albert Hirschman explained in 1973, the social tolerance for inequality depends on the characteristics of the growth process. He used the metaphor of the “tunnel effect”, which he described as follows:²⁶

Suppose that I drive through a two-lane tunnel, both lanes going in the same direction, and run into a serious traffic jam. No car moves in either lane [...] I am in the left lane and I feel dejected. After a while the cars in the right lane begin to move. Naturally, my spirits lift considerably, for I know that the jam has been broken and that my lane’s turn to move will surely come any moment now. Even though I still sit still, I feel much better off than before because of the expectation that I shall soon be on the move. But suppose that the expectation is disappointed and only the right lane keeps moving: in that case I, along with my left lane cosufferers, shall suspect foul play, and many of us will at some point become quite furious and ready to correct manifest injustice by taking direct action (such as illegally crossing the double line separating the two lanes).

Hirschman introduced the tunnel effect in the debate on the development policies of the 1950s and 1960s in order to show that an unequal distribution of the fruits of economic growth need not create political instability, popular rebellions, and authoritarian responses. However, the intuition of the tunnel effect is more general and can help us understand how the current concern for inequality has

²⁵ P. Emmenegger, *The politics of job security regulations in Western Europe: From drift to layering*, «Politics & Society», 43, pp. 89-118.

²⁶ A.O. Hirschman, *The changing tolerance for income inequality in the course of economic development*, with a Mathematical Appendix by M. Rothschild, «Quarterly Journal of Economics», 87, pp. 544-566, citation at p. 545. See also A.O. Hirschman, *Essays in Trespassing: Economics to Politics and Beyond*, Cambridge, Cambridge University Press, 1981.



emerged. The growing divergence in the dynamics of personal incomes experienced over the last thirty years in many countries was initially tolerated in the expectation of some rebalancing, sometimes relying on indebtedness to support living standards. As the rebalancing failed to materialise, in line with the tunnel effect, this state of affairs could not last. The Great Recession was the breaking point. Triggered by speculative behaviours on deregulated financial markets, its heavy repercussions on the real economy and household finances made it clear that not everybody in rich countries was benefitting from globalisation and technological progress. The growth of populist and anti-establishment positions is the political outcome of the tunnel effect, and the likely reason why the concern for inequality has spread to circles typically reluctant to consider it (such as the IMF).

This outcome was not unpredictable. Dani Rodrik presciently warned twenty years ago that “the most serious challenge for the world economy in the years ahead lies in making globalization compatible with domestic, social and political stability – or to put it even more directly, in ensuring that international economic integration does not contribute to domestic social *disintegration*”.²⁷ Neither was it inevitable, as Atkinson argued in the Third WIDER Annual Lecture in 1999.²⁸ Part of the problem lies with economics.

THE EQUALITY AND EFFICIENCY TRADE-OFF IN ECONOMICS

Income distribution has never featured prominently in mainstream economic thinking. The idea that any attempt to make income distribution less unequal is bound to jeopardise the good functioning of the economy is deep-seated in economics. Edwin Cannan explained it neatly (and critically) in 1905:²⁹

The economist regards the existing inequality of distribution as in itself extremely wasteful, but sees that it must in the main be retained for the present, because it provides both the motive force and the regulator for the existing system of

²⁷ D. Rodrik, *Has Globalization Gone Too Far?*, Washington, Institute for International Economics, 1997, p. 2.

²⁸ A.B. Atkinson, *Is Rising Income Inequality Inevitable?: A Critique Of The Transatlantic Consensus*, WIDER Annual Lecture 003, Helsinki, UNU-WIDER, 1999.

²⁹ E. Cannan, *The Division of Income*, «Quarterly Journal of Economics», 19, pp. 341-369, citation at pp. 367-368.



production; and, even if it were practicable, it would not be worth while to make and introduce the ideal of distribution if it led to a considerable fall in produce per head. The existing inequality, regarded broadly, is, in fact, a necessary evil. But there are many good reasons to suppose that it is greater than is necessary, and for hope, at any rate, that it may in the course of time be largely reduced, if not altogether abolished, without any appreciable injury (or even with advantage) to production.

In the same vein, but with a more pessimistic twist, Arthur Okun wrote seventy years later in his *Equality and Efficiency. The Big Tradeoff*.³⁰

In an economy that is based primarily on private enterprise, public efforts to promote equality represent a deliberate interference with the results generated by the market-place, and they are rarely costless. When the question is posed as: ‘Should the government tamper with the market?’ the self-evident answer is a resounding ‘No.’ Not surprisingly, this is a common approach among anti-egalitarian writers [...] with these blinders firmly in place, egalitarianism in economics can be investigated as though it were an idiosyncrasy, perhaps even a type of neurosis.

A democratic capitalist society will keep searching for better ways of drawing the boundary lines between the domain of rights and the domain of dollars. And it can make progress. To be sure, it will never solve the problem, for the conflict between equality and economic efficiency is inescapable.

The trade-off apparently finds a formal basis in the first basic theorem of welfare economics due to Kenneth Arrow and Gérard Debreu. The theorem establishes that under certain conditions a competitive equilibrium is Pareto optimal, that is, there exists no alternative allocation of goods that would make someone better off without making anyone worse off.³¹ The efficiency of a competitive equilibrium, however, does not imply its fairness, because its allocation depends on an original distribution of resources that can be very unequal. “If the lot of the poor cannot be made any better without cutting into the affluence of the rich,” commented Amartya Sen, “the situation would be Pareto optimal despite the disparity between

³⁰ A.M. Okun, *Equality and Efficiency. The Big Tradeoff*, Washington, The Brookings Institution, 1975, pp. 4-5 and p. 120.

³¹ K.J. Arrow and G. Debreu, *Existence of an Equilibrium for a Competitive Economy*, «Econometrica», 22, pp. 265-290.



the rich and the poor”.³² This normative limitation notwithstanding, the theorem is often seen as the justification for not interfering with market mechanisms.

Yet, this is unwarranted. Angus Deaton observed recently that “It is notable, if ironic today, that the man who was so central in proving the basic theorems of competitive equilibrium [Ken Arrow], saw his own achievement, not so much in what markets might achieve, but in the clarification of the assumptions necessary for the validity of the theorems. The negative result is at least as important as the positive one”.³³ Indeed, the conditions underlying the theorem are never met in reality and subsequent economic research has long investigated how results change when information is imperfect, goods are not homogeneous, firms have market power, entry barriers exist, and so forth.

Nonetheless, a stylised notion of general economic equilibrium has become the basis of the anti-Keynesian macroeconomic theory developed since the 1970s and centred on the concept of “representative agent”.³⁴ By construction, explaining the economy based on the optimising behaviour of a single agent, which “represents” all persons (or firms) interacting in the society, means ignoring heterogeneity. As Robert Solow commented in a hearing at the US House Committee on Science and Technology in 2010, “the DSGE [Dynamic Stochastic General Equilibrium] school populates its simplified economy [...] with exactly one single combination worker-owner-consumer-everything-else who plans ahead carefully and lives forever. One important consequence of this ‘representative agent’ assumption is that there are no conflicts of interest, no incompatible expectations, no deceptions”.³⁵ There is hardly any possibility for analysing income distribution by adopting this approach, which has become dominant in macroeconomics.³⁶ The underlying view is well captured

³² A. Sen, *On Economic Inequality*, Oxford, Clarendon Press, 1973, p. 7.

³³ A. Deaton, *Letter from America - Counting our losses*, «Royal Economic Society Newsletter», 179, October 2017, pp. 3-4, citation at p. 3.

³⁴ R.E. Lucas, Jr. and T. Sargent, *After Keynesian Macroeconomics*, «Federal Reserve Bank of Minneapolis - Quarterly Review», vol. 3, n. 2, pp. 1-16.

³⁵ R. Solow, *Statement prepared for the House Committee on Science and Technology, Subcommittee on Investigations and Oversight, ‘Building a Science of Economics for the Real World’*, 20th July 2010, https://science.house.gov/sites/republicans.science.house.gov/files/documents/hearings/072010_Solow.pdf. DSGE models evolved from the New Classical macroeconomics associated with the work of Robert Lucas, Thomas Sargent, Edward Prescott and followers.

³⁶ DSGE models have come under attacks for their difficulty to understand the global financial crisis and the Great Recession. For a discussion see, among others, S. Wren-Lewis, *Unravelling the New Classical Counter Revolution*, «Review of Keynesian Economics», 4, pp. 20-35, and O. Blanchard, *Do DSGE Models Have a Future?*, Peterson Institute for International Economics, Policy Brief, PB 16-11, August 2016.



by the following terse statement by Robert Lucas, a leading figure in this camp: “Of the tendencies that are harmful to sound economics, the most seductive, and in my opinion the most poisonous, is to focus on questions of distribution [...] The potential for improving the lives of poor people by finding different ways of distributing current production is nothing compared to the apparently limitless potential of increasing production”.³⁷

Even outside the representative agent’s world, two reasons have been put forward to explain why inequality is necessary for economic growth.³⁸ First, an egalitarian distribution could create disincentives for individual effort. It is Cannan’s motive force. Second, as financial markets are imperfect, capital accumulation may need a higher concentration of wealth because many investments are indivisible and require a large initial amount of resources that cannot be collected in the market.

The link between the distribution of resources and economic growth is however much more complex.³⁹ First, the distribution can influence aggregate demand. Greater inequality could reduce demand through Keynesian effects, since the propensity to consume is negatively correlated with income.⁴⁰ Moreover, during industrial take-off, the existence of a large middle class may be a condition for the consolidation of industrialisation if the adoption of more advanced technologies requires a critical level of internal demand: industrialisation would be hindered both by an excessive concentration of wealth, as the demand of property owners would turn to imported luxury goods, and by an egalitarian distribution, as it would not generate sufficient demand to activate domestic production.⁴¹ Second, assuming that individuals have well-defined preferences which are function of their income, the combination of taxes and transfers chosen in a democratic majoritarian system is the one preferred by the “median” voter, which is exactly halfway through the

³⁷ R.E. Lucas Jr., *The Industrial Revolution: Past and Future*, Federal Reserve Bank of Minneapolis - The Region, May 2004, <https://minneapolisfed.org/publications/the-region/the-industrial-revolution-past-and-future>.

³⁸ P. Aghion, *Inequality and economic growth*, in P. Aghion and J. Williamson, *Inequality, Growth, and Globalization. Theory, History and Policy*, Raffaele Mattioli Lectures, Cambridge, Cambridge University Press, 1998, pp. 5-102.

³⁹ R. Bénabou, *Inequality and growth*, in *NBER Macroeconomics Annual 1996*, ed. by B.S. Bernanke and J.J. Rotemberg, Cambridge, The MIT Press, 1996, pp. 11-92.

⁴⁰ T. Jappelli and L. Pistaferri, *Fiscal policy and MPC heterogeneity*, «American Economic Journal: Macroeconomics», 6, pp. 107-136; A. Auclert and M. Rognlie, *Inequality and aggregate demand*, mimeo, 2016, and *Aggregate demand and the top 1 percent*, «American Economic Review Papers and Proceedings», 107, pp. 588-592.

⁴¹ K.M. Murphy, A. Shleifer and R. Vishny, *Income distribution, market size, and industrialization*, «Quarterly Journal of Economics», 104, pp. 537-564.



distribution of income. The poorer the median voter is, the greater the chosen level of redistribution, and the lower economic growth, as taxes negatively affect the incentives to invest. Thus, inequality, as measured by the distance of the median from the mean, is harmful for growth.⁴² Third, imperfections in financial markets can prevent poor individuals from exploiting investment opportunities when they do not have enough capital to offer as collateral. Due to their inability to borrow, they could for example find themselves unable to invest in education and be forced to accept low-skill and less paid jobs. By hampering the accumulation of human capital, an unequal distribution would also hinder economic growth.⁴³ The interaction between informational asymmetries and unequal distribution can lead to inefficient resource allocations in other ways.⁴⁴

The theoretical developments just sketched show that there is no necessary trade-off between equality and economic growth, once the basic model is enriched with more realistic features. The question hence becomes essentially empirical. Several papers published in the 1990s found a negative link between inequality and growth, but overall the literature reached conflicting results.⁴⁵ The most recent studies

⁴² G. Bertola, *Factor shares and savings in endogenous growth*, «American Economic Review», 83, pp. 1184-1198; R. Perotti, *Political equilibrium, income distribution, and growth*, «Review of Economic Studies», 60, pp. 755-776; A. Alesina and D. Rodrik, *Distributive politics and economic growth*, «Quarterly Journal of Economics», 109, pp. 465-490; T. Persson and G. Tabellini, *Is inequality harmful for growth?*, «American Economic Review», 84, pp. 600-621; A. Alesina and R. Perotti, *The political economy of growth: A critical survey of the recent literature*, «World Bank Economic Review», 8, pp. 351-371. The result depends crucially on the assumption that taxes are distortionary; if this was not the case, the conclusion would be reversed, as shown by G. Saint-Paul and T. Verdier, *Historical accidents and the persistence of distributional conflict*, «Journal of the Japanese and International Economies», 6, pp. 406-422; G. Saint-Paul and T. Verdier, *Education, democracy and growth*, «Journal of Development Economics», 42, pp. 399-407; G. Saint-Paul and T. Verdier, *Inequality, redistribution and growth: A challenge to the conventional political economy approach*, «European Economic Review», 40, pp. 719-728.

⁴³ P. Aghion and P. Bolton, *Distribution and growth in models of imperfect capital markets*, «European Economic Review», 36, pp. 603-611; O. Galor and J. Zeira, *Income distribution and macroeconomics*, «Review of Economic Studies», 60, pp. 35-52; R. Torvik, *Talent, growth and income distribution*, «Scandinavian Journal of Economics», 95, pp. 581-596; P. Aghion and P. Bolton, *A theory of trickle-down growth and development*, «Review of Economic Studies», 64, pp. 151-172.

⁴⁴ For instance, when information is imperfect and lobbying provides information to policymakers, wealth inequality may distort the signals transmitted by economic agents to the government. Profitable sectors have an incentive to lobby intensively but sectors dominated by wealthy interest groups find it easier to lobby more intensively. Even honest policymakers can make bad resource allocation decisions as a consequence. J. Esteban and D. Ray, *Inequality, lobbying, and resource allocation*, «American Economic Review», 96, pp. 257-279.

⁴⁵ For estimates on cross-sectional data see Alesina and Rodrik, «Distributive Politics»; R. Perotti, *Income distribution and investment*, «European Economic Review», 38, pp. 827-835; Persson and Tabellini, «Is Inequality»; G.R.G. Clarke, *More evidence on income distribution and growth, journal of development economics*, 47, pp. 403-427; R. Perotti, *Growth, income distribution and democracy: What the data*



confirm that the relationship is complex and it is difficult to detect a robust unambiguous link. For instance, at the Organisation for Economic Co-operation and Development (OECD), Federico Cingano concludes that “Drawing on harmonised data covering the OECD countries over the past thirty years, the econometric analysis suggests that income inequality has a sizeable and statistically significant *negative* impact on growth, and that redistributive policies achieving greater equality in disposable income has no adverse growth consequences”.⁴⁶ Likewise, using a sample covering countries world wide, the IMF economists Jonathan Ostry, Andrew Berg and Charalambos Tsangarides find that lower income inequality is associated with faster and more durable growth for a given level of public redistribution, while the latter seems to have generally positive effects on growth, except in extreme cases (which include most of the advanced economies).⁴⁷ On the other hand, the variation in changes in income quintile group shares are on average small and less volatile than the variation in growth, and do not appear to be correlated with the latter according to research by David Dollar, Tatjana Kleineberg and Aart Kraay.⁴⁸ Sutirtha Bagchi and Jan Svejnar estimate that the effects on economic growth are nil or at most weakly positive for income inequality, but tend to be negative for wealth inequality, particularly when the latter mainly reflects the acquisition of billionaires’ fortunes through political connections.⁴⁹ Leaving aside the problems posed by data quality, this lack of firm conclusions may reflect the fact that the relationship between resource distribution and economic growth depends on the interaction of a variety of political, social and economic institutions.

The concrete possibility that a highly unequal distribution has negative consequences for economic growth, together with the awareness that there is a need

say, «Journal of Economic Growth», 1, pp. 149-187; A. Alesina and R. Perotti, *Income Distribution, Political Instability, and Investment*, «European Economic Review», 40, pp. 1203-1228. For estimates on longitudinal data see: A. Brandolini and N. Rossi, *Income distribution and growth in industrial countries*, in *Income Distribution and High-Quality Growth*, ed. by V. Tanzi and K. Chu, Cambridge, The MIT Press, 1998, pp. 69-105; K. Deininger and L. Squire, *New ways of looking at old issues: Inequality and growth*, «Journal of Development Economics», 57, pp. 259-287; K.J. Forbes, *A Reassessment of the relationship between inequality and growth*, «American Economic Review», 90, pp. 869-887.

⁴⁶ F. Cingano, *Trends in Income Inequality and its Impact on Economic Growth*, OECD Social, Employment and Migration Working Papers 163, 2014, p. 28.

⁴⁷ J.D. Ostry, A. Berg and C.G. Tsangarides, *Redistribution, Inequality, and Growth*, IMF Staff Discussion Note SDN/14/02, 2014.

⁴⁸ D. Dollar, T. Kleineberg and A. Kraay, *Growth still is good for the poor*, «European Economic Review», 81, pp. 68-85.

⁴⁹ S. Bagchi and J. Svejnar, *Does Wealth Inequality Matter for Growth? The Effect of Billionaire Wealth, Income Distribution, and Poverty*, «Journal of Comparative Economics», 43, pp. 505-530.

to account for the heterogeneity of economic agents, given the failure of macroeconomic models based on the representative agent,⁵⁰ contributes to explain the unusual interest for inequality in mainstream economics since the Great Recession. It is an “instrumental” interest. The level of inequality is important for its potentially destabilising effects, not because of its unfairness.

CONCLUSIONS

Borrowing the title of a famous Atkinson’s lecture, the Great Recession of 2008-2009 has brought income distribution in from the cold. Not so much for its direct impact on inequality, that was all in all limited, but rather for two indirect consequences. On the one side, the suffering caused by the downturn has made manifest the high levels of inequality in many advanced countries, revealing how unfair economic growth had been in the twenty or more years preceding it. This has turned inequality into a political problem. On the other side, the failure of mainstream macroeconomics to understand the crisis has exposed the weakness of modern economic modelling ignoring heterogeneity and imperfections of real economies. This has turned inequality into a conceptual problem worth investigating in economics. These considerations illustrate that the concern for inequality responds to both intrinsic reasons – its fairness – and to instrumental reasons – the consequences it may have on other relevant objectives. The two aspects are not independent each other.

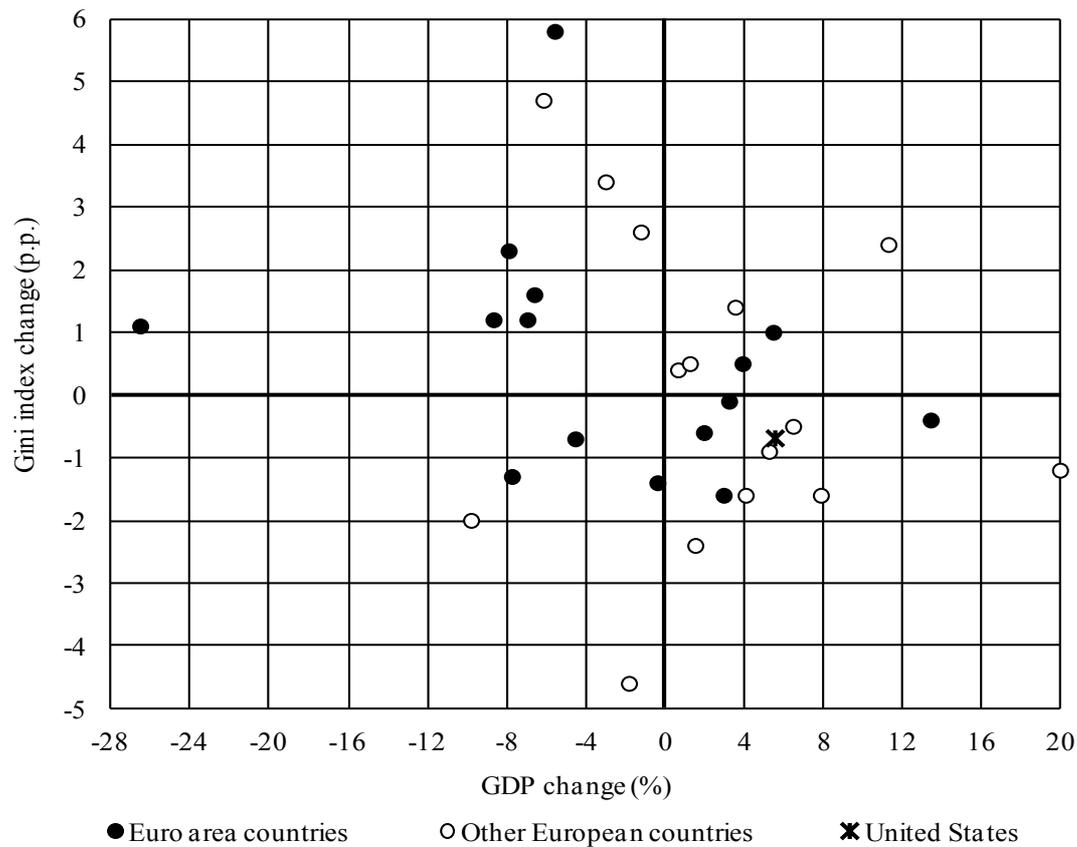
All three papers winning the 5th Giorgio Rota Best Paper Award deal with inequality, but take rather different perspectives. Alica Ida Bonk investigates how capital account liberalisations affect income inequality using country-level data and shows that the effects vary if the reforms are targeted to inward or outward flows. Madina Kurmangaliyeva studies Russian data on individual court cases and finds that the judicial system tends to be more indulgent with rich defendants, in part owing to the design of the legal system. Clara Martínez-Toledano Toledano uses information from tax records, national accounts and sample surveys to estimate a wealth distribution series for Spain over the period from 1984 to 2013 and

⁵⁰ E.g. O. Coibion, Y. Gorodnichenko, L. Kueng and J. Silvia, *Innocent bystanders? Monetary policy and inequality*, «Journal of Monetary Economics», 88, pp. 70-89.



concludes that housing bubbles and assets held offshore led to a rise in inequality. Despite their many differences, these papers provide intriguing examples of how taking seriously inequality can enhance our understanding of how modern economies work.

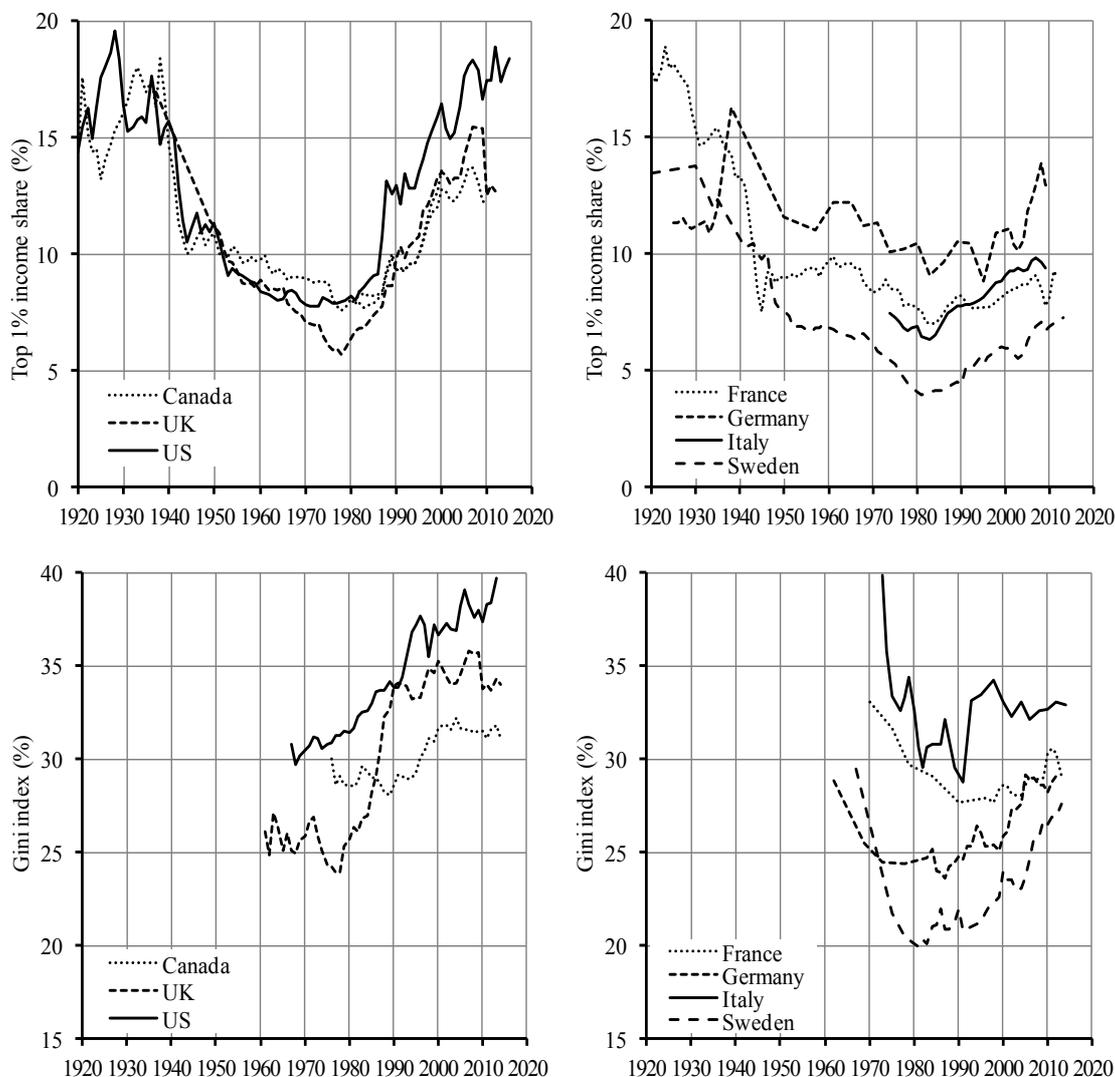
FIGURE 1 • GDP AND INEQUALITY CHANGE, 2007-2013



Source: elaboration on data from Eurostat, US Bureau of Economic Analysis and B. Andrews, J. Thomas and N. Palesch, *Estimation of EU-Comparable Poverty-Related Variables in the United States, 1995-2014*, CSLS Research Report 2015-2012, September 2015. Inequality of the distribution of equivalent disposable income among persons (modified OECD scale).



FIGURE 2 • THE EVOLUTION OF INCOME INEQUALITY IN SEVEN RICH COUNTRIES
IN THE LAST CENTURY



Sources: *Top 1% income share*: elaboration on data from The World Wealth and Income Database - WID (<http://www.wid.world>, as of 28th August 2016) for taxable income; for Canada, the series 1920-2000 is based on tabulated tax data and relate to adults aged 20+, while the series 1982-2010 is based on administrative database for tax-filers; for the United Kingdom, estimates relate to married couples and single adults until 1989 and to adults from 1990. *Gini index*: elaboration on data from national sources for equivalent disposable incomes; some statistical discontinuities are ignored by merging the underlying sub-series. For both statistics, levels are not comparable across countries due to differences in the income concept.

ALICA IDA BONK

**CAPITAL ACCOUNT LIBERALIZATION AND INEQUALITY.
THE ROLE OF SKILL LEVELS AND FINANCIAL DEPTH**

Abstract. Capital account liberalizations affect income inequality differently, depending on cross-country heterogeneities as well as on whether reforms are targeted at inflows or outflows. I provide evidence for this claim by following a difference-in-differences approach using a disaggregated index of capital account openness. While liberalizations with respect to FDI outflows reduce inequality in low income countries, FDI inflows aggravate disparities. The latter effect is decreasing in countries' average skill level. Moreover, lifting restrictions on financial credit inflows reduces inequality in both high and low-income countries and credit market depth reinforces this effect in the former group.

Keywords. Inequality, Capital account liberalization, Foreign direct investment, Credit

1. INTRODUCTION

The fall of the Bretton Woods system in the early 1970s, has led to a progressive repeal of capital controls. Since then, global financial flows have increased tremendously starting from less than 5 percent of global GDP in the 1980s and reaching 20 percent by 2007 (Arora *et al.* 2013). While liberalizations were partly motivated by the prospect of boosting growth through widened access to credit and profitable investment opportunities, it remains unclear whether the benefits have been shared equally among all members of society (Das and Mohapatra 2013). In fact, during the same time period, global income inequality embarked on its steadily rising path. This correlation has raised the question of whether capital account liberalizations are to blame for reversing the declining trend in inequality that had lasted for eight decades. The aim of this paper is to shed light on this controversy.

Specifically, I argue that the effect of liberalization policies on inequality varies by asset type and depends on whether they are aimed at inflows or outflows.



Furthermore, I highlight the importance of pre-existing cross-country heterogeneities in shaping the distributional impact of eliminating capital controls. I am interested in studying two asset types in particular with the goal of answering the following two research questions:

- How does the average skill level in a country affect the way in which foreign direct investment (FDI) shapes inequality?
- How does financial depth influence the extent to which credit inflow liberalizations translate into changes in inequality?

To motivate my empirical analysis exploring the first question, I extend a model on FDI inflows by Larrain (2015) by incorporating cross-country skill differentials as well as the possibility of FDI outflows. Assuming that advanced capital and skilled labor are complements, I hypothesize that FDI inflows increase inequality in developing countries, whereas outflows should reduce income discrepancies. Furthermore, both effects should decrease in the labor force's average skill level. The exact opposite effects are predicted to hold in high income countries.

To answer the second question I draw on a theoretical framework by Bumann and Lensink (2016) which demonstrates that facilitating foreign credit to enter a country only reduces inequality if financial depth is sufficiently high. However, I point out that the predictive power of this model fades in the presence of domestic financial risk.

To test these hypotheses, I make use of a newly published panel dataset by Fernández *et al.* (2015), which provides indices of capital account openness disaggregated by asset types. Following a modified difference-in-differences approach suggested by Larrain (2015), I compare changes in inequality for reforming countries pre- and post-liberalization with changes in nonreforming countries. Including various controls and estimating the relationship by fixed effects as well as Arellano-Bond GMM, the econometric analysis supports most of the predictions relating to low income countries: While FDI inflow liberalizations lead to a short term increase of the Gini index of 1.6-4 percent, FDI outflows reduce inequality by around 4 percent in the first year after liberalization. In the case of inflows, higher average skill levels succeed at mitigating the adverse distributional affects. Furthermore, financial credit liberalizations cause persistent reductions in the Gini coefficient but financial depth seems to increase rather than decrease inequality. For the sample of high income countries, the effects of liberalization are less clear-cut.



Overall, the analysis provides new evidence on the role of cross-country heterogeneities in shaping distributional responses after capital account openings. Most importantly, it highlights that reform-minded developing countries with low educational standards need to complement liberalizations with pre-emptive inequality decreasing measures.

The remainder of this paper is structured as follows: section 2 provides a short overview of the related literature. Section 3 presents the theoretical underpinnings for my analysis, laying the foundations for section 4 which describes the data, empirical methodology, results and policy implications. Finally, section 5 concludes.

2. REVIEW OF RELATED LITERATURE

This paper closely links to the existing literature which has attempted to identify the channels connecting capital account openness and inequality. Atkinson and Morelli (2011) suggest that opening up countries to global financial flows allows economic disturbances to be spread more easily. In particular, sudden stops of inflows can trigger recessions which tend to disproportionately affect the less wealthy. An alternative channel is highlighted by Jayadev (2007) who finds a negative correlation between the labor share in income and the degree of openness. He justifies his results by pointing at the possibility for firm owners to relocate production abroad, which presents a credible threat to workers who are more likely to tolerate lower wages as openness increases. Some studies have attempted to identify the effect of liberalizations with respect to specific asset types. Using FDI stocks as a percentage of GDP, Figini and Görg (2006) find that inward direct investment increases inequality in non-OECD countries but decreases disparities in OECD countries. Jaumotte *et al.* (2013) extend this analysis and add that outward flows also have an inequality decreasing effect on developed countries. Both studies use *de facto* measures of openness which have been criticized by Furceri and Loungani (2015) for suffering from endogeneity problems and for not reflecting purely policy-induced liberalizations. To remedy this issue, several researchers have adopted *de jure* measures of openness. The most widely used is the KAOPEN index developed by Chinn and Ito (2007) which relies on information published in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER). Two studies using this index are particularly relevant for my paper as they pay close



attention to the role of heterogeneities regarding financial depth and skill levels. The first is a paper by Bumann and Lensink (2016) which highlights that liberalizations are only successful at reducing inequality if financial depth is high, i.e. if the private credit to GDP ratio exceeds 25 percent. The second study, published by Larrain (2015), shows that liberalizations increase wage inequality most in industries in which capital is highly complementary to skilled labor. Both studies, by relying on the KAOPEN index, are neither able to identify liberalizations with respect to their respective assets of interest – financial credit and FDI – nor are they able to distinguish between effects on sending and receiving countries. Using the disaggregated Fernández *et al.* (2015) index allows me to overcome these shortcomings. Its granularity and wide coverage of countries enables me to contribute to the existing empirical research in the following ways: firstly, I can extend the analysis by Bumann and Lensink (2016) by distinguishing between financial and commercial credit liberalizations. Secondly, I can differentiate between the effects of FDI inflows and outflows while circumventing the endogeneity problems of de facto measures. Thirdly, I am able to expand the sample of Larrain (2015) who only studies the effect of FDI on inequality in European countries by including other developed as well as developing countries. Moreover, instead of looking at the role of cross-industry skill differentials within one country only, my analysis will focus on crosscountry differences in educational attainment. Through these extensions I am hoping to provide more complete guidelines of how to implement liberalizations in the most welfare enhancing way.

3. TWO ANALYTICAL FRAMEWORKS

3.1 FDI liberalization in the presence of skill heterogeneities

According to Larrain (2015), facilitating FDI inflows increases the demand for skilled labor leading to adverse distributional consequences. However, this view may be overly one-sided and the aim of this section is to extend Larrain's model in three dimensions. Firstly, instead of accounting only for distributional effects within receiving countries, consequences for sending countries will be explored. Secondly, allowing for pre-existing differences in average skill levels can help to derive more



nuanced policy implications in the context of between-country heterogeneities. Thirdly, by considering the possibility that incoming technology may require below-average skill levels, I can demonstrate that capital account openings possibly reduce inequality.

Assume that a country's production technology is described by $y = f(l^s, l^u, k^s, k^u)$, where l^s represents skilled labour and l^u unskilled labor. Furthermore, capital or machinery that needs to be operated by highly skilled workers is denoted by k^s ('skilled capital' from now on) whereas k^u stands for capital that requires no specific skills ('unskilled capital'). Denote the elasticity of substitution between the two types of capital and labor by $\sigma_{i,j}$ where $i \in \{k^s, k^u\}$ and $j \in \{l^s, l^u\}$. Following the 'capital-skill complementarity hypothesis' by Larrain (2015), one can state that skilled capital is more complementary to skilled than to unskilled labor and vice versa, i.e. $\sigma_{k^s, l^u} > \sigma_{k^s, l^s}$ and $\sigma_{k^u, l^s} > \sigma_{k^u, l^u}$ holds. Hence, it is assumed that unskilled workers have a comparative advantage in operating less advanced technology which, for example, could be due to their ability to tolerate repetitive tasks better than highly skilled workers. Labor markets are assumed to be perfectly competitive so that $\frac{\partial f}{\partial l^u} = w_u$ and $\frac{\partial f}{\partial l^s} = w_s$ with $w_s > w_u$. Furthermore, both types of labor are assumed to be supplied inelastically. Income inequality is measured as the ratio of skilled to unskilled wages $\left(\frac{w_s}{w_u}\right)$ and capital and capital-skill complementarity implies that

$$\frac{\partial\left(\frac{w_s}{w_u}\right)}{\partial k^s} > 0 \text{ and } \frac{\partial\left(\frac{w_s}{w_u}\right)}{\partial k^u} < 0$$

In other words, a larger stock of skilled capital increases relative demand for skilled labor. Since workers get paid their marginal product, w_s increases in equilibrium and income inequality intensifies. The reverse effect occurs in response to increases in unskilled capital, i.e. unskilled wages rise and inequality falls.

In order to describe the effect of capital account liberalizations, I assume that each country imposes restrictions on direct investment flows. Let θ^{in} and θ^{out} measure the degree of legal restrictions on FDI inflows and outflows, respectively, where higher values of represent capital account openings with respect to FDI. Policymakers' choice of θ is taken as exogenously given since distributional considerations are often absent when decisions on capital account liberalizations are made (Jayadev 2007). When a country opens up for inflows, both types of capital can enter more easily and as outflows are liberalized, both technologies can exit more freely, i.e.



$$k^h = k(\theta^{in}, \theta^{out}) \text{ with } \frac{\partial k^h}{\partial \theta^{in}} \geq 0 \text{ and } \frac{\partial k^h}{\partial \theta^{out}} \leq 0 \text{ where } h \in \{s, u\}.$$

Following Larrain (2015), the impact of capital account liberalization on inequality can be decomposed into a “complementarity effect” and a “capital effect”:

$$\frac{\partial \left(\frac{w_s}{w_u} \right)}{\partial \theta^g} = \underbrace{\frac{\partial \left(\frac{w_s}{w_u} \right)}{\partial k^h}}_{\text{Complementarity effect}} * \underbrace{\frac{\partial k^h}{\partial \theta^g}}_{\text{Capital effect}} \quad (1)$$

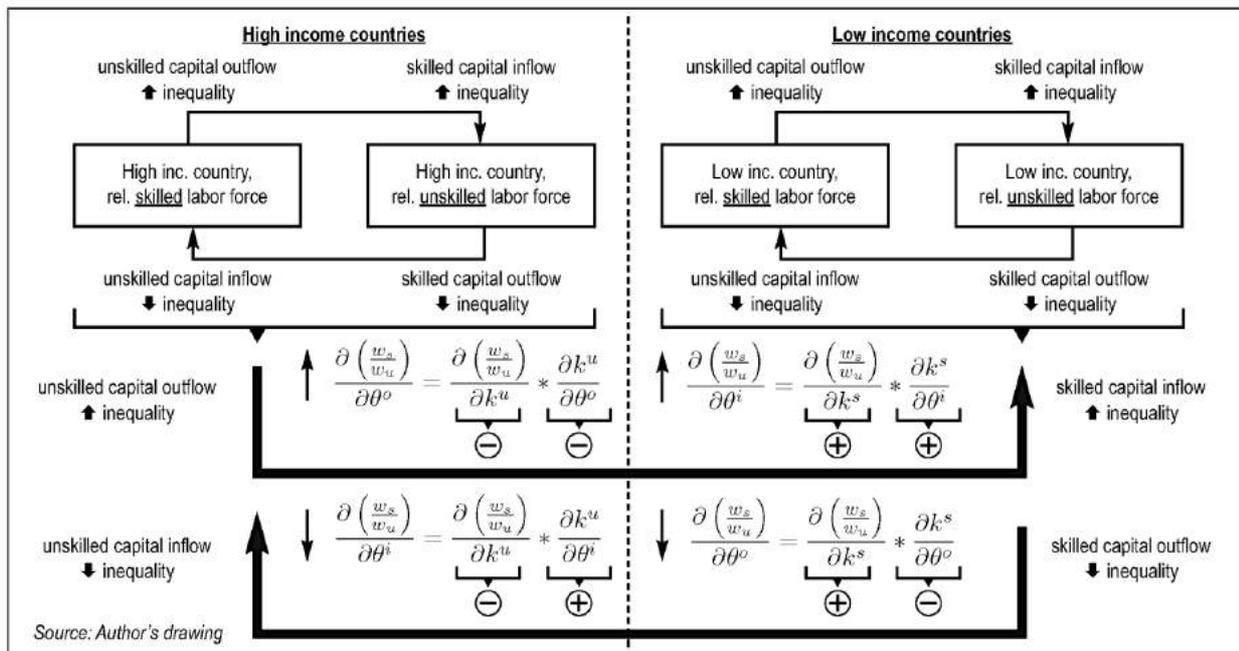
where $g \in \{in, out\}$ and $h \in \{s, u\}$. The capital effect refers to the extent of capital deepening whereas the complementarity effect describes increases in the relative demand of skilled labor in response to capital deepening. Hence, one can distinguish between four different cases and their effects on inequality:

- 1) If the economy opens up for *inflows* (positive capital effect) and predominantly skilled capital enters (positive complementarity effect), inequality *increases* (i.e., $\frac{\partial \left(\frac{w_s}{w_u} \right)}{\partial \theta^g} > 0$).
- 2) If the economy opens up for *inflows* (positive capital effect) but predominantly unskilled capital enters (negative complementarity effect), inequality *decreases*.
- 3) If the economy opens up for *outflows* (negative capital effect) and predominantly skilled capital exits (positive complementarity effect), inequality *decreases*.
- 4) If the economy opens up for *outflows* (negative capital effect) but predominantly unskilled capital exits (negative complementarity effect), inequality *increases*.

These predicted effects on inequality are intuitive. The latter case, for example, describes a situation in which low skilled production is outsourced to a foreign country. As a result, unskilled domestic workers are left without a job which decreases their already low incomes even further and thus increases inequality. The type of capital that flows into and out of a country after liberalization depends on the relative skill levels of sending and receiving countries. Figure 1 illustrates this idea.



FIGURE 1 • FDI FLOWS AND THEIR EFFECT ON INEQUALITY BY INCOME GROUP AND SKILL LEVEL



For the sake of cohesion with the analysis conducted in the empirical section, a distinction is made between high and low income countries. The average skill level in high income countries is assumed to exceed the average skill level in the group of low income countries. As a result of this comparative advantage in operating technologically advanced capital, high income countries tend to experience FDI outflows of capital that requires low skills (symbolized by the upper one of the two thick arrows). In that case, inequality would increase in response to liberalization. On the other hand, ‘unskilled capital outflows’ from high income countries may present ‘skilled capital inflows’ for low income countries which increase inequality¹. The opposite holds for FDI flows from poor to rich countries which are predicted to reduce inequality for countries in both groups (lower thick arrow). Besides between-income group FDI flows, liberalizations will also enhance flows across countries of the same income group, a claim which finds its empirical underpinnings in a study by UNCTAD (2015). Again, countries with higher educational standards will outsource unskilled production and will receive inflows that require below

¹ This assumption holds true if either the skill level in the most unskilled rich country exceeds the skill level in the most skilled poor country (unlikely) or if rich countries whose average skill level exceeds the one in poor countries, contribute equally to inflows into poor countries.



average skill levels. However, the latter presents relatively ‘skilled capital outflows’ for sending countries with an unskilled labor force. As a consequence, only for the most skilled high income country (on the far left) are all FDI inflows inequality decreasing and outflows inequality increasing. Similarly, only for the least skilled low income country (on the far right) should outflows unambiguously reduce inequality and inflows increase inequality. To summarize, two testable implications emerge:

PROPOSITION 1: Liberalizations with respect to FDI inflows (outflows) reduce (increase) inequality in *high income* countries on average and the effect is *increasing* in the labor force’s average skill level.

PROPOSITION 2: Liberalizations with respect to FDI inflows (outflows) increase (reduce) inequality in *low income* countries on average but the effect is *decreasing* in the labor force’s average skill level.

These hypotheses are tested empirically in section 4.

3.2 Credit inflows and financial depth

To motivate the second part of the empirical analysis, this section briefly presents a model by Bumann and Lensink (2016) describing the relation between credit market liberalization and inequality. The framework incorporates a banking sector, heterogeneous private agents and varying levels of financial depth.

Agents are assumed to live for one period and to receive an endowment of labor income (w) at the beginning of their lives. Thereafter, they face three alternatives: Firstly, they could deposit an amount d of their income at a domestic bank receiving a fraction r_d in interest payments. Secondly, they have the option of investing w in new capital (k) of which they can resell ϕk to the production sector at a price q (normalized to unity). Varying values of ϕ , where $\phi \sim U[0, 1]$, reflect differences in agents’ investment talent. Thirdly, there is the possibility of obtaining a bank loan at a rate r_l and to invest w together with the funds borrowed. Due to information asymmetries, agents can only borrow up to a fraction v of their endowment w , i.e. $0 \leq l \leq vw$, where $v \geq 0$ represents the level of credit market depth. Furthermore, it is assumed that $r_l > r_d$ so that agents only borrow for investment purposes. During their lifetime agents choose the amount of deposits and loans to maximize their consumption according to:

$$\max_{d,l}(\phi k + r_d d - r_l l) \quad (2)$$



subject to the budget constraint $w + l = d + k$ and the borrowing constraint $0 \leq l \leq vw$. Solving the above yields two threshold values $T_1 = r_l$ and $T_2 = r_d$ which together with the investment ability parameter (ϕ) determine which of the three possible actions agents will undertake. If $\phi < T_2$, agents prefer to become savers and deposit their entire labor income at the bank. If $T_2 < \phi < T_1$, agents invest all of their endowment in new capital but refrain from borrowing additional funds since the cost of doing so would exceed the return on investments. Lastly, if $\phi > T_1$, agents borrow as much as they can, i.e. $l = vw$ and invest these funds together with their labor income, i.e. $k = (1 + v)w$. Hence, given the uniform distribution of investment ability (ϕ), a proportion T_2 of the population are savers, $T_1 - T_2$ become 'pure' investors without borrowing and $1 - T_1$ borrow and invest. Consequently, aggregate demand for loans is determined only by the 'borrowing savers group' and amounts to $L = vw(1 - T_1)$. Similarly, the aggregate demand for deposits is determined by the 'savers group' and therefore equals $D = wT_1$. In order to determine equilibrium interest rates, Bumann and Lensink (2016) also incorporate a banking sector into their model. Banks' balance sheet is characterized by

$$L + R = D + F \quad (3)$$

where assets consist of domestic loans (L) as well as required reserves (R) and liabilities are the sum of domestic deposits (D) and deposits by foreigners (F). The government determines the fraction of domestic deposits ($1 - h$) with $0 < h < 1$, that banks need to keep in reserves, i.e.

$$R = (1 - h)D. \quad (4)$$

In addition, it sets the fraction a ($0 < a < 1$) of domestic lending that can be financed out of foreign deposits, i.e.

$$F = aL \quad (5)$$

where a low a reflects tight capital controls. The interest rate on foreign deposit is assumed to be lower than the one on domestic deposits so that banks prefer



financing loans through the former types of funds but are constrained by (5). With non-remunerated reserves, the banks' zero profit condition can be stated as

$$r_l L = r_d D + r_f F \quad (6)$$

Assuming that $r_f = 0$, swapping (3), (4) and (5) into (6) yields the relationship

$$r_d = b r_l \quad \text{with} \quad b = \frac{h}{(1-a)} r_d, \quad 0 < b < 1 \quad (7)$$

Capital account liberalization, by raising a , increases b and thus reduces the gap between the cost of borrowing and the benefit of saving. Combining (3), (4) and (7) with the two threshold values from the agent's problem and the demands for loans and domestic deposits finally yields the equilibrium conditions

$$T_1 = \frac{v}{(v + b^2)} \quad \text{and} \quad T_2 = \frac{bv}{(v + b^2)} \quad (8)$$

The impact of financial liberalization can then be described by

$$\frac{\partial T_1}{\partial b} = \frac{-2bv}{(v + b^2)^2} < 0 \quad \text{and} \quad \frac{\partial T_2}{\partial b} = \frac{v(v - b^2)}{(v + b^2)^2} \quad (9)$$

Hence, allowing banks to use a larger fraction of foreign deposits for domestic loans reduces the cost of borrowing which will motivate agents in the 'non-borrowing investors' group to start borrowing. As a result, more agents move from the middle to the right side of the income distribution. However, since $\frac{\partial^2 T_1}{\partial b \partial v} < 0$, this inequality increasing effect declines with the level of credit market depth. Additionally, from the equation on the right, it becomes clear that only if depth is relatively high, such that $v > b^2$, would liberalization increase r_d and benefit savers at the bottom of the income distribution. The above observations can be summarized as follows:

PROPOSITION 3: The distributional impact of liberalizing credit inflows is ambiguous but it is more likely to reduce inequality if financial depth is high.

Besides the the model's simplistic assumption that wage income is distributed equally across the population and that heterogeneous investment skills are the main



source of inequality, another point of criticism must be raised. By assuming that interest rates on foreign deposits are below the level that domestic depositors demand, the model by Bumann and Lensink (2016) neglects an important real-world feature. Especially in war-torn or disaster-affected poor countries, creditors demand high risk-premiums. As a result, accepting foreign deposits might be less attractive for banks so that credit liberalizations only lead to moderate increases in the supply of loans. Hence, r_l falls by less and r_d does not increase as much as in less risky countries. Assuming that the level of investment risk correlates negatively with GDP, one can state:

PROPOSITION 4: In the presence of deep financial markets, credit inflow liberalizations are more likely to decrease inequality in high income (low risk) countries than in low income (high risk) countries.

The following section tests the empirical validity of the four propositions derived above.

4. EMPIRICAL ANALYSIS AND RESULTS

4.1 Data

I construct a data set using several sources. To measure the intensity of capital controls with respect to FDI, financial and commercial credit I use indices developed by Fernández *et al.* (2015). These are available on an annual basis for 100 countries from 1995 to 2013. Their construction is based on information contained in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) and the measure ranges from 0 (no restrictions) to 1 (high restrictions). Inequality is measured by the annual before-tax Gini index and is taken from the Standardized World Income Inequality Database (SWIID). Values range from 18 to 71 over the sample period. Merging these two measures provides a baseline data set containing 92 low, middle and high income countries. A first inspection of time trends since 1995 suggests that inequality has increased on average in high income countries, which have also seen large-scale capital liberalizations. On the other hand, in low and lower middle income countries, inequality has fallen slightly, while controls on outflows have been increased. To examine the effect of skill heterogeneities, I obtain annual data on the mean years of schooling from Barro and



Lee (2013) as well as on lower secondary school completion rates and on the share of agricultural income in GDP from the World Development Indicators (WDI) database. Furthermore, credit market depth is proxied by two measures: The first is an index of credit market freedom contained in the Economic Freedom of the World (EFW) database. This indicator assigns annual scores to countries ranging from 0 (very low depth) to 10 (very high depth). As a second measure of depth I use the ratio of private credit by banks to GDP available from the WDI database. In addition, following previous research, my analysis controls for various other country-specific time varying factors. Similar to Furceri and Loungani (2015), I incorporate information on the occurrence of a banking crisis published in the Global Financial Development Database and data on the trade to GDP ratio from the WDI. Following Jayadev (2007), I obtain unemployment rates (WDI) as well as an index reflecting the degree of centralization of collective bargaining (EFW).

4.2 Difference-in-differences estimation with staggered treatment dates

Using a modified difference-in-differences approach I compare changes in income inequality among reforming countries before and after liberalizations with changes in control group countries in the pre- and post-reform periods. Unlike in classical difference-in-differences studies, capital account reforms are staggered over time. Consequently, defining a common post- and pre-treatment period is difficult. To remedy this issue, I define a post-opening dummy, which equals one in the period after the liberalization, and zero otherwise. Liberalizations are identified whenever, for a given country in a given year, the annual change in the Fernández index falls more than one standard deviation below the average change in all countries. Hence, the composition of the control group varies year-by-year. This approach has been previously adopted by Furceri and Loungani (2015) and Larrain (2015) using the Chinn and Ito index for overall capital account liberalizations. To extend their analysis, I construct separate post-reform dummies distinguishing between three asset types. For the sample period between 1995-2013 I identify 27 instances of capital account openings with respect to FDI inflows, 28 with respect to FDI outflows, 29 occasions of financial credit inflow liberalizations and 38 inflow liberalizations for commercial credit. Hence, I consider four different treatments. Since the theoretical model presented in section 3.2 makes no predictions on the



effect of credit outflows, I leave this analysis to future research. Two criteria need to be met for identification:

(i) There are no unobserved heterogeneities affecting treatment and control group countries differently at the time of liberalization. This includes the requirement that global shocks influence both groups equally and that none of the two adopts additional reforms influencing inequality.

(ii) Treatments are imposed randomly and do not correlate with pre-existing levels of inequality.

While (ii) is likely to hold, assumption (i) may be violated. However, the prerequisite of common global shocks is more likely to be fulfilled, the less heterogeneous countries are. Therefore, I conduct my analysis separately for high income and low income countries. The concern that countries may have undertaken simultaneous liberalizations with respect to various asset types is not unwarranted. However, dummies indicating FDI and credit reforms only show low correlations with incidences of overall capital reforms. Yet, one should keep in mind that in a specific year inequality in some control group countries may still be influenced by recently adopted reforms, which would bias the true difference-in-differences estimate. Nevertheless, the limitations of this approach are counterbalanced by its advantages: opening dates can be defined with precision and the sample size is large since control groups are not restricted to countries that have never implemented reforms.

To identify the effect of lifting capital restrictions on inequality, I estimate the following relationship for each of the four reforms separately:

$$\ln(\text{Inequality})_{c,t} = \beta_1 D_{c,t} + \beta_2 X_{c,t} + \alpha_c + \alpha_t + \varepsilon_{c,t} \quad (10)$$

where *Inequality* is measured by the Gini coefficient, $D_{c,t}$ is the dummy variable that equals one only in the first period after liberalization and $X_{c,t}$ represents a vector of time-varying country controls. The latter are described in section 4.1 and consist of factors that are thought to influence inequality, while also affecting the probability of financial reforms. Hence, they serve to mitigate endogeneities that could bias the coefficient of interest (β_1). Furthermore, I include country fixed effects (α_c) and time fixed effects (α_t) to capture the effect of global shocks.



4.3 Estimation results I: FDI liberalization

Table 1 presents the results from estimating (10) with respect to FDI liberalizations. Since the effect on inequality for high income countries is insignificant for any specification or subsample, only estimates for low income countries are reported. In the fixed effects estimation in column (2), I cluster standard errors at the country level to control for within-country correlations across time. The resulting estimates are significant at the 10% level and provide evidence that eliminating legal barriers to direct investment inflows has a significant inequality increasing effect in poor countries. Following Furceri and Loungani (2015), I augment (10) by including lagged inequality as an independent variable. Since this regressor is inevitably correlated with the idiosyncratic error, standard fixed effects estimation is inconsistent. Therefore, I revert to Arellano-Bond GMM estimation which confirms the positive relationship between inequality and FDI inflows for poor countries. As column (3) shows, this result is also robust to including further lags of the post-liberalization dummy. Immediately after opening up for inflows, the Gini coefficient increases by 2.6 percent. However, these adverse distributional effects are not permanent as the coefficients on the dummies with lags of higher order indicate. In order to examine the role of skill levels, I interact lower secondary school completion rates with the post-liberalization dummy. Column (4) reports the results from GMM estimation: Implementing inflow liberalizations when secondary completion is high, leads to slightly lower increases in inequality. While OLS and FE estimations yield the same conclusion, using alternative measures of skills such as average years of schooling or the share of agriculture in GDP, leads to insignificance.

Conducting the same sequence of analytical steps for FDI outflows, I find that this type of reform leads to a 4-5 percent decrease in inequality immediately after implementation. However, as column (7) documents, the effect becomes insignificant in the following two periods. Furthermore, including the same interaction term as above, I fail to provide evidence for the hypothesis that pre-existing skill levels influence the effect of outflows on inequality.

To extend my analysis further, I substitute the liberalization dummy for a ‘capital control dummy’ which equals one if the annual change in the Fernandez index falls below the average change in all countries by more than one standard deviation. However, capital control tightening has no significant effect on income



dispersion – a finding that is in line with Furceri and Loungani (2015). Moreover, as an alternative measure of inequality, I use the labor share in GDP provided by the OECD which is only available for high income countries. Again, no significant effect of FDI liberalizations emerges for the sub-sample of developed countries.

All in all, I fail to find evidence for proposition 1 relating to high income countries. However, the analysis finds evidence in favor of proposition 2: In low income countries, FDI outflow liberalizations reduce inequality, while inflow liberalizations increase disparities. In addition, the latter effect is decreasing in the labor force's average skill level if measured by the secondary school completion rate.

TABLE 1 • THE EFFECT OF FDI LIBERALIZATION ON INEQUALITY [LN(GINI)] IN LOW INCOME COUNTRIES

| VARIABLES | Low income countries, FDI inflow | | | | Low income countries, FDI outflow | | | |
|----------------------------------|----------------------------------|---------------------|------------------------|---------------------------|-----------------------------------|----------------------|-----------------------|------------------------|
| | (1) OLS | (2) FE | (3) A.-Bond GMM | (4) A.-Bond GMM | (5) OLS | (6) FE | (7) A.-Bond GMM | (8) A.-Bond GMM |
| L.ln(Gini) | | | 0.900*** (0.0173) | 0.874*** (0.0409) | | | 0.649*** (0.0630) | 0.767*** (0.0727) |
| L.FDI lib. | 0.0401** (0.0172) | 0.0374* (0.0195) | 0.0262*** (0.00530) | 0.0157*** (0.00428) | -0.0437* (0.0231) | -0.0471* (0.0244) | -0.0432** (0.0204) | -0.00894 (0.00549) |
| L2.FDI lib. | | | 0.00728** (0.00369) | | | | -0.0269 (0.0259) | |
| L3.FDI lib. | | | -0.00231 (0.00231) | | | | -0.0307 (0.0231) | |
| L.FDI lib.* School completion | | | | -0.000163** (7.18e-05) | | | | 6.73e-05 (6.98e-05) |
| Controls | YES | YES | YES | YES | YES | YES | YES | YES |
| Country FE | NO | YES | YES | YES | NO | YES | YES | YES |
| Year FE | NO | YES | NO | NO | NO | YES | NO | NO |

Note: The dependent variable is ln(Gini). 'L.FDI lib.' presents the post-liberalization dummy, L2. and L3. denote higher order lags. Controls include lower secondary school completion rate, collective bargaining index, a banking crisis dummy, international private debt to GDP ratio, private credit to GDP ratio, unemployment rate and trade to GDP ratio. For (1), (2), (5) and (6) clustered standard errors in parentheses, for (3), (4), (7) and (8) robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

4.4 Estimation results II: Credit inflow liberalization

Table 2 reports estimates for the effect of credit inflow liberalizations on inequality. A distinction is made between financial credit and commercial credit, the latter of which is associated with international trade transactions and the provision of international services. While in the case of high income countries, OLS and FE



estimation show no significant impact of financial credit inflows, including lagged inequality provides a more informative insight. The GMM estimate in column (2) indicates that this type of liberalization reduces the Gini index by 2.4 percent and the effect only abates in the third year after the reform has been introduced. Furthermore, interacting the post-liberalization dummy with the EFW index of credit market depth, reveals that inequality decreases even further if reforms are implemented in economies with deep financial markets. This result continues to hold even if depth is measured by the ratio of private credit to GDP. Opening up for commercial credit inflows, on the other hand, has no significant effect for high income countries and is therefore omitted. For low income countries, allowing financial credit to enter more freely, is associated with a more than 4 percent decrease in inequality and the result is robust across specifications. Even though the effect loses its strength in the second period, it remains significant. Contrary to what one would expect, higher depth widens the income distribution in liberalizing poor countries (column 4). However, this effect is small in magnitude. Commercial credit liberalizations show no significant impact under OLS and FE estimation but under GMM the effect on inequality is positive and significant at the 10 percent level. This contrast to the effect of financial credit might be due to commercial credit being more targeted towards already wealthy business owners. Financial depth seems to reinforce the adverse distributional consequences.

To summarize my findings, proposition 3 stating that credit liberalizations have stronger beneficial effects if depth is high can be partly confirmed for high income countries. In addition, the analysis supports proposition 4 which implied that the role of depth is less straightforward in low income countries due to pronounced financial risk for foreign depositors. The prominence of corruption in low income countries might provide an additional explanation for why, despite high depth, funds are not channeled towards the poor.



**TABLE 2. THE EFFECT OF FINANCIAL AND COMMERCIAL CREDIT LIBERALIZATION ON INEQUALITY [LN(GINI)]
BY COUNTRY INCOME LEVELS**

| VARIABLES | High income countries | | Low income countries | | | |
|--|-------------------------|-------------------------|-------------------------|-------------------------|--------------------------|--------------------------|
| | Financial credit inflow | | Financial credit inflow | | Commercial credit inflow | |
| | (1) FE | (2) A.-Bond GMM | (3) FE | (4) A.-Bond GMM | (5) FE | (6) A.-Bond GMM |
| L.ln(Gini) | | 0.518*** (0.0419) | | 0.881*** (0.0179) | | 0.851*** (0.0507) |
| L.credit inflow lib. | 0.00133 (0.00744) | -0.0240** (0.00968) | -0.0438*** (0.00985) | -0.0412*** (0.00446) | 0.0530 (0.0313) | 0.0155* (0.00917) |
| L2.credit inflow | | -0.0243** (0.0106) | | -0.0184*** (0.00496) | | 0.0173 (0.0151) |
| L3.credit inflow lib. | | -0.0185* (0.0101) | | -0.0150* (0.00877) | | -0.00273 (0.00676) |
| L.credit inflow lib.* credit m. depth | | -0.00277** (0.00130) | | 0.00211** (0.000874) | | 0.00366*** (0.000574) |
| Controls | YES | YES | YES | YES | YES | YES |
| Country FE | YES | YES | YES | YES | YES | YES |
| Year FE | YES | NO | YES | NO | YES | NO |

Note: The dependent variable is ln(Gini). 'L.credit inflow lib.' presents the post-liberalization dummy, L2. and L3. denote higher order lags. Controls include an index of credit market depth, a collective bargaining index, a banking crisis dummy, international private debt to GDP ratio, unemployment rate and trade to GDP ratio. For (1), (3) and (5) clustered standard errors in parentheses, for (2), (4) and (6) robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

4.5 Discussion and policy implications

The empirical results presented above largely support the theoretical predictions for low income countries. On the other hand, in high income countries, lifting legal restrictions on FDI and commercial credit flows seems to have no impact on inequality. This insignificance has several explanations: Firstly, in many developed countries, highly effective social welfare nets are in place. These are capable of safeguarding people from poverty after job losses, for example resulting from FDI outflows. Secondly, disaggregated capital control indices are only available starting in 1995. However, the bulk of liberalizations in developed countries took place in the 1980s and early 1990s, so that lack of variation in my sample might be responsible for insignificant estimates. Thirdly, the Fernández index is a de jure measure and legal decisions may not immediately translate into higher capital flows which could curb movements in inequality.



Overall, policy implications are not straightforward to derive. One reason is that liberalizing only with respect to one asset type may not be feasible in practice due to legal difficulties in drawing a clear line between direct investment and credit inflows. Furthermore, recommending developing countries to outsource high skill production to decrease inequality may be counterproductive as it might impede economic progress. Similarly, advising low income countries against FDI inflow liberalizations would be short-sighted as it would deprive them of reaping the long term benefits of improved resource allocation and growth (Ostry *et al.* 2011). Instead, what this paper implies is that financial integration needs to be complemented with pre-emptive inequality decreasing measures, especially in inflow liberalizing developing countries with low skill levels. These measures can take the form of short-term cash transfers but should also encompass investments in education. Training low-skilled workers to operate advanced technologies is likely to be the most sustainable path towards converging income levels. Another point that merits consideration is the fact that nations do not act in a vacuum but their policy actions impose externalities on others. Specifically, countries with high skill levels should be aware that their direct investment outflows might have adverse distributional repercussions for receiving countries and should contribute to offsetting this effect. Finally, the observation that in poor countries larger availability of credit does not reduce inequality even if financial depth is high, emphasizes the importance of eliminating corruption and making credit markets more inclusive.

5. CONCLUSION

In this paper, I have demonstrated that capital account liberalizations affect inequality differently depending on cross-country heterogeneities as well as on whether reforms are tailored towards inflows or outflows of specific assets. In particular, I extend the theoretical framework of FDI flows involving capital skill complementarity by Larrain (2015) and describe a model of credit and financial depth by Bumann and Lensink (2016). These allow me to derive predictions for the distributional impact of lifting capital account restrictions. Using a novel disaggregated index of openness by Fernández *et al.* (2015) and following a difference-in-differences approach, I assess the empirical validity of my hypotheses.



I am able to show that FDI inflow liberalizations increase inequality in low income countries but the effect is partly offset if the average skill level is high. The theoretical model explains this finding: Highly skilled poor countries receive capital inflows from other poor unskilled countries, which need to be paired with below-average skilled labor. The resulting increased demand for relatively unskilled labor reduces wage spreads. Consequently, adverse distributional effects of technologically advanced inflows from rich countries can be partly offset. Furthermore, I find evidence that FDI outflows reduce inequality in poor countries, as they tend to outsource tasks requiring high skills to high income countries. However, skill differential have no significant impact. In addition, I show that lifting restrictions on financial credit inflows reduces inequality in both high and low income countries but credit market depth only reinforces this effect in the former group.

All in all, the paper highlights that unhindered capital flows have mostly desirable distributional consequences. However, it also emphasizes that FDI inflow liberalizations in poor countries with low skill levels need to be accompanied by short-term inequality reducing measures. Future research should consider other asset types as well as additional cross-country heterogeneities such as differences in the magnitude of business cycles fluctuations.

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CRIMINAL JUSTICE AND WEALTH INEQUALITY: HOW MUCH FREEDOM CAN MONEY BUY IN RUSSIA?¹

Abstract. In many countries, the public would like to know whether their criminal judicial system is more lenient towards wealthier citizens and if so, by how much. The calculation of the relevant statistics requires knowledge of defendants' wealth, which is not observed in most circumstances. To address this issue, this paper proposes to base the analysis on criminal traffic accidents and use the information on the car of the defendant as the proxy to wealth and other proxies, if available. Utilizing the multiple proxy approach based on the data from Russia, the analysis finds that the Russian judicial system is more lenient to the defendants with higher wealth. The inequality partially comes from the design of the legal system which provides for certain legal channels that naturally create those disparities. However, the data suggests that the inequality persists even after accounting for those legal channels.

Keywords. Sentencing disparities, Wealth inequality, Criminal justice

1. INTRODUCTION

In many countries, especially developing ones, the public is concerned whether their judicial system treats all citizens equally, irrespective of their wealth. Perhaps, the area that interests people the most is criminal justice, given the high stakes of someone's freedom and future. Unfortunately, there are no readily available

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measures of the court rulings disparities for different wealth groups that would allow the public to monitor such discrepancies officially and transparently. Some countries provide access to court rulings, but the wealth of the defendant is not recorded. This paper proposes to base the analysis on criminal traffic offenses, which provide a handy proxy to wealth – the value of the car of the defendant. Using a unique database on the population of criminal cases for Russia, this paper answers the question of how strong is the effect of wealth on court rulings in this country, and even sheds light on some of the channels of the effect.

The mistrust in the impartiality of the judiciary is high in Russia: more than a half of Russians do not trust the judicial system and perceive it as corrupt.² According to the World Justice Project, Russia ranks 74th among 102 countries for the effectiveness of the criminal justice system, which summarizes public and expert opinion on criminal justice's impartiality, freedom from corruption and improper influence.³ Mass media focuses on cases that involve the rich and the powerful with the public discussion in social media calling for justice.

The Russian constitution guarantees the equality of all citizens before the law. At the same time, the judicial system provides for certain legal channels that naturally create disparities among different wealth groups. For non-severe crimes, which include traffic offenses, the judicial system allows the defendant and the victim to settle, where the settlement terminates the criminal prosecution of the defendant. If no settlement can be reached, the fact that the defendant has voluntarily compensated the victim's civil claims is regarded as a mitigating circumstance. Moreover, the quality of legal representation may differ between the specialized private lawyer and the defense attorney appointed by the court to those unable to pay. Wealthier defendants have higher ability to compensate victims and to afford better lawyers. This paper aims to provide a method on how to capture the extent of disparity that is contributed by legal channels and, most importantly, the disparity that goes beyond them. It does not attempt to provide normative judgments on the

² According to the survey by Levada center in 2014 and 2013: <http://www.levada.ru/sbornik-obshhestvennoe-mnenie/>.

³ <http://worldjusticeproject.org/rule-of-law-index>.



optimality of these legal channels and the inequality they produce. If policy-makers can justify the disparity created by the legal channels, the residual disparity is more controversial.

This study relies on multiple sources of information: the administrative court data on the population of criminal traffic offenses; the texts of court rulings available for a subsample of cases; and the additional sources of information on lawyers and car prices.⁴

I use the multiple-proxy approach by employing GMM/IV regressions to measure the effect of wealth on settlement and incarceration rates.^{5 6} The wealth is proxied by three variables: whether the defendant has a tertiary education degree, whether he is a company executive or a company owner, and the estimated price of his or her car. The car price estimates are available only for a subset of cases, which represents one tenth of the population. So, first I use the restricted sample that has information on car prices and show that the GMM/IV results are robust. However, the results may not be valid for the whole population due to possible sample selection. So I validate the results by using the full sample and just two proxies. The results obtained using the subsample of cases and the results that use the full sample are similar, alleviating the concerns about sample selection.

The results show that defendants in Russia indeed get unequal outcomes in criminal courts. The disparity in the outcomes exist due to the legal channels, but it seems to go beyond them. For instance, the owner of a car at the bottom 5 percent of the distribution of car prices observed in the data (c. 1200 US Dollars) is associated with the settlement rates of 7 percent, while the owner of a car at the top 5 percent of the distribution (c. 24.500 US Dollars) is associated with the settlement rates of 43 percent. Among the non-settled cases – when the judge chooses between probation and incarceration – the former group of defendants are imprisoned in 42 percent of cases, while the latter group of defendants are imprisoned only in 25 percent of

⁴ Access to the administrative dataset was provided by the Institute for the Rule of Law at the European University at St. Petersburg.

⁵ It is inspired by the work of Black and Smith (2006) and Lubotsky and Wittenberg (2006) that generalize the classical measurement error models.

⁶ I would like to thank Dmitriy Skougarevskiy for suggesting to use the multiple proxy approach.



cases. All the comparisons are for the group of traffic accidents with one fatality, caused by a sober driver, first-time offender, without dependents. The gap in the incarceration rates becomes slightly smaller if accounted for the voluntary compensations, but remains substantial. Controlling for the lawyer's experience as a way to capture her quality/specialization, the estimates of the gap barely changes.

In fact, the actual gap may be even larger, considering that the pre-court selection process and in-court settlements may lead to different quality of cases that reach the sentencing stage for different wealth groups. Similar to other empirical papers analyzing court data (see for example Ichino *et al.*, 2003), I develop a theoretical model, specific to the setting, and use it to predict the characteristics of cases that reach the sentencing stage. Wealthier defendants are able to settle for higher severity of cases, so the cases that reach the sentencing stage are more severe on average for the wealthy. The same mechanism is likely to be at play for pre-court selection. In fact, the data seems to confirm the hypothesis based on the observable characteristics of case severity. Hence, the selection bias is likely causing a bias in the estimates, making the gap look smaller than it is.

The residual disparity raises questions about the judicial impartiality, corruption or some other forms of discrimination. Although the data does not give any further indication of what other channels are at play, this information might nevertheless be a good starting point for further investigation. Also, one can trace how this gap changes over time or reacts to the judicial reforms. Moreover, such statistics can be calculated for other countries that give open access to court rulings, which may be used for a cross-country comparison.

This study complements the study by Volkov (2016), who analyzes the judicial disparities in Russia with respect to different demographic characteristics and the social status of offenders. His paper focuses on violent crimes, theft, drugs, and fraud. Volkov finds that judges tend to incarcerate the college-educated less and the unemployed more, which he links to the judges' expectations of the probability of recidivism. At the same time, he finds that judges incarcerate entrepreneurs and top managers more often and for longer duration, which the author links to the judges' bias against people in "the position of trust and authority". This paper differs in that



it does not classify the defendants into different groups based on employment, education, gender, citizenship, etc., but rather focuses on the common underlying factor – wealth – that confounds with all of them. For the questions concerning the effect of wealth, it can be argued that the defendants in traffic accident cases provide a more representative sample of the overall population compared to the defendants who committed felonies with intent. For example, executives who are involved in the latter case are likely to be a very limited and specific sample of the whole population of executives. Also, the current paper provides some intuition behind the process of case selection which may also explain why Volkov (2016) observes harsher outcomes for entrepreneurs and top managers.

This study also complements those by Paneyakh (2016) and Paneyakh (2014), which discuss how the system of performance evaluation create perverse incentives for prosecutors to indict disproportionately people who lack resources to fight against the conviction. According to the author, the same evaluation system makes judges avoid acquittals and use settlements and probation as quasi-acquittals instead. This paper provides some evidence on unequal case selection to court based on the employment status of the defendant. However, I do not find that the defendants with lower socio-economic status are more likely to get the quasi-acquittals, but quite the opposite. Hence, it seems that inequality in indictment is exacerbated further in court.

This paper also contributes to the existing empirical literature on court outcome disparities in criminal justice for different wealth categories (Hartley *et al.* 2010; Rattner *et al.* 2008; Champion 1989) and to the empirical papers on judicial inequality, of which there are many (see for example Alesina and La Ferrara 2014; Shayo and Zussman 2011).

The paper is organized as follows: Section 2 provides information on the judicial system in Russia for criminal traffic offenses, it also gives the description of data sources and samples used in the analysis; Section 3 describes the model of settlements and its implications for the empirical approach; Section 4 provides the setup for the analysis based on the multiple proxies and discusses the results; and Section 5 concludes.



2. JUDICIAL PROCESS AND DATA

2.1 *Judicial process for criminal traffic offenses*

Russia has a civil law legal system. The core principles of its criminal law are summarized by the Criminal Code that categorizes types of crimes and prescribes possible punishments. According to the Code, the criminal traffic offenses include traffic accidents that have led to severe injuries or death.

The Code categorizes criminal traffic offenses based on the number of fatalities – severe injuries only; one death; multiple fatalities. It also differentiates between sober and drunk offenders. The Code prescribes the upper bound of a prison sentence depending on the offense category: it starts at two years for *severe injuries + sober* and rises up to nine years for *multiple fatalities + drunk*.⁷ Besides the prison sentence, the driver license might be temporarily revoked.⁸ Moreover, the judge that rules on the criminal case usually decides simultaneously on the outcome of the civil case: the amount of compensation liable by the defendant to the victim.

Suppose there is a traffic collision where at least one person is severely injured or dies. Before court, this case is processed by an investigator in the police department who collects and analyze evidence, after which she transfers all the materials to the prosecutor. Based on the evidence, the prosecutor decides whether, and whom, to indict. Then the case is transferred to the court.⁹ Given that the acquittals are very rare in Russian courts, the indictment in most cases is equivalent to being found guilty, whereas court's task reduces to the decision on the type and duration of the punishment (Volkov 2016; Shklyaruk 2014; Trochev 2014).

Importantly, the cases that reach court can be already subject to non-random selection. According to Paneyakh (2014), the investigators and prosecutors aim at minimizing the probability of case acquittals in court, since every acquittal results in

⁷ In legal practice, the offense categories are referenced by numerals, from 1 to 6. In this paper, I reference them by the combination they represent, e.g. offense type 1 is *severe injuries + sober*.

⁸ In case of real imprisonment, the license revocation starts after the date of the release from prison.

⁹ If a deceased person was indicted, this cases are likely to be closed before reaching the court.



a written reprimand to the prosecutor. So they select “easy” cases where the culpability of the potential defendant is obvious or the defendant is not expected to be able to fight against the conviction. According to the author, this creates unequal selection of cases where those who have resources to fight are less likely to get indicted.

In the case of traffic offenses, one may expect that the degree of selection issues should be less pronounced: after all, they involve serious harm. Nevertheless, the data shows some suspicious patterns of case selection into court. Table 1 shows that for sober drivers there are usually around 23 cases with severe injuries for every multiple-fatality case. However, for executives the ratio drops to 18 and for the law enforcement officials to 10.¹⁰ Either they are predisposed to cause much larger harm when they get into accidents, or this is the result of asymmetric selection into court, where these groups are more likely to avoid indictment for less severe crimes. Notice, that law enforcement officials might not be wealthier than the average citizen, but they possess other kind of resources: higher ability to exert informal influence. The ratio of single deaths to multiple fatalities shows a similar, but less pronounced pattern. Overall, it seems that the asymmetric attrition is more likely to happen when the severity of the offense is lower

**TABLE 1 • NUMBER OF CASES BY TYPE OF HARM AND JOB CATEGORY OF THE DEFENDANT,
 AS A MULTIPLE OF TO THE NUMBER OF CASES WITH MULTIPLE FATALITIES WITHIN EACH JOB CATEGORY**

| Job category | Severe injuries | One death | Multiple fatalities |
|---------------|-----------------|-----------|---------------------|
| Not working | 24.65 | 8.82 | 1 |
| Worker | 23.28 | 9.29 | 1 |
| Office worker | 22.73 | 8.32 | 1 |
| Executive | 18.25 | 7.06 | 1 |
| Law enforcer | 10.41 | 5.81 | 1 |

Note: Only the cases where the defendant was sober.

¹⁰ The definition of the law enforcement official is the same as in Volkov (2016).



For certain crimes, including traffic offenses, the court has the right to stop the criminal prosecution if the defendant and the victim reached reconciliation. Since the reconciliation assumes monetary compensation of the victim, this is equivalent to a settlement in a civil litigation. The victim-defendant settlement in the criminal case involves the following actions: (1) the defendant completely compensates the victim’s moral damages, (2) the victim forgives the offender and officially asks in written form the court to stop criminal prosecution, (3) the judge allows the criminal charges to be dropped and waives any punishment for the defendant.¹¹ In case of the settlement, the victim cannot make any compensation claims for moral damages against the defendant afterwards.¹² The compensation of medical expenses and material damage, however, is a separate civil suit, which usually involves the insurance company.

TABLE 2 • TYPES OF OUTCOMES FOR THE DEFENDANT IN A CRIMINAL TRAFFIC OFFENSE

| | Found guilty | Criminal record | Incarcerated | Compensation | License |
|-------------------|--------------|-----------------|--------------|------------------|---------------------|
| Acquittal | No | No | No | No | No |
| Settlement | No | No | No | Yes | No |
| Prison sentence: | | | | | |
| Probation | Yes | Yes | No | Yes ^B | Yes/No ^C |
| Real imprisonment | Yes | Yes | Yes | Yes ^B | Yes/No ^C |

^A The voluntary compensation of the victim’s moral damages is a pre-requisite for settlement;

^B The judge rules on the amount of compensation if defendant disagrees with the victim’s demands;

^C On the judge’s discretion.

¹¹ If the initial victim dies, close relatives are recognized as victims.

¹² Although the investigator with the permission of prosecutor also has the right to drop the case due to the settlement, the official statistics suggests it happens not so often.



TABLE 3 • THE CRIMINAL CODE’S CLASSIFICATION OF TRAFFIC OFFENSES AND THE SUMMARY STATISTICS OF OUTCOMES

| The Criminal Code classification | | | | Summary statistics | | | |
|----------------------------------|---------------------|------------------|--------------------|--------------------|---------------|------------------|---------------|
| # | Harm | Under influence? | Max prison (years) | Settled (%) | Probation (%) | Incarcerated (%) | (mean, years) |
| 1 | Severe injuries | Sober | 2 | 43 | 30 | 3 | 1.4 |
| 2 | Severe injuries | Drunk | 3 | 22 | 50 | 26 | 1.9 |
| 3 | Single fatality | Sober | 3 | 23 | 44 | 31 | 2.3 |
| 4 | Single fatality | Drunk | 7 | 5 | 23 | 70 | 3.1 |
| 5 | Multiple fatalities | Sober | 7 | 7 | 29 | 62 | 3.5 |
| 6 | Multiple fatalities | Drunk | 9 | 2 | 6 | 91 | 5.0 |

Note: The summary statistics is based on the official database of the defendants’ statistical cards; averaged over 2009-2013 years.

In court, if no settlement is reached, the judge acquits less than 0.5 percent of cases. The rest get a prison term, but the judge may decide to suspend the sentence, except for repeat offenders. If the defendant compensates voluntarily the claims asked by the victim, this is considered to be a mitigating circumstance. The potential outcomes for the defendant are summarized in Table 2. Table 3 classifies the Criminal traffic accidents and provides descriptive statistics on the frequency of real imprisonment, suspended sentences and in-court settlements.



2.2 Data

The paper uses multiple sources of information. The two main sources are the database of the statistical cards on defendants and the collection of the texts of court rulings. The defendants' statistical cards contain information about each criminal case: the name of the judge, court, region, the judge's ruling, the defendant's demographic characteristics and prior criminal records, and other data. Most importantly, it provides information about the educational and employment status of defendants. The texts of court rulings additionally provide information on the lawyer's name, the car model driven by the defendant, and the presence of a voluntarily compensation.

The database of statistical cards contains the universe of the criminal traffic offenses for the period from January 2009 to December 2013. The database is unified by the Judicial Department at the Supreme Court of the Russian Federation, which requires courts to collect statistical information about each case in a standardized manner.^{13,14} This is more than forty-six thousand cases, excluding the *severe injuries + sober* offense category.¹⁵ Unlike other criminal traffic offenses which are punished by incarceration, the *severe injuries + sober* offense category assumes milder punishment types such as fines and the deprivation of freedom with no isolation from society. These defendants are rarely incarcerated, so this offense category is excluded from the analysis.

The database of the rulings texts consists of around twenty-five thousand cases for the period from June 2010 to the end of 2013. The texts of court rulings were found online.¹⁶ The Law "On ensuring of access to courts' activity in the Russian Federation" obliged all courts to post the texts of all public rulings online. The law became effective in June 2010. In reality, compliance with the law was not perfect

¹³ See their website: <http://www.cdep.ru/index.php?id=70>.

¹⁴ The access to the anonymized database was kindly provided by the Institute for the Rule of Law at the European University at Saint-Petersburg: <http://enforce.spb.ru/en/>.

¹⁵ Except for some omissions and errors, for detailed explanations see Volkov (2016).

¹⁶ Accessed through the websites that aggregate the texts of rulings that have been posted by courts: primarily rospravosudic.com, but also gcourts.ru, sudebniyeresheniya.rf.



and varied from court to court (Pozdnyakov 2013a; Pozdnyakov 2013b). The ratio of number of texts to statistical cards is around 70 percent for June 2010 to December 2013.

The legislators provided contradicting and vague directives to courts on what should be considered sensitive information, so the courts sanitized the texts to varying degree before posting them. They left the lawyers' names in most of the cases. They often stripped monetary values, including the amount of compensations, but one can always tell whether voluntary compensation took place or not. They often cut the information on the defendants' cars. Only one quarter of the cases with the information on cars (excluding trucks, buses, motorbikes, etc.) have complete information on the brands and models. This raises concerns of non-random sample selection. I assess this issue in Section 2.4, by looking at the summary statistics, and in Section 4.4, by checking the robustness of results in the full sample, which I find to be robust.

The statistical cards and the texts of court rulings were merged based on the combination of common variables: the registry number of the case, the court name, the judge's name, case outcomes, etc. After the merge, one half of the statistical cards for the period from June 2010 to the end of 2013 have been successfully linked to their texts.

I collected car prices for different car models in October 2014 from the secondary market car sales website *auto.ru*. Based on the three hundred most recent advertisements at the time of collection, I calculate the average of the offer prices for each car model, which I call the estimated car price. For the cars belonging to companies or for the expensive cars driven by chauffeurs, I consider the price to be missing. The resulting sample that has the information on car prices represents one tenth of the population of cases.

I used other texts of court rulings to find additional information for each lawyer that appear in the sample. For each lawyer, I count the average annual caseload of criminal cases and criminal traffic offenses. This additional information is available for 80 percent of cases from the subsample with the car prices. Table 4 provides the descriptive statistics for each sample for the period from 2010 to 2013.

**TABLE 4 • THE DESCRIPTIVE STATISTICS FOR 2010-2013 BY SAMPLES**

| Statistics | Population | Sample with car prices | Sample with car prices and lawyers |
|--|------------|------------------------|------------------------------------|
| N. obs. | 38910 | 3976 | 3239 |
| N. courts | 2359 | 1157 | 1041 |
| N. courts by traffic offense case load: ^A | | | |
| (1,32] | 1295 | 464 | 397 |
| (32,61] | 523 | 314 | 288 |
| (61,108] | 333 | 240 | 225 |
| (108,302] | 181 | 139 | 131 |
| Type of offense: (sample share, %) | | | |
| severe injuries + drunk | 28.7 | 26.1 | 27.1 |
| one fatality + sober | 46 | 47.3 | 45.5 |
| one fatality + drunk | 17.6 | 19.3 | 20.2 |
| mult. fatalities + sober | 5.5 | 4.9 | 4.8 |
| mult. fatalities + drunk | 2.2 | 2.4 | 2.4 |
| Year: (sample share, %) | | | |
| 2010 | 22.8 | 11.4 | 11.2 |
| 2011 | 24.2 | 26.3 | 26.5 |
| 2012 | 27.1 | 31.5 | 32.4 |
| 2013 | 25.8 | 30.8 | 29.9 |
| Trial outcome: (sample share, %) | | | |
| settled | 18.9 | 16.5 | 15.6 |
| incarcerated | 38 | 37.3 | 37.7 |
| suspended | 41.1 | 44.6 | 45.1 |
| First-time offenders (sample share, %) | 83.9 | 86.2 | 85.5 |
| Education: (sample share, %) | | | |
| college | 19.2 | 21.2 | 20.3 |
| vocational | 36.1 | 36.5 | 36.8 |
| Occupational status: (sample share, %) | | | |
| executive | 3.3 | 3.2 | 2.8 |
| office or civil worker | 7.5 | 7.4 | 7.4 |
| manual worker | 38.8 | 36.6 | 37.9 |
| no employment | 38.4 | 40 | 39.6 |
| Males (sample share, %) | 94.7 | 93.9 | 93.9 |
| Marital status: (sample share, %) | | | |
| single | 44.2 | 45 | 45.3 |
| married | 45.6 | 44.7 | 44.1 |
| Age: | | | |
| age, mean | 33.5 | 33.1 | 33 |
| age, median | 30 | 30 | 30 |
| age, st. dev. | 11.6 | 11.6 | 11.5 |

A The case load is calculated as the sum of all criminal traffic offences in a given court during 2009 to 2013, including the category of 'severe injuries + sober'.



2.3 Proxies of wealth

The executive status, college degree, and car prices are used as proxies to wealth. The executive status dummy equals one if the defendant is the owner of a firm or the chief executive of a commercial organization. The share of executives in the samples is around 3 percent. The college degree dummy equals one if the defendant has complete or incomplete college degree. The share of college graduates is around 19 percent in the population and around 21 percent in the restricted sample. The average of the estimated car prices is 291 thousand Rubles, which was equal to 7.3 thousand US Dollars at the time of data collection.¹⁷ The median of the prices is twice lower than the average. Table 5 reports the percentiles of the distribution of the estimated car prices.

Table 5 • The distribution of the estimated car prices in the court rulings

| Quantiles | 5% | 25% | 50% | 75% | 90% | 95% | 99% |
|--------------------|-------|-------|-------|-------|-------|-------|-------|
| Price (in RUB mln) | 0.048 | 0.075 | 0.147 | 0.382 | 0.584 | 0.959 | 1.907 |

Based on 7052 observations (the texts of court rulings)

The three proxies positively correlate with each other (see the matrix of correlations in Table 6). Figure 1 compares the distribution of the estimated car prices conditional on the executive status or college degree. The distribution shifts to the right both for the college graduates and for the executives, however there is no perfect sorting. The degree of correlations is relatively weak, since each variable is only a noisy signal of wealth. The estimated car price is likely to be the noisiest measure since it is itself a noisy measure of the true car price.

¹⁷ The average exchange rate for the period from September 16, 2014, to October 15, 2014, was 39.22 Rubles per USD. Source: Russian Central Bank; www.cbr.ru/currency_base.

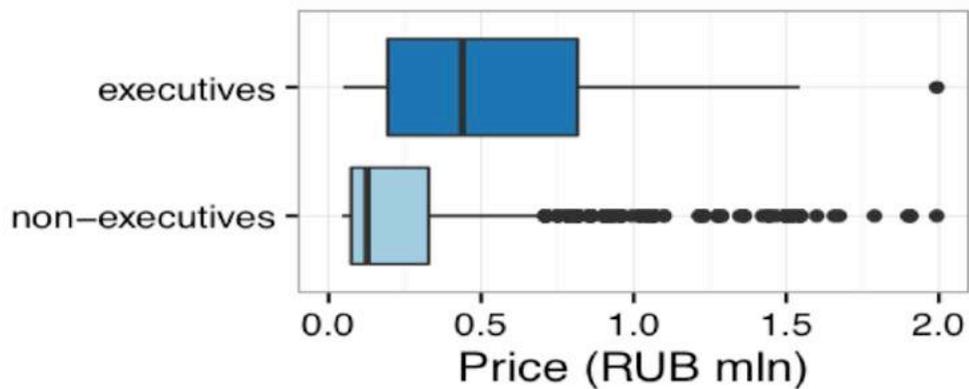


TABLE 6 • THE MATRIX OF CORRELATIONS

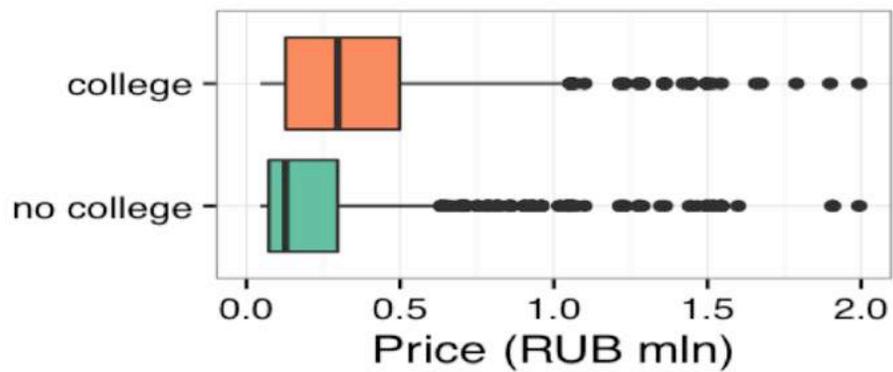
| | car price | executive | college |
|-----------|-----------|-----------|---------|
| car price | 1 | | |
| executive | 0.1729 | 1 | |
| college | 0.1916 | 0.1798 | 1 |

Based on 3987 observations (only those cases that have information on all three variables).

FIGURE 1 • BOX PLOTS FOR CAR PRICE DISTRIBUTIONS BY:



A) THE EXECUTIVE STATUS



b) The college degree



2.4 *The restricted sample*

The analysis starts with the restricted sample that contains both the estimated car prices and the information from the statistical cards. The restricted sample captures only one tenth of all observations, so the courts that have higher caseload are more likely to remain in the sample. Table 4 shows that at the lowest quartile of the caseload the restricted sample loses two thirds of the courts. At the highest quartile the restricted sample loses only one fifth of the courts. According to the table, all other characteristics do not differ dramatically across the samples.

The estimation based on the restricted sample might be not valid for the whole population if the low caseload courts are substantially different from the high caseload courts in the parameter of interest – the incarceration rate disparity due to wealth. Later, Section 4.4 checks whether the estimates for the restricted sample are the same for the population and shows that they are quite similar.

3. SELECTION INTO THE SENTENCING STAGE

Since incarceration rates are calculated using the non-settled cases only, it is important to understand the selection of cases into the settlement. I argue that if I could account for the possible bias this would make the estimates for the gap in incarceration rates even larger, reinforcing the findings. Ever since Priest and Klein, 1984, the mechanisms of the selection of cases into court and the understanding of the direction of bias have been the important part of the judicial research (e.g., Waldfogel 1998; Eisenberg and Faber 1996; Shavell 1996; Waldfogel 1993). Similar to Ichino *et al.* 2003, I develop a theoretical model, specific to the setting, and use it to predict the characteristics of cases that reach the sentencing stage. I assume that the probability of settlement declines with the severity of offense.

This prediction is consistent with the data. The settlement rate drops with the number of victims and with culpability of the defendant: for example, drunk drivers



are less likely to get settlement (see the settlement rates summary statistics in Table 2). Since wealthier defendants are able to settle more often, all other things being equal the severity of cases that reach the sentencing stage is expected to be higher on average for the wealthy. Some aspects of the severity of the case can be observed in the data, but some cannot. Hence, the unobserved component will bias the estimates. If judges cared about the severity of offense only, they would incarcerate the wealthy more frequently. If the data shows that the wealthy are incarcerated less often, it must be due to indeed more lenient outcomes prescribed by the judges. Moreover, if one accounts also for a similar pattern of case selection into court, the estimate of the gap in incarceration rates is likely to increase even further.

3.1 *The basic model*

This section presents the model that helps to understand the direction of the estimator's bias that may arise due to settlements. The model solves optimal decisions of the defendant and the victim right after the indictment but before the court decision.

The settlement model is a perfect information sequential game, described by the game tree in Figure 2. There are two risk-neutral rational players: the defendant and the victim. The defendant is initially endowed with wealth w , the victim – with zero. The defendant moves first and chooses the amount of compensation C to offer, subject to the initial endowment constraint: $C \in [0, w]$. The victim moves second, observes C and decides whether to *Accept* or *Decline* the offer. If the victim accepts, the game ends with the payoff of $w - C$ for the defendant and C for the victim. If the victim declines, the game reaches lottery called Court.

The lottery portrays the ex-ante uncertainty faced by the players. Outcomes of the lottery are *Prison* with the probability p and *Suspend* with the probability $1 - p$.¹⁸ In the case of *Suspend*, the payoffs are $(w, 0)$, i.e., every player remains with the initial

¹⁸ Since in-court acquittals are almost non-existent, the defendant's prospects in court are limited to real imprisonment or suspended sentence.



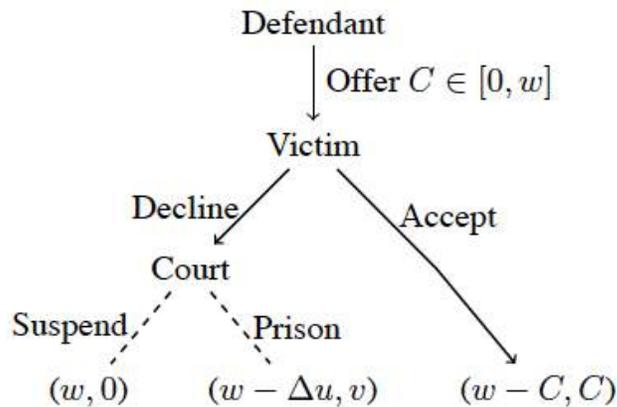
endowment. In the case of *Prison*, the defendant suffers the disutility from going to prison Δu , while the victim gets vengeance satisfaction $v > 0$.¹⁹

The defendant first solves the victim's optimal strategy. The victim maximizes her utility given the compensation offer: $\max\{C, pv\}$. The victim accepts the offer if $C \geq pv$. The defendant maximizes $\max\{w - C, w - pd\}$ subject to the following constraints: $C \leq w$ and $C \geq pv$. If $pv > w$, Defendant offers zero. If $pv \leq w$, Defendant finds it optimal to settle only if $d \geq v$.

Thus, the settlement takes place ($S = 1$) if the settlement is feasible ($pv \leq w$) and the settlement is a better alternative to the lottery ($pv \leq pd$).

$$S = \begin{cases} 1 & \text{if } v \leq \min\left\{\frac{w}{p}, d\right\} \\ 0 & \text{Otherwise.} \end{cases} \quad (1)$$

FIGURE 2 • GAME TREE



3.2 The selection bias

Assume that the probability of incarceration, p , and the vengeance utility of the victim, v , increase with the gravity of offense, as measured by the indices b and g .

¹⁹ Notice that since the defendant is not acquitted, he will be liable to compensate the victim. In the game, the victim's endowment of zero already includes the expected compensation, and C offered by the defendant is a surplus over the expected compensation he is ready to pay to settle.



The index b is correlated with w , while g is distributed independently of b and w . For example b includes defendant’s reckless behavior at the time of the accident, while g includes behavior and personal characteristics of the victim, which are random ex-ante, but legally relevant ex-post.²⁰ Moreover, d and p depend on w , assuming that the wealthier prisoners experience a greater decline in utility and that wealth may improve chances of the defendant in court. The assumptions on the functional forms of p , v , and d and their partial derivatives are presented in Table 7 below.

TABLE 7 • ASSUMPTIONS ON FUNCTIONAL FORMS

| Function | $\partial f(.)$ / ∂b | $\partial f(.)$ / ∂g | $\partial f(.)$ / ∂w |
|--------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| $f(.)$ | | | |
| $\bar{p}(b, g, w)$ | ≥ 0 | ≥ 0 | ≤ 0 |
| $\bar{v}(b, g)$ | ≥ 0 | ≥ 0 | |
| $\bar{d}(w)$ | | | ≥ 0 |

Restating the settlement condition 1, the settlement takes place if:

$$v(b, g) \leq \min\left\{\frac{w}{\bar{p}(b, g, w)}, \bar{d}(w)\right\} \tag{2}$$

The left-hand side of the inequality is increasing with g , while the right-hand side is decreasing with g . So there exists a threshold $\tau(b, w)$, such that the two sides are equal. Then the settlement condition can be rewritten as in the system of equations 3.

²⁰ For instance, the death of a child is likely to be perceived by the judge as a graver incident than a similar offense with an adult victim. Glaeser and Sacerdote (2013) show in their study of the criminal traffic offenses in Alabama, U.S., that the characteristics of the victim such as race and criminal history tend to affect judicial sentencing, despite the random nature of the victim-offender match.



$$S = \begin{cases} 1 & \text{if } g \leq \tau(b, w); \\ 0 & \text{Otherwise} \end{cases} \quad (3)$$

$$\tau(b, w): \quad v(b, g = \tau) = \min \left\{ \frac{w}{\bar{p}(b, g = \tau, w)}, \bar{d}(w) \right\} \quad (4)$$

Suppose that there is a continuum of cases that differ in b , g and w . The cumulative density of g is denoted as $F^g()$ and by definition $Pr(g \leq a | b, w) = Pr(g \leq a) = F^g(a) \forall a, b, w$. Settlements truncate the density of g , and the new density of the non-settled cases is represented as:

$$\begin{aligned} Pr(g < a | b, w, S = 0) &= Pr(g < a | g \geq \tau(b, w)) \\ &= \max \left\{ \frac{\int_{\tau(b, w)}^a dF^g(x)}{\int_{\tau(b, w)}^{\infty} dF^g(x)}, 0 \right\} \\ &\equiv \theta^{NS}(a | b, w) \end{aligned} \quad (5)$$

Notice that for any two levels of wealth, $w' > w$, the function $\theta^{NS}(b, w')$ first order stochastically dominates $\theta^{NS}(b, w)$. Hence, the conditional expected difference in the gravity of offense is positive (see Equation 6). This is the selection bias.

$$\begin{aligned} E(g | b, w', S = 0) - E(g | b, w, S = 0) \\ = \int_{-\infty}^{+\infty} x d\theta^{NS}(x | b, w') - \int_{-\infty}^{+\infty} x d\theta^{NS}(x | b, w) \geq 0 \end{aligned} \quad (6)$$

I assume that the true functional form of the probability of prison $p(g, w, b)$ can be linearly approximated with parameters α and ξ as in equation 7. If b is observed, while g is not, I can run the regression 8 on the sample of the non-settled cases ($S = 0$).

$$p_i(w_i, b_i, g_i) = \alpha_0 + \alpha w_i + \xi_b b_i + \xi_g g_i + \epsilon_i \quad (7)$$

$$p_i(w_i, b_i, S_i = 0) = \beta_0 + \beta w_i + \gamma_b b_i + \epsilon_i \quad (8)$$



Then, the parameter β will be identified as the difference in the conditional expectations of p for the discrete change in the level of wealth from $w = 0$ to $w = 1$ averaged across all b (Equation 9). The parameter β will capture α , the true effect of wealth, plus some extra term, which is the positive selection bias ($\xi_g > 0$ is assumed).

$$\begin{aligned}\beta &= \int_{-\infty}^{+\infty} (\mathbb{E}(p \mid b, w = 1; S = 0) - \mathbb{E}(p \mid b, w = 0; S = 0))db \\ &= \alpha + \xi_g \int_{-\infty}^{+\infty} (\mathbb{E}(g \mid g \geq \tau(b, w = 1)) - \mathbb{E}(g \mid g \geq \tau(b, w = 0)))db\end{aligned}\tag{9}$$

PROPOSITION 3.1: β is an upper bound of α , i.e., $\beta \geq \alpha$. If β is below zero, then it must be that α is also below zero, i.e., judges incarcerate wealthier defendants with a lower frequency.

The next section will be devoted to estimating the disparities in settlements rates and in the incarceration rates for the non-settled cases. For the latter, the estimated β will be a conservative estimate for the true effect α .

4. RESULTS

4.1 The econometric model with multiple proxies

Suppose that the dependence of incarceration rates or settlements rates on wealth, as well as the relation between wealth and their proxies, can be approximated with the following non-causal linear model:

$$y = \beta x^* + u \tag{10a}$$

$$x_1 = x^* + \epsilon_1 \tag{10b}$$

$$x_2 = \rho_2 x^* + \epsilon_2 \tag{10c}$$

$$x_3 = \rho_3 x^* + \epsilon_3 \tag{10d}$$

where y can be either the dummy for settlements or the dummy for incarceration; x^* is the true measure of wealth, which is unobserved to the econometrician; $x_1, x_2,$



and x_3 are the noisy measures of wealth. In this paper, x_1 is the car price in millions of Rubles, x_2 is the dummy for executive status, and x_3 is the dummy for college degree.

As in Lubotsky and Wittenberg (2006), I normalize the scale of wealth to the scale of the first proxy, i.e., $\rho_1 = 1$. This normalization is harmless, since the true scale of wealth is non-identifiable in the given framework. The normalization to the car price should be understood in the following way: we do not know how much wealth levels are different between someone whose car costs $Value_1$ and someone who owns $Value_2$ car, but we can estimate the effect associated with that increase in wealth.

In the presence of other covariates, Z , (e.g. the constant, the type of offense, etc.), the variables y , x_1 , x_2 , and x_3 in equations 10a-10d should be substituted by their Yulized residuals – the residuals obtained after regressing each variable on Z . Black and Smith (2006) argue that the econometrician must be careful of what is included in Z . The inclusion of other covariates that also correlate with wealth will strip the Yulized proxies from their signaling power. This is why I am reluctant to add the rich set of demographic controls into Z , leaving only those that are legally relevant.

The measurement errors make the OLS estimators biased downward in the magnitude. The attenuation bias can be remedied by the instrumental variable approach, but additional assumptions are required (see more at Browning and Crossley 2009; Black and Smith 2006; Griliches 1986). The regression of y on x_1 using x_j as an instrument, where $j \in \{2,3\}$, would provide the estimator, which in probability converges to $\beta_{1,j}^{IV}$ (eq. 11). If the two measurement errors are uncorrelated, $cov(\epsilon_j, \epsilon_1) = 0$, and the measurement error of the j -th proxy does not affect y , $cov(\epsilon_j, u) = 0$, then $\beta_{1,j}^{IV}$ will be equal to the parameter of interest, β . If the above mentioned assumptions are true both for $j = 2$ and $j = 3$, then β can be efficiently estimated by the General Method of Moments estimator, whereas the validity of the instruments can be tested since the model is overidentified (see Wooldridge 2010, on the GMM estimator).



$$\beta_{1,j}^{IV} = \frac{cov(y, x_j)}{cov(x_1, x_j)} = \frac{\rho_j \beta \sigma_x^2 + cov(\epsilon_j, u)}{\rho_j \sigma_x^2 + cov(\epsilon_j, \epsilon_1)} \tag{11}$$

4.2 The GMM results

Table 8 shows the estimates of $\hat{\beta}^{GMM}$. The additional regressors, Z , control for the offense type (see Table 2), criminal priors, other simultaneous crimes, and dependents. The optimal weighting matrix takes into account the possibility of clustering at the regional level. All estimates are statistically significant at 95 percent confidence level. According to the first and second columns, the one million Rubles increase in the car price is associated with the forty-nine percentage points rise in the settlement rate, and for the non-settled cases it is associated with the thirty-two percentage points drop in the incarceration rate. The intercepts are at 5 percent and 50 percent, respectively. These figures do not control for the presence of voluntary compensations. If the regression controls for it, the size of the associated effect decreases in the magnitude, but only insignificantly (see column 3). Remember that the estimates of $\hat{\beta}$ for the probability of incarceration are based on the sample of the non-settled cases and are likely to be affected by the selection bias. According to Proposition 3.1 the estimated parameter is the upper bound for the true parameter, so the real gap in the incarceration rates can be even larger.

Moreover, I recalculate the incarceration probabilities by adding the variables that associate with the quality of the lawyer – their average caseload per year, its square, and the yearly caseload of the criminal traffic offenses. The sample shrinks since not all observations have this additional information on lawyers. In order to make a meaningful comparison, I reestimate the previous regression – with no controls for the lawyer quality – on the smaller sample; the results are reported in column 4. The movement from the previous sample, column 3, to the more constrained one, column 4, does not affect the intercept, but the point estimate of $\hat{\beta}^{GMM}$ increases in magnitude (not significantly). After adding the controls for the lawyer’s caseload (column 5), the estimate of $\hat{\beta}^{GMM}$ does not change much, but the intercept grows: now the intercept captures the defendant with a completely inexperienced lawyer (as



opposed to the average caseload lawyer). Having an inexperienced lawyer is associated with higher incarceration rates.

Why do not the additional controls for the lawyers experience reduce the magnitude of the estimate of $\hat{\beta}$? One would expect to see a decrease in the magnitude of the wealth effect if the quality of the lawyer is one of the channels of the disparity. Nevertheless, the magnitude seems to go into the opposite direction. It might be so because the wealthier defendants choose experienced lawyers when their cases are relatively easier compared to the less wealthy who choose the experienced lawyers only when their prospects are especially grim. Then, when the controls for the lawyer's experience are added, the change in $\hat{\beta}^{GMM}$ captures two effects: the decrease in the wealth effect and the change in the quality of the cases – selection bias. Alternatively, it could be that the lawyer's caseload does not capture the true quality of her work. The regression misses the information on whether the attorney is hired or appointed by court. The same experienced lawyer may put much more effort when he is hired as opposed to being appointed.²¹ Also, the lawyer's quality might not be an important channel.

²¹ More on the role of defense attorney in Russia see Moiseeva (2016).



TABLE 8 • THE GMM ESTIMATES OF THE EFFECT OF WEALTH ON THE SETTLEMENT RATE AND THE INCARCERATION RATE

| | Pr(settlement) | Pr(incarceration) | | | |
|-------------------------------------|------------------|-------------------|-------------------|-------------------|-------------------|
| | (1) | (2) | (3) | (4) | (5) |
| $\hat{\beta}^{GMM}$ | 0.489 (0.086) | -0.325 (0.115) | -0.266 (0.113) | -0.324 (0.121) | -0.367 (0.129) |
| Intercept | 0.048 (0.030) | 0.499 (0.041) | 0.541 (0.040) | 0.549 (0.045) | 0.611 (0.050) |
| F statistic for weak identification | 55.5 | 45.1 | 45.7 | 43.9 | 40.6 |
| Test underidentification, p-value | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Test overident. restr., p-value | 0.469 | 0.678 | 0.863 | 0.799 | 0.965 |
| N. obs. | 3986 | 3329 | 3329 | 2736 | 2736 |
| Sample ID | A | B | B | C | C |
| Main controls | + | + | + | + | + |
| Volunt. compensation | - | - | + | + | + |
| Lawyer's experience | - | - | - | - | + |

$\hat{\beta}^{GMM}$ is the feasible GMM estimate for β when x_1 is instrumented and x_2 and x_3 are excluded instruments (See eqns 10a-10d). Samples A, B, and C include the matched dataset of the statistical cards and the court rulings (see Section 2.2). Samples B and C exclude the settled cases. Sample C drops cases with missing information about the lawyers' caseloads. F statistics for weak identification is based on Kleibergen-Paap rk Wald F statistic, robust for clustered correlation. For reference, the Stock and Yogo (2005) critical value for Cragg-Donald F statistic and i.i.d. errors, 10 percent maximal IV size bias, is 19.93 (valid for iid errors). Underidentification test is based on Kleibergen-Paap rk LM statistic, robust for clustered correlation. Test for the overidentifying restrictions is based on Hansen J statistic test; the joint null hypothesis is that the instruments are valid. Main controls: drunk, severe injuries only, multiple fatalities, drunk*multiple fatalities, first-time offender, multiple crimes, the presence of dependents. Lawyer's experience: the average number of cases per year, the square of the average number of cases per year, the average number of traffic offense cases per year. All regressions include regional fixed effects. Standard errors are in parenthesis, clustered at the regional level. Number of clusters = 80.

4.3 Robustness

The test for the overidentifying restrictions fails to reject the null hypothesis that the two instruments are jointly valid (Table 8). In fact, the just-identified IV estimation with either of the two instruments gives similar results (compare $\hat{\beta}_{1,2}^{IV}$ and $\hat{\beta}_{1,3}^{IV}$ in Table 9). The standard errors of the IV estimates are substantially larger, which



makes $\hat{\beta}_{1,3}^{IV}$ for the incarceration probability insignificant at 95 percent confidence level.

The results of Table 8 are replicated using the continuously updated GMM estimator (CUE), proposed by Hansen et al. (1996) and the limited information maximum likelihood estimator (LIML). The CUE estimator is the GMM estimator with the weighting matrix being continuously updated with each estimation of $\hat{\beta}^{GMM}$ until convergence. Hansen et al. (1996) show that this estimator is robust to the small sample biases and more reliable for testing the overidentifying assumptions. CUE estimator takes into account the clustered structure of errors, while LIML estimator assumes homoscedasticity. Both are robust to the small sample biases of IV estimates (see discussion in Angrist and Pischke 2008). Both estimators give results almost identical to the one estimated by GMM with optimal weighting matrix. All estimates are reported in Table 9.



TABLE 9 • THE GMM ESTIMATES OF THE EFFECT OF WEALTH ON THE SETTLEMENT RATE AND THE INCARCERATION RATE

| | Pr(settlement) | Pr(incarceration) | | |
|-------------------------------------|------------------|-------------------|----------------|-------------------|
| | (1) | (2) | (3) | (4) |
| $\hat{\beta}^{GMM}$ | 0.489 (0.086) | -0.325 (0.115) | -0.266 (0.113) | -0.367 (0.129) |
| F statistic for weak identification | 55.5 | 45.1 | 45.7 | 40.6 |
| $\hat{\beta}^{CUE}$ | 0.491 (0.086) | -0.325 (0.115) | -0.266 (0.113) | -0.367 (0.129) |
| F statistic for weak identification | 55.5 | 45.1 | 45.7 | 40.6 |
| $\hat{\beta}^{LIML}$ | 0.493 (0.087) | -0.313 (0.118) | -0.261 (0.117) | -0.365 (0.141) |
| F statistic for weak identification | 55.5 | 45.1 | 45.7 | 40.6 |
| $\hat{\beta}_{1,2}^{IV}$ | 0.430 (0.115) | -0.356 (0.140) | -0.278 (0.133) | -0.371 (0.148) |
| F statistic for weak identification | 41.7 | 24.9 | 25.2 | 17 |
| $\hat{\beta}_{1,3}^{IV}$ | 0.557 (0.132) | -0.268 (0.177) | -0.243 (0.172) | -0.360 (0.209) |
| F statistic for weak identification | 98.5 | 77.1 | 25.2 | 60 |
| N. obs. | 3986 | 3329 | 3329 | 2736 |
| Sample ID | A | B | B | C |
| Main controls | + | + | + | + |
| Volunt. compensation | - | - | + | + |
| Lawyer's experience | - | - | - | + |

$\hat{\beta}^{GMM}$ is the feasible GMM estimate for β when x_1 is instrumented and x_2 and x_3 are excluded instruments (See eqns 10a-10d). $\hat{\beta}^{CUE}$ is the continuously updated GMM estimator of Hansen et al., 1996. $\hat{\beta}^{LIML}$ is the limited information ML estimator. $\hat{\beta}_{1,j}^{IV}$ is the IV estimate with x_1 is an endogenous variable and x_j is the excluded instrument, where $j \in \{2,3\}$. The Stock and Yogo (2005) critical value for Cragg-Donald F statistic and i.i.d. errors, 10 percent maximal IV size bias, is 19.93 for $\hat{\beta}^{GMM}$ and $\hat{\beta}^{CUE}$ and 16.38 for $\hat{\beta}_{1,j}^{IV}$. All regressions include regional fixed effects. Standard errors are in parenthesis, clustered at the regional level. Number of clusters = 80. For more information on the definitions of controls, samples, and F statistic, please see the footnotes for Table 8



The GMM/IV approach substantially improves the identification with respect to the one-proxy OLS results. Table 10 reports estimates by using each proxy separately in an OLS equation. To make comparison between the three proxies meaningful, I scale the estimates for the second and the third proxies by using their respective $\hat{\rho}$, calculated as:

$$\tilde{\rho}_j = \frac{cov(x_j, x_k)}{cov(x_1, x_k)} = \frac{\rho_j \rho_k \sigma_x^2 + cov(\epsilon_j, \epsilon_k)}{\rho_k \sigma_x^2 + cov(\epsilon_k, \epsilon_1)}$$

where $j = 2$ and $k = 3$, or $j = 3$ and $k = 2$. Notice, that $\tilde{\rho}_j$ is a consistent estimator of ρ_j only if $cov(\epsilon_2, \epsilon_3) = 0$, i.e. the measurement errors of the second and the third proxies are uncorrelated.

TABLE 10 • THE OLS ESTIMATES OF THE EFFECT OF WEALTH ON SETTLEMENT AND INCARCERATION RATES.

x_1 = CAR PRICE, x_2 =EXECUTIVE POSITION, x_3 =COLLEGE DEGREE

| | Pr(settlement) | Pr(incarceration) | | |
|--|----------------|-------------------|----------------|----------------|
| | (1) | (2) | (3) | (4) |
| $\hat{\beta}_1^{OLS}$ | 0.026 (0.018) | 0.012 (0.022) | 0.019 (0.022) | 0.040 (0.026) |
| N | 3987 | 3330 | 3330 | 2738 |
| $\hat{\beta}_2^{OLS} * \tilde{\rho}_2$ | 0.041 (0.006) | -0.019 (0.006) | -0.027 (0.010) | -0.028 (0.010) |
| N | 46087 | 37434 | 15430 | 12931 |
| $\hat{\beta}_3^{OLS} * \tilde{\rho}_3$ | 0.082 (0.007) | -0.036 (0.008) | -0.046 (0.010) | -0.051 (0.012) |
| N | 46087 | 37434 | 15430 | 12931 |
| $\tilde{\rho}_2$ | 0.49 | 0.426 | 0.426 | 0.389 |
| $\tilde{\rho}_3$ | 1.09 | 1.048 | 1.055 | 1.089 |
| Main controls | + | + | + | + |
| Volunt. compensation | - | - | + | + |
| Lawyer's experience | - | - | - | + |

$\hat{\beta}_j^{OLS}$ is the OLS estimate for β when y is regressed on x_j separately from other proxies (See eqns 10a-10d). The regressions use maximum observations available for each proxy. $\tilde{\rho}_j$ is estimated as in equation 12. All regressions include regional fixed effects. Standard errors are in parenthesis, clustered at the regional level. Number of clusters = 80. The sample for Pr(incarceration) excludes the settled cases. For more information on the definitions of controls and F statistic, please see the footnotes for Table 8



In general, the OLS estimates have the correct sign and even statistical significance (except for the first proxy and the probability of incarceration), but the magnitude of the effect is much smaller compared to the GMM. This is due to the attenuation bias resulting from the measurement errors. According to the OLS results, the first proxy – car prices – is the noisiest measure out of the three, as expected.

4.4 The IV estimation using the full sample

Assuming that the estimate of ρ_2 is valid for the overall population, I estimate $\hat{\beta}_{2,3}^{IV}$ by instrumenting the executive status by the college degree, i.e., x_2 by x_3 . This approach will be less efficient than the GMM, because it uses just one instrument, but if valid, it can gain efficiency and external validity by being able to use all forty-six thousand observations, the whole population.

First of all, I check how the estimator performs on the restricted sample with car prices in order to compare the results with the GMM estimates. Table 11 shows $\hat{\beta}_{2,3}^{IV}$, translated into the same scale as car prices. The standard errors have increased compared to the standard errors of the GMM estimator, especially for the samples with non-settled cases only, but the point estimates are quite close to the GMM estimates. This boosts confidence in applying this estimation approach on the larger sample.



**TABLE 11 • THE COMPARISON OF THE GMM ESTIMATES TO THE IV ESTIMATES THAT INSTRUMENT
 THE EXECUTIVE STATUS BY THE COLLEGE DEGREE.**
 x_1 = CAR PRICE, x_2 =EXECUTIVE POSITION, x_3 =COLLEGE DEGREE

| | Pr(settlement) | Pr(incarceration) | | |
|---|----------------|-------------------|---------|----------------|
| | (1) | (2) | (3) | (4) |
| $\hat{\beta}^{GMM}$ | | -0.325 | -0.266 | |
| $\hat{\beta}$ | 0.489 (0.086) | (0.115) | (0.113) | -0.367 (0.129) |
| F statistic for weak identification | 55.5 | 45.1 | 45.7 | 40.6 |
| $\hat{\beta}_{2,3}^{IV} * \tilde{\rho}_2$ | | -0.268 | -0.243 | |
| $\hat{\beta}_{2,3}^{IV}$ | 0.557 (0.106) | (0.183) | (0.180) | -0.360 (0.215) |
| F statistic for weak identification | 35.9 | 16.4 | 16.7 | 14.1 |
| $\tilde{\rho}_2$ | 0.49 | 0.426 | 0.426 | 0.389 |
| N. obs. | 3986 | 3329 | 3329 | 2736 |
| Sample ID | A | B | B | C |
| Main controls | + | + | + | + |
| Volunt. compensation | - | - | + | + |
| Lawyer's experience | - | - | - | + |

$\hat{\beta}^{GMM}$ is the feasible GMM estimate for β when x_1 is instrumented and x_2 and x_3 are excluded instruments (See eqns 10a-10d). $\hat{\beta}_{2,3}^{IV}$ is the IV estimate where x_2 is instrumented by x_3 . $\tilde{\rho}_2$ is estimated as in 12. All regressions include regional fixed effects. Standard errors are in parenthesis, clustered at the regional level. Number of clusters = 80. For more information on the definitions of controls, samples, and the critical values for F statistic, please see the footnotes for Tables 8 and 9

Table 12 reports the IV estimates for the maximum available samples. In columns 1 and 2, $\hat{\beta}_{2,3}^{IV}$ is estimated using all the population of cases. The estimates are now more efficient than the GMM thanks to the larger sample size. The results show that the IV estimates for the population are not significantly different from the GMM estimates on the restricted sample in Table 8, however the point estimates based on the full sample have shrunk in magnitude.

Columns 3, 4, and 5 represent results for the probability of incarceration with additional controls, information on which is available only in the texts of court



rulings. Hence, I am unable to calculate the results using the full population of cases, but have to use the dataset of the matched cases. However, this still represents a considerable fivefold increase in the sample size, compared to the sample which was available for the GMM estimates. The results are similar to the GMM estimates.

Thanks to the sample size, now the regressions can be reestimated with the court fixed effects instead of the regional fixed effect. In general, the results are very similar with the estimated gap in incarceration rates slightly increasing in magnitude. This serves as an additional robustness check to the GMM estimates on the restricted sample.

Overall, this exercise suggests that the estimates based on the restricted sample are in general similar to the ones obtained for the overall population, and that the omission of the court fixed effects does not alter results. It also shows that the use of only two proxies on the larger sample helps in gaining efficiency compared to the GMM estimates, but there is a tradeoff: I have to assume that the estimate of ρ_2 is a valid estimate for the population data. Nevertheless, the GMM approach with the three proxies was an important step for testing the validity of the identifying restriction.

5. CONCLUSION

Overall, the empirical results suggest that there is a substantial difference in the court outcomes among different wealth groups in Russia. Unsurprisingly, the wealthier defendants tend to settle much more often. If the defendant at the bottom 5 percent of wealth distribution settles only in 7 percent of the cases, the defendant at the top 5 percent settles in 43 percent of the cases. Wealthier defendants are able to afford higher compensation, which makes victims more willing to accept their offers. The disparities created by the different abilities to afford settlements cannot be given any straightforward normative judgment. From the social welfare point of



view, perhaps, settlements serve important role as a way to improve the wellbeing of victims, decriminalize certain acts, and save resources for the judicial system, but it may well decrease the deterrent effect of criminal prosecution. Whether settlements are efficient or not in this setup should be a subject of another study which goes beyond the aims of this paper.

More striking, however, is the finding that the disparity persists even accounting for the actual settlements, voluntary compensations, and lawyer experience. Among the non-settled cases, when the judge decides whether to suspend the prison term or not, the defendants at the bottom 5 percent of wealth distribution are imprisoned in 42 percent of cases, while the defendants at the top 5 percent are imprisoned only in 25 percent of cases. Keeping in mind that the wealthier group is also expected to be more culpable on average, given the selection bias, the fact that we find this gap at all is telling.

I am cautious to interpret the gap in incarceration rates as the evidence of judicial bias. There may still be some defense-attorney effect, which has not been perfectly captured by the controls. Importantly, the regression misses the information on whether the attorney is hired or appointed by court. The same attorney may exert much less effort when she is appointed by court. So even the lawyer's fixed effects would not help to overcome this difficulty. Nevertheless, it does not undermine the results, if one believes that there should not be any disparity neither due to the judicial bias, nor to the quality of legal counsel (after all, court appoints the attorney as an attempt to smooth the inequality).

The estimates are robust to the choice of instruments. The paper shows that having two proxies for wealth may be already enough to test the disparities and having three proxies is useful for testing the validity of the identifying restrictions. The approach proposed in this paper can be applied to analyze the judicial systems of other countries that provide access to their judicial data.



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CLARA MARTÍNEZ-TOLEDANO TOLEDANO

WEALTH INEQUALITY IN SPAIN (1984-2013)

Abstract. This paper combines different sources (tax records, national accounts, wealth surveys) and the capitalization method in order to deliver consistent, unified wealth distribution series for Spain over the 1984-2013 period, with detailed breakdowns by age over the 1999-2013 sub-period. My findings point out a moderate decrease in the top 10 percent wealth share from the mid-1980s until beginning of the 1990s, at the expense of the increase in both the middle 40 percent and the bottom 50 percent of the distribution. The top 10 percent wealth share increases from the mid-1990s until the burst of the housing bubble in 2008 and then it stabilizes at a similar level to the mid-1980s. The bulk in both housing and offshore assets have pushed toward rising wealth concentration in the last two decades.

Keywords: Wealth Inequality, Housing, Offshore Assets, Spain

1. INTRODUCTION

Both the evolution and determinants of wealth inequality are currently at the center of the academic and political sphere. This is largely due to the debate generated by Thomas Piketty's prominent book, *Capital in the Twenty-First Century* (2014), in which he warns that the tendency of returns on capital to exceed the rate of economic growth threatens to generate extreme inequalities. Moreover, he also emphasizes the importance of analyzing empirically the historical evolution of wealth distributions. Research on wealth inequality has, however, a long tradition which dates back to the late 19th century and beginning of the 20th century, in which a number of authors started to study wealth among the living using mainly French and British inheritance data.¹ Nonetheless, it is only after the first half of the 20th century that academics

¹ See Piketty (2011) for the main references in this literature.

started to construct long run homogeneous historical series on top wealth shares (Lampman 1962 for the US, Atkinson and Harrison 1978 for the UK, Piketty *et al.* 2006 for France and Roine and Waldenström 2009 for Sweden).

There exist five main methods and or sources to analyze wealth inequality. The first is the estate multiplier method, that provides a snapshot of the wealth distribution at the time of death using estate tax records data. The main difficulty is how to generalize from decedents to the full population. The second possible approach is to use surveys of household finances. Contrary to the estate multiplier method, one advantage of using survey data is that it allows to characterize the middle and bottom of the wealth distribution. Nevertheless, even though most of these surveys oversample wealthy households, concentration at the top tends to be underestimated because of misreporting or top coding. The third available source are wealth tax returns. Wealth tax data cover very well the top of the distribution, but three main limitations remain. First, there are very few countries in the world which have a wealth tax (i.e. Spain, France, Norway, Uruguay, etc.). Second, only very wealthy individuals are subject to the tax, making it impossible to analyze the middle and bottom of the distribution. Third, many assets are exempted from this tax, so that it is not possible to have a whole picture of the wealth distribution. The fourth is the capitalization method, which consists of applying a capitalization factor to the capital income distribution to arrive to the wealth distribution. The main advantages of the capitalization technique are that it is based on income data, which are much easier to obtain than wealth data, and that the top is very well covered. The main limitation is, as in the case of the wealth tax, that there are also some assets whose generated income is not subject to the tax. Finally, one can also analyze the upper part of the distribution using lists of high-wealth individuals, such as the annual Forbes 400 list. The drawback in this case is that named lists are limited to the very small group of top wealth-holders and have non-systematic coverage.

Despite the immense literature on the analysis of wealth distributions, two important gaps remain. First, there is still no consensus on the method of analysis that should be adopted, since there are conflicting results depending on which of the techniques or sources are used. For instance, Saez and Zucman (2016) find that wealth considerably increased at the top 0.1 percent in the US over the last two decades using the income capitalization method, contrary to the results obtained by



Kopczuk and Saez (2004) using the estate multiplier method. Second, due to data limitations, empirical evidence on the determinants of wealth concentration is still scarce. There is some evidence that the surge in top incomes and offshore wealth (Saez and Zucman 2016, Alstadsæter *et al.* 2016), and the increase in saving and rates of return inequality (Garbinti *et al.* 2017, Saez and Zucman 2016) have pushed toward wealth concentration in the last two decades. However, it is still unclear which are the distributional effects of specific economic phenomena, such as housing bubbles.

The aim of this research is to analyze wealth inequality in Spain using a mixed survey-capitalization method from 1984 up to 2013, with a particular focus on the years of the housing boom and bust. By analyzing Spain I will contribute to the literature of wealth inequality in three ways. First, Spain experienced a unprecedented increase in aggregate wealth due to a boom in housing prices between 2000 and 2008. Hence, it is interesting to analyze which are the distributional effects of this economic phenomenon which has not been deeply studied so far. Second, Spain has high-quality personal income tax micro-files with detailed income for each tax unit and income category. They are constructed by the Spanish Institute of Fiscal Studies (Instituto de Estudios Fiscales) and they cover the period 1984-2013. Thus, they allow to provide a careful estimation of the evolution of Spanish wealth shares from bottom to the top. To my knowledge, the few studies that have analyzed wealth concentration in Spain using administrative data have only focused on the top 1 percent, and survey data (Survey of Household Finances, Bank of Spain) are only available for four waves since 2002. Third, Spain is one of the few countries in the world that has a wealth tax and for which micro-files from wealth tax records are available. Thus, from the methodological point of view, it is interesting to test the capitalization method by comparing the wealth shares using the income capitalization method with the shares using wealth tax returns and by calculating the distribution of the rates of return.

The starting point of the mixed capitalization-survey approach used in this work involves the application of a capitalization factor to the distribution of capital income to arrive to an estimate of the wealth distribution. Capitalization factors are computed for each asset in such a way as to map the total flow of taxable income to total wealth recorded in Financial and Non-financial accounts. When combining

taxable incomes and aggregate capitalization factors, it is assumed that within each asset class capitalization factors are the same for each individual. By using this methodology, I am able to obtain wealth distribution series consistent with official financial and non-financial household accounts. In Spain, as in most of countries, not all assets generate taxable income. We account for them by allocating them on the basis of how they are distributed, in such a way as to match the distribution of these assets in the Survey of Household Finances developed by the Bank of Spain. The assets which we account for are main owner-occupied housing, life insurance, investment and pension funds.

The wealth distribution in Spain has been analyzed in the past using three different data sources. Firstly, Alvaredo and Saez (2009) use wealth tax returns to construct long run series of wealth concentration for the period 1982 to 2007. The progressive wealth tax has high exemption levels and only the top 2 percent or 3 percent wealthiest individuals file wealth tax returns. Thus, they limit their analysis of wealth concentration to the top 1 percent and above. They find that top wealth concentration decreases at the top 1 percent from 19 percent in 1982 to 16 percent in 1992 and then increases to almost 20 percent in 2007. However, in contrast to the top 1 percent, they obtain that the 0.1 percent falls substantially from over 7 percent in 1982 to 5.6 percent in 2007. Durán-Cabré and Esteller-Moré (2010) also use wealth tax returns to analyze the distribution of wealth at the top and obtain similar results. Their approach complements theirs by offering a more precise treatment of the correction of fiscal underassessment and tax fraud in real estate, which is the main asset in Spaniards' portfolios.

Secondly, Azpitarte (2010) and Bover (2010) use the 2002 Survey of Household Finances developed by the Bank of Spain in order to analyze the distribution of wealth at the top. This analysis can be carried out because the survey is constructed doing an oversampling of wealthy households. Azpitarte (2010) presents results for the top 10-5 percent, 5-1 percent and 1 percent. Bover (2010) provides shares for the top 50 percent, top 10 percent, top 5 percent and top 1 percent. Their estimates for the top 1 percent are very similar, 13.6 percent and 13.2 percent, respectively. However, they are much lower than the results of Alvaredo and Saez (2009) using wealth tax returns, who obtain that the top 1 percent holds 20 percent of total wealth. The OECD has also published recently a report in which they analyze



wealth inequality across countries (OECD 2015) using household survey data. They find that the top 1 percent holds 15.2 percent in 2011 and that wealth inequality in Spain is lower relative to the average of other 16 OECD countries.

Finally, Alvaredo and Artola (2017) use inheritance tax statistics to estimate the concentration of personal wealth at death in Spain between 1901 and 1958. They compare their results with the estimates among the living of Alvaredo and Saez (2009) for the period between 1982 and 2007. They find that concentration of wealth at the top 1 percent of the distribution was approximately three times larger during the first half of the 20th century than at the end of the same century.

My findings point out a moderate decrease in the top 10 percent wealth share from the mid-1980s until beginning of the 1990s, at the expense of the increase in both the middle 40 percent and the bottom 50 percent of the distribution. The top 10 percent wealth share increases from the mid-1990s until the burst of the housing bubble in 2008 and then it stabilizes at a similar level to the mid-1980s. The bulk in both housing and offshore assets, together with rising inequality in rates of return, have pushed toward rising wealth concentration.

The trends and levels in the wealth shares are very similar to the ones obtained by Alvaredo and Saez (2009) using wealth tax returns. Moreover, I test the assumption underlying the capitalization technique, that within each asset class capitalization factors are the same for each individual and I find using the wealth tax micro-files, that rates of return for deposits and fixed-income securities are flat along the distribution. Hence, the mixed capitalization-survey approach seems to be quite a consistent method to analyze the full wealth distribution in Spain over time.

The layout of the paper is as follows. Section 2 discusses the wealth concept and data used, together with an analysis of the aggregate trends in wealth in the last three decades in Spain. In Section 3 I formalize and explain the procedure used in order to obtain wealth shares from income tax and survey data. Results for the period 1984-2013, derived from using the mixed survey-capitalization method, are presented in Section 4. In Section 5 I adjust the series for offshore assets and in Section 6 I test the capitalization method. Finally, Section 7 concludes. All Figures to which the text refers to are included in the appendix at the end of the paper.

2. WEALTH: CONCEPT, DATA AND AGGREGATE TRENDS

This section describes the wealth concept used and the trends in the evolution of aggregate wealth over the period of analysis (1984-2013).

2.1 *Wealth concept and data sources*

The wealth concept used is based upon national income categories and it is restricted to net personal wealth, that is, the current market value of all financial and non-financial assets owned by the household sector net of all debts. For net financial wealth, that is, for both financial assets and liabilities, the latest (ESA 2010, Bank of Spain) and previous (ESA 95, Bank of Spain) Financial Accounts are used for the period 1996-2013 and 1984-1995, respectively. Financial Accounts report wealth quarterly and I use mid-year values.

Households' financial assets include equities (stocks, investment funds and financial derivatives), debt assets, cash, deposits, life insurance and pensions. Households' financial liabilities are composed of loans and other debts. It is important to mention that pension wealth excludes Social Security pensions, since they are promises of future government transfers. As it is stated in Saez and Zucman (2016), including them in wealth would thus call for including the present value of future health care benefits, future government education spending for one's children, etc., net of future taxes. Hence, it would not be clear where to stop.

My wealth concept only considers the household sector (code S14, according to the System of National Accounts (SNA)) and excludes non-profit institutions serving households (NPISH, code S15). There are three reasons which explain this decision. First, due to lack of data, non-profit wealth is not easy attributable to individuals. Second, income from NPISH is not reported in personal income tax returns. Third, non-profit financial wealth amounts to around only 1 percent of household financial wealth between 1996 and 2014 in Spain. Hence, it is a negligible part of wealth and excluding it should not alter the results.

Spanish Financial Accounts report financial wealth for the household and NPISH sector and also for both households and NPISH isolated as separate sectors. However, the level of disaggregation of the Balance Sheets in the latter case is lower



than in the case in which households and NPISH are considered as one single sector. For instance, whereas the Balance Sheet of the sector of households and NPISH distinguishes among wealth held in investment funds and wealth held in stocks, the Balance Sheet of the household sector only provides an aggregate value with the sum of wealth held in these two assets. In order to have one value for household wealth held in investment funds and one value for household wealth held in stocks, I assume that they are proportional to the values of households' investment funds and stocks in the Balance Sheet of households and NPISH.

For non-financial wealth, it is not possible to rely on Non-financial Accounts based on the System of National Accounts. Even though there are some countries that have these accounts, such as France and United Kingdom, no institution has constructed these type of statistics for Spain yet. I need to use other statistics instead. My definition of household non-financial wealth consists of housing and unincorporated business assets and I rely on the series elaborated in Artola *et al.* (2017). Housing wealth is derived based on residential units and average surface from census data on the one hand, and average market prices from property appraisals, on the other hand.² Unincorporated business assets have been constructed using the four waves of the Survey of Household Finances (2002, 2005, 2008, 2011) elaborated by the Bank of Spain and extrapolated backwards using the series of non-financial assets held by non-financial corporations also constructed by the Bank of Spain.³

I exclude collectibles since they amount to only 1 percent of total household wealth and they are not subject to the personal income tax. Furthermore, consumer durables, which amount to approximately 10 percent of total household wealth, are also excluded, because they are not included in the definition of wealth by the System of National Accounts.⁴

² Net housing wealth is the result of deducting mortgage loans from household real estate wealth. Note that mortgage debts are approximated by total household liabilities.

³ A detailed explanation of the sources and methodology used in order to construct these two series can be found in data appendix of Artola *et al.* 2017.

⁴ The shares of both collectibles and consumer durables over total household wealth are obtained using the Survey of Household Finances developed by the Bank of Spain.

2.2 *Aggregate Wealth Stylized Facts (1984-2013)*

Understanding how wealth has evolved in aggregate terms is crucial in order to later interpret the dynamics in the wealth distribution series.

From a historical perspective, the ratio of household wealth to national income has followed a U-shaped evolution over the past century, a pattern also seen in other advanced economies (Artola *et al.* 2017, Piketty and Zucman 2014). However, this process was initially delayed with respect to leading European countries. This finding is consistent with a long post-Civil war economic stagnation and the larger importance of agriculture in Spain. During my period of analysis, from 1984 onwards, I distinguish three stylized facts on the evolution of the level and composition of the stock of wealth in Spain.

The first stylized fact is that the household wealth to national income ratio has almost doubled during that period of time. Household wealth amounted to around 380 percent in the late 1980s and it grew up to around 470 percent in the mid-1990s. From 1995 onwards, it started to increase more rapidly reaching the peak of 728 percent of national income in 2007. After the burst of the crisis in 2008, it dropped and it has been decreasing since then. In 2014, the household wealth to national income ratio amounted to 646 percent, a level which is similar to the wealth to national income ratio of years 2004 and 2005, but much higher than the household wealth to national income ratios of the 1980s and 1990s (Fig. 1).

The second stylized fact determines the existence of temporal differences not only in the growth of total net wealth (as it was pointed out in the first stylized fact), but also in the growth of its components. In the late 1980s the growth in net housing was more than double the growth in financial assets. During the nineties this trend reversed and financial assets started to rise faster due mainly to the dot-com bubble. After the stock market crash of 2000, housing prices increased rapidly surpassing financial assets. The value of dwellings reached the peak in 2008, after which the housing bubble burst and the drop in housing wealth was larger than in financial assets (Figg. 1 and 2).

The third and last stylized fact points out the increase in the importance of net housing in the asset portfolio of households. Even though dwellings are during the whole period the most important asset held by households, always representing



more than 40 percent of total household net wealth, the composition of household wealth has not evolved homogeneously over time and it has lost importance in times when financial assets significantly increase (i.e. dot-com bubble). The increase in the fraction of housing in the total portfolio of households has also been exacerbated by the steady decrease in the fraction of unincorporated business assets (from 23 percent in 1984 up to 11 percent in 2014), due mainly to the reduction in the importance of agriculture (Fig. 2).

3. THE MIXED CAPITALIZATION-SURVEY APPROACH (1984-2013)

The main goal of this article is to construct wealth shares by allocating the total household wealth depicted in Figure 1 to the various groups of the distribution. For that, it is needed to proceed with the following three steps. First, I start by calculating the distribution of taxable capital income at the individual level. Second, the taxable capital income is capitalized. Third, I account for wealth that does not generate taxable income. This is a mixed method and not the pure capitalization technique, because the survey method is used in order to account for both wealth at bottom of the distribution and assets that do not generate taxable income.

3.1 *The distribution of taxable capital income*

The starting point is the taxable capital income reported on personal income tax returns. I use micro-files of personal income tax returns constructed by the Spanish Institute of Fiscal Studies (Instituto de Estudios Fiscales (IEF)) in collaboration with the State Agency of Fiscal Administration (Agencia Estatal de Administración Tributaria (AEAT)). They have three different types of files: two personal income tax panels that range from 1982-1998 and 1999-2012, respectively, and personal income tax samples for 2002-2013. I use the first income tax panel for 1984-1998⁵, the second panel for 1999-2011 and all income tax samples for 2002-2013. The

⁵ Even though the first panel is available since 1982, I decided to start using it from 1984 since I found some inconsistencies between the files for 1982 and 1983 and subsequent years.

micro-files provide information for a large sample of taxpayers⁶, with detailed income categories and an oversampling of the top. The income categories I use are interest, dividends, effective and imputed housing rents, as well as the profits of sole proprietorships.⁷ The micro-files are drawn from 15 of the 17 autonomous communities of Spain, in addition to the two autonomous cities, Ceuta and Melilla. Two autonomous regions, Basque Country and Navarra, are excluded, as they do not belong to the Common Fiscal Regime (Régimen Fiscal Común), because they manage their income taxes directly. Combined these two regions represent about 6 percent and 8 percent of Spain in terms of population and gross domestic product, respectively.⁸

The unit of analysis used is the adult individual (aged 20 or above), rather than the tax unit. Splitting the data into individual units has on the one hand the advantage of increasing comparability as across units since individuals in a couple with income for example at the 90th percentile are not as well off as an individual with the same level of income. On the other hand, it is also more advantageous for making international comparisons, given that in some countries individual filing is possible (i.e. Spain, Italy) and in others (i.e. France, US) not.

Since in personal income tax returns the reporting unit is the tax unit, I need to transform it into an individual unit. A tax unit in Spain is defined as a married couple (with or without dependent children aged less than 18 or aged more than 18 if they are disabled) living together, or a single adult (with or without dependent children aged less than 18 or aged more than 18 if they are disabled). Hence, only the units for which the tax return has been jointly made by a married couple need to be transformed. For each of these units I split the joint tax returns into two separate individual returns. We assign half of the jointly reported capital income to each member of the couple.⁹ For 2011, for instance, this operation converts 19.38 million

⁶ Personal income tax samples are more exhaustive (i.e. 2,161,647 tax units in 2013) than the panels (i.e. 390,613 tax units in 1999).

⁷ Note that imputed housing rents exclude main residence from the period 1999-2013. I explain the way in which I account for main residence in the following subsection. Moreover, profits of sole proprietorships are considered as a mixed income, so that I assume as it is commonly done in the literature that 70% of profits are labor income and 30 percent capital income.

⁸ These figures have been obtained using Regional National Accounts and the Census of Population of the Spanish Statistics Institute (Instituto Nacional de Estadística (INE)).

⁹ Since business income from self-employment is a mixed income, only the part corresponding to capital income is split among the couple.



tax units into 23.07 million individual units in the population aged 20 or above, that is, approximately 19 percent of units are converted.¹⁰

One limitation of using personal income tax returns in order to construct income shares in the Spanish case is that not all individuals are obliged to file. There exist some labour income and capital income thresholds under which individuals are exempted from filing. In 2013, for instance, the labour income threshold when receiving labour income from one single source was 22,000 euros and 11,200 when receiving it from two or more sources. The capital income threshold was 1,600 euros for interest, dividends and/or capital gains and 1,000 for imputed rental income and/or Treasury bills.¹¹ Approximately one third of the population is exempted from filing.¹² I account for the missing adults using the Spanish Population Census for the period 1984-2013 by comparing the population totals by age and gender of the micro-files with the population totals of the Census excluding País Vasco and Navarra and I then create new observations for all the missing individuals by age and gender. By construction, my series perfectly match the Census population series by gender and age.¹³ These new individuals, although being the poorest since they do not have to file the personal income tax, earn some labour and also some capital income in the form of interest from checking accounts or deposits. Hence, we need to account for this missing income, otherwise we would be overestimating the amount of wealth held by the middle and the top of the distribution. For that, I rely on the Survey of Household Finances for the period 1999-2013 and on the Household Budget Continuous Survey for the period 1984-1998.

The Spanish Survey of Household Finances (SHF) has been conducted by the Bank of Spain for four waves: 2002, 2005, 2008 and 2011. It is the only statistical source in Spain that allows the linking of incomes, assets, debts, and consumption at the

¹⁰ Given the incentives of the tax code to file separately whenever both individuals in the couple receive income, there are more married couples filing individually the further we move up in the income distribution. See AEAT (2013) for a more detailed explanation in Spanish of how personal income tax filing works in Spain.

¹¹ See AEAT (2013) for a more detailed explanation in Spanish of how personal income tax filing works in Spain.

¹² This figure has been obtained comparing the total number of personal income tax filers with the population totals of the Spanish Population Census.

¹³ The oldest personal income tax panel that I use for the period 1984-1998 does not include information about age nor gender. Hence, for this period of time I simply adjust the micro-files to match the Census population totals excluding País Vasco and Navarra but without taking age and gender into consideration.

household level and that provides a representative picture of the structure of household incomes, assets and debts at the household level. Therefore, it is extremely suitable for our analysis. First, using the SHF I classify individuals into seven age groups: from 20-24, 25-29, 30-39, 40-49, 50-59, 60-69, and above 69. I then calculate the fraction of income by category (labor income, interest and dividends, rental income and business income) that each age group has in the P20-P50 percentiles with respect to the P50-P60 percentiles, for labor income, and P60-P70 percentiles, for capital income. Finally, I also compute the fraction of individuals that own each income category by age group and assign these fractions to the same groups in the personal income tax data. I linearly interpolate the fractions for the years in between in order to account for the missing income at the bottom across all years.

The Household Budget Continuous Survey (HBCS) was carried out during the 1985-2005 period, for the purpose of providing quarterly and annual information regarding the origin and amount of household income, and the way in which income is used for different consumption expenses. As of 2006, this survey was replaced by the Household Budget Survey (HBS). I calculate the fraction of income by category (labor income, interest and dividends, rental income and business income) that the P20-P70 percentiles have with respect to the P70-P80 percentiles. Since the shares using the HBCS differ substantially from the shares using the SHF, I stick to the SHF levels and I only use the growth rate in the HBCS shares to extrapolate the series backwards (1984-1998).

Finally, before capitalizing the capital income shares, it is important to check that income is distributed in a coherent way and that there are no significant breaks across years due to, for instance, tax reforms or the use of different data sources. If already the income data are not coherently distributed, neither the wealth distribution estimates will be. In appendix B, I explain in detail the particular aspects of the reforms, which could potentially affect my methodology and how I deal with them in order to ensure consistency in the series across the whole period of analysis.



3.2 *The income capitalization method*

In the second step of the analysis the investment income approach is used. In essence, this method involves the application of a capitalization factor to the distribution of taxable capital income to arrive to an estimate of the wealth distribution.

3.2.1 A formal setting

The income capitalization method used in this paper may be set out formally as follows. An individual i with wealth w invests an amount a_{ij} in assets of type j , where j is an index of the asset classification ($j = 1, \dots, J$). If the return obtained by the individual on asset type j is r_j , his investment income by asset type is:

$$y_{ij} = r_j * a_{ij} \quad (1)$$

and his total investment income:

$$y_i = \sum_{j=1}^J r_j * a_{ij} \quad (2)$$

Rearranging equation (1), the wealth for each individual by asset type is, thus, the following:

$$a_{ij} = y_{ij}/r_j \quad (3)$$

By rearranging equation (2), the total wealth for each individual is:

$$w_i = \sum_{j=1}^J y_{ij} * r_j \quad (4)$$

In the next subsection, this formal setting is applied to the Spanish case in order to obtain the wealth distribution series.

3.2.2 How the capitalization technique works for the Spanish case

There are five categories of capital income in personal income tax data: effective and imputed (excluding main residence) rental income, business income from self-employment, interest and dividends. Tax return income for each category is weighted in order to match aggregate national income from National Accounts. I then map each income category (e.g. business income from self-employment) to a wealth category in the Financial Accounts from the Bank of Spain (e.g. business assets from self-employment).¹⁴

As it was mentioned in Section 3.1, income tax data exclude the regions of País Vasco and Navarra. Therefore, before mapping the taxable income to each wealth category, income and wealth in National Accounts need to be adjusted excluding the amounts corresponding to these two regions. Ideally, if one would know the amount of wealth and income in each category by region, one could simply discount the wealth and income corresponding to País Vasco and Navarra. Unfortunately, neither the Bank of Spain nor the National Statistics Institute have constructed Regional National Accounts with disaggregated information by asset type yet, so another methodology needs to be used. I assume that income and wealth in each category are proportional to total gross domestic product and housing wealth excluding these two regions, respectively.¹⁵

Once income and wealth have been adjusted accordingly, a capitalization factor is computed for each category as the ratio of aggregate wealth to tax return income, every year since 1984. This procedure ensures consistency with the Bank of Spain aggregate wealth data by construction. In 2013, for instance, there are about 19.4 billion euros of business income and 612.8 billion euros of business assets from self-employees generating taxable income. Hence, the rate of return on taxable

¹⁴ Capital gains are excluded from the analysis. The reason is that they are not an annual flow of income and consequently, they experience large aggregate variations from year to year depending on stock price variations. By including them, the trends in the wealth distribution series could be biased since we observe large variations in capital gains from year to year.

¹⁵ Total gross domestic product in Spain excluding País Vasco and Navarra accounts for approximately 92 percent of total gross domestic product. This figure is obtained using Regional National Accounts constructed by the National Statistics Institute. The share of housing wealth excluding País Vasco and Navarra amounts to approximately 92 percent of total housing wealth. This figure has been obtained using a study elaborated by the financial institution La Caixa (Caixa Catalunya 2004), in which they provide the value of housing wealth by region.



business assets is 3.2 percent and the capitalization factor is equal to 31.6. As it is shown in Figure 3, rates of return (and thus capitalization factors) vary across asset types, being for instance higher for financial assets than for business assets.¹⁶

The capitalization method is well suited to estimating the Spanish wealth distribution because the Spanish income tax code is designed so that a large part of capital income flows are taxable. However, as it has been already mentioned, tax returns do not include all income categories. In Section 3.3, I carefully account for the assets that do not generate taxable income.

3.3 Accounting for Wealth that Does not Generate Taxable Income

The third and last step consists of dealing with the assets that do not generate taxable income. In Spain, there are four assets whose generated income is not subject to the personal income tax: Main owner-occupied housing¹⁷, life insurance, investment and pension funds. Although these assets account for a large part of total household wealth, namely 32.8 percent for main residence and 8.1 percent for life insurance, investment and pension funds in 2013, the fact that they do not generate taxable income does not constitute a non-solvable problem for one main reason: Spain has a high quality Survey of Household Finances (SHF).

As it was mentioned in Section 3.1, this survey provides a representative picture of the structure of household incomes, assets and debts at the household level and does an oversampling at the top. This is achieved on the basis of the wealth tax through a blind system of collaboration between the National Statistics Institute and the State Agency of Fiscal Administration which preserves stringent tax confidentiality. The distribution of wealth is heavily skewed and some types of assets are held by only a small fraction of the population. Therefore, unless one is prepared to collect very large samples, oversampling is important to achieve

¹⁶ The rate of return on housing using National Accounts is very low for international standards, particularly during the most recent period (2002-2013). This can be explained by the fact that the differences in growth between housing wealth and housing rental income were much larger in Spain than in the rest of advanced economies. One potential explanation are the large differences in demand for renting (low) versus buying (high) dwellings in Spain, which have led to a larger increase in housing versus rental prices. In fact, the home-ownership ratio is approximately 80% at present (Census of dwellings, INE 2011). Nonetheless, one cannot fully disregard the existence of some type of measurement error in the construction of the rental income and/or housing wealth series.

¹⁷ This is the case from 1999 onwards, since until 1998 imputed rents from main residence were subject to the personal income tax. Hence, we only need to impute main residence for the period 1999-2013.



representativeness of the population and of aggregate wealth and also, to enable the study of financial behavior at the top of the wealth distribution. Hence, this survey is extremely suitable for this analysis and it allows to allocate all the previous assets on the basis of how they are distributed, in such a way as to match the distribution of wealth for each of these assets in the survey.

The imputations are conducted using the four waves of the Survey of Household Finances and they are based on the methodology used by Garbinti *et al.* (2017) for France. I only consider individuals aged 20 or above in order to be consistent with the population of interest in the micro tax data, which are all individuals aged 20 or above. The unit of analysis used in the SHF is the household. Since data in the micro-files are rearranged in order to have individuals as units of analysis, I proceed in the same way with the survey in order to be as consistent as possible. Hence, if the head of the household is not married, I assume that all capital income belongs to him. However, if the head of the household is married, I create a new individual and split the capital income of the household among the two. The new individuals are the partners of the heads of the households that are married and become now head of households.

The first step of the imputation consists of constructing groups of individuals according to their age, labor and capital income. First, individuals are classified into ten age groups: from 20-24, 25-30, 31-40, 41-50, 51-54, 55-60, 61-65, 66-70, 71-80 and above 80. Second, they are also grouped according to their capital income into seven brackets of percentiles: P0-P39, P40-P49, P50-P59, P60-P89, P90-P94, P95-P97 and equal or above P98. In order for the imputations to be consistent, I only consider as capital income the one that is subject to the personal income tax. Finally, three groups of percentiles are formed according to the labour income the individuals have: P0-P49, P50-P89 and equal or above P90.

Once individuals are sorted by age, capital and labor income, I combine them and end up with 210 different groups. One can then calculate which is the share of main owner-occupied housing, life insurance, investment and pension funds that corresponds to each group, as well as the fraction of individuals that owns the asset within each group, that is, the within-group ownership shares.¹⁸ The final aim is to

¹⁸ Since the survey is only available for four waves I linearly interpolate the shares for the years in between and I use the 2002 shares for imputing life insurance, pension and investment funds for the historical period. Ideally, we would have some waves of the wealth survey for the historical part, but unfortunately they do not



impute the value of these assets that do not generate taxable income to the capitalized distribution of income in order to obtain the distribution of total net wealth. For that, I need to construct with the data from the micro-files the same groups by age, capital and labor income. Once the individuals in the tax data are classified into the same 210 groups, the group shares and the within-group ownership shares that are obtained with the survey can be used in order to calculate which is the amount of main owner-occupied housing,¹⁹ wealth from life insurance, investment and pension funds from National Accounts that corresponds to each group.²⁰

In order to make sure that the imputations are correctly done, I conducted sensitivity tests and applied several alternative imputation methods for tax-exempt assets and I find that the overall impact on wealth distribution series is extremely small. Furthermore, I also calculate wealth shares with and without conducting my imputation method using the four waves of the wealth survey and I obtain very similar results (Fig. 4).

4. TRENDS IN THE DISTRIBUTION OF WEALTH (1984-2013)

4.1 *Wealth inequality series*

This section presents the benchmark unified series for wealth distribution in Spain over the period 1984-2013 and the breakdowns by asset category (1984-2013) and age (1999-2013). Figure 9 displays the wealth distribution in Spain decomposed into three groups: top 10 percent, middle 40 percent and bottom 50 percent. The top 10 percent wealth share drops from the mid-1980s until beginning of the 1990s, at the expense of the increase in both the middle 40 percent and the bottom 50 percent of

exist. Nonetheless, these assets were much less important in the asset portfolio of households during the 1980s and beginning of the 1990s and consequently, this assumption should not affect our results much.

¹⁹ Individuals are not indebted in an homogeneous way along the distribution. Hence, I calculate the ratio of main residence indebtedness for each of the 210 groups using the survey and I apply it to each group when doing the imputation.

²⁰ Due the limited information on negative net wealth holders in Spain and the small fraction of negative aggregate net wealth over total net wealth (3 percent according to Cowell and Kerm 2015) using the Eurosystem Household Finance and Consumption Survey (HFCS) I have decided to set minimum net wealth at zero.

the distribution. From the mid-1990s the top 10 percent wealth share starts to rise again until the burst of the housing bubble in 2008 and then it stabilizes at a similar level to the mid-1980s.

Spain has experienced substantial changes in the level and composition of personal wealth during this period (see Section II), which have significantly affected the evolution of wealth inequality. As it is shown on Figure 6, the most important asset for the bottom 50 percent is housing over the whole period of analysis. The middle 40 percent also owns mainly housing, but financial assets and unincorporated assets are more important than for the bottom 50 percent. On the contrary, for the top 10 percent financial assets are much more important accounting for approximately half of their total net wealth. For all groups, unincorporated assets have lost importance over time and this is mainly due to the reduction in agricultural activity among self-employees. One particularity of the Spanish case is that housing is a very important asset of the portfolio of households even at the top of the distribution. This has been the case during the whole period of analysis, but it has become more striking in the last fifteen years due to the increase in the value of dwellings. In fact, as Figure 7 displays, the share of housing wealth owned by the top 10 percent grew during the housing boom at the expense of the decrease in the middle 40 percent, even though housing represented a larger fraction of the portfolio of net wealth for the middle 40 percent. Hence, even though housing has acted as a smoothing factor of wealth concentration in the long-run, it has contributed to the rise in wealth concentration during the years of the housing bubble.

Moving to the analysis by age, I find that average wealth is always very small at age 20 (less than 10 percent of average adult wealth), then rises sharply with age until age 60-65 reaching 160-170 percent of average adult wealth, and moderately decreases (around 150-110 percent of average adult wealth) at ages 65-85 (Fig. 8). This age-wealth profile appears to be relatively stable over the 1999-2013.

When decomposing the wealth distribution series by age, I find that wealth inequality is more pronounced for the old (+60) and even more for the young (20-39) than for the middle-old (40-59), for which wealth inequality is almost as large than for the population taken as a whole (Fig. 9).



4.2 International comparison

When comparing the top 10 percent and top 1 percent wealth share in Spain versus the US, I observe that concentration in Spain is lower than in the US over the whole period, but that these differences have increased in the last two decades due to the huge rise in wealth concentration in the US (Figg. 10 and 11). On the contrary, the levels of wealth inequality in Spain are quite similar to the ones observed in France and Sweden. Spain had a larger top 10 percent and top 1 percent during the 1980s, but since the nineties Spain has converged to the levels of the rest of European countries. Nonetheless, comparisons should be made carefully since there are important methodological differences across countries.

5. OFFSHORE ASSETS AND WEALTH INEQUALITY

In Spain, as in most countries, official financial data fail to capture a large part of the wealth held by households abroad such as the portfolios of equities, bonds, and mutual fund shares held by Spanish persons through offshore financial institutions in tax havens (Banco de España 2011). Zucman (2013) estimates that around 8 percent of households' financial wealth is held through tax havens, three-quarters of which goes unrecorded. Moreover, he also provides evidence that the share of offshore wealth has increased considerably since the 1970s. This fraction is even larger for Spain. According to Zucman (2015), wealth held by Spanish residents in tax havens amounted to approximately 80 billion euros in 2012, which accounts for more than 9 percent of household's net financial wealth. Furthermore, Alstadsæter *et al.* (2016) find using micro-data on the Norwegian tax amnesty, that the probability to disclose evading taxes rises steeply with wealth. Hence, by not incorporating offshore wealth in our wealth distribution series, both total assets and wealth concentration would be substantially underestimated.

In order to adjust the wealth distribution series for offshore assets I use the historical series of offshore wealth in Artola *et al.* (2017). They rely on two main data sources: Zucman (2013; 2014), whose series mainly come from the Swiss National Bank (SNB) statistics, and the unique information provided by the 720 tax-form.

Since 2012, Spanish residents holding more than 50,000 euros abroad are obliged to file this form specifying the type of asset (real estate, stocks, investment funds, deposits, etc.), value, and country of location. This new form aims to reduce evasion by imposing large fines in case taxpayers are caught not reporting or misreporting their wealth. In an attempt to increase future revenue and reduce further evasion, the Tax Agency also introduced a tax amnesty in 2012.

Artola *et al.* (2017) calculate separately reported assets, that is, claims held abroad by Spanish residents and declared to the Spanish tax authorities, from unreported offshore wealth. Given that the Spanish Tax Agency cross-checks across all taxes reported income and wealth by taxpayers, income generated by reported assets in the wealth tax and 720 tax-form should be included in personal income taxes. Hence, I will only correct the series for unreported offshore assets. Artola *et al.* (2017) derive the series of unreported financial offshore wealth by first comparing total wealth held in Switzerland by Spanish residents with assets declared in this country in the 720 tax form. In 2012, the comparison shows that 23 percent of offshore wealth was reported to tax authorities (Fig. 12). This figure is consistent with Zucman (2013) estimate that around three quarters of offshore wealth held abroad goes unrecorded. According to the 720 tax form, Switzerland concentrated in 2012 24 percent of total offshore wealth held by Spanish residents in tax havens. They extrapolate this series by applying the fraction of unreported assets we observe in Switzerland to the rest of tax havens that appear in the 720 tax form.

The series ranges between 1999 and 2014, since the statistics on total offshore held in Switzerland are only available for this period of time. They extrapolate the series backwards using the total amount of offshore wealth that flourished in the 1991 Spanish tax amnesty (10,367 million euros) and the proportion of European financial wealth held in offshore havens estimated by Zucman (2014) for the years prior to 1991.²¹

Offshore assets increased rapidly during the 1980s, 1990s and beginning of the 2000s and stabilized after 2007, a period in which Spanish tax authorities have become stricter with tax evasion by introducing the 720 tax form and implementing

²¹ For a more detailed explanation of how the series of unreported and reported offshore assets are constructed, read the appendix in Artola *et al.* 2017.



a tax amnesty in 2012 (Fig. 13). Unreported offshore wealth amounted to 149,520 million euros in 2012, which represents 8.6 percent of personal financial wealth.²² Investment funds represent 50 percent of total unreported offshore assets, followed by stocks with 30 percent, and deposits and life insurance with 18 percent and 2 percent, respectively (Fig. 14).

I correct the wealth distribution series by assigning proportionally to the top 1 percent the annual estimate of unreported offshore wealth. This is consistent with an official document of the Spanish Tax Agency (Ministerio de Hacienda y Administraciones Públicas 2016) stating that the majority of reported foreign assets by Spanish residents are held by top wealthholders and that these assets represent 12 percent and 31 percent of the total wealth tax base in 2007 and 2015, respectively.²³ Furthermore, Alstadsæter *et al.* (2016) also find that the top 1 percent in Norway accumulates almost all the disclosed assets of the tax amnesty.

Wealth concentration is larger during the 2000s than in the 1980s, contrary to what it is observed when offshore assets are not taken into account (see Fig. 15). The top 1 percent wealth share average over 2000-13 is 23.6 percent, versus 21.3 percent when disregarding offshore wealth. This increase is quite remarkable, taking into account that during that period of time the country experienced a housing boom and both non-financial and financial assets held in Spain grew considerably as it was discussed in section II. In line with Alstadsæter *et al.* (2016), this finding also suggests that the historical decline in wealth inequality over the twentieth century that happened in Spain and the rest of analyzed countries (Alvaredo and Artola 2017, Piketty 2014), may be much less spectacular in actual facts than suggested by tax data.

²² This figure is larger than the estimate of 80,000 million euros in Zucman 2015. Note that Zucman's estimate is an extrapolation using Swiss National Banks statistics, but that Artola *et al.* (2017) use administrative data on reported wealth held by Spanish residents abroad.

²³ Note that according to Alvaredo and Saez (2009) Spanish wealth tax filers belong approximately to the top 1 percent of the wealth distribution.

6. RECONCILIATION AND TEST OF THE CAPITALIZATION METHOD WITH OTHER SOURCES

6.1 Comparison with other methods and sources

6.1.1 Wealth Tax

The wealth tax in Spain was introduced for the first time in 1978 as by law 50/1977. Initially, it was meant to be “transitory” and “exceptional”. The tax rate was relatively small, with a maximum of 2 percent. The aim of the Spanish wealth tax was basically to complement the Spanish personal income tax, which had limited redistributive goals. Tax filing was done on an individual basis, with the exception of married couples under joint tenancy. Since 1988, married couples can file individually.

In 1992, a major reform by the Law 19/1991 put an end to the transitory and exceptional character of the tax. It established a strictly individual filing and introduced changes in some of the included components as well as in their valuation rules. In year 2008, the tax was not abolished but a bonus of 100 percent was introduced by law 4/2008. Nevertheless, the economic crisis and the lack of funds of the Spanish Inland Revenue, reactivated the wealth tax from exercise 2011 (payable in 2012) up to 2015 (payable in 2016).

Alvaredo and Saez (2009) use wealth tax returns and the Pareto interpolation method to construct long run series of wealth concentration for the period 1982 to 2007. The progressive wealth tax has high exemption levels and only the top 2 percent or 3 percent wealthiest individuals file wealth tax returns. Thus, they limit their analysis of wealth concentration to the top 1 percent and above. This is a general limitation of using wealth tax data, the middle and bottom of the distribution can not be analyzed. They find that top wealth concentration decreases at the top 1 percent from 19 percent in 1982 to 16 percent in 1992 and then increases to almost 20 percent in 2007. However, in contrast to the top 1 percent, they obtain that the 0.1 percent falls substantially from over 7 percent in 1982 to 5.6 percent in 2007. Durán-Cabré and Esteller-Moré (2010) also use wealth tax returns to analyze the distribution of wealth at the top and obtain similar results to them.



Their approach complements theirs by offering a more precise treatment of the correction of fiscal underassessment and tax fraud in real estate, which is the main asset in Spaniards' portfolios.

Results using wealth tax data and the capitalization method are quite similar (Fig. 16). In line with the trends observed in Alvaredo and Saez (2009), my estimates also reveal a fall in concentration at the top 1 percent during the mid-1980s until beginning of the 1990s, and an increase in concentration from that date onwards. Concentration differs more across methods, being larger with capitalized income shares, at times in which asset prices significantly grow, namely the mid-1980s, the years of the dot-com bubble and the beginning of the 2000s.

There are several conceptual and methodological differences across the two methods which might explain these differences. First, Alvaredo and Saez (2009) use financial wealth from both households and non-profit institutions serving households in their wealth denominator, rather than only financial household wealth. Second, they exclude pensions and business assets from the wealth denominator. Hence, they use slightly different wealth aggregates as the ones used in this paper (Tab. 1). Third, they use real state wealth at cadastral value as reported in the wealth tax and update it based on the differences between real state wealth at market value. In contrast, I use a series of housing wealth at market prices and impute main residence housing wealth for the period 1999-2013 using the Survey of Household Finances. Another difference is that they use the Pareto interpolation method in order to obtain top wealth shares because they have tabulated data. Finally, they use the tax unit and not the individual unit as unit of analysis. The exclusion of business assets and pension funds, together with the different valuation of housing wealth seem to be the biggest determinants in the differences observed in the shares using the two methods, given that these disparities are more pronounced at times of large price movements.

6.1.2 The Survey of Household Finances

The Survey of Household Finances provides a representative picture of the structure of household incomes, assets and debts at the household level and does an oversampling at the top, as it was already pointed out in section III. It exists for

four waves (2002, 2005, 2008 and 2011) and it is elaborated by the Bank of Spain. Azpitarte (2010) and Bover (2010) use the 2002 survey in order to analyze the distribution of wealth at the top. Azpitarte (2010) presents results for the top 10-5 percent, 5-1 percent and 1 percent. Bover (2010) provides shares for the top 50 percent, top 10 percent, top 5 percent and top 1 percent. Their estimates for the top 1 percent are very similar, 13.6 percent and 13.2 percent, respectively. However, they are lower than the results of Alvaredo and Saez (2009) using wealth tax returns and the results using the capitalization method, which find that the top 1 percent holds approximately 20 percent of total net wealth.

The OECD has also published a paper (OECD 2015) in which they construct top wealth shares using the 2011 SHF. They find that concentration at the top is lower than the OECD average, considering other sixteen countries. Comparing their results with the ones using tax data, we find that the top 1 percent is lower than in the case wealth tax or capitalized income data are used. For instance, the top 1% in 2011 using capitalized income data is 22.1 percent and the one obtained by OECD (2015) is 15.2 percent.

There are notable differences in terms of definitions and methodology between our estimates and the studies using the SHF. First, we use individual units while the SHF uses households to define each fractile. Second, they use a different definition of wealth. Azpitarte (2010) includes collectibles, Bover (2010) also considers consumer durables on top of collectibles, and OECD (2015) excludes pension wealth and incorporates collectibles and consumer durables to its definition of wealth as well.

In an attempt to do a more consistent comparison across the two methods, I have also constructed the wealth distribution series with the SHF, under the same definition of wealth and splitting households and their wealth into two once they are married. Results are still quite different across the two methods (Fig. 17). Whereas the top 10 percent holds 55.8 percent using the capitalization method in 2011, it only concentrates 43.9 percent using the survey-method. Contrary to what happens at the top 10 percent, the middle 40 percent and the bottom 50 percent concentrate more wealth using the survey (44.2 percent and 12 percent, respectively) than the capitalization method (36.5 percent and 7.7 percent, respectively).



Apart from the differences in wealth totals, it is a challenge for the SHF, as with all wealth surveys, to accurately capture wealthy individuals because of limited sample size and low response rates at the very top, so as it is the case with income, wealth shares tend to be lower using survey data instead of tax data. This is also the case in the US, as documented by Saez and Zucman (2016). Nonetheless, it is important to emphasize the extreme usefulness of wealth surveys in order to analyze the bottom and middle of the distribution, which in many countries, in particular Spain, it is not entirely possible using only tax data.

6.2 Testing the capitalization method

As in Saez and Zucman (2016), I obtain the wealth estimates at the individual level by assuming that within a given asset class, everybody has the same capitalization factor. Computing wealth shares by capitalizing income consists of allocating the wealth for each asset recorded in the Non-financial and Financial Accounts to each group of the distribution based on how the income for this asset is distributed. Hence, this method does not require to know the exact rate of return for each asset type, as long as the distribution of each capital income category is similar to the distribution of its corresponding wealth category.

In an attempt to test whether rates of returns are flat along the distribution I use the microfiles from personal income tax records linked to wealth tax records for the period 2002-2007. This allows me to calculate the individual rate of return on deposits and fixed-income securities as the ratio of the interest they earn in these assets and the total value they hold in these assets. Whether ranking individuals by the total amount of deposits and fixed-income securities they owned or by total net wealth, rates of return are flat along the distribution (Fig. 18).²⁴

As another robustness check, I use the SHF and compare the wealth shares using direct reported wealth, with the shares calculated by capitalizing the income from the survey. Results are very similar (Fig. 19).

²⁴ Results presented here are only for 2005, but they are very similar for the rest of years available (2002-2007). Ideally, rates of return for all asset categories should be computed, but unfortunately for the rest of assets it is not possible to perfectly link the income with the wealth reported.

7. CONCLUSION

In this paper we have constructed wealth inequality series for the full distribution over the period 1984 to 2013 using a mixed capitalization-survey method. My findings point out a moderate decrease in the top 10 percent wealth share from the mid-1980s until beginning of the 1990s, at the expense of the increase in both the middle 40 percent and the bottom 50 percent of the distribution. The top 10 percent wealth share increases from the mid-1990s until the burst of the housing bubble in 2008 and then it stabilizes at a similar level to the mid-1980s. The bulk in both housing and offshore assets have pushed toward rising wealth concentration in the last two decades.

Further research is needed about the evolution of wealth inequality over time. There are conflicting results among studies that need to be better explained. Although sometimes it may be forgotten, how wealth is concentrated extremely matters from the policy point of view. It can help in the designing of policies aimed at achieving a more equitable system that at the same time could create new sources of economic growth.

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9. APPENDIX A. FIGURES

FIGURE 1 • LEVEL AND COMPOSITION OF PERSONAL WEALTH, SPAIN 1984-2014

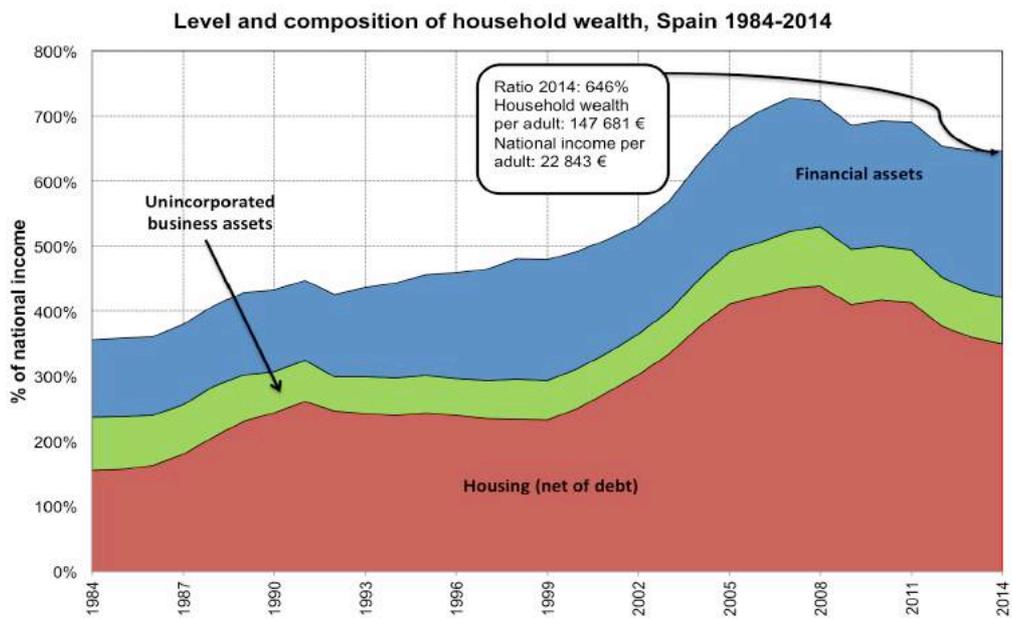


FIGURE 2 • COMPOSITION OF PERSONAL WEALTH, SPAIN 1984-2014

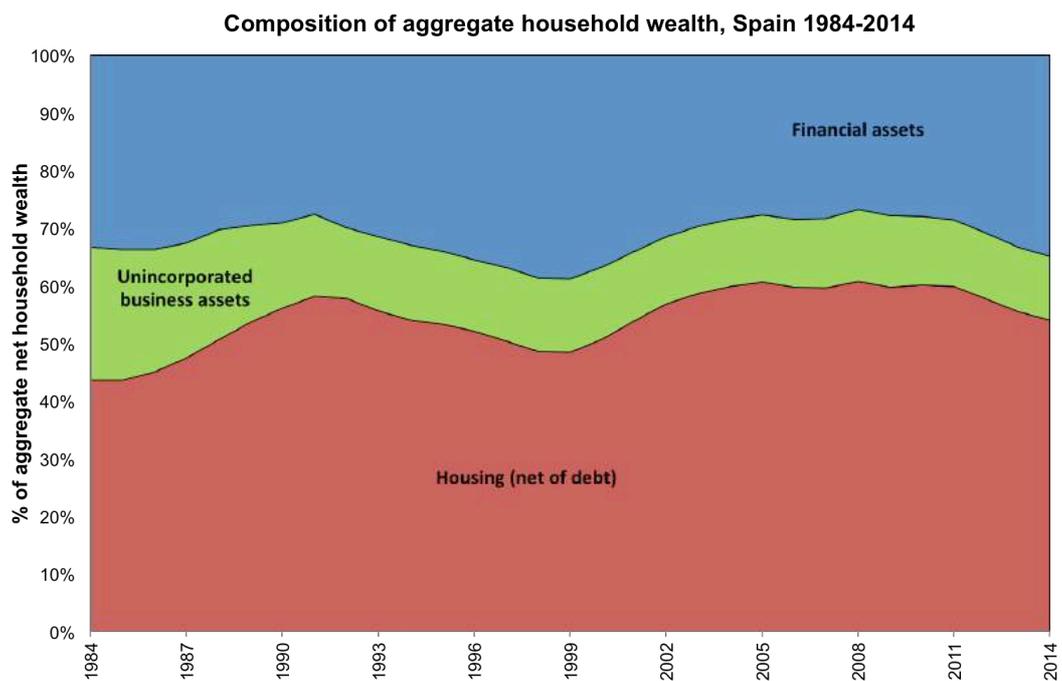




FIGURE 3 • FLOW RETURNS IN SPAIN, 1984-2014 (GROSS OF ALL TAXES)

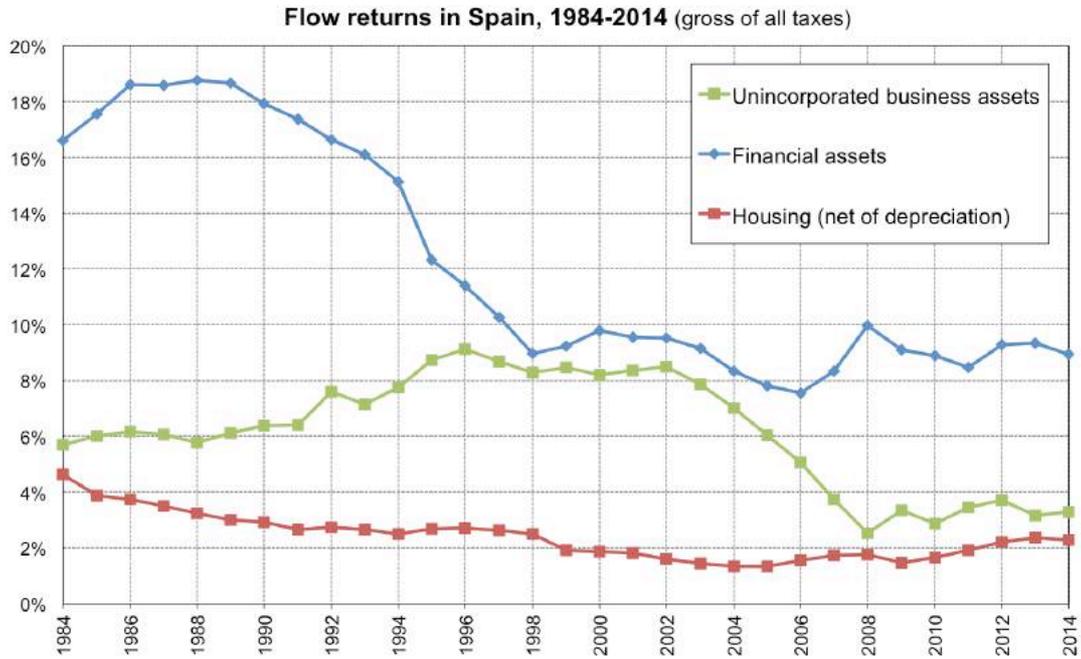


FIGURE 4 • DIRECT VS. IMPUTED WEALTH

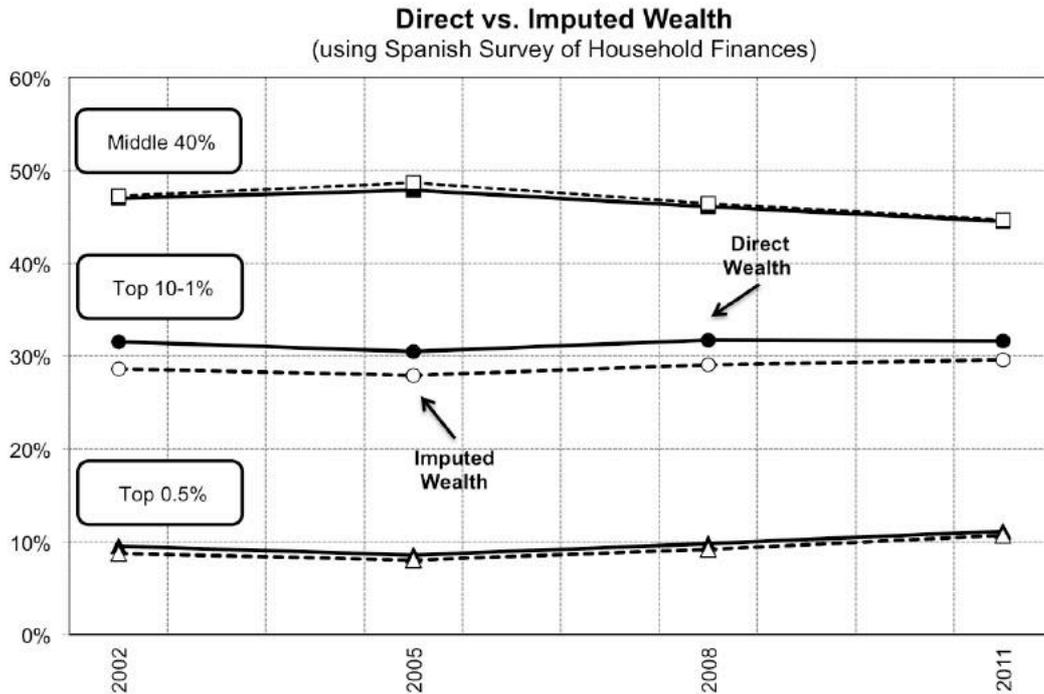




FIGURE 5 • WEALTH CONCENTRATION IN SPAIN, 1984-2013

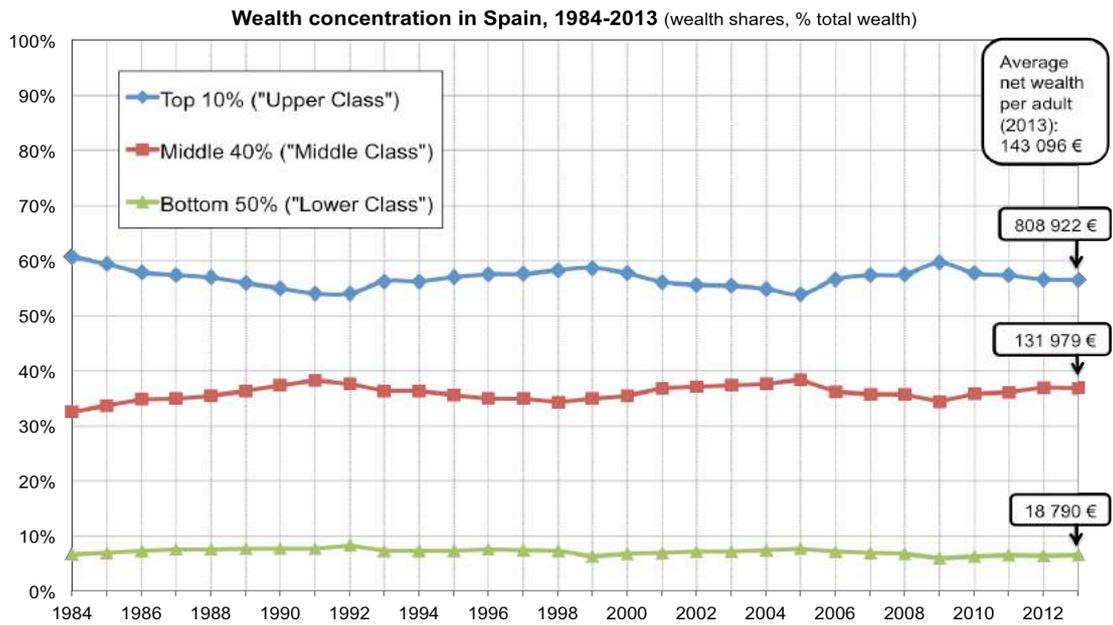


FIGURE 6A • COMPOSITION OF THE WEALTH DISTRIBUTION, SPAIN 1984-2013

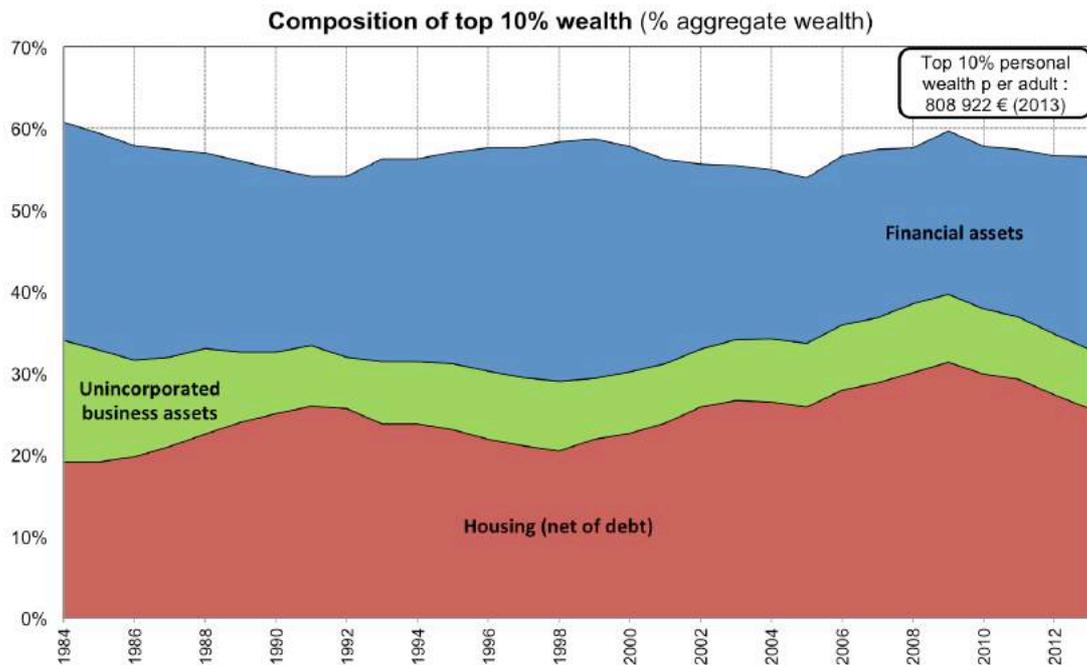




FIGURE 6B • COMPOSITION OF THE WEALTH DISTRIBUTION, SPAIN 1984-2013

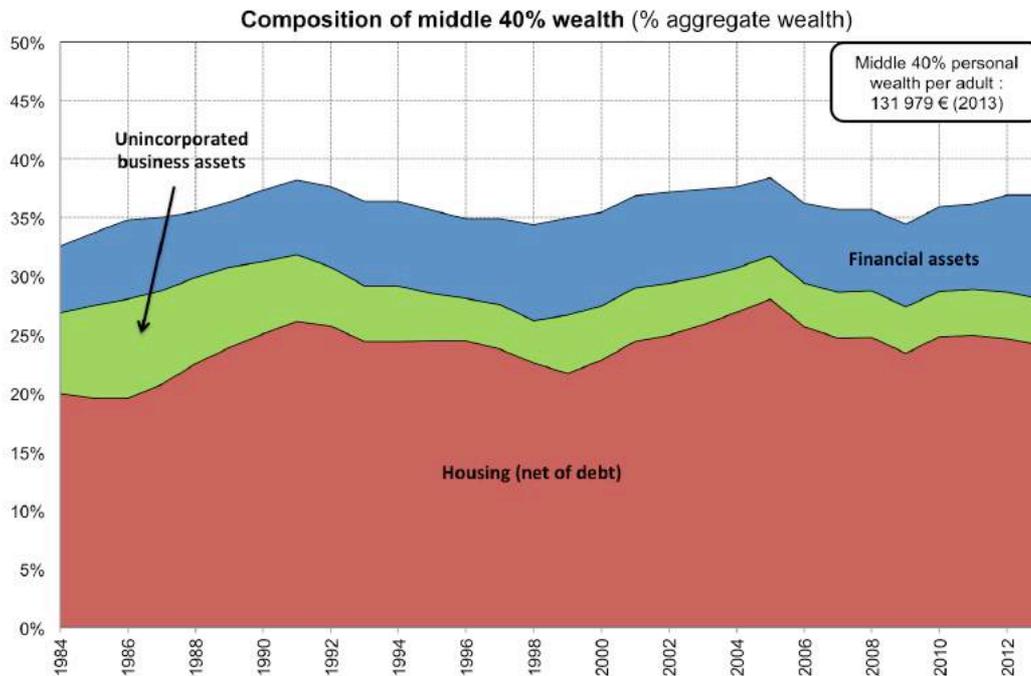


FIGURE 6C • COMPOSITION OF THE WEALTH DISTRIBUTION, SPAIN 1984-2013

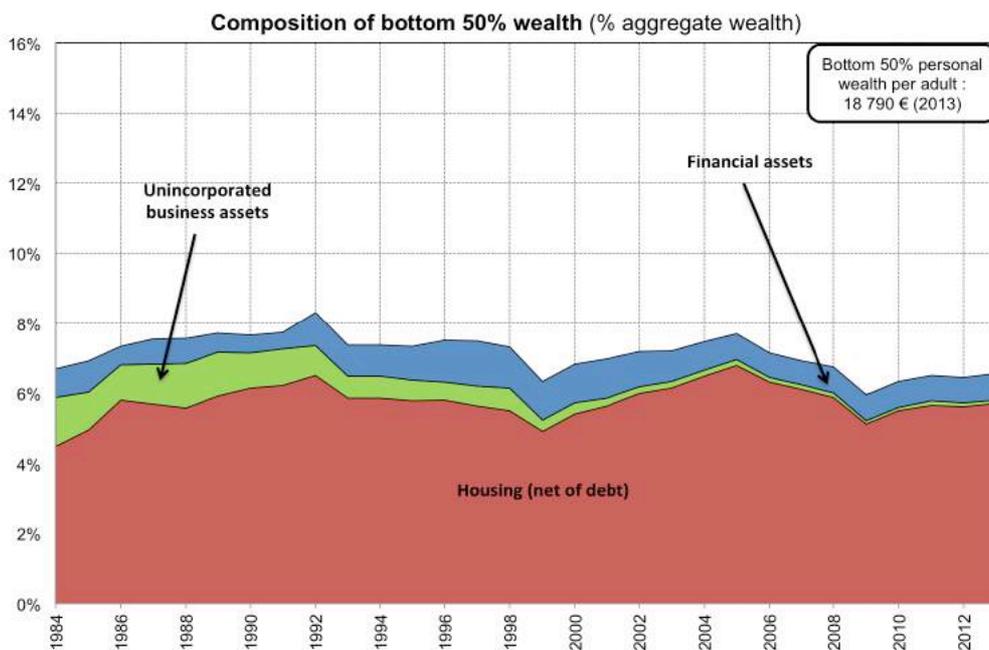




FIGURE 7 • COMPOSITION OF HOUSING BY WEALTH GROUP, SPAIN 1984-2013

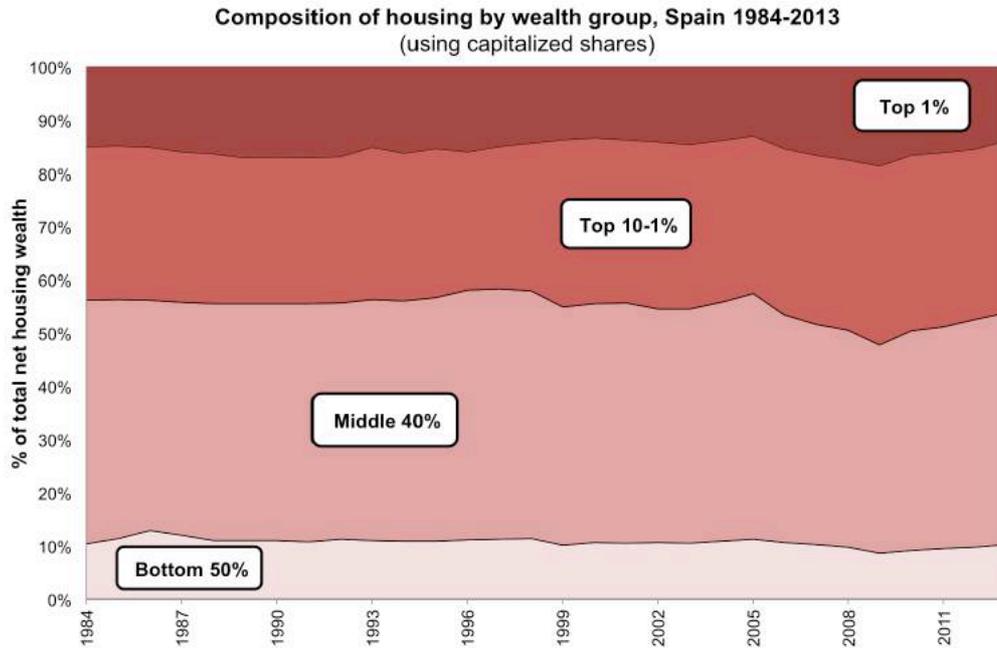


FIGURE 8 • AGE-WEALTH PROFILES IN SPAIN, 2001-2013

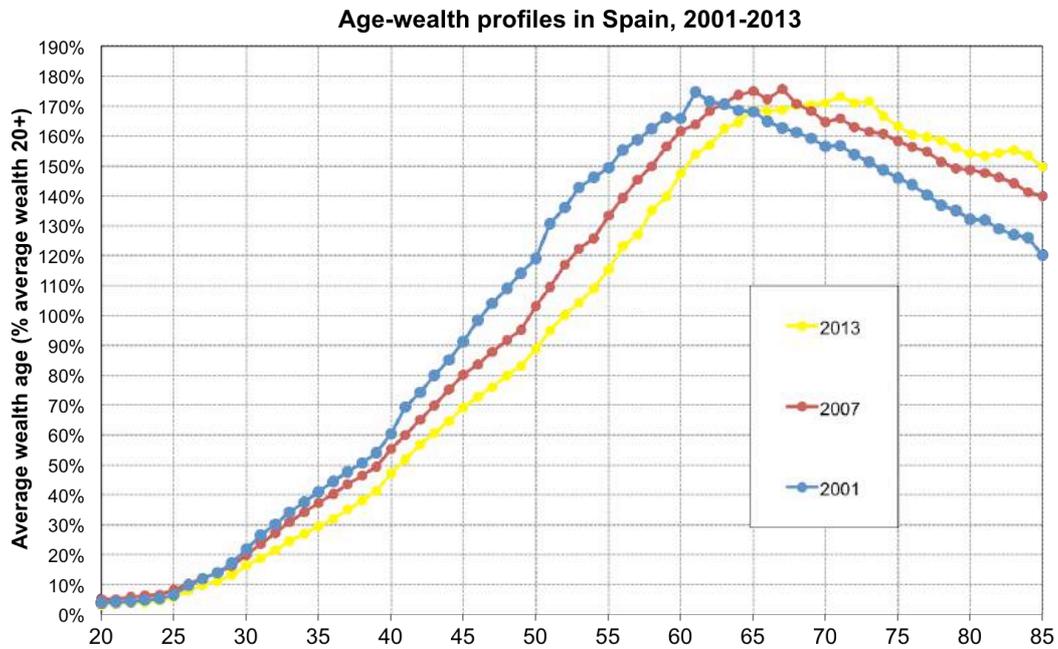




FIGURE 9 • WEALTH CONCENTRATION BY AGE GROUP, 1999-2013

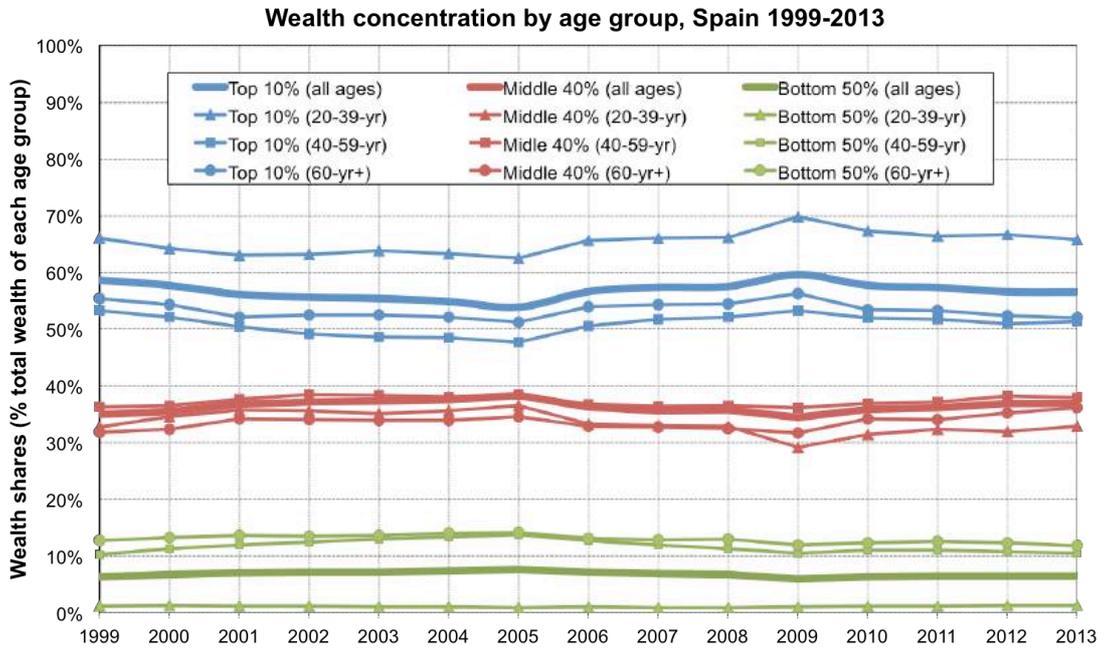


FIGURE 10 • TOP 10 % WEALTH SHARE: INTERNATIONAL COMPARISON, 1984-2013
(USING CAPITALIZATION METHOD)

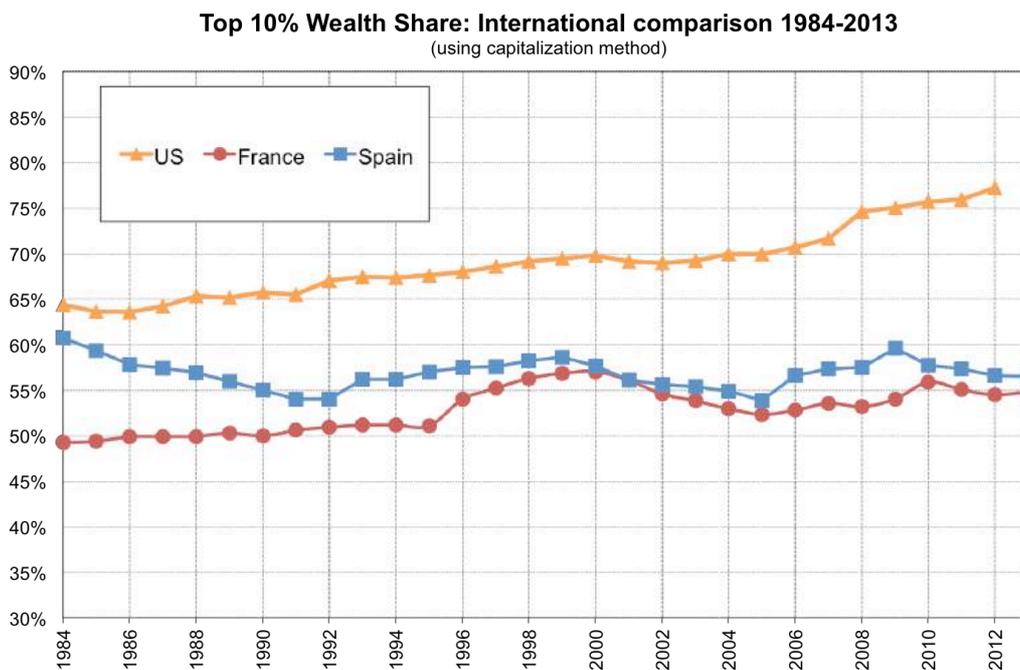




FIGURE 11 • TOP 1% WEALTH SHARE: INTERNATIONAL COMPARISON, 1984-2013
(USING CAPITALIZATION METHOD)

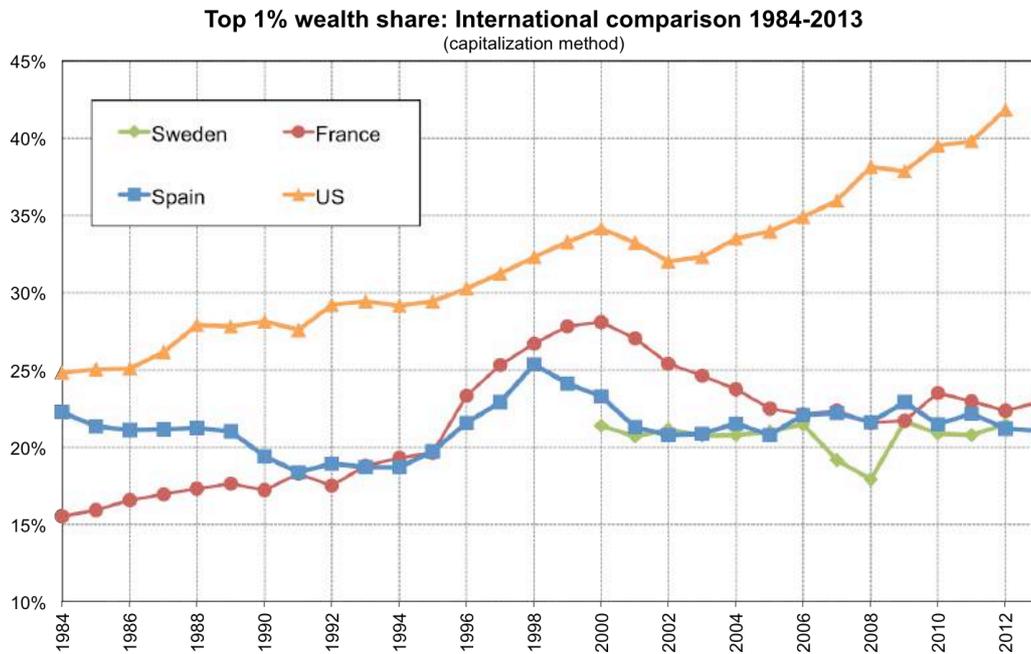


FIGURE 12 • OFFSHORE ASSETS HELD BY SPANISH RESIDENTS IN SWITZERLAND, 1999-2015

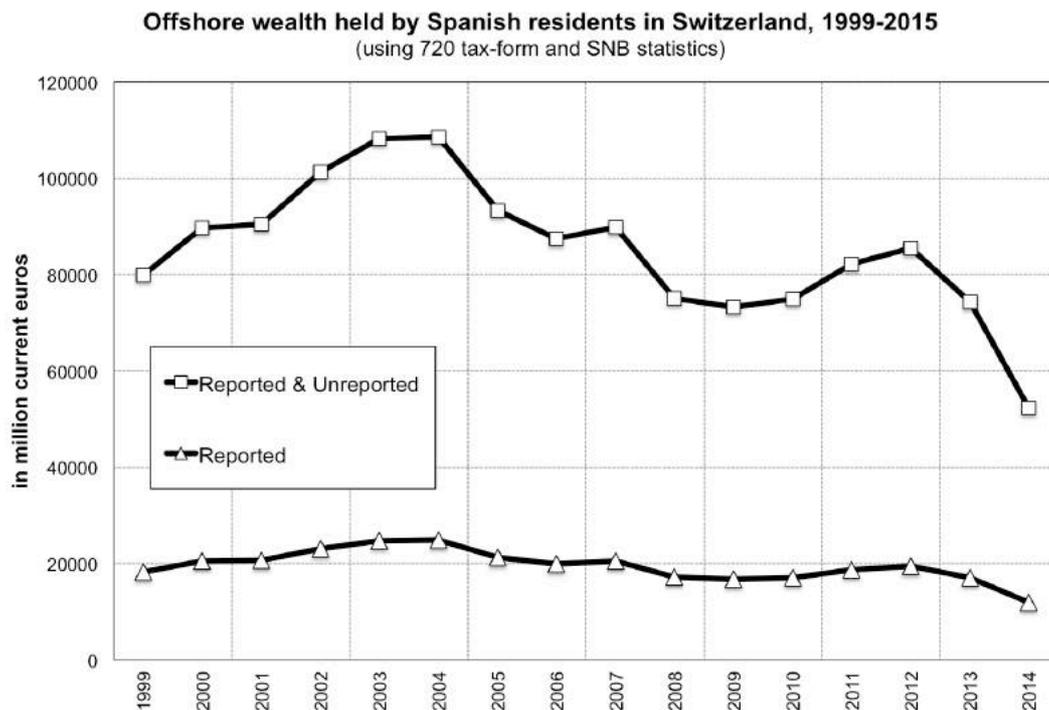


FIGURE 13 • TOTAL UNREPORTED OFFSHORE ASSETS, SPAIN 1984-2015



FIGURE 14 • COMPOSITION OF UNREPORTED OFFSHORE ASSETS, SPAIN 2012





FIGURE 15 • COMPOSITION OF TOP 1 % WEALTH SHARE INCLUDING UNREPORTED OFFSHORE WEALTH, SPAIN 1984-2013

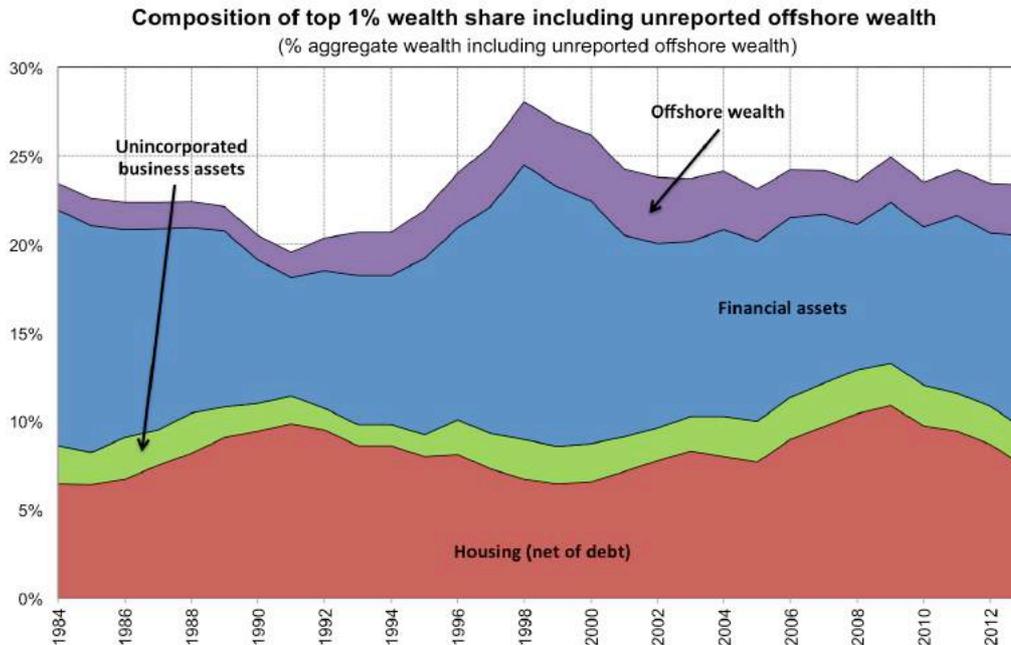


FIGURE 16 • WEALTH TAX TABULATIONS VS. CAPITALIZATION METHOD, SPAIN 1982-2013

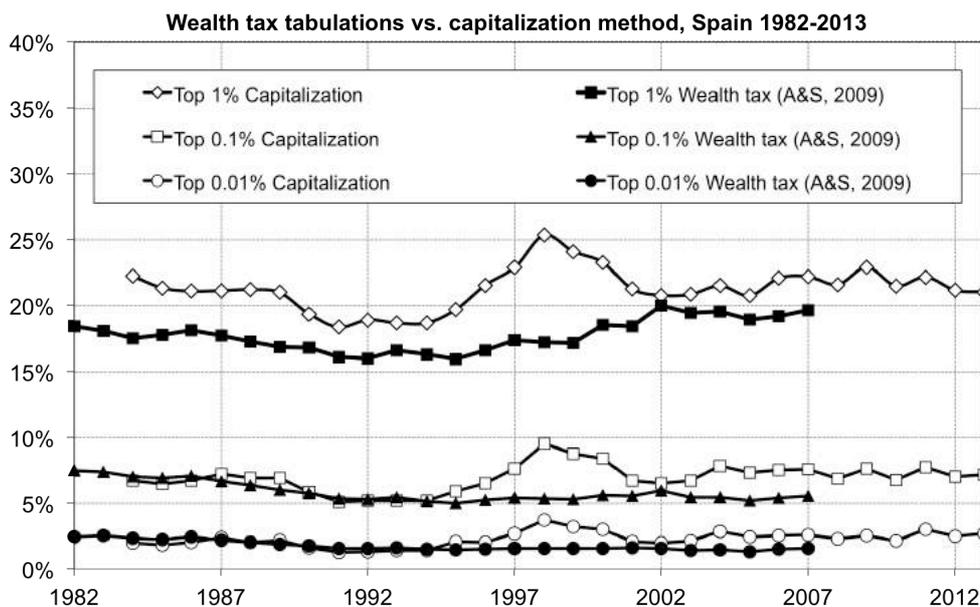




FIGURE 17 • WEALTH SHARES (SHF VS. CAPITALIZATION METHOD), SPAIN 2001-2013

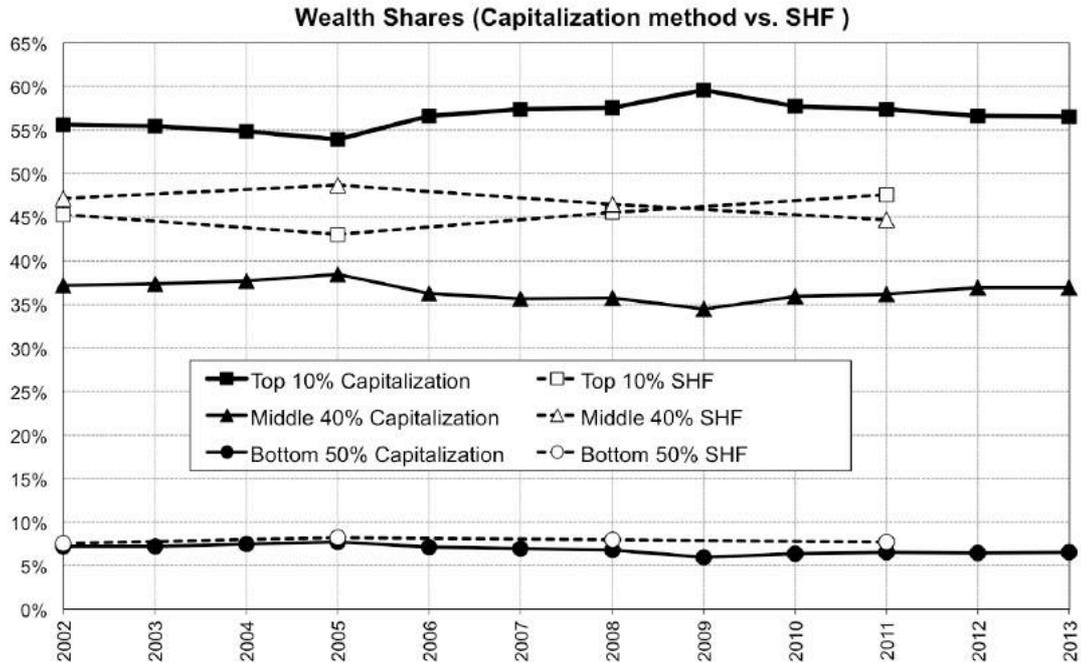


FIGURE 18A • RETURNS ON DEPOSITS AND FIXED-INCOME SECURITIES, SPAIN 2005

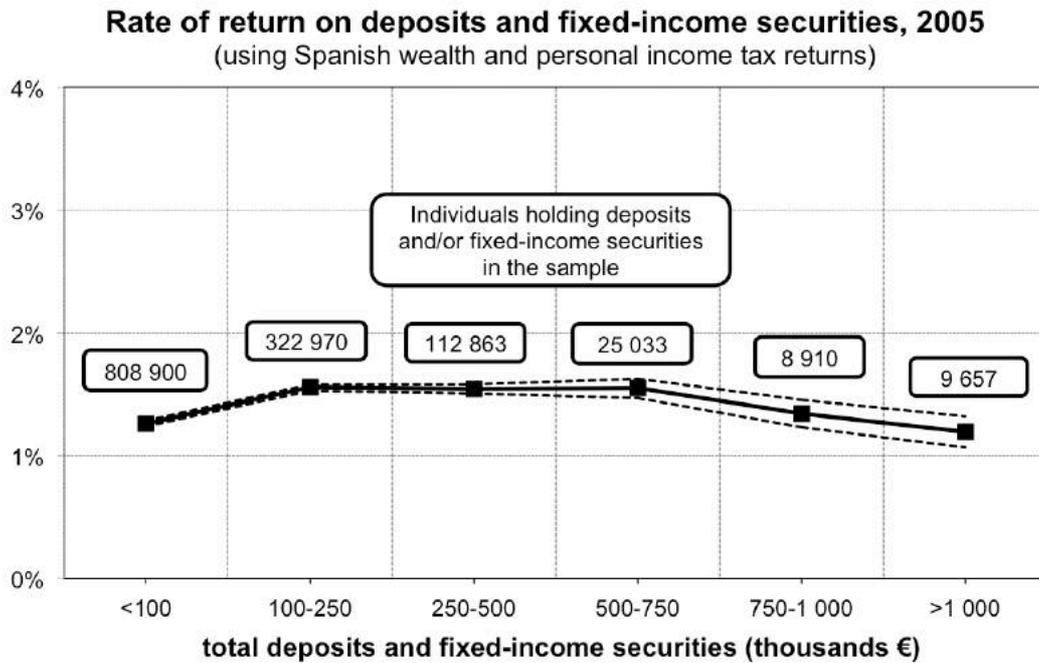




FIGURE 18B • RETURNS ON DEPOSITS AND FIXED-INCOME SECURITIES, SPAIN 2005

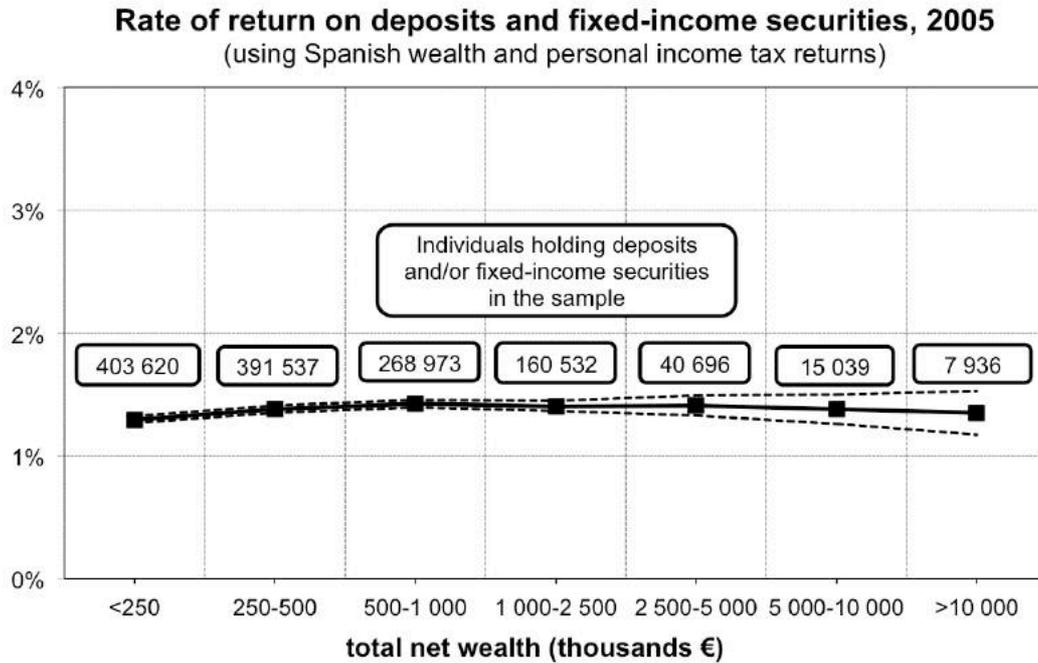
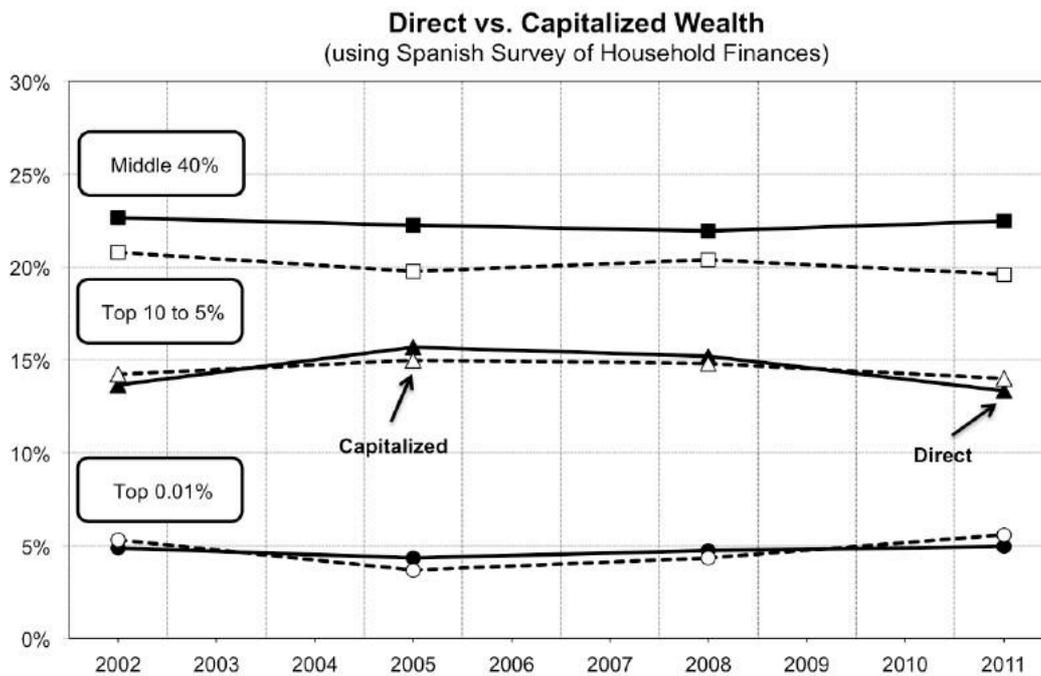


FIGURE 19 • DIRECT VS. CAPITALIZED WEALTH, SPAIN 2002-2011





10. APPENDIX B. TABLES

TABLE 1 • COMPARISON OF WEALTH AGGREGATES, SPAIN 2005

Comparison of wealth aggregates, 2005 (in current billion euros)

| | Capitalization method | Alvaredo & Saez (2009) | Survey of Household Finances |
|---------------------------------|----------------------------------|---------------------------------------|---|
| Net personal wealth | 4 867 | 5 057 | 3 491 |
| Net non-financial assets | 3 518 | 3 778 | 3 118 |
| Financial assets | 1349 | 1 279 | 434 |

I tre lavori qui pubblicati sono i vincitori della quinta edizione (2017) del Giorgio Rota Best Paper Award for Young Researchers sul tema “Economics Consequence of Inequality” e sono stati presentati alla Giorgio Rota Conference di maggio 2017 tenutasi presso il Campus Einaudi in collaborazione con il Dipartimento di Economia e Statistica ‘Cognetti de Martiis’.

Il Premio, istituito dal Centro Einaudi in memoria dell’economista torinese che ne era stato uno degli animatori, è sostenuto dalla Fondazione CRT.

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