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Financial Centres' Polyarchy and Competitiveness Does Political Participation Change a Financial Centre's Competitiveness?

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Financial Centres' Polyarchy and Competitiveness

Does Political Participation Change a Financial Centre's Competitiveness?

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Abstract

What role does polyarchy (and thus increased democracy) play in aiding the development of an international financial centre? We find support for decades of theorising that some jurisdictions use autocracy (less polyarchy) to help grow out their financial centres. We look at the growth of these financial centres as the extent to which they attract more funds from abroad (cross-border bank liabilities). Polyarchy decreases as other international financial centres' centrality in the global financial centre network expands. Polyarchy increases in most jurisdictions over time because some financial centres rely on increasingly polyartic governance as a way to foster financial innovation through increased participation by non-previously powerful sectors. Namely, the growth of an international financial centre's centrality in global financial networks relies on tapping down on polyarchy. Yet, such polyarchy – when used by some very central jurisdictions to remain central – “spreads.” We model such a relationship between polyarchy and centrality in the global financial network, describing even the most complex quantitative analysis in a way a non-specialist can understand. These results could impact decisions ranging from Brexit to Hong Kong's autonomy in its post-2047 period.

Keywords: international financial centres, endogenous global city network centrality, dynamic polyarchy, finance juntas, financial competitiveness, Bayesian network analysis.

JEL Codes: D72, F55, F33, P48

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Contents

Introduction	3
The Blundering Literature on Political Institutions and International Financial Centres.....	7
From regressions on democracy to political cycles	7
Looking for democratic/polyartic cycles as politicians promise more foreign investment	12
The Stylized Facts: The Link between Democratic Inclusion and Financial Centre Competitiveness.....	16
Democracy in Y/Zen's top international financial centres.....	16
Polyarchy and international financial centres	19
Modelling and Operationalizing Endogenous Change in IFC Politics and Competitiveness	26
Changes Within and Between Countries	26
Changes over Time	31
The Data and Empirical Methods We Used.....	33
Jurisdictions, raw polyarchy and network centralities	33
Getting polyarchy and network centralities ready for analysis	38
Changes over time.....	43
Does Polyarchy React to a Financial Centre's Centrality?.....	47
How Reliable Are These Results?.....	52
Conclusion.....	57
Appendix I: A Model of Domestic Political Change and a Model of Network Change	59
The micro-foundations of financial assets versus polyarchy	59
Supply and demand for polyarchy, innovation and investment assets.....	61
Modelling the interference from covariates	64
Appendix II: Details of Econometric Procedures and Results	67
Fitting the macro and other factors to the data.....	67
Variables used to create network data.....	70
Matrix Statistics for Banking Liability Data.....	74
Polyarchy and Importance to the Financial Network.....	78
Regressions for Robustness	80

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Introduction

Democratic institutions seem antithetical to building world-class international financial centres. Most famously, Shaxson – in his survey of tax havens – notes the extent to which secret cabals in The City (in London), Delaware, Jersey and other places dominated financial services lawmaking.¹ Regulatory capture has resulted in financial regulations which have made several international financial centres far more competitive – if far less robust to crises -- and less consumer-friendly.² The need to grow local financial centres into internationally competitive international financial centres has subsumed local politics in many places – resulting in the tacit or explicit restriction of certain political ideas and politics.³ Even in places not usually considered as financial centres until recently, the design of regulatory institutions has encouraged such capture.⁴ Politics -- dominated by elites, specialists and/or special interest groups -- has determined the extent and type of financial regulations in international financial centres.⁵ Indeed, some have argued that policies aimed at making an international financial centre more competitive have helped some of these groups stay in power and forestall political rivalry.⁶ To what extent does international financial centres' competitiveness incentivize/enable such restrictions on political pluralism? To what extent does the reverse happen – as restrictions on political participation boost the competitiveness of the financial centres which legitimizes certain politically powerful groups?

Our paper shows that political participation in adjusts to a financial centre's competitiveness, and that competition between international financial centres affects the extent of such political participation/pluralism in these financial centres. For example, Hong Kong lawmakers and politicians may keep a close eye on how many assets London, New York and Singapore-based

¹ See Nicholas Shaxson, *Treasure Islands: Uncovering the Damage of Offshore Banking and Tax Havens*, 2012, available [online](#).

² Hong Kong, for example, has always had a strong pro-business lobby in government (known even now as the Establishment). The city's own mini constitution (the Basic Law) even enshrines narrow financial interests as an object of constitutional law in article 109, requiring the government to "provide an appropriate economic and legal environment for the maintenance of the status of Hong Kong as an international financial centre." For more on the special concentration of financial interests governing Hong Kong's financial regulation, see Andrew Sheng, *From Asian to Global Financial Crisis: An Asian Regulator's View of Unfettered Finance in the 1990s and 2000s*, Cambridge University Press, 2009.

³ For one description, see Darryl Jarvis, Race for the Money: International Financial Centres in Asia, *Journal of International Relations and Development* 14(1): 60-95, 2011, available [online](#).

⁴ For an Irish account, see John Turner, Gerard Hughes, and Michelle Maher, An International Comparison of Regulatory Capture and Regulatory Outcomes: The Case of Pension Regulators in Ireland and the United States, *Journal of Financial Regulation and Compliance* 24(4): 383-401, 2016, available [online](#).

⁵ See Douglas Arner, The Politics of International Financial Law in the Aftermath of the Global Financial Crisis of 2008, In Friedl Weiss and Armin Kammel (Eds.), *The Changing Landscape of Global Financial Governance and the Role of Soft Law*, Brill, 2015.

⁶ Prem Sikka, The Role of Offshore Financial Centres in Globalization, *Accounting Forum* 27: 365-399, 2003, available [online](#).

asset managers attract from abroad – shutting down groups vying for other interests (like income redistribution) when Hong Kong’s own competitiveness falls. Decisions about political pluralism and financial centre performance seem inexorably linked in leading financial centres, not only within these centres but also between them.⁷ Yet, greater political participation/inclusiveness does not always/only reduce the performance/competitiveness of an international financial centre. The inclusion of different ideas and interests does not only drag down performance. As costs and benefits in the international network of financial centres changes, so must individual centres adapt – renewing the services and systems they use to compete globally. Increasingly democratic political institutions help foment these new ideas.⁸ Political competition and plurality helps generate new ideas for improving the intermediation of capital, as well as support for the financial centre. As these financial centres attract more assets and thus profits, they have more gains to share among different constituencies who demand rewards for their previous patient silence. When a financial centre reaches a certain size, more polyartistic institutions allow the winners to compensate other sectors of society, as well as draw them in into a process for seeking their ideas and political support for new and better ways of competing internationally.⁹ Political plurality and international centre competitiveness are thus locked in a dynamic dance across time. Any proposal to reform financial institutions thus needs to match the phase of that dance in order to achieve its desired effects. Policymakers in places like the UK and Hong Kong need not ask whether they should keep or give up greater autonomy over their financial regulation. The main question concerns whether they need to make this adjust *right now*.

We draw together the data into a conjecture about the way that international financial centres’ competitiveness and polyarchy interact across these centres. We measure such competitiveness as the cross-border assets drawn in by international financial centres’ banks. We use an off-the-shelf measure of polyarchy, as the extent to which more groups affect (or are allowed to affect) policy.¹⁰ We conjecture that these international financial centres need to restrict such polyarchy to pass the narrow financial regulations needed to grow the national financial centre(s).¹¹ As

⁷ Many forget this point when talking about ‘domination’ in financial regulation. While authors like Rahman bemoan reduced polyarchy in financial regulation, their domestic-mainly analysis fails to capture the deep-seated reasons for the political/regulatory domination of certain individuals/groups (besides their own oligopolistic self-interest). See Sabeel Rahman, *Democracy Against Domination*, Oxford, 2016.

⁸ According to some authors, not only does the financial sector benefit, but so does the whole economy. See Chun-yu Ho, Shao-qing Huang, Hao Shi, Jun Wu, Financial Deepening and Innovation Efficiency: The Role of Political Institutions, *ADB Working Paper 694*, 2017, available [online](#).

⁹ Story and Walter provide a fascinating glimpse of such politics in Germany, as German politicians decided to create a *Finanzplatz Deutschland* in the early 1990s. Carpenter provides a decidedly less sanguine picture of such politics from the ‘institutional strangulation’ taking place in the US’s post mortgage crisis politics. See the online chapter from Jonathan Story and Ingo Walter, The Politics and Markets of German Financial Services, In *The Political Economy of Financial Integration in Europe*, MIT Press, 1997, available [online](#). See also David Carpenter, Institutional Strangulation: Bureaucratic Politics and Financial Reform in the Obama Administration, *Perspectives on Politics* 8(3), 825-846, 2010, available [online](#).

¹⁰ As we describe later, the variable does not truly represent Ronald Dahl’s original conception of such polyarchy as a count of the number of political powerful groups engaged in policymaking – but as rough measures of democracy. For more on the linkage between ‘the finance polyarchy’ and democracy in the Canadian context, see William Carroll, Neoliberalism and the Recomposition of Finance Capital in Canada, *Capital & Class* 13(2), 1989, available [online](#).

¹¹ Some authors rightly refer to this process as the ‘capture’ of financial regulation. See Lawrence Baxter, “Capture” in Financial Regulation: Can We Channel it Toward the Common Good, *Cornell Journal of Law and Public Policy* 21(1), 2011, available [online](#).

other financial centres do the same thing – lawmakers, politicians and regulators need new ideas for financial sector regulations that will give them the edge. Such ideas come from the fracas of political competition, from new polities and the need to strike compromises.¹² Yet, polyarchy reduces again as governments of the day need to reduce resistance toward implementing these new ideas.¹³

We structure the paper as follows. First, we review the scant theorising about international financial centre competitiveness (size, growth, market niches and so forth) and their political plurality. Hundreds of political theorists, historians and geographers have written about the way that political interest groups use financial policies to obtain and keep political power. Yet, we could find none looking at the use of these policies at the global level (between financial centres themselves). Second, we look at trends in the raw data before going into our in-depth analysis. These trends set the stage for our main analysis, and should provide the reader with the intuitions and insights needed to assess our later analysis. The third section presents our model – showing how we see the trade-off between innovation and ‘focus’ (for lack of a better word). As usual in economics, jurisdictions have an optimal amount of polyarchy at any given time – polyarchy which helps attract the larger amount of cross-border bank liabilities given the polyarchy and central of other financial centres in global financial centre networks. The fourth section explains our empirical methods, using language simple enough for a non-social scientist to understand.¹⁴ The final section concludes. The appendices offer more quantitative background and support for our analysis.

We should caution the reader about some assumptions we make before beginning our argument. First, we must assume that political polyarchy at the ballet box in some way reflects polyarchy of those groups, cabals, juntas, bureaucrats and bankers who make financial policy.¹⁵ We understand the limitations of assuming that Swedish financial interests must vary more than Chinese ones – even though China has far more stakeholder groups interested in the outcomes of financial policy than Sweden has.¹⁶ Even though Saudi Arabia (for example) does not hold open elections often, elite rivalries do shape financial policy, as patrons on behalf of their clients and

¹² Far from the fracas of politics, some authors see such ideas emerging from the elite ‘knowledge capitalists’ who arise from (and as a result of) financial competition. With greater involvement in the design of financial regulations, these knowledge capitalists think up the next, competitive-charging ideas needed for financial centre growth. See Luiz Carlos Bresser-Pereira, *The Global Financial Crisis and a New Capitalism?*, *Levy Economics Institute Working Paper No. 592*, 2010, available [online](#).

¹³ These ideas do not need for come from home. Jacque and Vaaler document the large amount of copying/learning that takes place as money flows over borders. Unfortunately, these cheerleaders of globalisation do not discuss the subsequent political impacts – and the way these innovations have strengthened the grip of elites in power in places like Latin America. See Laurent Jacque and Paul Vaaler, *Financial Innovations and the Welfare of Nations: How Cross-Border Transfers of Financial Innovations Nurture Emerging Capital Markets*, Springer, 2001.

¹⁴ Our writing thus follows in the tradition of the new institutionalists, who argue for simplicity in economic writing. While we use advanced mathematics and statistics in this paper, we leave much of this complexity to the appendices. For more on this counter-culture method of writing, see John Kenneth Galbraith, *Writing, Typing, and Economics*, *Atlantic*, March 1978, available [online](#).

¹⁵ For a deeper description of the extent to which these regulators represent the values and preferences of the electorate, see Saule Omarova, *Bankers, Bureaucrats, and Guardians: Toward Tripartism in Financial Services Regulation*, *Cornell Law Faculty Paper 1010*, 2012, available [online](#).

¹⁶ He provides more information about China’s internal factions vying for bureaucratic-administrative political capital. See Alex He, *The Dragon's Footprints: China in the Global Economic Governance System under the G20 Framework*, Centre for International Governance Innovation, 2016.

supporters – and they influence financial policies polyartically at the Cabinet of Ministers and ministerial levels.¹⁷ Where possible, we provide references to previous research showing the usefulness and likely validity of such an assumption on the macro-level. Similarly, albeit more credibly, we hypothesize that when polyarchy decreases, financial regulation reflects the interests of the groups in power. In other words, we do not distinguish between differences in power between groups exercising polyartic power. Nevertheless, we do not assume that the members of a particular polyarchy reflect mostly financial institutions' interests (indeed we test this proposition in our paper). We may also slip by associating more polyarchy with more democracy – a fact true by definition except when a jurisdiction changes from a position of greater to less democracy (thus becoming more autocratic).¹⁸ We may also slip by talking about V-Dem's polyarchy measure as a more reliable measure of the polyarchy we want to understand than it is.¹⁹

Our other assumption major assumption deals with the way more polyarchy translates into more financial innovation (or at least competitiveness). We empirically test the extent to which polyarchy correlates with a financial centre's centrality – particularly for very large and central jurisdictions with rising polyarchy. We theorise that polyarchy's benefit comes from financial innovation and good ideas from a larger range of society's stakeholders – rather than from something else. Based on our literature review, this looks like a reasonable assumption.²⁰ However, we usually refer to this chain of causation, while ignoring other possibilities.²¹ To keep our paper at a reasonable length, we do not try to figure out the exact reason why polyarchy might rise after a time of repression, when the financial centre becomes larger.²²

¹⁷ Indeed, every jurisdiction has its own configuration of government institutions that decide on financial policy – from a financial council to a diarchy between the central bank governor and financial minister. We do not observe how many wealthy families or bank CEOs these rulers represent – the true extent of polyarchy over financial policy. See Richard Ratcliff, Mary Gallagher, and Kathryn Ratcliff, *The Civic Involvement of Bankers: An Analysis of the Influence of Economic Power and Social Prominence in the Command of Civic Policy Positions*, *Social Problems* 26(3), 1979, available [online](#).

¹⁸ Our use of variable measuring polyarchy unfortunately requires us to few political participation along a continuum from autocracy (rule by one person or group) to democracy (rule by all) – with polyarchy lying somewhere in the middle. We wholeheartedly accept that political regimes are far more complex than the standard linear portrayal of them allows for. Yet, following a long tradition, we use this simplification only to make our main ideas clearer. For an early contribution to this linear way of thinking about political institutions, see Martin McGuire and Mancur Olson, *The Economics of Autocracy and Majority Rule: The Invisible Hand and the Use of Force*, *Journal of Economic Literature* 34(1): 72-96, 1996, available [online](#).

¹⁹ See Vanessa Boese, *How (Not) to Measure Democracy*, *Research Gate Working Paper*, 2018, available [online](#).

²⁰ A reading of histories like Prin's might suggest that a wave of democratic populism often follows a period of banker controlled politics (at least in the US). Such an observation does not exclude previously marginalised bankers, and banker wannabes, (with new and better business models) who subsequently have access to positions they previously did not have. See Nomi Prins, *All the Presidents' Bankers: The Alliances that Drive American Power*, Tantor, 2014.

²¹ An almost infinite number of alternative explanations exist. One could imagine that each social group in a jurisdiction has separate ties to banking/investment contacts abroad. Thus, more polyarchy might, almost mechanically, increase cross-border bank liabilities as these groups call their foreign contacts looking for assets to manage. Higher polyarchy might represent the outcome of a political stalemate, where formerly excluded groups now participate in government and stop sabotaging rival's investment/banking opportunities.

²² Another study may wish to tackle this question. Authors like Chwiero might argue that polyarchy may rise after a group or groups achieve their aims, allowing de jure polyarchy rather than de facto polyarchy. Authors like Cobb might argue that such polyarchy brings the 'balance' between trust, knowledge, reputation, and networks in the functioning. See Jeffrey Chwiero, *The Crisis in Global Finance: Political Economy Perspectives on International*

Another assumption concerns our definition of financial centre competitiveness. We equate cross-border banking liabilities with a jurisdiction's competitiveness. Yet, we use Y/Zen's list of top international financial centres to choose the jurisdictions to study – a list which most decidedly rejects such a narrow definition.²³ Indeed, as we show later in our paper, cross-border bank liabilities flows differ from the flows of assets, equity, short-term and long-term debt. With some jurisdictions specialising in securitisation, mutual funds, and foreign exchange, our approach captures a microscopic part of this overall competitiveness.²⁴ We feel justified though in talking about broader competitiveness, as our methodology easily extends to these markets. Many financial centres excel in many financial services at the same time because of their “product complementarities, the nature of local epistemic communities, and regulation.”²⁵

Finally, we often must talk about international financial centres (like Frankfurt or Paris) using data for their nation-state (Germany and France respectively). For jurisdictions with multiple financial centres -- like the US, China, and Germany – using national polyarchy hardly represents a fair portrayal of polyarchy on Wall Street (New York) versus Sand Hill Road (San Francisco). Doha, Seoul or Tokyo might (or might not) account for most of these jurisdictions' banking centrality. Lack of data at the city-level forces us to elide entire jurisdictions with the city that appears on Z/Yen's index of top international financial centres. We try to refer to the country as a whole, rather than individual financial centres – leaving it up to the reader and future researchers as to the extent to which the jurisdiction's whole represents its parts as metropolitan financial centres.²⁶

The Blundering Literature on Political Institutions and International Financial Centres

From regressions on democracy to political cycles

None of the studies of international financial centres look directly, quantitatively or econometrically at the way local political institutions respond to the competitiveness of their international financial centres. Did Singapore's and Lee Kwan Yew's People's Action Party's

Financial Regulatory Change. *LSE Eprint*, 2011, available [online](#). See also Corkill Cobb, Global Finance and the Growth of Offshore Financial Centers: The Manx Experience, *Geoforum* 29(1), 1998, available [online](#).

²³ The Y/Zen measure represents a survey of surveys, with many of the variables entering into their list representing factors related more with the quality of life of people working in a jurisdiction, rather their ability to attract funds. For a description of their methodology, see Mark Yeandle, *The Global Financial Centres Index* 22, 2017, available [online](#). For a critique of their methodology, see Douglas Arner et al., Assessing Hong Kong as an International Financial Centre, *University of Hong Kong Faculty of Law Research Paper No. 2014/012*, 2014, available [online](#).

²⁴ For a richer look at these factors, see Youssef Cassis, *Capitals of Capital: The Rise and Fall of International Financial Centres 1780-2009*. Cambridge University Press, 2010.

²⁵ See James Faulconbridge, Ewald Engelen, Michael Hoyler, and Jonathan Beaverstock, Analysing the Changing Landscape of European Financial Centres: The Role of Financial Products and the Case of Amsterdam, *Growth and Change* 38(2): 279-303, 2007, available [online](#).

²⁶ We wish to avoid the debate about the extent to which national policy makes an international financial centre (though we deal with the inverse question in our paper as the effect of an international financial centre on national policy). From skeptics like Yildirim and Mullineux to cheerleaders like Abramov and co-authors, a multitude of varying positions keep the debate going. See Tansu Yildirim and Andrew Mullineux, An empirical assessment of the Istanbul International Financial Centre Project, *Cities* 48:1-7, 2015, available [online](#). See also Dmitry Abramov Stanislav Polezhaev Mikhail Sherstnev, Moscow as International Financial Center: Ideas, Plans and Perspectives, *Journal of Eurasian Studies* 2(1): 144-152, 2011, available [online](#).

resistance to outside and variegated political participation help the nation-state's elites build a world-class financial centre? How much did the politics of Wall Street's elites drive Ronald Reagan's liberalisation programme (and his chocking off to participatory policymaking institutions like labour unions' input into policy)? How much did the need to compete with Tokyo or London also shape the former US President's decisions? Despite extensive work on measuring and assessing international financial centres, previous studies tend to ignore three aspects of international financial centre competitiveness politics. First, to the extent they empirically/econometrically look at the link between politics and international financial centre competitiveness, they do so through the lens of "democracy." Second, they ignore the dynamics of political change – and the way that political change drives international financial centre competitiveness. Third, they ignore local politics responds to and affects local politics abroad as these politicians look at the competitiveness of their jurisdictions' financial institutions.

The first blunder of the literature consists of a narrow focus on regressions looking at the relationship between democracy and financial development.²⁷ For example, studies like Doces looked at the extent to which differing levels of a survey indicator designed to proxy the extent/level of 'democracy' correlated with levels of foreign direct investment.²⁸ Girma and Shortland might find that the degree of democracy (or elite capture of political decisions) affects financial sector development, as measured by indicators such as private sector credit-to-GDP ratios, stock market capitalisation-to-GDP ratios and stock market value traded-to-GDP ratios.²⁹ Democracy and "good" political institutions – holding other variables fixed – aid in financial sector development and thus the likely emergence of international financial centres.³⁰ Yet, the consensus – if one can call it a consensus – finds that democracy helps promote the development of large financial sectors using measures like these, only for countries with robust legal and governance institutions in place.³¹ Democratic development and financial sector/market development have gone together since the industrial revolution, and will likely continue to do so.³² Of course dissenters and hedgers will always remain, given the messy nature of the world

²⁷ The almost hundreds of similar studies handle the econometric issues involved with varying degrees of aplomb. Rajan and Zingales, for example, completely fail to show any kind of link, mixing anecdotes with regressions of macroeconomic variables only obliquely related to either politics or financial development. For such 'worse practice,' see Raghuram Rajan and Luigi Zingales, *The Great Reversals: The Politics of Financial Development in the 20th Century*, *NBER Working Paper 8178*, 2001, available [online](#). While readers might dismiss this as an old flawed – similar studies keep emerging in this vein of the literature. See also Elias Papaioannou, *What Drives International Financial Flows? Politics, Institutions and Other Determinants*, *Journal of Development Economics* 88(2), 2009, available [online](#).

²⁸ For a review of these earlier studies, see John Doces, *The Dynamics of Democracy and Direct Investment: An Empirical Analysis*, *Polity* 42(3), 2010, available [online](#).

²⁹ See Sourafel Girma and Anja Shortland, *The Political Economy of Financial Development*, *Oxford Economic Papers* 60(4), 2008, available [online](#).

³⁰ See for example Sambit Bhattacharyya, *Political Origins of Financial Structure*, *CSAE Working Paper WPS/2011-20*, 2011, available [online](#). For the effect of these supposedly "good" political institutions, see Yong-fu Huang, *Political Institutions and Financial Development: An Empirical Study*, *World Development* 38(12), 2010, available [online](#).

³¹ Wafa Ghardalloul and Abdelkader Boudriga, *Financial Development and Democracy: Does the Institutional Quality Matter*, *Group on European Research Conference Paper*, 2013, available [online](#).

³² For evidence, see Barry Eichengreen and David Leblang, *Democracy and Globalisation*, *Bank for International Settlements Working Papers No 219*, 2006, available [online](#).

and the data.³³ The nature of these measures also pose problems, as indicators measuring the extent to which a country has an autocratic versus democratic governance institutions, as well as measures which try to measure the durability of those institutions, remain highly problematic.³⁴ Yet, these studies fail in a more fundamental way. They fail to look at dynamics – how the extent of democracy and self-determination change over time in response to changing investment needs.³⁵

The second blunder of the literature consists of ignoring the dynamics of changing financial sector competitiveness and political participation. Many works – particularly by geographers – talk about cycles of political participation and financial sector competitiveness over time, from an economic, political and sociological perspective. Any study of a financial centre, like Singapore, would show the constant competition with other financial centres, the need for politicians to restrict or expand democratic participation as needed, and the way that such participation affects an international financial centre's competitiveness.³⁶ In the US context, scholars and pundits alike see a dichotomy between “democratic participation” in finance and a more centralised one, focused around finance-sector interest groups.³⁷ Many of these focus on events which depend as much as historical accident as any deliberate policies arising after, or in reaction to, these accidents. Subsequent policy may encourage the development of a financial centre.³⁸ Yet, few provide a working, testable model of political and financial sector change in international financial centres. Some exceptions do exist.³⁹ Yet, many describe such accidents as “path dependencies” (meaning we do not know really if their causes can be replicated).⁴⁰ Yet, a large

³³ For example, see Ben-Hua Yang, Does Democracy Foster Financial Development? An Empirical Analysis, *Economics Letters* 112(3), 2011, available [online](#).

³⁴ The ‘polity’ measure in particular maps country polities onto a numerical scale, somewhere between pure autocracy and pure democracy. The variables ‘durability [of] autocracy’ and the ‘durability [of] democracy’ represent the longevity of such a system (brackets ours). ‘Negative regime change’ represents the extent to which such a variable reflects a more autocratic government. A ‘positive regime change’ shows a jurisdiction exhibiting more democratic tendencies. While such a measure at least tries to incorporate time into the analysis, such variables hardly replace a time series or other dynamic analysis looking at change over time. See Quintyn, Marc and Genevieve Verdier (2010), “Mother, Can I Trust the Government?” Sustained Financial Deepening – A Political Institutions View, *IMF Working Paper 10/2010*, 2010, available [online](#).

³⁵ As if to cap off this section, a doctoral dissertation done a decade ago finds no reliable pattern between the extent of democratic governance and the performance of financial policy. Despite the hundreds of studies conducted since then, we have not really made much progress since. See John Liscano, Democracy and Financial Regulation: The Effects of Political Institutions on Economic Policy, *University of California at Santa Barbara Dissertation*, ProQuest Dissertations Publishing, 2007, available [online](#).

³⁶ Woo reflects many writing in this tradition. He analyzes domestic factors leading to Singapore's financial centre, but ignores the international impetus leading to the presence of these factors in the first place. See Jun-Jie Woo, *3-in-1: Governing a Global Financial Centre*, 2017.

³⁷ For example, see Simon Johnson, The Financial System of the Future, *Democracy: A Journal of Ideas* Spring(40), 2016, available [online](#).

³⁸ For an example about London. see Photis Lysandrou, Anastasia Nesvetailova and Ronen Palan The Best of Both Worlds: Scale Economies and Discriminatory Policies in London's Global Financial Centre, *Economy and Society* 46(2), 2017, available [online](#).

³⁹ Thomas Oatley, Kindred Winecoff, Andrew Pennock, and Sarah Danzman, The Political Economy of Global Finance: A Complex Network Model, *Perspectives in Politics* 11(1), 2013, available [online](#). See also William Winecoff, Global Banking as a Complex Political Economy, *American Political Science Association Conference Paper*, 2013, available [online](#).

⁴⁰ See Donato Masciandaro, Offshore Financial Centres: The Political Economy of Regulation, *European Journal of Law and Economics* 26(3), 2008, available [online](#).

literature even exists admonishing academics with quantitative research skills to pay attention to the inter-relationship between politics and finance in the development and growth of these international financial centres...leading to our third blunder.⁴¹

The third blunder committed by the literature in our subject consists of most discussions tending to depoliticise both the national and international aspects of international financial centres.⁴² At their most extreme, models of financial centres see different policies ‘diffusing’ – with financial authorities copying policies from other jurisdictions like the spreading of a fad or hit song.⁴³ Such diffusion has no room for politics, either within or between jurisdictions. For authors like Hampton and Christensen, the politics of these international financial centres extends only so far as such lobbying (usually targeted at tax havens) help or hurt other – particularly larger – countries like the US.⁴⁴ They describe how the IMF, the OECD and even countries like the US call for financial and other reforms in the international financial centres.⁴⁵ They draft the rules that countries can follow – or not.⁴⁶ Many even argue that international elites use and abuse these centres and their places – in effect usurping their politics.⁴⁷ Others argue that local elites manipulate the political process – without ever describing who or how -- to create an international financial centre serving their own interests.⁴⁸ These elites’ better understanding of the complexities of finance (better than even national regulators) supposedly facilitate their ability to manipulate the political process and the government itself.⁴⁹ If international financial centres do compete, authors like Hall would have us believe that they do so through apolitical government policies.⁵⁰ Wang and authors of his ilk present the results of such political

⁴¹ For a recent incarnation, see Michael Lee, What Do We Know About Global Financial Crises? Putting IPE and Economics in Conversation, *Oxford Research Encyclopedia of Politics*, 2017, available [online](#).

⁴² For authors like Woo, this represents one of the largest failings of current efforts to study international financial centres. See Jun-Jie Woo, Studying International Financial Centres, In Jun-Jie Woo, *Singapore as an International Financial Centre*, 2016, at p. 9-24.

⁴³ Because these models do not contain agents, they do not contain agency. See Christopher Gandrud, The Diffusion of Financial Supervisory Governance Ideas, *Review of International Political Economy* 20(4): 881-916, 2013, available [online](#).

⁴⁴ For an example, see Mark Hampton and John Christensen, Offshore Pariahs? Small Island Economies, Tax Havens, and the Re-configuration of Global Finance, *World Development* 30(9): 1657–1673, 2002.

⁴⁵ For example, see J. C. Sharman, The Bark is the Bite: International Organizations and Blacklisting, *Review of International Political Economy* 16(4), 2009, available [online](#).

⁴⁶ Authors Deeg and O’Sullivan unhelpfully propose a dichotomy between international financial rule-makers and rule-followers (or breakers as they describe). Such a false dichotomy – a problem that runs through the literature – creates a normative framework and club to which jurisdictions should aspire. Academics’ tasks thus involve trying to explain why countries do not follow these international regulations. See Richard Deeg and Mary O’Sullivan, The Political Economy of Global Finance Capital, *World Politics* 61(4), 2009, available [online](#).

⁴⁷ For foreign elites using these centres, see Anthony van Fossen, The Transnational Capitalist Class and Tax Havens, In Georgina Murray and John Scott, *Financial Elites and Transnational Business: Who Rules the World?*, Edward Elgar, 2012. For local elites using and abusing them, see Ronen Palan, International Financial Centers: The British-Empire, City-States and Commercially Oriented Politics, *Theoretical Inquiries in Law* 11(1), 2010, available [online](#).

⁴⁸ Sabine Dorry, The role of elites in the co-evolution of international financial markets and financial centres: The case of Luxembourg, *Competition & Change* 20(1), 2016, available [online](#). See also Sarah Hall, Financialised elites and the changing nature of finance capitalism: Investment bankers in London’s financial district. *Competition & Change* 13(2), 2009, available [online](#).

⁴⁹ See Geoffrey Underhill and Xiao-Ke Zhang, Setting the rules: private power, political underpinnings, and legitimacy in global monetary and financial governance, *International Affairs* 84(3), 2008, available [online](#).

⁵⁰ While Hall accepts the existence and pressures of national politics in forming these policies, her paper makes such passing references to such politics as to make the rough-and-tumble of actual fights over power and principles something that happens in the background. See Sarah Hall, Rethinking International Financial Centres Through the

machinations and movements as *faits accomplis* (the inevitable result and cause of “political will”).⁵¹

Worse still, they ignore the strong political as well as economic harms many of these reforms would cause if local politicians did more than pay these reforms lip service. For these authors, the most that can happen is that, “the cumulative pressures for reform will significantly re-configure the offshore finance industry. Offshore finance may return onshore to the large, functional financial centers such as London or New York.”⁵² Such a reshoring would kill many political careers in these centres. Many international financial centres seem to exist to serve as offshore international financial centres – making their success a prime political objective.⁵³ Authors that claim that such competition simply represents “jurists’ and policymakers’ attempts to resolve an inherent contradiction between insulated state law and the rapidly integrating world market” have been as misled as these politicians’ constituents into believing financial law represents a non-political, non-competitive ‘policy area.’⁵⁴

To understand the dynamics of political change, given economic/commercial change in an international financial centre, we must turn toward the historical literature. Recent case study and historical treatments of financial centre development have particularly shown the waning and waning nature of democracy and financial sector development. Financial, and thus economic, performance represents a strong electoral issue in many countries – just as electoral results represent strong drivers of international portfolio and direct investment.⁵⁵ Politicians and any/all interested parties keep an eye on the rhetoric and policies foreign investors want.⁵⁶ Sometimes, such competition between international financial centres may imperil the viability of the policies these jurisdictions have put in place to compete internationally in the first place.⁵⁷ While many emerging markets “simply do not exist for global financial market investors,” some financial

Politics of Territory: Renminbi Internationalisation in London's Financial District, *Transactions of the Institute of British Geographers* 42(4), 2017, available [online](#).

⁵¹ Jiang-Yu Wang, The Rise of Singapore As International Financial Centre: Political Will, Industrial Policy, and Rule of Law, In Jia-xiang Hu, Matthias Vanhullebusch and Andrew Harding (Eds.), *Finance, Rule of Law and Development in Asia: Perspectives from Singapore, Hong Kong and Mainland China*, Boston: Brill Academic Publishers, 2016, available [online](#).

⁵² Id. at p. 1667.

⁵³ Malta represents an obvious example where political disputes in/with other European Union member states have come into conflict with those enabling the jurisdiction’s financial centre. See Bertrand Borg, MEPs’ barrage of criticism against Malta met with caution by European Commission, *Times of Malta November 14, 2017*, available [online](#).

⁵⁴ At the time of this writing, literally hundreds of senior officials loot their states treasuries – looking for every possible loop-hole to help their own interests and avoid taxes and competition abroad. Who could policymakers engaged in commercializing state sovereignty as the innocent victims of some abstract contradiction in global capitalism? See Ronen Palan, Tax Havens and the Commercialization of State Sovereignty, *International Organization* 56(1): 151-176, 2002, available [online](#).

⁵⁵ For more on the flip side of this coin (the impact of politics on foreign investors), see Javier Santiso, *Banking on Democracy: Financial Markets and Elections in Emerging Countries*, MIT Press, 2013.

⁵⁶ For more than our example-less one sentence assertion, see Hye Jee Cho, *Institutions, Partisanship and Credibility in Global Financial Markets*, Routledge, 2017. See also Darryl Jarvis, International Financial Centres in Asia: Contest, Competition and Possible Trajectories, In *ASEAN Industries and the Challenge from China*, Palgrave, 2011.

⁵⁷ For example, a jurisdiction’s senior politicians may pass foreign investor-friendly rules, when they require them to make them less friendly in order to attract some investors to the detriment of others. For examples, see George Bragues, *Money, Markets, and Democracy: Politically Skewed Financial Markets and How to Fix Them*, 2018.

centres absolutely do.⁵⁸ Many of these political and foreign investment decisions follow cycles. Most scholars have assumed that the uncertainty in these cycles drive investment.⁵⁹ But what if the decisions taken in these cycles reflect the nature of the cycle itself? Namely, what if disposition toward particular political practices and institutions (particularly democratic ones) cause changes in investment – which in turn – causes changes in political preferences?⁶⁰

Looking for democratic/polyartic cycles as politicians promise more foreign investment

The British Virgin Islands provides one concrete example, showing how the politics of an international financial centre depend on that centre's ranking vis-a-vis other centres (and the difficulty of empirically detecting such dependency). Like many of the top international financial centres, the British Virgin Islands (BVI) has inherited a historical focus on international finance due to its position along trading routes and its specialisation in a larger political/economic entity (the British Empire).⁶¹ In the classical telling of BVI's inherited position as an international financial centre, the jurisdiction – like the other crown dependencies – had served as an extension of the City of London.⁶² Like in the Cayman Islands, groups vied for power by giving foreigners tax and other benefits in exchange for bringing their money to the island.⁶³ Yet, as shown in Figure 1, these policies had less impact than similar policies in the Cayman Islands, Jersey, Bermuda and the other jurisdictions shown in the figure. The BVI's GDP and employment share of finance hovered at around 10% of GDP at the start of this decade. Doubtlessly, the BVI's falling behind other financial centres at the time of the global financial crisis, and long before then, influenced the Island's politicians far more than this sector's meagre size suggests. The financial sector almost certainly influences local politicians more than its small size to GDP suggests.⁶⁴

⁵⁸ Quote from Santiso at p. 27.

⁵⁹ See Dae-hee Bak, Political Investment Cycles in Democracies and Autocracies, *International Interactions: Empirical and Theoretical Research in International Relations* 42(5), 2016, available [online](#).

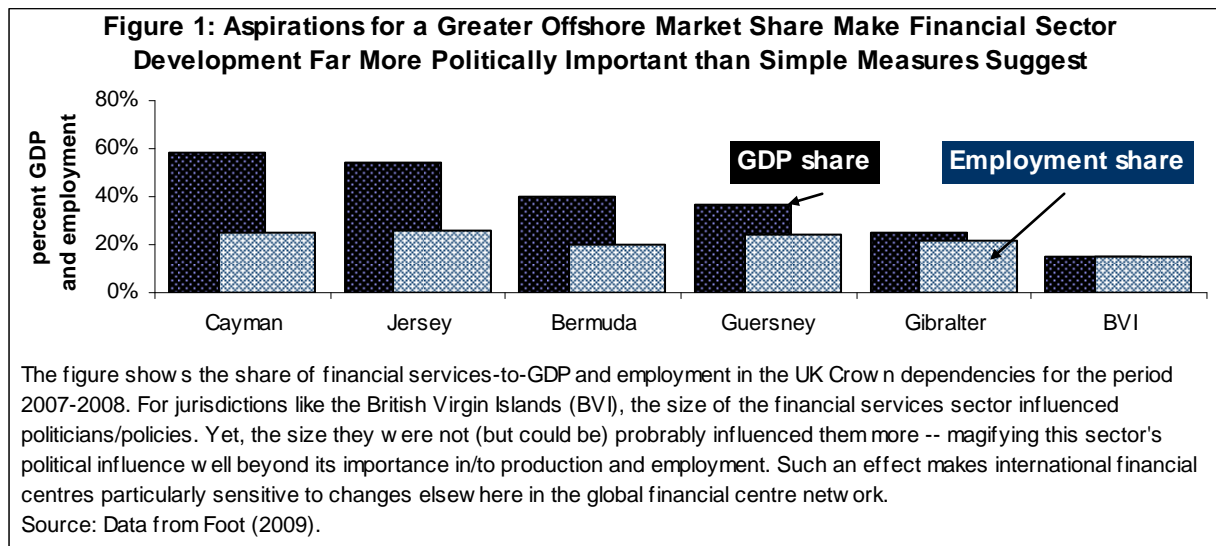
⁶⁰ We do not have room to discuss the nature of “political design”, decisions about politics taken years previously, that embed institutions which cause variations and instabilities in the extent of political power and finance-friendly policy. For more on this perspective, see Charles Calomiris and Stephen Haber, *Fragile by Design: The Political Origins of Banking Crises and Scarce Credit*, Princeton University Press, 2014.

⁶¹ For a discussion of the role the UK's offshore dependencies and territories played in international finance (and the way they used their legal status to fulfil their offshore finance mandates, see Sol Picciotto, Offshore: The State as Legal Fiction, In Mark Hampton and Jason Abbott, *The Rise of Global Capital*, Palgrave, 1999. Sikka puts it succinctly, “Despite the veneer of liberal democracy, some OFCs are captured by the finance industry and advance the interests of financial capital. Many OFCs are nurtured and protected by leading Western hegemony with developed capital and financial markets.” See Prem Sikka, *The Role of Offshore Financial Centres in Globalization*, *University of Essex Economics Department Working Paper 03-02*, 2003, available [online](#).

⁶² For proof and a discussion, see John Christensen, Nick Shaxson, and Duncan Wigan, The Finance Curse: Britain and the World Economy, *The British Journal of Politics and International Relations* 18(1) 255–269, 2016, available [online](#).

⁶³ Freyer and Morriss provide one of the best studies of this process, far better than the much-more cited Roberts article. See Tony Freyer and Andrew Morriss, Creating Cayman as an Offshore Financial Center: Structure & Strategy since 1960, *Arizona State Law Journal* 45, 2013, available [online](#). See also Susan Roberts, Small Place, Big Money: The Cayman Islands and the International Financial System, *Economic Geography* 71(3), 1995, available [online](#).

⁶⁴ Some might go so far as to claim that setting up as an international financial centre helped to cement the national identity and culture of the Island. According to this telling, the passing of laws encouraging the development of offshore financial services represented a step toward greater national autonomy and self-determination.... namely a



In fact, national politicians used the jurisdiction's nascent financial development as both political end and means. Orlando Smith, at the start of the millennium, intensified the trend already underway of cooperating with business interests, cleaning up corruption, and most prominently working to grow the Island's offshore financial industry.⁶⁵ His National Democratic Party won the 2003 general election (having formed to run in the previous election of 1999). While he and his party did not win the next elections in 2007, they proved instrumental in ratify a new constitution by the time of the 2007 election. True to BVI politics, neither the National Democratic Party, nor the incumbent Virgin Islands Party focused on the development of offshore finance on ideological grounds. Instead, as noted by several commentators, politics has focused on personal connections, charisma and most importantly -- patronage. As such, the new constitutional project did not appear out of some deep-seated philosophical struggle. The effects of the new constitution -- and subsequent laws passed under it -- included putting foreign investors and financiers at ease by offering protections against arbitrary seizure/nationalisation of their property rights and investments as well as unwelcome interference from the UK.⁶⁶ As in other places, foreign politicians fed this internal political dynamic, as these financial centres served their personal and national pecuniary interests.⁶⁷

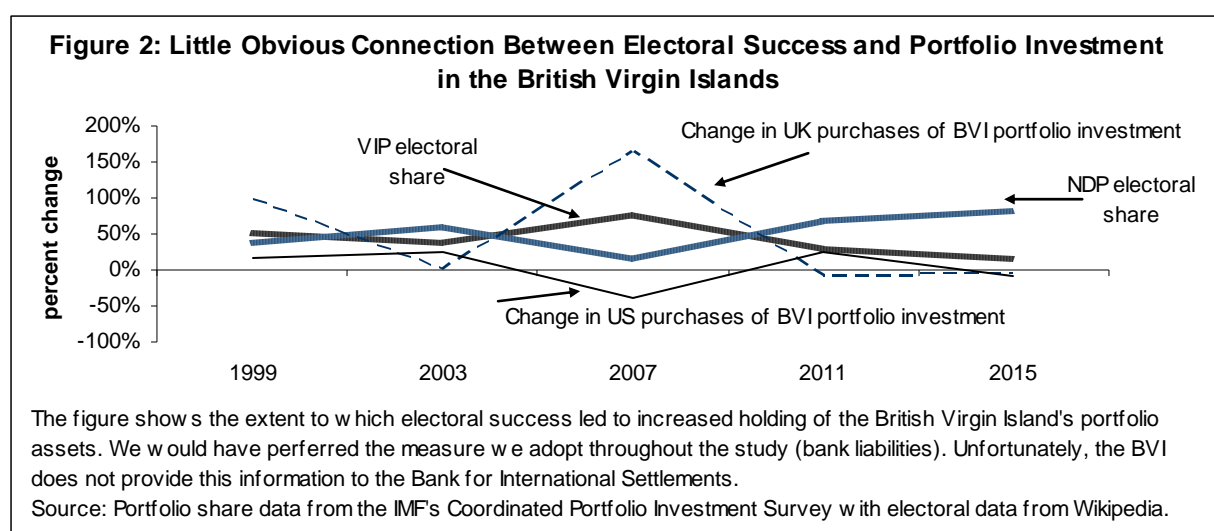
political act of fomenting national identity. See William Maurer, Writing Law, Making a "Nation:" History, Modernity, and Paradoxes of Self-Rule in the British Virgin Islands, *Law and Society Review* 29(2), 1995.

⁶⁵ For more details, see Dana Lewis-Ambrose, *Moving from Infancy to Young Adulthood: A Contemporary Review of the Development of the Virgin Islands*, 2013.

⁶⁶ While the impetus for the new constitution came from the broader negotiations between the British Government and the Overseas Territories, the effect of the new constitutional structure remains the same. The separation of powers, the extensive devolution of powers from the UK to implement self-rule on the island, and even the creation of a constitutionally mandated complaints commissioner helped provide the appearance -- if not the actual implementation -- of democratic safeguards protecting property rights. See *Virgin Islands Constitution Order*, 2007, available [online](#).

⁶⁷ See Prem Sikka, The Role of Offshore Financial Centres in Globalization, *Accounting Forum* 27, 2003, available [online](#).

Yet, even for a small jurisdiction like the BVI, finding any direct link between politics and foreign investment proves difficult. Figure 2 shows the electoral share of the National Democratic Party (NDP), its main rival the Virgin Islands Party (VIP) and portfolio investment from the US and UK.⁶⁸ Despite over-whelming support for the VIP around 2007, US investment shrank (with UK investment radically rising). At the beginning of the 2000s and in recent years, the NDP has won elections, coinciding with slower growth (or even shrinkage) of such portfolio investment. The 2004 BVI Business Companies Act came on the books on the NDP's watch (though fully implemented by the time the VIP won power).⁶⁹ Offshore finance – and offshore company registrations – provided about 55% of total government revenues (amounting to a bit over US\$187 million) around that time.⁷⁰ No matter which political party held power, the BVI represented a “captured state.”⁷¹ The particular party in power mattered far less for the passage of competitive legislation like the 2003 Virgin Islands Special Trusts Act or non-enforcement of due diligence rules than the **extent of political competition.**⁷²



The lack of political competition and thus effective democracy in any international financial centres, has given financial interests very large influence over financial policies. The BVIs do not quite epitomize the state capture attributed to Jersey.⁷³ Centres like Jersey allow us to witness the way such capture transcends borders – showing the dependence of financial centres' politics and

⁶⁸ These two major parties have won most of the votes in BVI elections in the previous 30-ish years.

⁶⁹ Tax Justice Network, Financial Secrecy Index 2018: Narrative Report on the British Virgin Islands, 2018, at p. 6, available [online](#).

⁷⁰ International Monetary Fund, Review of Financial Sector Regulation and Supervision - British Virgin Islands, 2004, available [online](#).

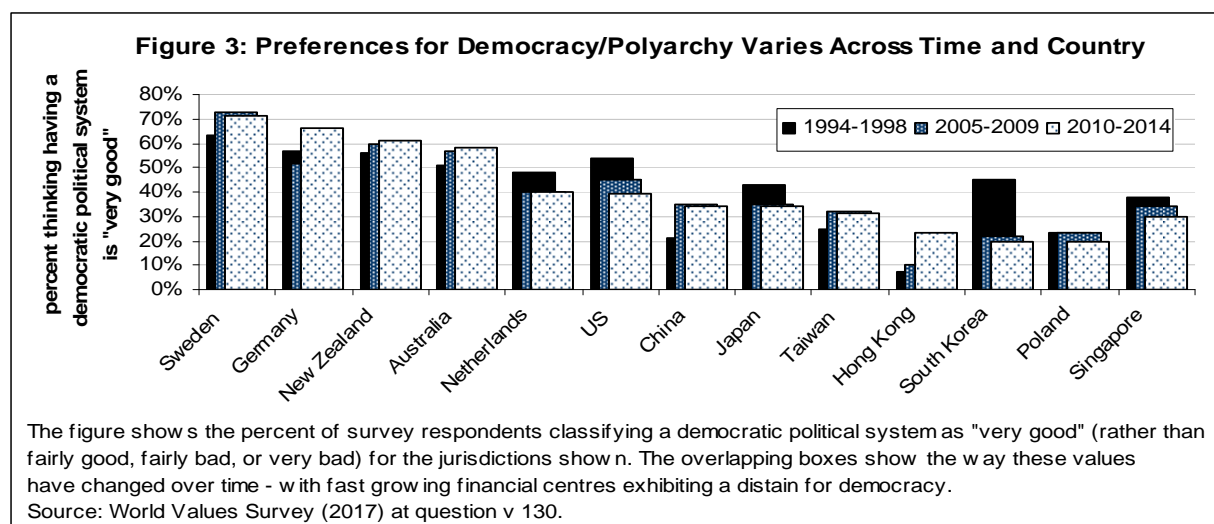
⁷¹ Id at p. 4.

⁷² Such a result appears time and time again. For evidence of such rules serving political ends, see Brian Burgoon, Panicos Demetriades and Geoffrey R.D. Underhill, Sources and legitimacy of financial liberalization, *European Journal of Political Economy* 28(2), 2012, available [online](#). For evidence showing how more autocratic regimes can more easily pass investor-friendly law, see Amy Pond, Financial Liberalization: Stable Autocracies and Constrained Democracies, *Comparative Political Studies* 51(1), 2018, available [online](#).

⁷³ See John Christensen and Mark Hampton, A Legislature for Hire: The Capture of the State in Jersey's Offshore Finance Centre, In Mark Hampton and Jason Abbott, *Offshore Finance Centres and Tax Havens: The Rise of Global Capital*, Palgrave Macmillan, 1999.

policies on each other. International services firms' (like Price Waterhouse and Ernst & Young) push to expand rules enabling financial centres like Jersey show the extent of global pressure on financial centres.⁷⁴ Jersey, in this case, clearly reacted to developments in other jurisdictions. Just like Jersey, other financial centres' politicians point to the BVIs as model, rival and legitimiser.⁷⁵ The lack of effective multi-party democratic decision-making in some places leaves them open to influence from/through these other channels. Politics represents a contest over financial policy – and finance itself.⁷⁶ Less vigorous political competition may allow the state capture which promotes the financial sector competitiveness of places like the BVI and Jersey. Yet, preferences for such political competition do not exist in a vacuum.

Economic forces affect the extent of political competition. Figure 3 shows support for a democratic political system in the jurisdictions housing most of the financial centres we study.⁷⁷ US and Japanese voters/citizens view democracy less favourably after the global financial crisis. Relatively untouched jurisdictions like Sweden and Hong Kong have had greater support for democracy over time. A simple bar chart does not prove that democratic or polyarttic governance responds to changes in economic factors or a jurisdiction's financial sector's competitiveness. Yet, preferences for – and responses to – democratic and polyarttic governance do change over time in response to economic change and visa versa.⁷⁸ What do the data tell us?



⁷⁴ See Prem Sikka, Globalization and its discontents: Accounting firms buy limited liability partnership legislation in Jersey, *Accounting, Auditing & Accountability Journal* 21(3), 2008, available [online](#).

⁷⁵ For more on the role of such a legitimiser in domestic political discourse in other financial centres, see Mark Hampton and James Christensen, *Treasure Island Revisited. Jersey's Offshore Finance Centre Crisis: Implications for other Small Island Economies*, *Environment and Planning A: Economy and Space* 31(9), 1999. See also Eugene Vogel, Joseph Bernstein and Marc Nitsche, *Inward Investments in Securities and Direct Operations through the British Virgin Islands: How Serious a Rival to the Netherlands Antilles Island Paradise Tax Law Review* 34(3), 1979, available [online](#).

⁷⁶ Gerald Davis, Politics and financial markets, In Alex Preda and Karin Knorr Cetina (Eds), *Oxford Handbook of the Sociology of Finance*, 2011. Available [online](#).

⁷⁷ See World Values Survey, 2017, available [online](#).

⁷⁸ While we have our suspicions, Coccia seems to have figured it all out. See Mario Coccia, Democratization Is the Driving Force for Technological and Economic Change, *Technological Forecasting and Social Change* 77(2): 248-264, 2010, available [online](#).

The Stylized Facts: The Link between Democratic Inclusion and Financial Centre Competitiveness

Democracy in Y/Zen's top international financial centres

Superficial data show that international financial centres need just the right amount of democracy at just the right time to thrive. Figure 4 shows the most simplistic analysis available – a popular survey-based measure of international financial centres' competitiveness versus a measure of the extent of democracy in the international financial centres' jurisdiction.⁷⁹ 'Authoritarian' (their words, not ours) leaders like China and the United Arab Emirates sit at one end of the spectrum.⁸⁰ Legitimacy-by-performance might drive any attempt to create an international financial centre (as authoritarian governments seek to bolster their rule by creating sectors that push up national income).⁸¹ Gibraltar and the Bahamas, as 'contender democracies,' sit at the other end of the spectrum.⁸² According to this static picture, taken in 2016, the largest number of highly competitive 'leader' jurisdictions came from 'flawed' democracies. 'Hybrid democracies' had the hardest time breaking into the ranks of the international financial centre leaders. Such difficulty probably reflects both their fragility and the resources going into 'stage managing' the political/electoral system.⁸³ **Most importantly, different political regimes statistically significantly correspond with a particular type of financial centre.**⁸⁴ In other words, leader

⁷⁹ See Mark Yeandle, *The Global Financial Centres Index 22*, Y/Zen Publication, 2017, available [online](#). The terms qualifying/ranking authoritarianism versus democracy come from the Economist Intelligence Unit. Only 12% of countries (or 19 jurisdictions) qualify as "full democracies" – a sample size too small to make any definitive statements about democracy and international financial centre development. See also Economist Intelligence Unit, *Democracy Index 2017: Free Speech Under Attack*, 2018, available [online](#).

⁸⁰ Governments like these expressly grew their financial centres to provide surrogates for Western markets. Thus, these centres did not develop simply to capture share of existing international financial assets – but to provide an alternative market to trade those assets. See Gordon Cheung, *The 2008–2009 Global Financial Fallout: Shanghai and Dubai as Emerging Financial Powerhouses?* *Asian Politics & Policy* 2(1), 2010, available [online](#).

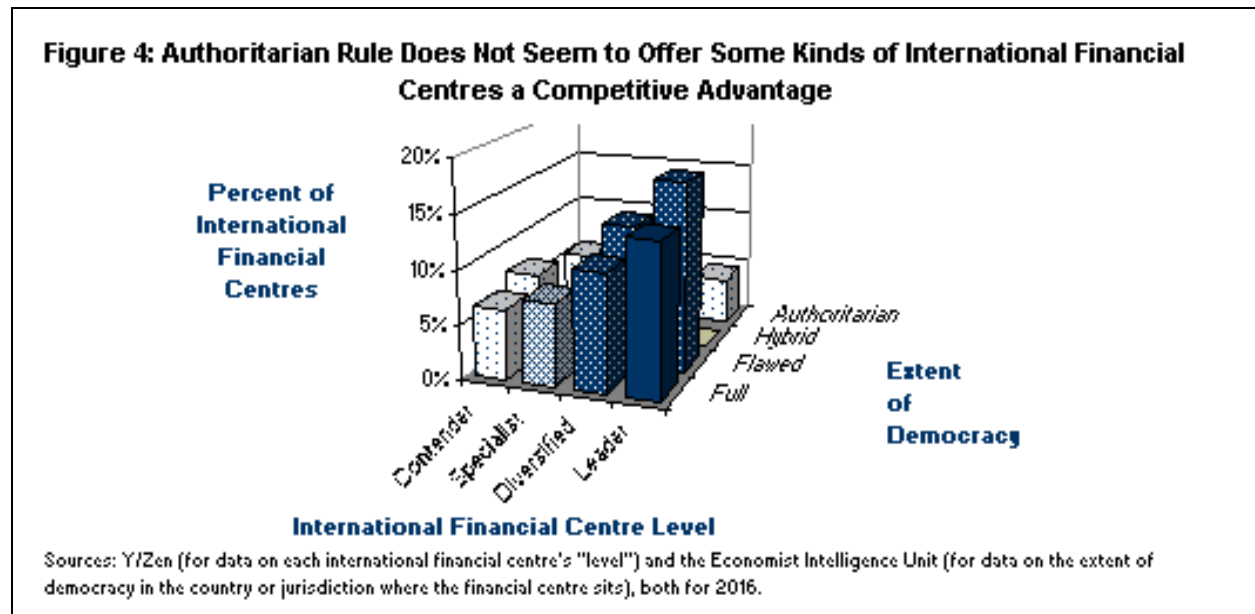
⁸¹ Levitsky and Way refer to this as competitive authoritarianism. In an international financial centre context, political elites supporting the establishment of such financial centres could provide far more resources than those supporting alternative sectors like agriculture or livestock. See Steven Levitsky and Lucan Way, *The Rise of Competitive Authoritarianism*, *Journal of Democracy* 11(2), 2002, available [online](#).

⁸² Such a classification seems tongue-in-cheek, as most scholars might argue that the development of a financial centre in these jurisdictions requires the opacity and lack of democracy needed to serve larger financial centres like London's City. See Chizu Nakajima, *Politics: Offshore Centres, Transparency and Integrity: The Case of the UK Territories*, In Donato Masciandaro, *Global Financial Crime: Terrorism, Money Laundering and Offshore Centres*, London: Taylor & Francis, 2004.

⁸³ For more on the fragility of hybrid democratic regimes, see Alina Menocal, Verena Fritz and Lise Rakner, *Hybrid Regimes and the Challenges of Deepening and Sustaining Democracy in Developing Countries*, *South African Journal of International Affairs* 15(1), 2008, available [online](#). For more on the stage management aspect of hybrid democracy, and the growing importance of policy to support the illusion of free and fair elections, see Nikolai Petrov, Masha Lipman and Henry Hale, *Overmanaged Democracy in Russia: Governance Implications of Hybrid Regimes*, *Carnegie Endowment for International Peace Working Paper 106*, 2010, available [online](#).

⁸⁴ Running a simple analysis of variance (ANOVA) on the data shown in Figure 4 shows statistically significant differences across the extent of democracy in these financial centres. Between group sums of squared errors corresponded to around 0.025 (with 3 degrees of freedom) and 0.016 within groups with 12 degrees of freedom). On an F-distribution (showing the likelihood these groups have the same type of financial centre), a value of 6.05 corresponds to a 0.0094 probability they are all the same.

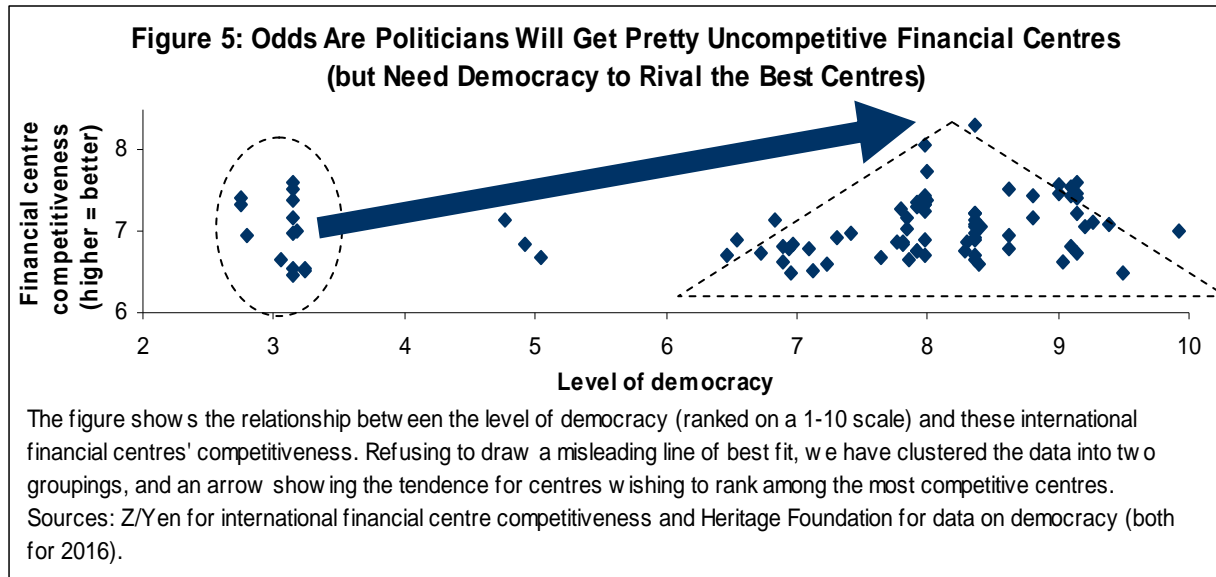
financial centres grow up around democratic governments statistically significantly more often than they do in authoritarian governments.



More specific data seems to show that democracy hurts financial centre competitiveness. Figure 5 moves from comparing categories to comparing numerical measurements of the extent of democracy and the competitiveness of international financial centres. The same rough pattern emerges. From such a static picture, we see that relatively uncompetitive financial centres have all kinds of governments – from the very democratic to the not-so-much. Yet, the most competitive financial centres in the mid-2010s had more democratic governments (as represented by the countries at the top of the pyramid of dots on the right hand side of the figure). Such figures immediately dispel any monolithic theory positing that globalisation somehow leads to the degeneration of democracy.⁸⁵ Nothing in these data point to a supposed contradiction between financial globalisation and democracy.⁸⁶

⁸⁵ For the opposite, misguided view, see Philip Cerny, Globalization and the erosion of democracy, *European Journal of Political Research* 36(1):1-26, 1999, available [online](#).

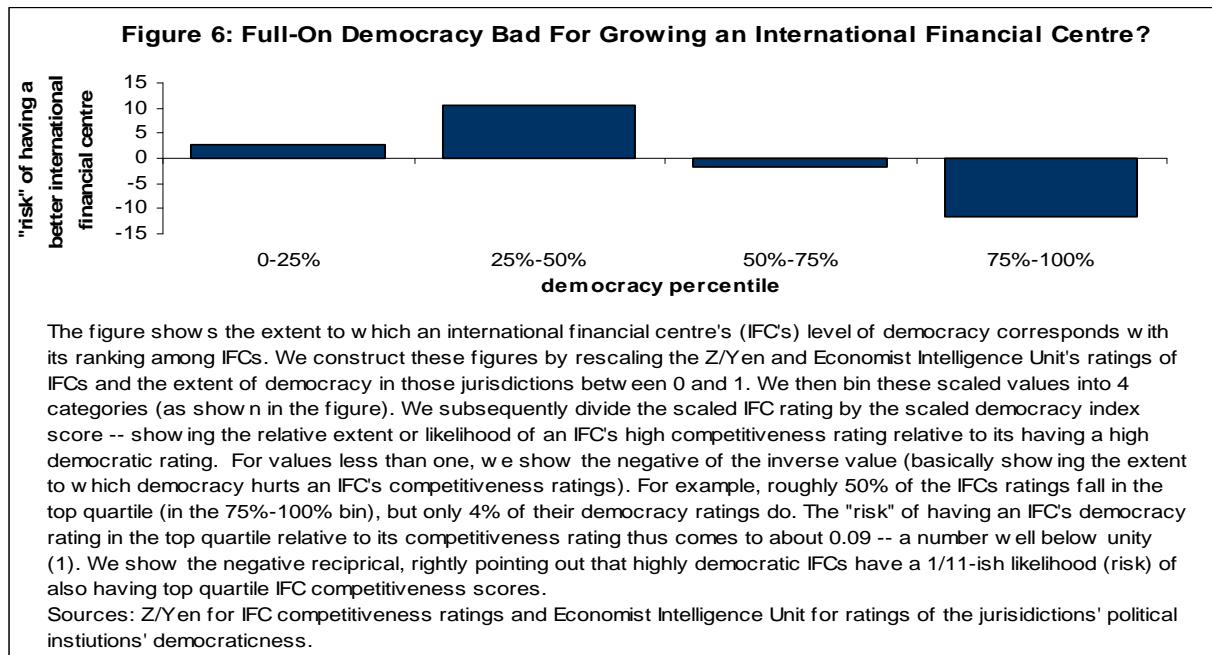
⁸⁶ Thousands of wasted pages and man-hours have gone into econometrically showing some kind of pattern between increased cross-border flows of money, goods and people (globalisation) and the existence/use of democratic political processes. See Dani Rodrik, *The Globalization Paradox: Why Global Markets, States, and Democracy Can't Coexist*, 2011. More refined econometric studies show the same non-sense. See also Quan Li and Rafael Reuveny, Economic Globalization and Democracy: An Empirical Analysis, *British Journal of Political Science* 33(1), 2003, available [online](#). The scatter of dots we see in Figure 5 show that even assertions about globalisation promoting democracy oversimplify reality. See also Barry Eichengreen and David Leblang, Democracy and Globalization, *Economics & Politics* 20(3), 2008, available [online](#).



What happens to the odds of an international financial centre becoming more competitive as it becomes more democratic? Figure 6 shows the “risk” of an international financial centre improving its competitiveness ranking for various levels of democracy. For example, international financial centres scoring highly in the 75% to 100% percentile on the democracy scale tend to have lower odds of increasing their rating as an internationally competitive financial centre. Yet, for the 2nd lowest percentile, relatively low levels of democracy correspond with higher odds of becoming more competitive. Such a view contradicts the view of international policy networks as a monolithic structure aimed at pushing financial openness one way or the other.⁸⁷ Such a view also contradicts the binary view of democracy as only good or bad for financial centre growth. Clearly, a certain level of democracy corresponds to a certain level of financial centre competitiveness for any particular jurisdiction.⁸⁸

⁸⁷ For a discussion such a view, see Geoffrey Underhill and Xiao-ke Zhang, Setting the Rules: Private Power, Political Underpinnings, and Legitimacy in Global Monetary and Financial Governance, *International Affairs*, 84(3), 535-554, 2008, available [online](#).

⁸⁸ For the way these jurisdictions settled into their own corresponding levels of competitiveness, see Ben Derudder, Michael Hoyler and Peter Taylor, Goodbye Reykjavik: International Banking Centres and the Global Financial Crisis, *Area* 43 (2): 173-18, 2011, available [online](#).



Polyarchy and international financial centres

Polyarchy probably represents a better measure of the extent of political participation in deciding an international financial centre's policies. Polyarchy describes the rule of multiple groups in a political or decision-making system.⁸⁹ A more polyartical political system includes larger numbers of individuals/organisations taking decisions about a jurisdiction's financial policies/laws, as well as a more even 'distribution' of power between these individuals and groups.⁹⁰ While many see such a polyarchy as a benign combination of bureaucrats, financial supervisors, financiers themselves, and even consumer activists; others see such rule as the contest for political power which it is.⁹¹ Many authors have argued that an increased role for financial institutions in financial policymaking would necessarily crowd-out and diminish democratic governance – as “researchers on both sides of the Atlantic started expressing concern about the threat to democratic process posed by the emergent corporate form, the potential for collusion allowed by the growing practice of interlocking directorate, and the general concentration of power in the hands of large firms and banks.”⁹²

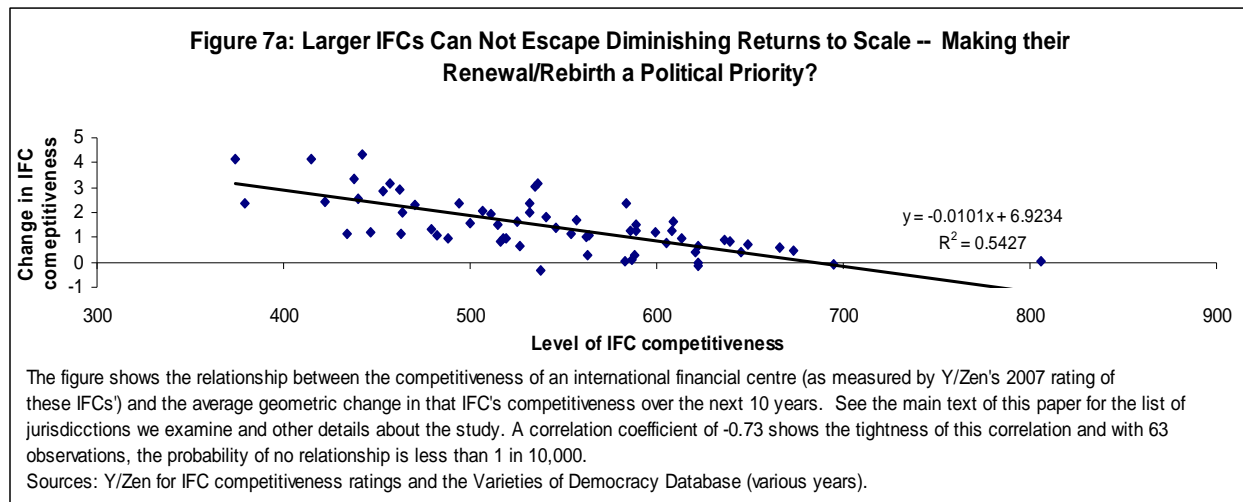
⁸⁹ The concept has come a long way since Robert Dahl's day. For a more recent exposition, see Christopher Williams, *Researching Power, Elites and Leadership*, 2012.

⁹⁰ For an example, see Stefano Pagliari and Kevin Young, Leveraged Interests: Financial Industry Power and the Role of Private Sector Coalitions, *Review of International Political Economy* 21(3), 2014, available [online](#). For some evidence from the US on financial sector lobbies as actors in the US's polyarchy, see Deniz Igan, A Fistful of Dollars: Lobbying and the Financial Crisis, Prachi Mishra and Thierry Tresselt, *Paper presented at the 10th Jacques Polak Annual Research Conference*, 2009, available [online](#).

⁹¹ We discussed the 'depoliticisation' of financial centre development already. For a recent casting of polyarchy as the rule of multiple socially-minded actors, see Saule Omarova, Bankers, Bureaucrats, and Guardians: Toward Tripartism in Financial Services Regulation, *Journal of Corporate Law* 37, 2012, available [online](#).

⁹² Jean-Paul Sapinski and William Carroll, Interlocking Directorates and Corporate Networks, In Andreas Nölke and Christian May (Eds.), *Handbook of the International Political Economy of the Corporation*, 2017.

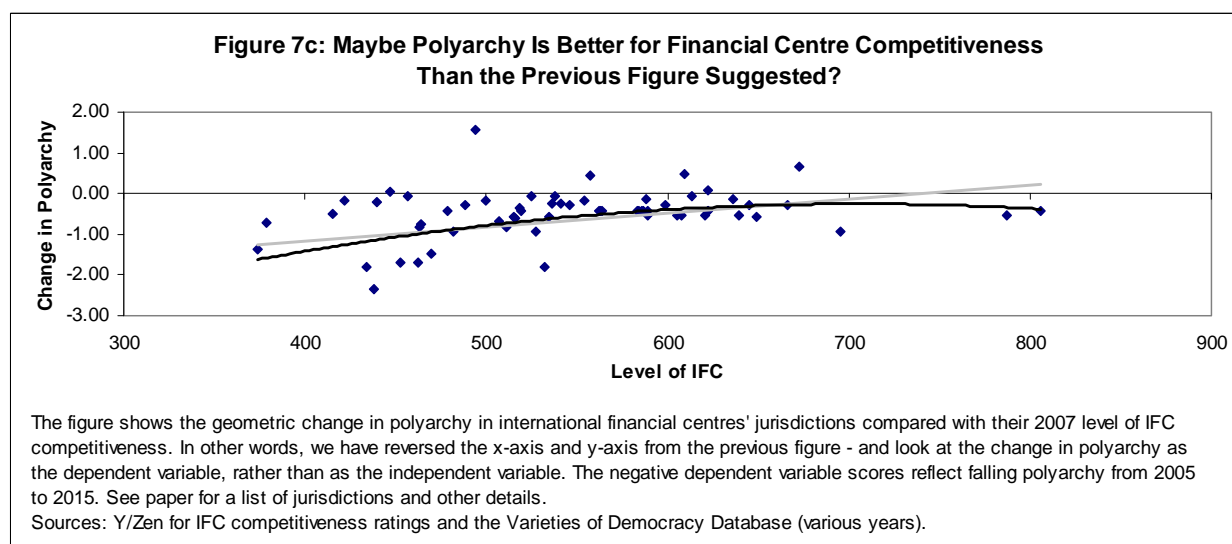
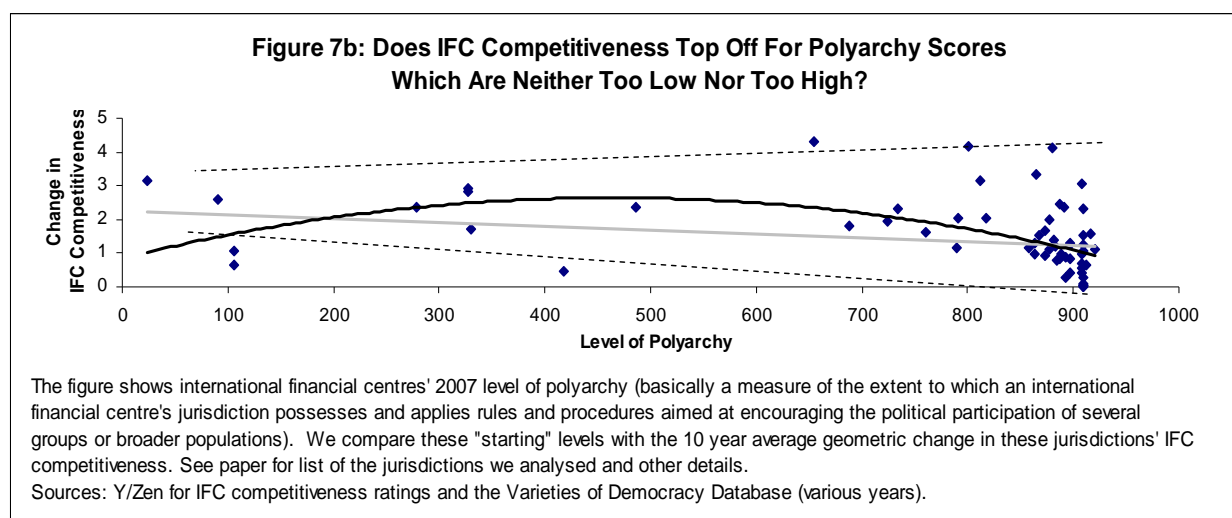
What do the preliminary data show about polyarchy and international financial centre competitiveness? Figures 7 point to a likely balance, or best relationship, between international financial centre competitiveness and polyarchy. Figure 7a shows the relationship between the measure of polyarchy we use in our study and Y/Zen's simple measure of financial centre competitiveness.⁹³ While many theories would predict that big financial centres should get bigger, few would predict the decreasing returns to scale seemingly shown in the figure.⁹⁴ Such a dependence on size though means we must use special mathematics later to account for these size effects.⁹⁵ Figure 7b looks at this same change in IFC competitiveness, compared with the extent of polyarchy in the international financial centres we analyse. The shotgun pattern in the data shows that more polyartic jurisdictions represent both highly competitive and less competitive financial centres. Yet, the wedge we drew in dotted gray lines suggests that no clear pattern seems to exist in these data. In contrast, Figure 7c flips this relationship on its head. The figure shows the change in polyarchy for international financial centres starting with a certain level of competitiveness. Again, a slightly positive pattern seems to exist between democracy and financial competitiveness. Yet, as we saw already, a golden medium or optimal level appears to exist.



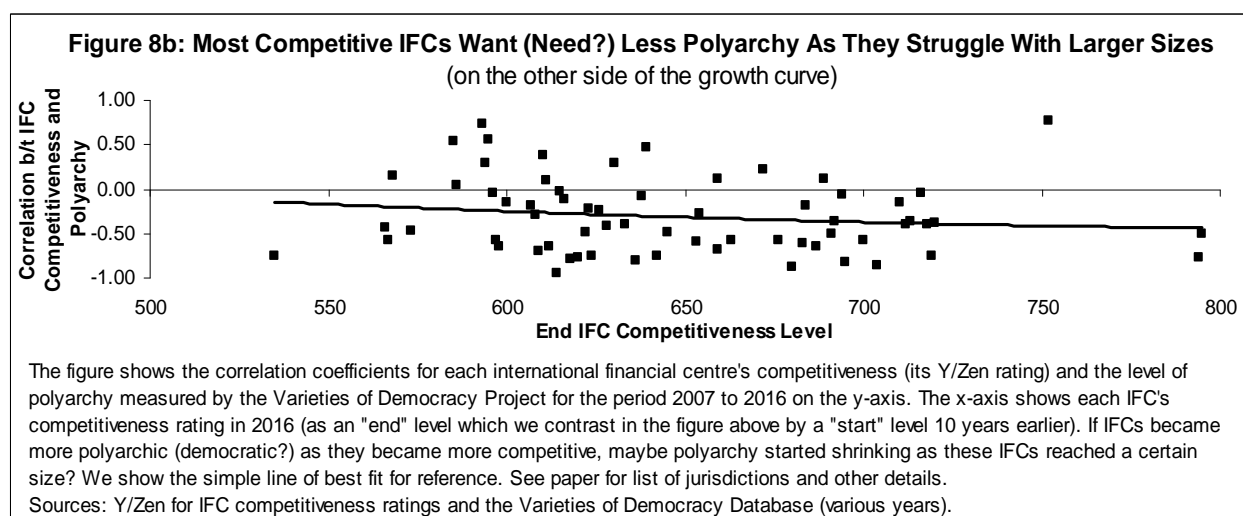
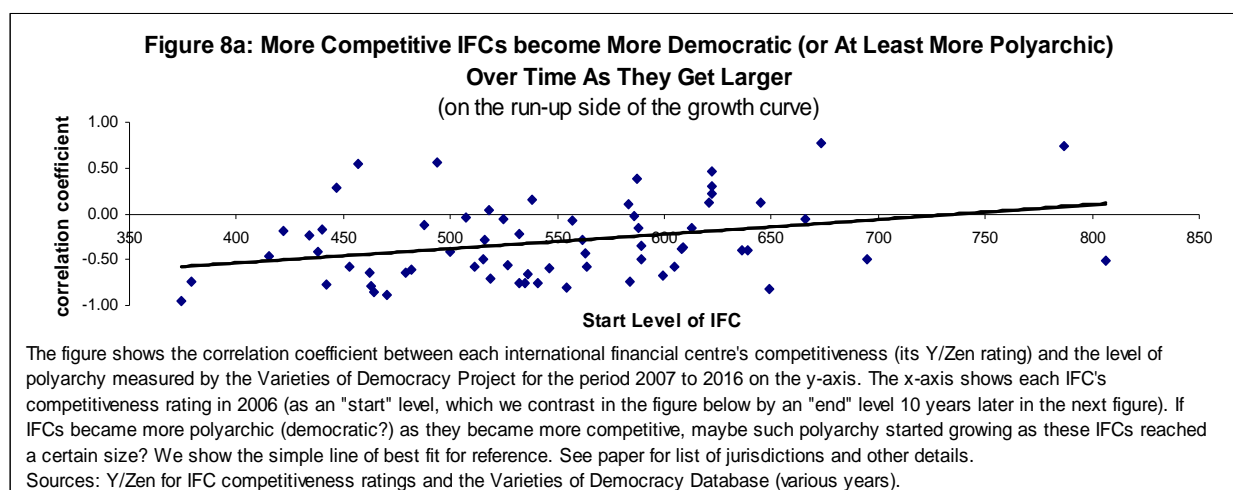
⁹³ For a discussion about these data, see Jan Teorell, Michael Coppedge, Svend-Erik Skaaning and Staffan Lindberg, *Measuring Electoral Democracy with V-Dem Data: Introducing a New Polyarchy Index*, *V-Dem Working Paper 2016:25*, 2016, available [online](#).

⁹⁴ We say “seemingly” because these data do not control for macroeconomic fluctuations and other factors. Indeed, a gravity model would predict the opposite – namely larger financial centres should get larger still. See Lillian Cheung and Vincent, *Hong Kong As An International Financial Centre: Measuring Its Position And Determinants*, *HKMA Working Paper 14/2007*, 2007, available [online](#). Yu might attribute a size advantage to the “exorbitant advantage” of holding a central position in global financial networks (a subject we return to later). See also Chang-hua Yu, *Evaluating International Financial Integration in a Center-Periphery Economy*, 2012, available [online](#).

⁹⁵ These mathematics refer to differential equations. A financial centre's initial position and speed of growth plays a profound role in deciding how the centre responds to other factors like political polyarchy.



Not only does polyarchy and level of IFC vary across jurisdictions, these correlations vary across time. Figures 8 illustrate how the correlation between polyarchy and IFC competitiveness can positively correlate in one year, but negatively correlate in another year. Figure 8a, in particular, shows the correlation coefficients across the jurisdictions we studied for 2007. In these data, IFC competitiveness increases with the extent of polyarchy. Yet, as shown in 8b, the correlation between polyarchy and IFC competitiveness decreases across countries. Such results highlight the variable nature of the relationship between polyarchy and IFC competitiveness. The first impression from these data might point to a positive correlation between polyarchy and IFC competitiveness for lower ranked financial centres, and negative correlations for higher ranked financial centres. If we interpret these data more conservatively, however, we might notice change, without trying to shove the data into a pattern. No matter what you/we think about these data -- **polyarchy and IFC competitiveness clearly adjust to each other somehow over time.**

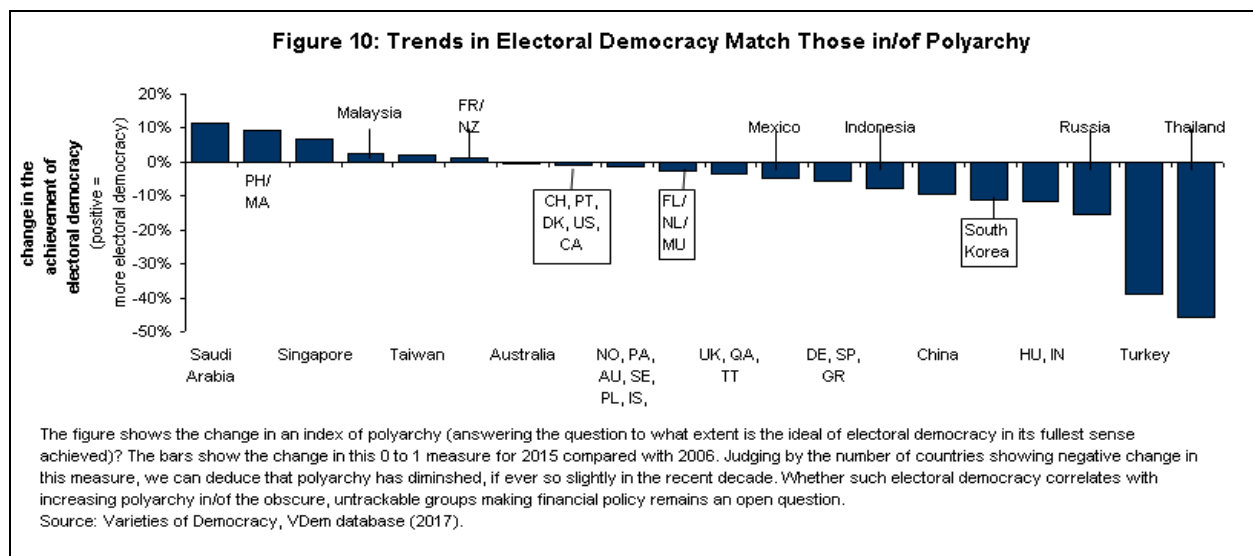
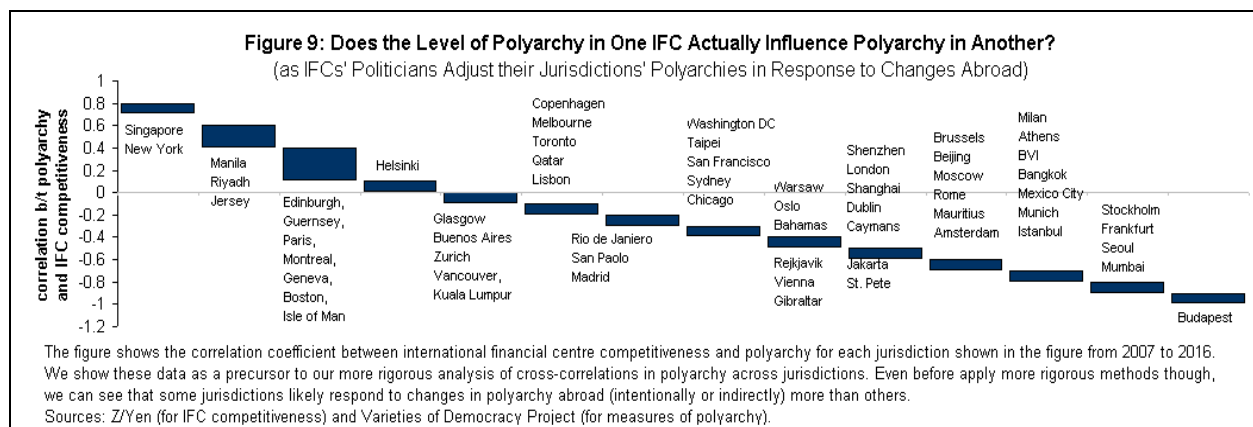


Other evidence seems to point toward polyarchy helping more competitive international financial centres than less competitive ones. Figure 9 shows the correlations between polyarchy and IFC competitiveness for specific jurisdictions. If each metropolitan financial centre reflects the polyarchy and IFC competitiveness of its host jurisdiction, Singapore and New York, in this sample, had increasingly polyarchic institutions with increasingly competitive international financial centres.⁹⁶ Jurisdictions from Jakarta to Budapest had decreasingly polyarchic political participation, perhaps in a bid to increase their financial centres' competitiveness? Figure 10 bolsters such an interpretation by looking at how the achievement of electoral democracy has responded in various international financial centres in response to the global financial crisis – or visa versa.⁹⁷ Naturally, the extent of polyarchy (and possible electoral democracy) would affect the economic response to the crisis – and thus the ranking of a jurisdiction's international

⁹⁶ Readers will notice we use the names of Z/Yen's financial centres (as metropolitan areas rather than as nation-states). We do this to make these data directly comparable with the jurisdictions Z/Yen's reports describe.

⁹⁷ We do not want to delve into the issue of causality (whether polyarchy helped reduce the effects of crisis or whether crisis reduced polyarchy). We only want to say that crisis provided an impetus for political adjustment, irregardless of the nature and robustness of such adjustment. For more on the mechanisms of influence, see Kristof Jacobs, *The Impact of the Economic Crisis on Democracy: Outlining the Research Agenda and First Findings*, *Institute for Management Research Radboud University Working Paper POL13-02*, 2013, available [online](#).

financial centre.⁹⁸ Yet, as with most social economic questions, the converse might also hold. The crisis – and thus an international financial centre’s competitiveness -- affects the extent of polyarchy.⁹⁹ More participation in many cases means a replacement of incumbents, rather than an increased diversity of voices and preferences at the political bargaining table.¹⁰⁰ **Regardless of which way causality lies, polyarchy and the size/growth of international financial centres affect each other.**



⁹⁸ Lipsy finds that “democracies are about twice as likely to experience a crisis as autocracies.” See Phillip Lipsy, *Democracy and Financial Crisis*, 2017, available [online](#). Autocracies particularly help fragile economies (fragilized by high debt-to-GDP ratios) reduce the likelihood of economic/financial crisis. See also Rashad Hasanov, Prasad Bhattacharya, and Chris Doucouliagos, *How Does Political Regime Affect Financial Crises?*, *Conference Paper presented at the Economic Society of Australia and Australian Conference of Economists Meeting*, 2014, available [online](#).

⁹⁹ We do not want to dwell too much on the mechanisms of this causality. For authors like Kern et al., they record increased political participation (albeit non institutional participation). See Anna Kern, Sofie Marien and Marc Hooghe, *Economic Crisis and Levels of Political Participation in Europe (2002–2010): The Role of Resources and Grievances*, *West European Politics* 38(3), 2015, available [online](#).

¹⁰⁰ For examples, see Jeffrey Chwieroth and Andrew Walter, *Financial Crises and Political Turnover: A Long Run Panoramic View*, *Conference Paper Presented at the Annual Meeting of the International Political Economy Society*, *Harvard University*, November 2010, available [online](#).

The centrality of a financial centre among the flow of funds in the network of international financial centres best measures an IFC's competitiveness. Academics have long theorised about – and even mapped -- the networks of financial capital flowing across/between international financial centres.¹⁰¹ Such network maps have included measurements of financial centres' degree of linkage, betweenness and other network statistics common to all graphs.¹⁰² Such network measurements have allowed academics to measure things like the extent of systemic risks to the entire global banking system.¹⁰³ In such a network, geographic distance and physical centrality matters far less than network centrality.¹⁰⁴ Figure 11a for example shows the changes in polyarchy and changes in international financial centres' clustering coefficients (or the extent to which a jurisdiction connects its banking partners without these other banking partners necessarily having linkages between themselves). More polyartic international financial centres cluster more with other financial centres, as measured by their clustering coefficient (basically a measure of their centrality importance in the international financial centre network).¹⁰⁵ Figure 11b shows the same data – fit to a non-linear curve instead of a simple line. Such a curve suggests that polyarchy increases in/for weakly and strongly clustered international financial centres. Singapore represents an increasingly important (as measured by its clustering coefficient) jurisdiction becoming more polyartic over time. Japan's clustering coefficient rose, while polyarchy fell. The trend seems to show that polyarchy remains stable for jurisdictions losing importance over time (like Austria and Canada). Does a stable, equilibrium-level of polyarchy correspond with ever-decreasing clustering importance? Or put conversely, do some jurisdictions need to become more polyartic before they can gain network centrality?

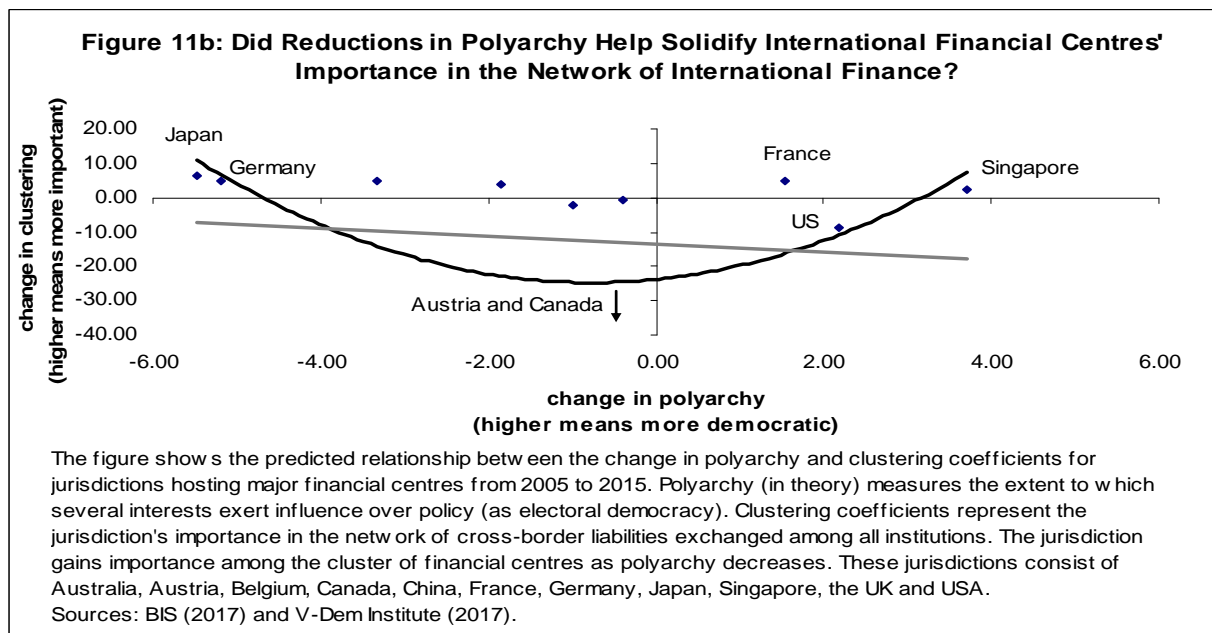
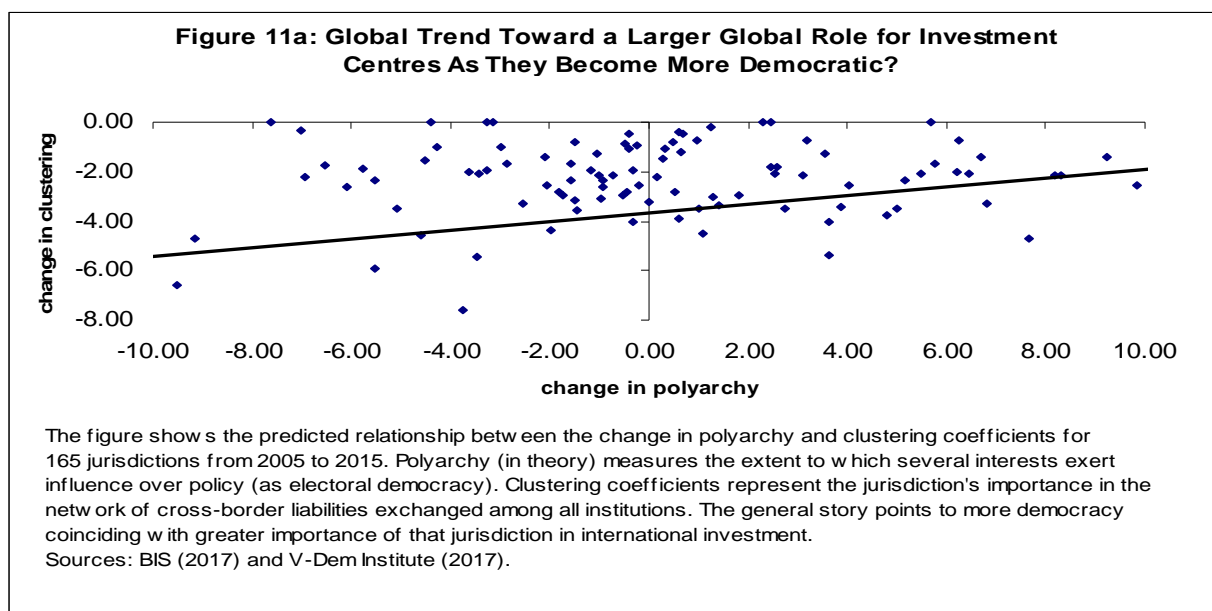
¹⁰¹ For examples, see Jan Fichtner, *The Offshore-Intensity Ratio: Identifying the Strongest Magnets for Foreign Capital*, *City Political Economy Research Centre (CITYPERC) Working Paper 2015/02*, available [online](#). For a more recent attempt, see Jenny Corbett and Ying Xu, *Measuring Financial Integration: The Network Approach*, *Centre for International Finance and Regulation Research Working Paper 062/2015*, 2015, available [online](#).

¹⁰² Mathematicians and increasingly social scientists refer to networks as graphs. The degree of linkage refers to the number of other jurisdictions that jurisdiction's banks do business with. Betweenness refers to the extent to which an international financial centre sits on the shortest path between financial flows going between other financial centres. See Goetz von Peter, *International banking centres: a network perspective*, *BIS Quarterly Review*, 2007, available [online](#).

¹⁰³ See International Monetary Fund, *Mapping Cross-Border Financial Linkages: A Supporting Case for Global Financial Safety Nets*, 2011, available [online](#).

¹⁰⁴ See Ivan Fernandez, Francisco Garcia and Emili Tortosa-Ausina, *Openness and Geographic Neutrality: How Do They Contribute to International Banking Integration?* *BBVA Foundation Working Paper 5*, 2009, available [online](#).

¹⁰⁵ The predominantly negative values in the figure signify the increased linkages forming across financial centres during the time period we studied. We do not show the sparse data in the positive part of the graph, as we use this figure as background to illustrate our larger point.

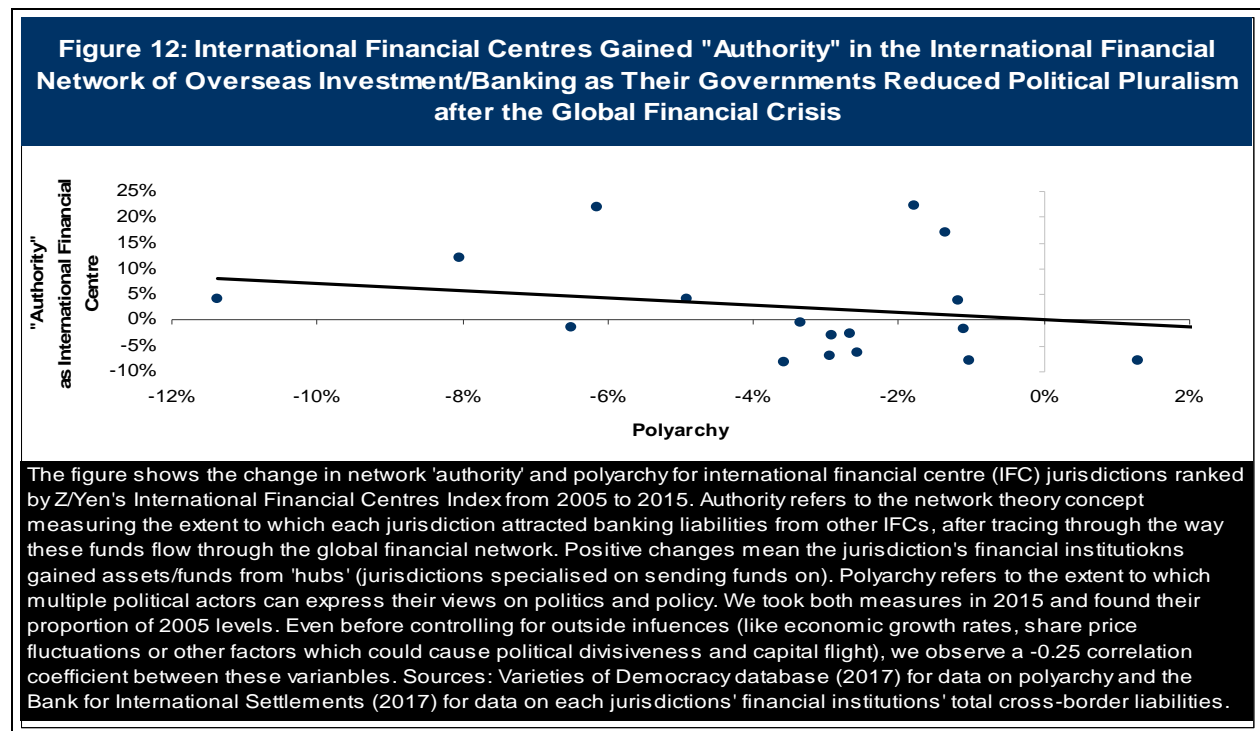


Without controlling for other factors like macroeconomic fluctuations and the demand for capital, the network data seem to display contradictory trends. Figure 12 shows the relationship between international financial centres' authority (or the extent to which other financial centres place money with their banks). Over the period we studied, international financial centres' authority decreased as polyarchy in these international financial centres rose.¹⁰⁶ Some might argue that highly connected financial centres feel crises and other large changes in their competitiveness less – attenuating the need for the polyarchy which helps boost competitiveness.¹⁰⁷ Others argue

¹⁰⁶ Authority usually contrasts with 'hub' values – the extent to which a financial centre serves as a source of funds or conduit for these financial flows, basically 'referring' these funds to high authority centres.

¹⁰⁷ For example, see Matteo Chinazzia, Giorgio Fagiolo, Javier Reyes, Stefano Schiavo, Post-Mortem Examination of the International Financial Network, *Journal of Economic Dynamics and Control* 37(8), 2013, available [online](#).

that regional links have replaced global links.¹⁰⁸ Yet, without controlling for other factors though, these data could say anything (or nothing at all). Other factors likely interfere too badly for us to draw any conclusions about these data.



Modelling and Operationalizing Endogenous Change in IFC Politics and Competitiveness

Changes Within and Between Countries

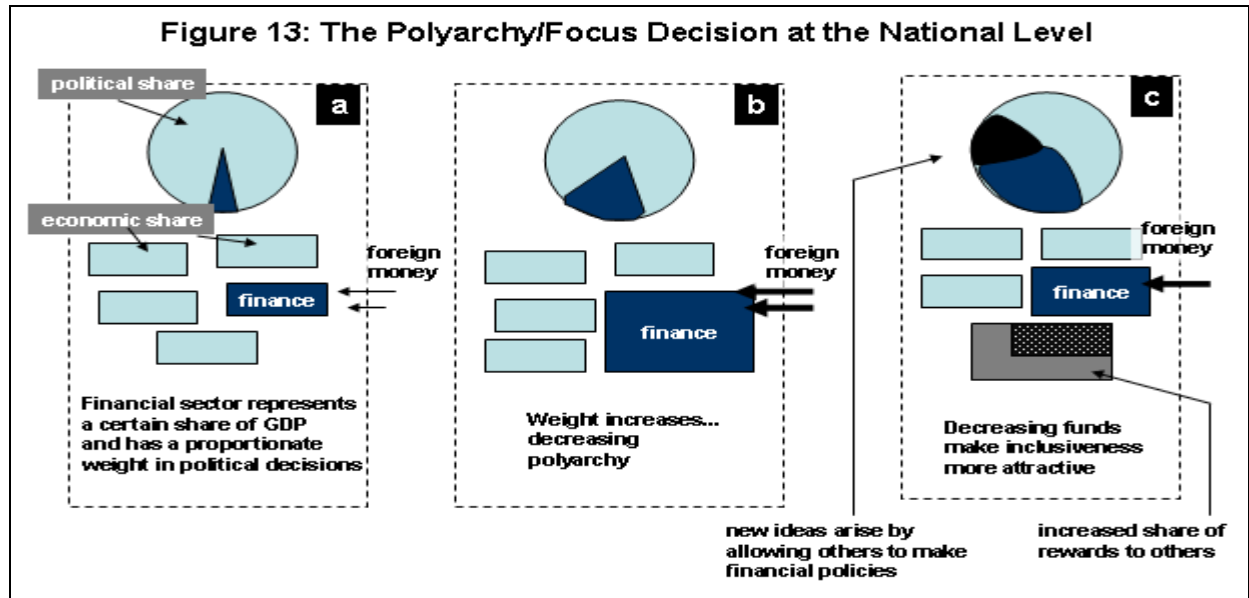
Our model focuses on the trade-off between political rights and economic power in international financial centres. Figure 13 shows a simplified, non-mathematical, graphical, static version of our model. In the left-most side of the figure (part a), we depict various sectors of the economy (as blocks) and their relative political power as the circular pie at the top. We highlight the financial sector as the dark blue box, whose size depends on cross-border banking liabilities (deposits and funds from abroad). The dark blue slice of the pie represents finance's weight in political decision-making. In part b of the figure, we observe the financial sector's increased importance (share) in/of political decision making, concomitant with its current, future, or even perceived ability to attract capital from abroad.¹⁰⁹ Such a trend might correspond with an increased focus on financial policy (and thus decreasing polyarchy in order to implement financial policies rather than other policies).¹¹⁰ Similar decisions in other jurisdictions negatively impact on the size of

¹⁰⁸ Eugenio Cerutti and Hao-nan Zhou The Global Banking Network in the Aftermath of the Crisis: Is There Evidence of De-globalization? *IMF Working Paper WP/17/232*, 2017, available [online](#).

¹⁰⁹ We discussed in the literature review how even the perceived importance of a future, possible financial centre could influence political decisions taken in the present.

¹¹⁰ Part of this trade-off involves simple opportunity costs. Politicians have finite attention spans, meaning that topics which take up more of policymakers' time and attention necessarily crowd out consideration and work on other topics. See Christopher Cotton, Competing for Attention: Lobbying Time-Constrained Politicians, *Journal of Public*

the home jurisdiction's financial institutions (depicted in the figure's part c) as a shrinking in size compared with part b. In part c, the financial sector's political power (concentration of influence) shrinks, yielding way to other sectors with better/different ideas – as depicted by the black coloured slice of the political pie. Other sectors' inclusion in policy making increases as does their inclusion in the economy (as shown by the larger size of non-finance sectors).

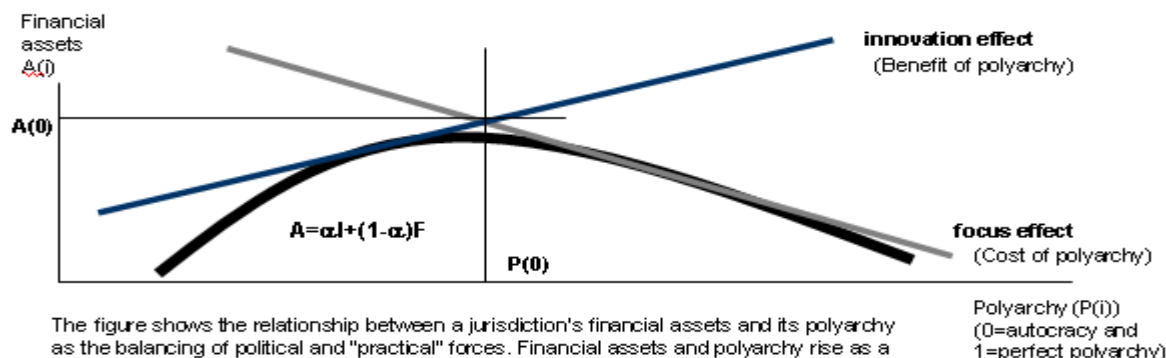


In slightly more mathematical form, the amount of cross-border financial assets and polyarchy in a jurisdiction depends on the focus/concentration of policy on finance and the creation of new ideas and innovations in finance, ideas which will help attract funds from foreign financial centres. Figure 14 shows the simplest possible representation of these factors. In theory, more polyarchy brings more innovation, from access to more ideas and high-powered interest in finance's success – as represented by an upward sloping innovation effect curve.¹¹¹ At the same time though, more polyarchy diverts time, attention and political capital away from finance – as shown by a decreasing focus curve. The mix between these forces decides the level of cross-border financial system liabilities and the level of political polyarchy – and both forces work at the same time.

Economic Theory 18(4): 642-665, 2016, available [online](#). For a fuller treatment, see Bryan Jones and Frank Baumgartner, *The Politics of Attention: How Government Prioritizes Problems*, 2005.

¹¹¹ Of course, the economy has several sectors – and innovation spreads/differs across sectors. The spread of such innovation would affect the supply and demand for financial services. Because we do not model the way such an “innovation effect” curve from microeconomic foundations, we do not discuss further details here. For a taste of some of the complexity involved, see Laurent Calvet, Martin Gonzalez-Eiras, Paolo Sodini, Financial Innovation, Market Participation and Asset Prices, *NBER Working Paper No. 9840*, 2003, available [online](#).

Figure 14: The Basic Political Driver of Financial Centre Competitiveness



These curves allow us to examine the impact of other jurisdictions' changes in policy. Figure 15a shows the effect of an increase in the focus of financial policies and politics in one of the jurisdiction's main counterpart jurisdictions (for example the effect in France of the UK focusing on financial policy and Westminster's deafening to health and other policies).¹¹² Such a policy – according to our model – would shift out the focus effect curve. The move (and we flipped the axes to make the figure focus on changes in financial assets) results in a decrease in polyarchy and a fall in financial assets – as the home jurisdiction matches this focus and loses business to the more focused rival. Figure 15b shows the effect at home of these changes – as local political and economic forces encourage more participation. A shifting out of the innovation curve represents the effect of local financiers looking for new, innovative ideas from sectors formerly muted out, and other sectors looking for recompense for their previous patience. Such an internal shift further undermines foreigners' confidence in placing their money with our financial institutions.¹¹³ Such a decline would have – in the past – represented the simple redistribution of political power and economic fortunes (as shown by point α in the figure lying along the previous focus curve). Because our counterpart jurisdictions have increased their focus on becoming world class financial centres, we can extend our own polyarchy far less than before in order to remain competitive... at least in this middle term.

¹¹² Westminster refers to the place in London where government operates from.

¹¹³ For a model of this effect, with the financial sector replacing these authors' view of exploitation from government, see Amy Pond, *Protecting Property: The Politics of Redistribution, Expropriation, and Market Openness*, *Economics & Politics*, 2018 (forthcoming), available [online](#).

Figure 15a: Our Reaction To Other Jurisdictions' Political Tightening

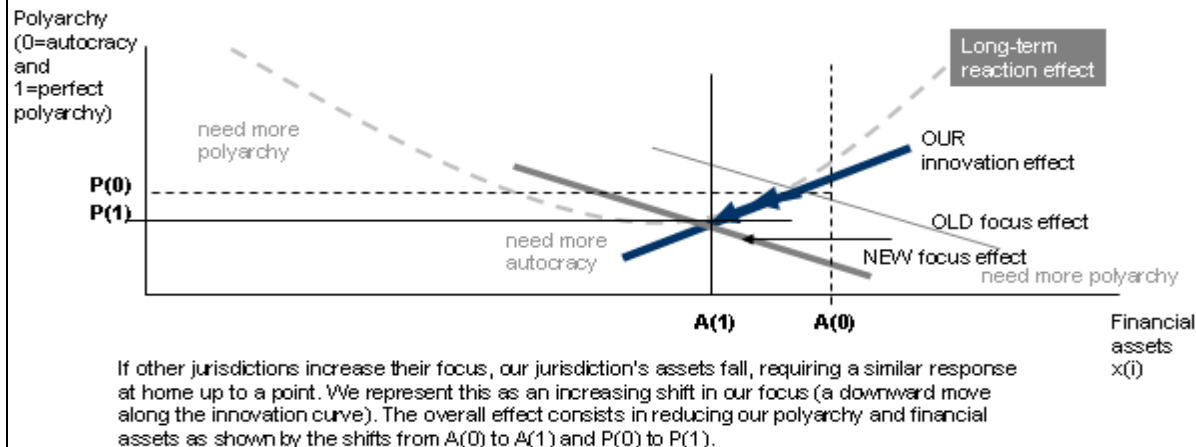
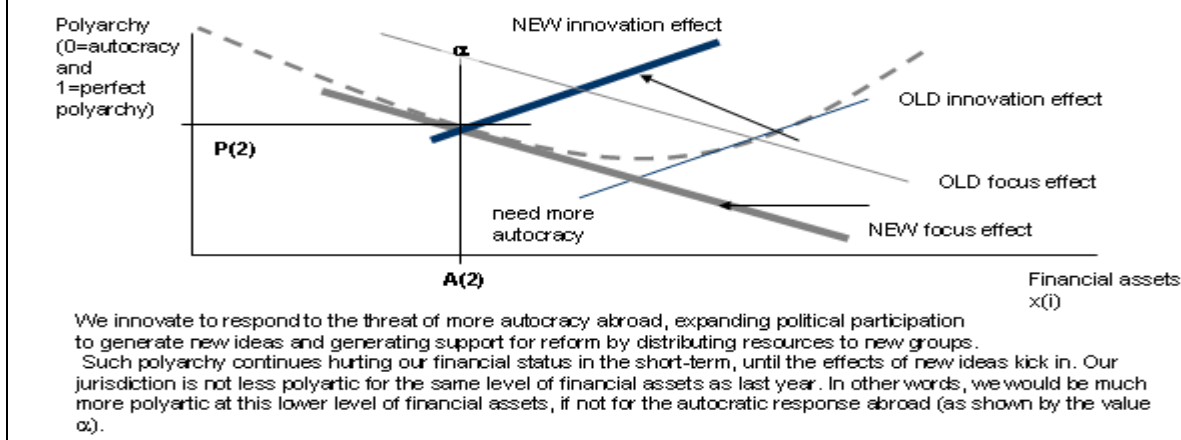
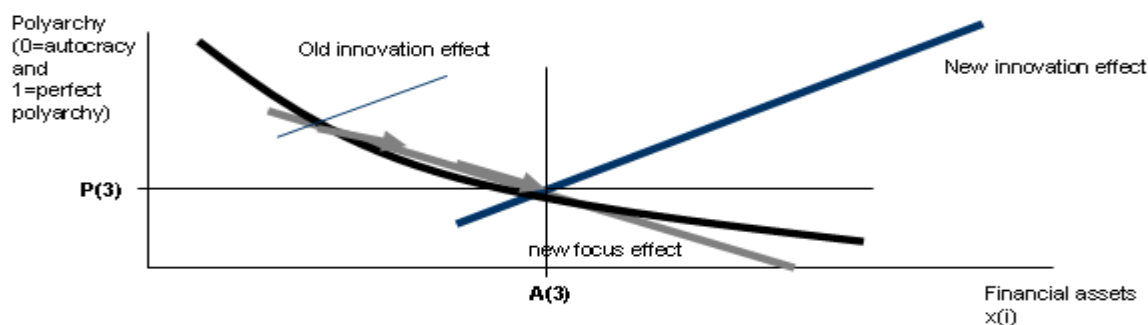


Figure 15b: The Need to Innovate Our Way Out of Declining Competitiveness



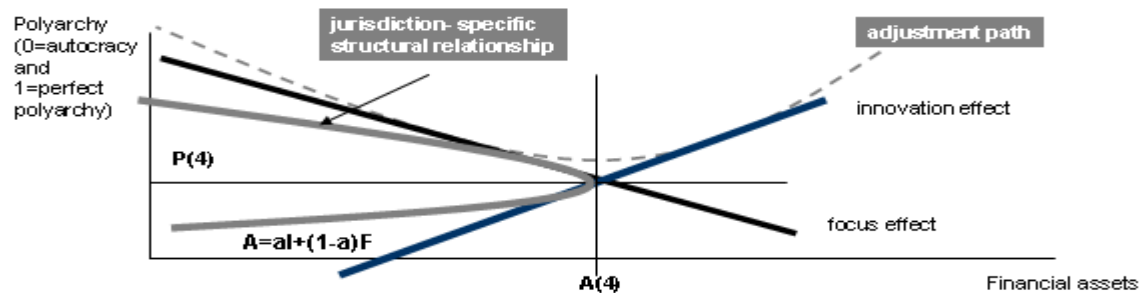
In the longer-term though, polyarchy and financial assets held by our financial institutions settle at an equilibrium point dictated by finance-related tastes and technologies. Figure 15c shows the increase in financial assets and the accompanying decrease in polyarchy from its temporary very high levels, as financial services firms implement innovative ideas. Figure 15d shows the same relationship between these variables as in Figure 14, though with the figure turned on its side. The figure shows an adjustment path as other jurisdictions change their polyarchy and/or financial assets (and thus their centrality in the international network of financial centres). The levels A(4) and P(4) represent those post-adjustment, equilibrium values.

Figure 15c: Reactions of Other Jurisdictions' Political and Financial States



Decreased political participation and polyarchy helps our jurisdiction quickly and efficiently implement the results of the innovation we "feed" into our financial system. Such a political concentration moves us along the focus effect curve. Our financial assets grow, as polyarchy falls.

Figure 15d: Reactions of Other Jurisdictions' Political and Financial States



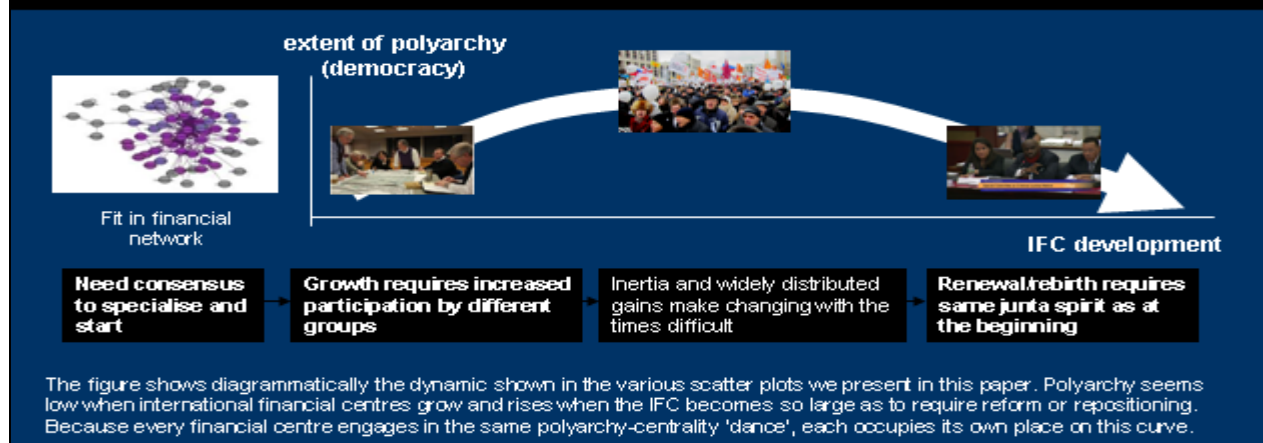
We go back full-circle. In theory, our jurisdiction has an equilibrium level of focus and innovation. Barring other jurisdictions changing their polyarchy and centrality in the international financial centre network, our polyarchy and centrality should settle at some steady state. We show the structural relation we described in the first of this series of figures (except with the axes flipped).

Because each wave of innovation leads to larger, more developed financial services firms, we can hypothesize about the way polyarchy changes as a financial centre develops. Figure 16 shows that conjectured change. As a financial centre seeks to grow, a pushing/guiding political force discourages dissent and encourages foreign investment. Experiences from the UAE, Singapore, and Qatar represent the most mediated examples.¹¹⁴ In other cases, the lack any traditional means of economic development -- combined with a geography that gave finance a natural competitive advantage - encouraged an autocratic political focus on finance.¹¹⁵ While many international financial centres still make finance a core area of policy, many have started opening to other areas. To what extent does such an opening represent a way of invigorating finance – rather than an attempt to diversify the local/national economy? Only time will tell.

¹¹⁴ Such a theory completely contradicts work by authors like Genschel and colleagues, who argue that autocratic regimes have little incentive to be reform. History dispels this myth. See Philipp Genschel, Hanna Lierse and Laura Seelkopf, Dictators Don't Compete: Autocracy, Democracy, and Tax Competition, *Review of International Political Economy* 23(2), 2016, available [online](#).

¹¹⁵ For a discussion of autocrats' 'world city' approach to development, see David Bassens, Ben Derudder, Frank Witlox, The Making and Breaking of Dubai: The End of a City-State?, *Political Geography* 29: 299–301, 2010, available [online](#).

Figure 16: The Transition Path of an International Financial Centre?



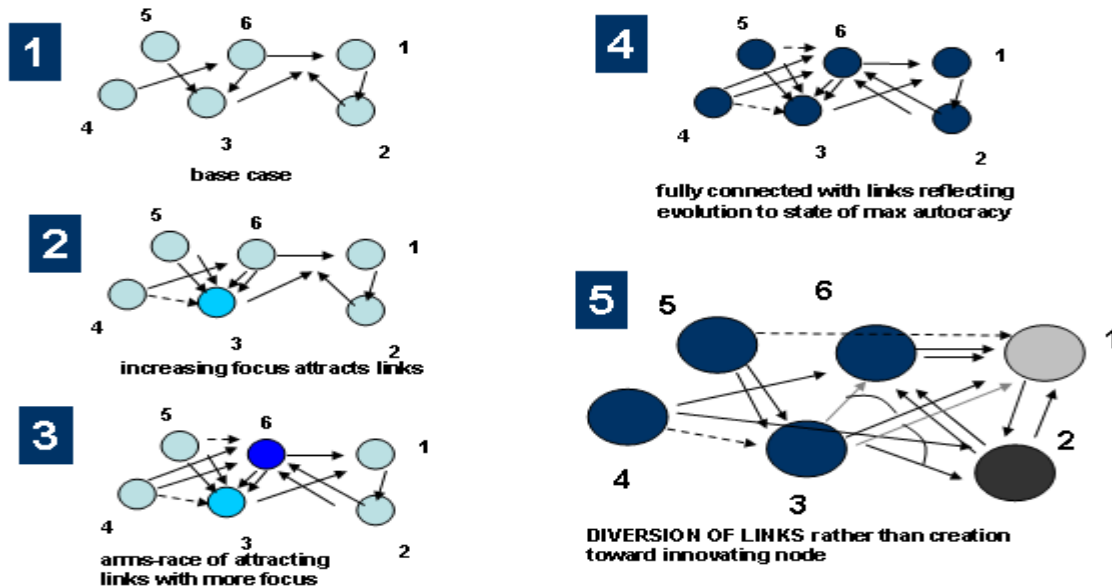
Changes over Time

In our model, international financial centres grow over time, as they focus on finance. Figure 17 shows the mental model we used to develop our model. In plate 1, we see 6 financial centres represented as a simple set of nodes. In plate 2, we show the situation where financial centre number 3 focuses on developing its financial centre. As we described in the literature review, and showed in the previous empirical overview section, such a policy-focus leads to more links and more financial assets travelling along those links.¹¹⁶ As plate 3 shows, as other financial centres focus even more intensively on finance, they build out both the quantity and depth of these network links.¹¹⁷ As we described in the literature review, historically one financial centre developed and grow because of growth in counterpart centres. The self-reinforcing network of financial centres grows as more and more centres decide to develop their financial centres and linkages.

¹¹⁶ Li and Resnick, using a model very similar to ours, finds for two effects influencing democracy's impact on foreign investment. See Quan Li and Adam Resnick, Reversal of Fortunes: Democratic Institutions and Foreign Direct Investment Inflows to Developing Countries, *International Organization* 57(1): 175-211, 2003, available [online](#).

¹¹⁷ A theoretical justification for such an effect might go as follows. More polyartic institutions reduce certainty over the protection of property rights (as more interests vying for control means more unstable policy). Such uncertainty thus reduces all kinds of capital flows, deposits and portfolio investments. For more on this approach, see Xun Cao and Michael Ward, Do Democracies Attract Portfolio Investment? Transnational Portfolio Investments Modeled as Dynamic Network, *International Interactions*, 40(2):216-245, 2014, available [online](#). Naturally the argument could go the opposite way, with more autocracy giving politicians discretionary power over already-made investments. Such power would decrease confidence in the sanctity of property rights – and thus reduce foreign deposits and portfolio investments. See David Stasavage, Private Investment and Political Institutions, *Economics and Politics* 14(1), 2002, available [online](#).

**Figure 17: Dynamics of International Financial Networks
(Link/Fund Attraction Versus Diversion)**



The figure shows the dynamic effects of an increase in focus (a decrease in polyarchy) for theoretical financial centres in a theoretical network. The light blue node (number 3) indicates an exogenous change toward more focus. The darker blue node (number 6) indicates more focused policies than those pursued by node 3 (simulated possibly as a random reaction to node 3's policy). As more nodes focus their financial policies, the number of links increases. Plate number 4 shows the results of this race to the bottom, where all nodes have the maximum number of links. Similarly, in plate 5, the light gray node (number 1) represents the introduction of innovation-producing polyartic policies. The dark gray node (number 2) represents a jurisdiction introducing more polyarchy than in node 1. The cycle reverses itself, except such increases in polyartic policies cause links to divert from other financial centres (preserving the total number of links in the system). One could imagine/model an intermediary situation, where some nodes decrease their polyarchy, while others increase such polyarchy (thus avoiding the all-of-nothing wave-like patterns we have shown in this simple example).

As some financial centres fall behind, they engage in the innovation needed to develop new markets, new ideas, new financial products and new markets. New innovations do not always require democracy (increased polyarchy). An increase in polyarchy does not guarantee financial innovation. Places like Singapore and Shanghai have developed for a long time without such polyarchy. In our model, such polyartic-led innovation results in a shift in financial links – a diversion of funds from other centres.¹¹⁸ Polyarchy changes the relative distribution of resources – allowing for future concentration.¹¹⁹ Yet, in the short-term, innovation only serves to give other financial centres time to further focus their policy priorities toward finance.

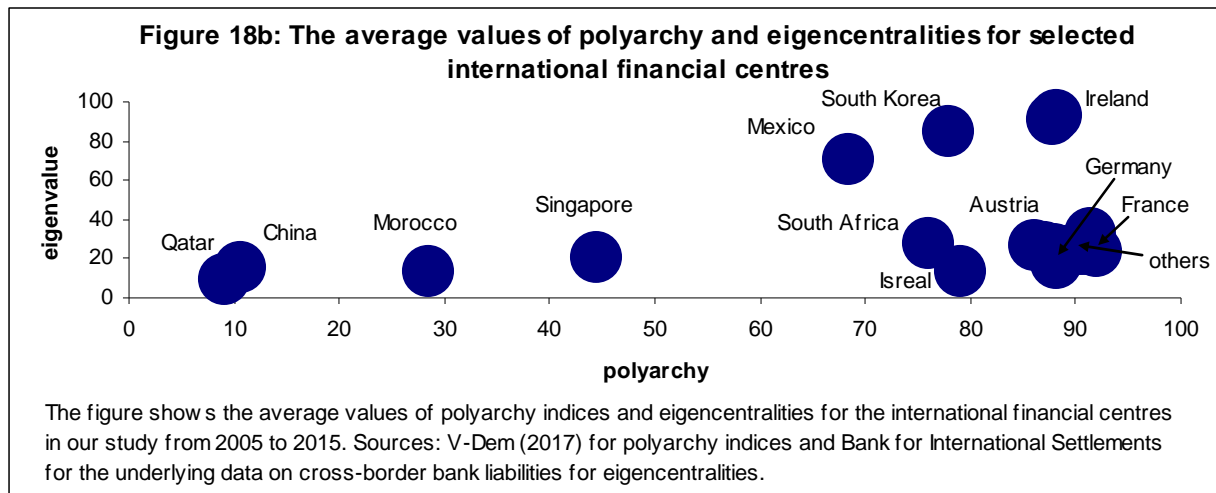
¹¹⁸ Most of the literature would probably agree with such a diversion – though most of the literature does not couch financial flows in network terms. Armstrong and Drysdale, for example, describe how ‘political closeness’ encourages investment between politically close jurisdictions (necessarily at the expense of less politically close jurisdictions in a world with finite/scarc resources. Because they do not model investment in network terms, their investment diversion effects less clearly show the way funds swing from one place to the next with changes in politics. See Shiro Armstrong and Peter Drysdale, *The Influence of Economics and Politics on the Structure of World Trade and Investment Flows*, In Shiro Armstrong (Ed.), *The Politics and the Economics of Integration in Asia and the Pacific*, 2011, available [online](#).

¹¹⁹ Indeed, not enough academics note the diversionary effect that political regime has on cross-border financial flows. Every time a study like Jakobsen and De Soysa finds that democracy (or whatever political institution)

The Data and Empirical Methods We Used

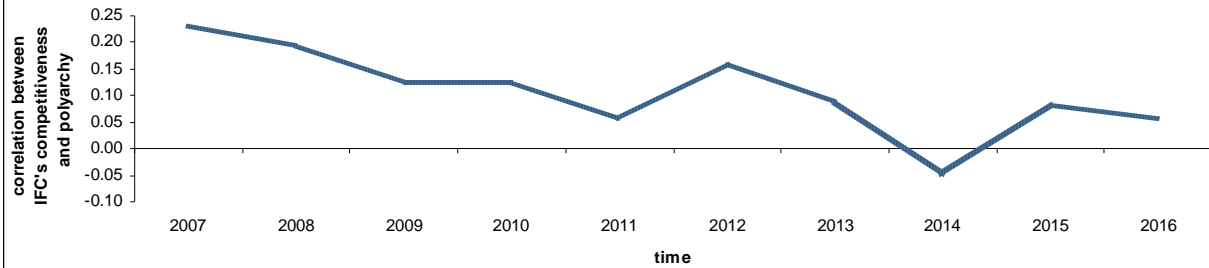
Jurisdictions, raw polyarchy and network centralities

In order to test our theories, we first had to compile the relevant data for the relevant jurisdictions. Figures 18 provide an overview of the data we used. Figure 18a show the jurisdictions in our study, while Figure 18b shows the average values of polyarchy and eigencentality from 2005 to 2015 – before being adjusted for the way that macroeconomic and other factors affect them. Figure 18c shows the extent to which aggregate polyarchy has changed (fallen) over the years when compares with jurisdictions' eigencentality. . Figure 18d shows the networks of financial relations between international financial centres in 2005 and 2015. Grouping these networks in modules, we see increasing concentration over time (matching other data).



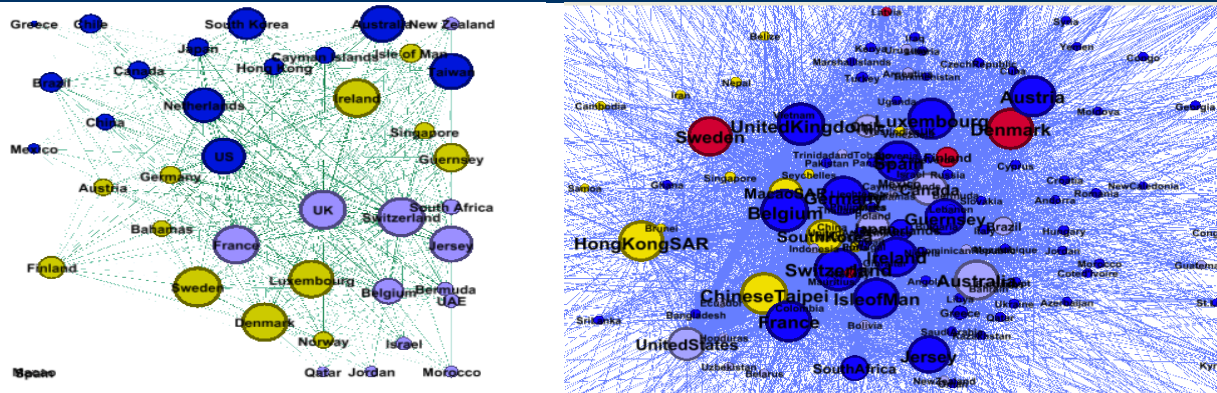
increases foreign financial flows, every country-specific negative sign in their regression analysis represents a case of diversion (where a country lost funds at the expense of another). See Jo Jakobsen and Indra De Soysa, Do Foreign Investors Punish Democracy? Theory and Empirics, 1984–2001, *Kyklos* 59(3): 396–410, 2006, available [online](#).

Figure 18c: Recent Years Have Seen Anti-Democratic Reforms for IFCs



The figure shows the correlation between each international financial centre's competitiveness (its Y/Zen rating) and the level of polyarchy measured by the Varieties of Democracy Project for the period 2007 to 2016. The downward trend in this correlation does not account for uncertainties (variance) in these data and we do not show confidence intervals.... providing the reader with a roughly "feeling" for the data. See paper for list of jurisdictions we used and other details.
Sources: Y/Zen for IFC competitiveness ratings and the Varieties of Democracy Database (various years).

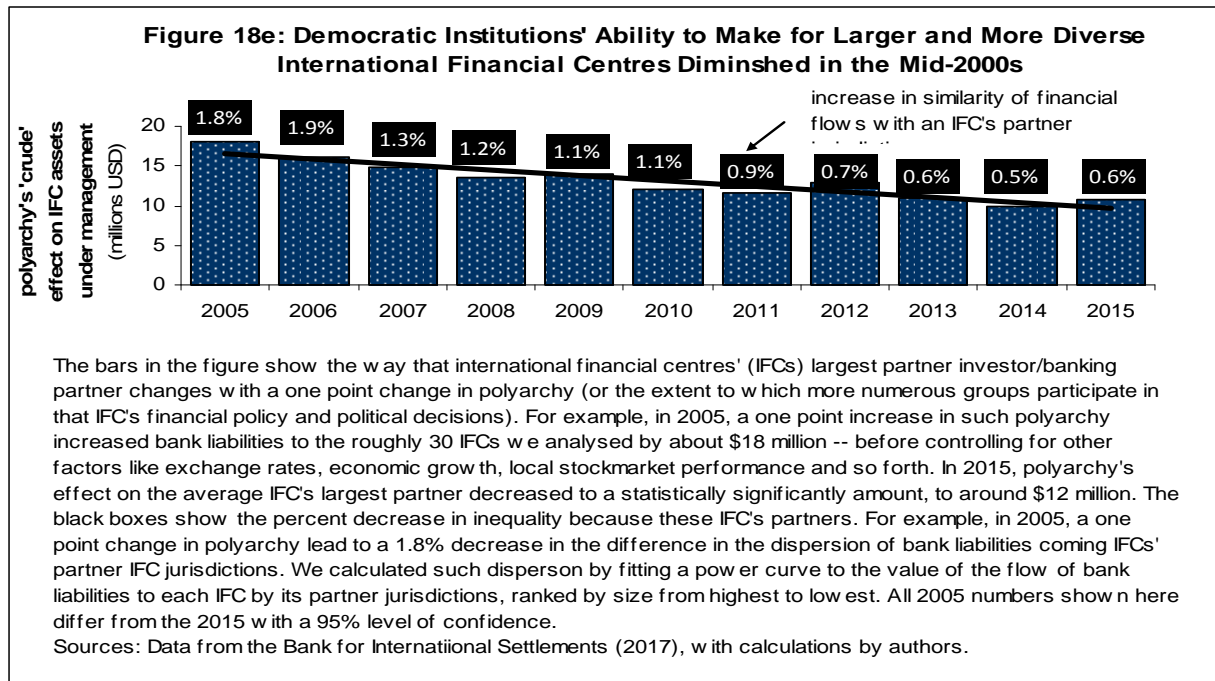
Figure 18d: Financial Networks in 2005 and 2015



The figure shows the network of cross-border bank liabilities in 2005 and 2015, sorted by the top major groupings of financial centres. Such “modularity” (as the statistical name for such grouping) results from closer links between module members than the rest of the network. Such modularity changed radically over the 10 years. In 2015, top groupings accounted for 56%, 39% and 3% respectively for the top three modules. In 2015, the top grouping accounted for 63%, 20% and 10% of all financial centres (with 3 more groups scoring the remainder). These networks became thus more concentrated over time.

The way that polyarchy affects the amount of cross-border liabilities that banks can attract has decreased over time. Figure 18e shows the slope of a line of best fit between polyarchy and cross-border bank liabilities placed by each jurisdiction’s largest counterpart jurisdiction. For example, in 2005, on average, a one point increase in polyarchy in any particular jurisdiction (like France) resulted in that jurisdiction’s main counterpart (like the UK) placing roughly \$18 million in extra cross-border liabilities in that particular jurisdiction (France). The values in the black boxes show the way ‘drop off’ in each jurisdiction’s counterpart’s cross-border liabilities changes for a one point increase in that jurisdiction’s polyarchy. We define such a ‘drop-off’ as the proportional difference in the value of cross-border liabilities from lower ranked jurisdiction counterparts. For example, France’s second largest counterpart jurisdiction (the US) may provide 12% fewer cross-border bank liabilities than the first ranked jurisdiction (the UK). Similarly, on average, France’s third largest counterpart jurisdiction provided 12% fewer liabilities than the US. The value in the

black boxes in Figure 18e do not represent the value of such a drop-off. Instead, they measure the way that drop-off value changes as polyarchy in a jurisdiction rises.¹²⁰



One approach to analysing our bank liabilities data might consist of looking at the ranks of cross-border bank liabilities between these financial centres. We might devise some method – like a ratio of largest to smallest counterpart jurisdiction – or some measure the deviations from the average. Figures 19 explains why we used network characteristics instead. In brief, we used network characteristics because of the dependencies between the financing partners themselves. As Figure 19a shows, the construction of any ratio of even deviation from average assumes that one observation (country's data) do not depend on other countries. We can construct a reliable ratio (for example) if the denominator partly changes every time the denominator does. As Figure 19b shows, if we compare financial centres' network centralities with entropies (a measure of the similarity of each partner's bank liabilities), we see little relationship at all (as shown in the scatter plot in the lower left hand side of the figure). Figure 19c describes the term eigencentality we use throughout this study.

¹²⁰ As explained in the figure, we estimate such a change by regressing the value of these drop-offs by polyarchy ratings for the jurisdictions we studied for each year. The value in the black box shows the value of the slope of that regression line. Such a regression covers up differences in jurisdictions (namely the line of best fit may not completely describe two countries' data lying relatively far away from the line). The regression also does not control for extraneous factors like macroeconomic conditions and the quality of national institutions. We control for these variables later in our study.

Figure 19a: Why Do We Use Networks Rather than Ranks?

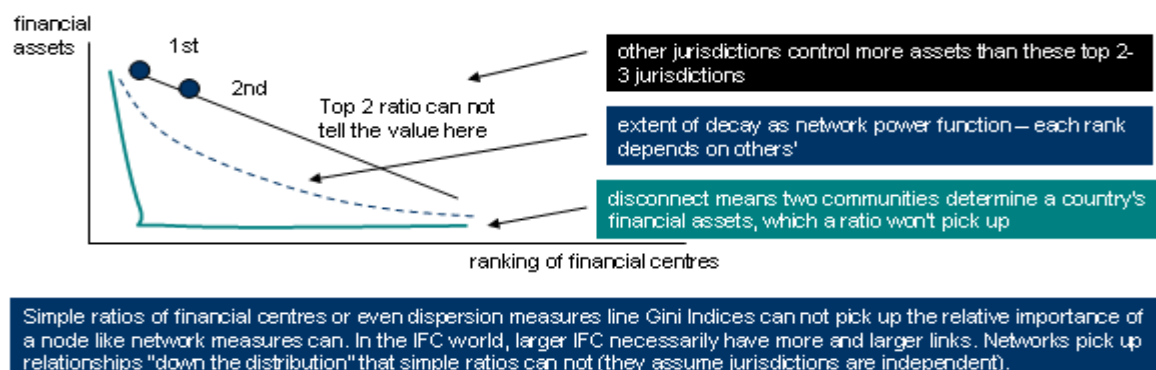
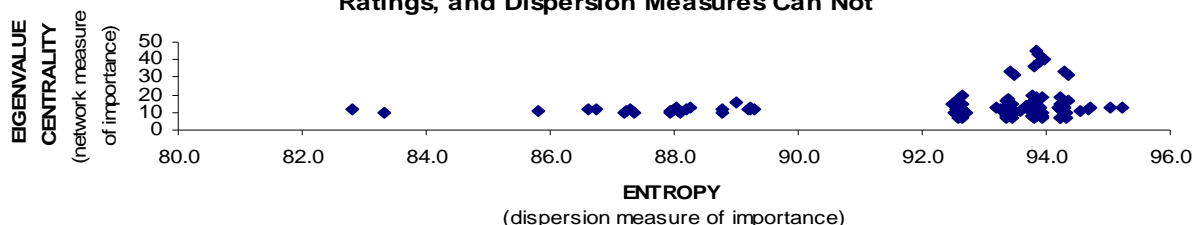


Figure 19b: Network Measures Capture IFC Importance In a Way Standard Ranks, Ratings, and Dispersion Measures Can Not



The figure shows the eigenvalue centrality and the entropy of financial centres in each year used in our study. We see no clear relationship, with such a relationship varying across countries and times (as we described earlier). Eigenvalue centrality refers to the importance of an international financial centre's cross-border bank liabilities, given the links to other important centres. Entropy just measures the difference in these liabilities, relative to all other countries for that year. Source: authors (based on data from the BIS).

Figure 19c: What is Eigencentality?

As we describe in the appendix, eigencentality refers to the importance of an international financial centre in the network of such financial centres. Such centrality takes into account the value of cross-border bank liabilities a jurisdiction attracts from counterpart jurisdictions. Such centrality also takes into account the importance of that jurisdiction's partner countries for their own counterparts. The eigencentality algorithm basically traces the value of all these liabilities across the whole network of financial centres for all jurisdictions. The most central jurisdictions attract large amounts of cross-border liabilities from jurisdictions which attract a large amount of these liabilities and so on all the way through the network. The German word *eigen* means characteristic (as in a physical or identifying characteristic). Such a procedure thus finds the true or characteristic values of these jurisdictions by already including the potential investments/liabilities other financial centres indirectly make to that jurisdiction through its networks of partners. Eigencentality thus truly provides a financial-system-wide view.

Figure 20 shows the variables we used in our study. The dependent variables consist of polyarchy in each jurisdiction as well as two measures allowing us to quantify the nature of each jurisdiction's financial networks. In order to compare polyarchy and a jurisdiction's centrality in international financial centre networks, we had to control for non-political factors. For example, a jurisdiction could attract large amounts of cross-border bank liabilities because of favourable exchange rates or because its government requires more funding to operate public services (and they want to use foreign funds/deposits to finance such funding).

Figure 20: List of Variables Used to Remove the Effect of Macroeconomic and Other Variables When Estimating the Amount of Cross-Border Bank Liabilities

Factor	N	Mean	Std. Dev	Min	Max	Diff?
Dependent Variables						
Polyarchy	192	85.06	12.45	9.21	94.71	*
Largest 'investment' partner	181	231776	355,563	1406	2,002,814	*
Power Law	181	-0.3	0.1	-0.63	-0	*
Macro push/ pull factors						
Real effective exchange rate index†	180	99.03	7.95	70.9	125.7	*
Real interest rate (%)	140	5.28	8.56	-10.8	44.6	
Attraction Factors						
Market cap. (% of GDP)	150	93.94	61.16	17.57	282.51	*
GDP per capita, PPP (current thousands international \$)	192	37.4	14.56	4.77	129.34	*
S&P Global Equity Indices (annual % change)	192	7.13	29.27	-69.94	125.11	
Current account balance (% of GDP)	192	1.35	5.44	-7.51	31.06	
Commercial service exports (current billion US\$)	192	116.45	134.74	5.58	730.59	*
Connectivity factors						
Air transport, millions of passengers carried	172	89.23	172.36	0.55	798.22	*
Demanders of funds						
Central government debt, total (% of GDP)	160	60.65	26.52	18.37	132.36	*
Gross capital formation (% of GDP)	192	23.07	4.14	14.73	43.26	
Suppliers of funds						
Gross domestic savings (% of GDP)	192	26.03	8.08	12.47	75.54	*
FDI, net inflows (% of GDP)	192	6.22	11.35	-5.63	87.44	*
Broad money growth (annual %)	116	8.50	6.66	-25.5	22.05	
Institutional factors						
Rule of Law‡	190	1.35	0.78	-0.66	2.10	*

† 100 = 2010

‡ rule of law comes from the World Bank's Governance Indicators for the variable by that same name. All the other variables should be self-explanatory.

Diff? refers to whether we calculated and used annual differences in this variable.

Without controlling for macroeconomic and other factors, our analysis would have been badly biased. The previous figure (Figure 20) shows the five (5) factors that we grouped these variables into.¹²¹ Macroeconomic push-pull factors include variables that could push or pull funds across borders to a jurisdiction's banks. Exchange rates and interest rates represent self-explanatory variables.¹²² Attraction factors represent variables that might attract foreign funds (the size and

¹²¹ We do not provide a complete literature review – which would easily double the size of this paper. Instead, we appeal to readers' common sense, and refer to the literature when necessary (especially in determining if any work exists about polyarchy as a dependent variable in analysis related to the variables we describe in this section).

¹²² While these variables obviously affect cross border deposits and portfolio investment, their effect on polyarchy/democracy remains murkier. Few academics have (rightly) tried to assess the effect of exchange rate changes on political regimes (and/or the extent of democracy/polyarchy). Of the studies we could find, most looked at the effect of political regime on exchange/interest rates – rather than the other way around. Likely endogeneity makes these variables, though, but dependent and independent in any econometric analysis. For some examples, see David Steinberg and Krishan Malhotra, The Effect of Authoritarian Regime Type on Exchange Rate Policy, *World Politics* 66(3): 491-529, 2014, available [online](#). One can easily see how exchange rate changes affect the distribution of gains from globalisation – which affects the relative bargaining power of these sectors. See also Jeffry Frieden,

performance of local stock markets, the need to finance trade, and the overall jurisdiction's wealth/size.¹²³ Air transport represents our only factor measuring the jurisdiction's connectivity.¹²⁴ Demanders of funds – like government and business investment – draw out demand for foreign funds.¹²⁵ Suppliers of local funds might help crowd out (or crowd in) foreign funds.¹²⁶ These suppliers include households and their savings, foreign direct investment and credit growth by/from the central bank.¹²⁷ Finally, no analysis is complete these days without a consideration of local institutions and the quality of regulations (as proxied by the World Bank's *Governance Indicators* variable measuring the rule of law).¹²⁸

Getting polyarchy and network centralities ready for analysis

Macroeconomic and other factors correlate heavily with the polyarchy and centrality of international financial centres. Figure 21 shows the number of variables, combinations of these variables, and non-linearities in these variables which correlate with their jurisdiction's polyarchy indices.¹²⁹ About 80% of all these combinations statistically significantly correlate with

Exchange Rate Politics: Contemporary Lessons from American History, *Review of International Political Economy* 1(1), 81-103, 1994, available [online](#).

¹²³ The most popular area of research for stock market performance revolves around political cycles. While not exactly our question (about the cycling of democratic versus autocratic decision making in financial policy), the reader can probably easily infer the extension from the effects on partisan politicians describes by authors writing in this area. See Pedro Santa Clara and Rossen Valkanov, The Presidential Puzzle: Political Cycles and the Stock Market, *Journal of Finance* 63(5), 2003, available [online](#). See also Dimitrios Asteriou and Antonios Sarantis, Political Instability and Stock Market Returns: Evidence from OECD countries, *Economics and Business Letters* 5(4): 113-124, 2016, available [online](#).

¹²⁴ Econometric analyses have already tied connectivity to banking and investment, though not very specifically to political regime. For an example from the EU on how travel (connectivity) influences political regime, see Philip Levitz and Grigore Pop-Eleches, Why No Backsliding? The European Union's Impact on Democracy and Governance Before and After Accession, *Comparative Political Studies* 43(4), 2010, available [online](#). For a broader, more robust study, see Toman Barsbai, Hillel Rapoport, Andreas Steinmayr and Christoph Trebesch, The Effect of Labor Migration on the Diffusion of Democracy: Evidence from a Former Soviet Republic, *American Economic Journal* 9(3): 36-69, 2017, available [online](#).

¹²⁵ The effect of cross-border capital flows on political openness represents another under-researched question (like any question where polyarchy/democracy represents the dependent variable). Bak and Moon find statistically significant effects, while Escriba-Folch does not. See Dae-hee Bak, Chung-shik Moon, Foreign Direct Investment and Authoritarian Stability, *Comparative Political Studies* 49(14): 1998-2037, 2016, available [online](#). See also Abel Escriba-Folch, Foreign Direct Investment and the Risk of Regime Transition in Autocracies, *Democratization* 24(1), 2017, available [online](#).

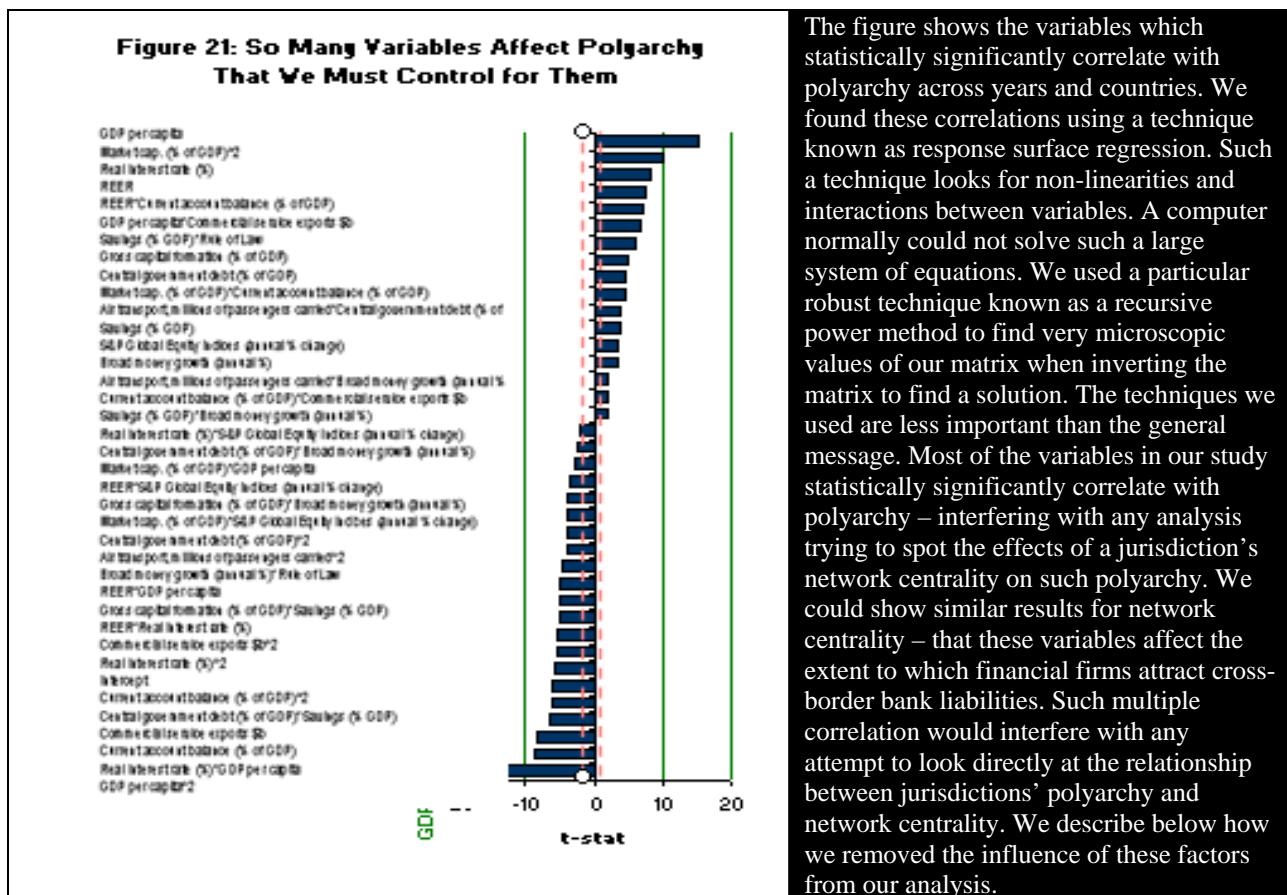
¹²⁶ While no one seems to have looked at how savings affects democracy, at least they have looked at wealth. See Kenneth Scheve and David Stasavage, Wealth Inequality and Democracy, *The Annual Review of Political Science* 20(24): 1-24, 2017, available [online](#). For a general review, see also Pippa Norris, Wealth and Democracy, In Pippa Norris, *Driving Democracy*, 2008, available [online](#).

¹²⁷ Credit policy's effects on democratisation alone has taken up a vast literature, with expansion money and credit supporting the incumbent or not (depending on credit's effects on inflation, public spending, and other variables). We prefer to avoid this discussion all together, rather than give a few, inadequate, references.

¹²⁸ The World Bank's Governance Indicators have opened up an entire academic industry looking at the effects of "institutions" on just about everything. For one study looking at the 'quality of institutions' and its effects on democracy, see Alexander Wagner Friedrich Schneider, Martin Hall, The Quality of Institutions and Satisfaction with Democracy in Western Europe - A Panel Analysis, *European Journal of Political Economy* 25(1): 30-41, 2009, available [online](#).

¹²⁹ We refer to a technique in the figure known as response surface regression. Such a regression basically has squared terms (which hunt for non-linearities) and interactions between variables already built into the algorithm.

polyarchy at a 95% level of confidence or better. These data show that we must remove their effects before trying to find patterns related to these international financial centres' centrality in their financial networks. Figure 22 shows the general process we used to strip away the effects of these macroeconomic variables – on both polyarchy and eigencentality values. We regressed these variables (the covariates) on polyarchy and eigencentality values using panel methods – in order to arrive at “pure” polyarchy and eigencentality values.¹³⁰ As Figure 23 shows though, we had to correct the data for the interdependencies between them. The left side of the figure shows two completely independent factors (regression requires such independence to “work correctly”).¹³¹ We see many variables clumping nearer to each other than these independent axes (known as eigenvectors). The correlation matrix on the right side of the figure further shows such interdependencies between these variables. A bit fewer than half of all these variables statistically significantly correlate with each other. Without correcting for such inter-correlation, we would accidentally assign part of the effect of exchange rate movements on trade balances, to cite one of the many ‘multicollinearities’ (as economists refer to such a problem) in these data.



The recursive method we discuss helped our analysis because regressing so many values “bins” our data into so many containers that parameter estimates become very imprecise.

¹³⁰ Panel regression represents such a well-known technique that we do not describe these methods. The reader completely unfamiliar with such regression can easily find a [video](#) about the technique.

¹³¹ ‘Work correctly’ means to find the unbiased, least variance estimates of parameters like the effect of eigencentality on polyarchy (and visa-versa).

Figure 22: Empirical Methods for the Study of Political Institutions on IFC Competitiveness

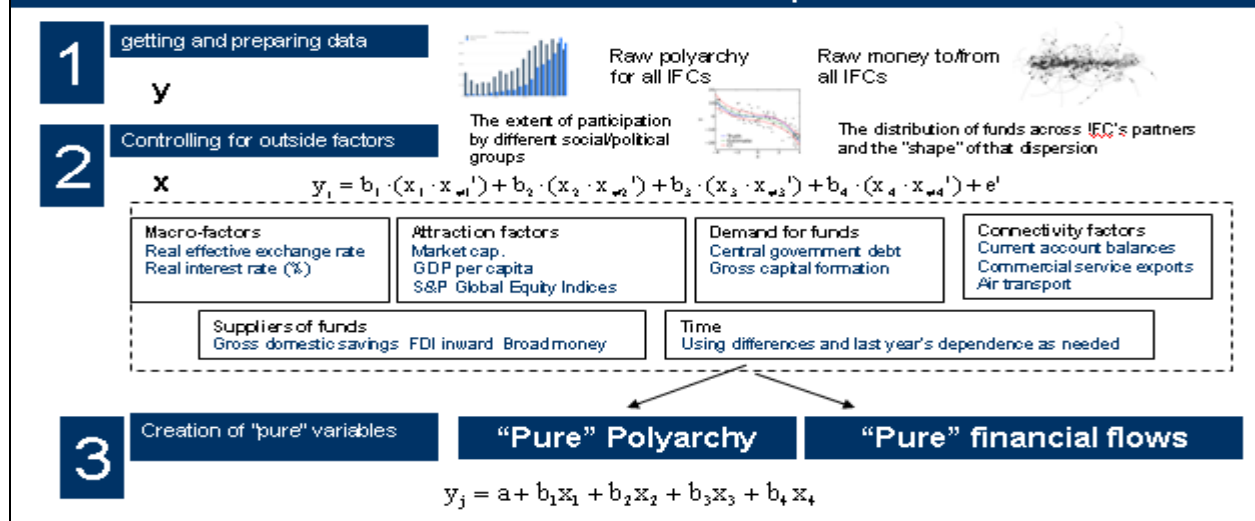
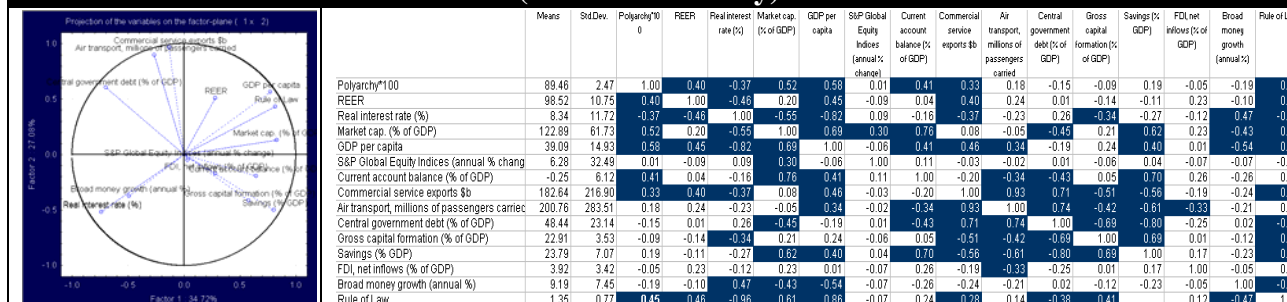


Figure 23: Fixing Problems That Arise When Variables Correlate With Each Other (Multi-collinearity)

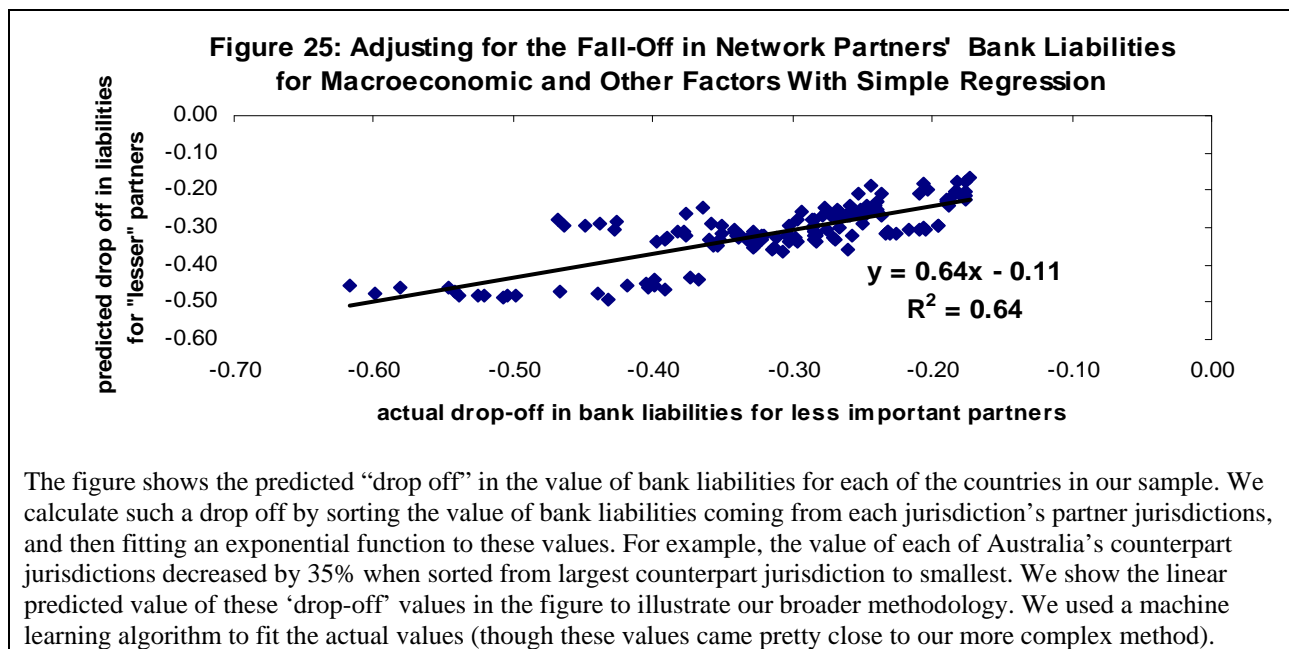
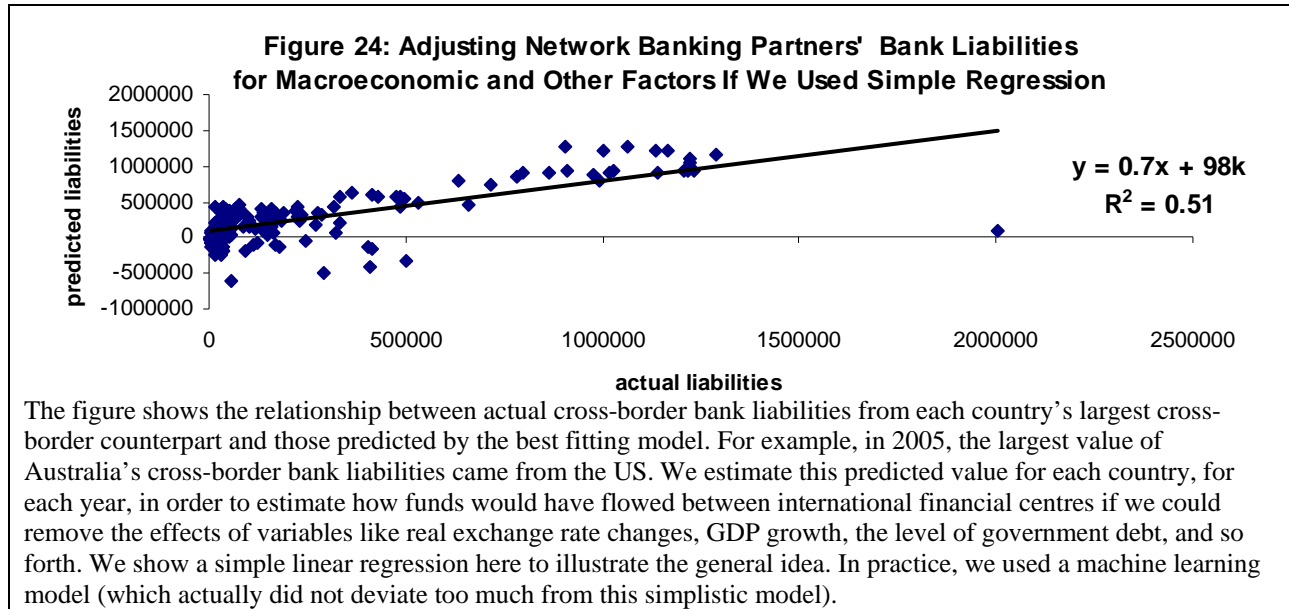


The figure shows the extent to which the covariates we try to control for correlate with each other. Such correlation (called multi-collinearity) causes any analysis of one variable (like government debt) to pick up the effects of other variables like market capitalisation, trade balances, popularity as an air travel destination and so forth. The left part of the figure shows the relationship of our variables with two completely independent variables (called orthogonal factors). Ideally, we need our variables to sit on one of these axes. The right hand side shows the correlation coefficients between the variables we used to adjust our polyarchy and network centrality data. The coloured cells show the correlations with a 95% probability or greater of statistically significantly varying with each other.

Source: authors calculations (with data from the Bank for International Settlements, 2017).

The resulting analysis yields the 'predicted values' of our key variables of interest. Regressing a jurisdiction's bank liabilities on exchange rates, government debt, air travel and other factors yields a predicted value for these liabilities. The model's error thus reflects the part of these financial flows unexplained by these macroeconomic and other factors. We use these errors as our estimates/variables of 'pure' cross-border bank liabilities (after controlling for these other factors). Figure 24 provides one example of how we estimated the largest liability flow from each jurisdiction's largest counterpart for one year (in 2005). The figure shows the actual values of these liabilities, their predicted values from our model, and the differences between the predicted values and actual values. Figure 25 shows the extent to which the values of bank liabilities for the second, third, fourth and other partner jurisdictions "drop off" (decrease in value) by rank. Such a

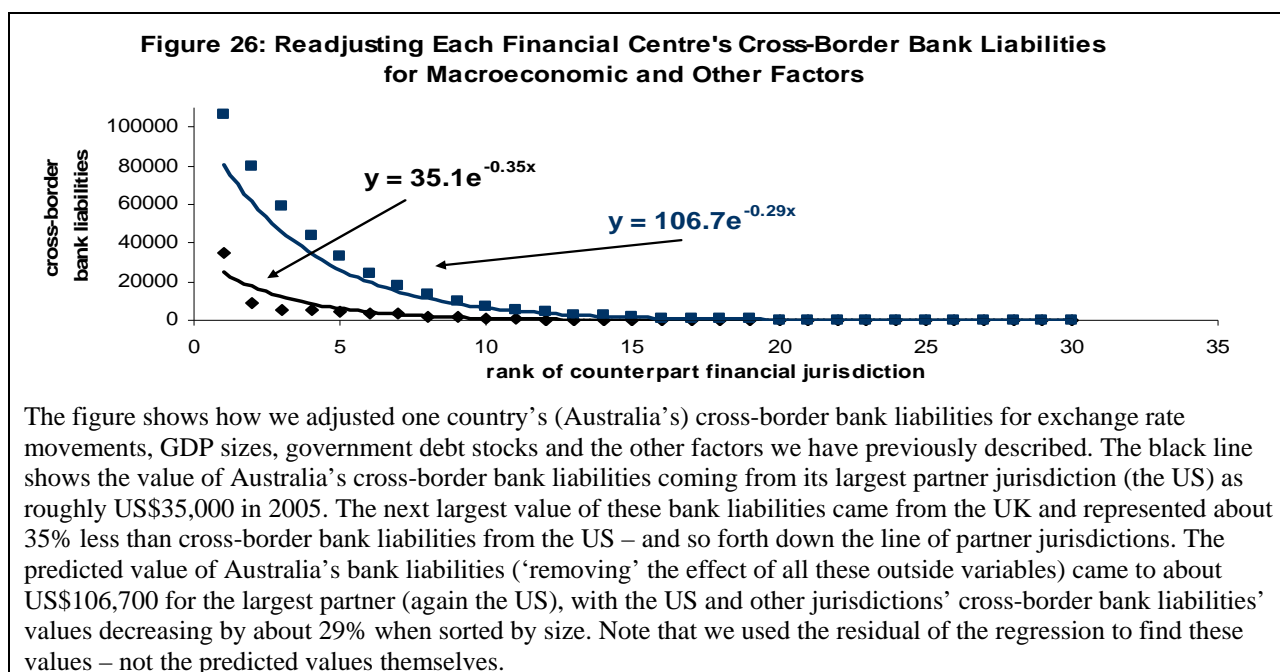
drop off – combined with the largest finance partner – provides the new structure of financial networks.¹³²



We constructed ‘pure’ financial networks for these cross-border bank liabilities by combining these new largest partner estimates with these new drop-off estimates. Figure 26 shows how we

¹³² Because all jurisdictions in the BIS database link to each other, we do not need to worry about the existence/absence of links. Thus, we only need to know which jurisdiction provides the most bank liabilities (as a lead counterpart) and the other finance partners’ (ranked by the value of their cross-border bank liabilities in a jurisdiction) liability flows diminish in relation to that ranking. These two numbers (the lead counterpart and the ‘drop-off’ value) provide all the data necessary to construct a fully-linked network.

constructed these new networks – using Australia’s cross-border bank liabilities from 2005 as an example. If Australia’s largest provider of funds in 2005 held \$35 million in assets (recorded on the Australian side as a liability), then our cross-country econometric estimation predicted a value of \$106 million – assuming exchange rate movements, different government debt levels, and other factors had not affected these funding patterns. By rank, each counterpart jurisdiction placed 35% fewer funds with Australian banks than the one ranked ahead it. After controlling for these macroeconomic and other effects, they should have placed 29% less – in effect investing more per partner jurisdiction.

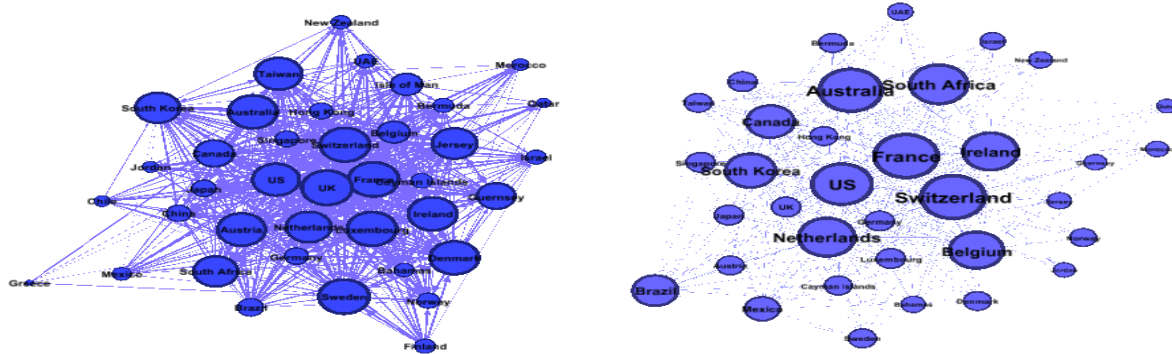


Such differences in these financial centres’ leading financial partner and the extent to which such financing drops off by rank leads to different network configurations, after going through this exercise for all the financial centres in a particular year.¹³³ Figure 27 shows the network of these bank liabilities in 2010, before adjusting for the effects of these macroeconomic and other variables – and after. Australia’s and South Africa’s centrality would have increased remarkably. Places like Jersey would have lost out a bit.¹³⁴ Figure 28 summarises these changes – showing the way mean values would have changed.

¹³³ Researchers have taken increasing interest in mapping out the networks of cross-border financial flows. The configurations of these networks take many forms – depending on the goal of the analysis. For one example, see Co-Pierre Georg, *The Effect of the Interbank Network Structure on Contagion and Common Shocks*, *Deutsche Bundesbank Discussion Paper No 12/2011*, 2011, available [online](#). See also Ben Derudder, P. Taylor, F. Witlox and G. Catalano, *Hierarchical Tendencies and Regional Patterns in the World City Network: A Global Urban Analysis of 234 Cities*, *Regional Studies* 37(9), 2003, available [online](#).

¹³⁴ Unfortunately, too few scholars bother adjusting these networks. Without adjustment, network changes could result from any factor – not just the one the author studies. For examples of this all-too-common problem, see Inaki Aldasoro, Domenico Delli-Gatti and Ester Faia, *Bank Networks: Contagion, Systemic Risk and Prudential Policy*, *Journal of Economic Behavior & Organization* 142: 164-188, 2017, available [online](#). See also Leonardo Bargigli, Giovanni di Iasio, Luigi Infante, Fabrizio Lillo and Federico Pierobon *Interbank Markets and Multiplex Networks: Centrality Measures and Statistical Null Models*, *Interconnected Networks*: 179-194, 2016, available [online](#).

Figure 27: The Network of Cross-Border Bank Deposits and Other Liabilities for International Financial Centres Before and After Adjusting for Macroeconomic and Other Variables



BEFORE ADJUSTMENT

AFTER ADJUSTMENT

The figure shows the network structure (geography) of cross-border bank liabilities for the most important international financial centres for 2010 (as one example from 2005 to 2015). For negative values of these flows, we switched the direction of these flows, from destination to source (rather than the other way around). We calculated each country's eigencentrality from networks like these for each year from 2005 to 2015. These eigencentralities measure the importance of an international financial centre, taking into account the size of cross-border bank liabilities its counterpart jurisdictions attract from their own partner jurisdictions. The final eigencentralities thus exclude the effects of macroeconomic and other factors we used in our preliminary regressions.

Figure 28: Summary Statistics for Polyarchies and Eigencentralities Used in Study

Variable	Valid N	Mean	Minimum	Maximum	Std.Dev.
Pure Polyarchy	160	18.81	0.0	119.38	11.15
Difference in Pure Polyarchy	141	0.74	-7.5	45.51	5.27
Voice	192	114.83	-170.0	173.96	55.87
Difference in Voice	163	-2.05	-162.3	91.89	19.48
Old eigencentrality	128	90.79	0.0	100.00	11.97
New eigencentrality	156	37.80	8.7	100.00	33.28
Change in new eigencentrality*	130	63.68	-10000.0	10000.00	3646.91
Invest Entropic Measure * 100	184	15.91	6.7	54.26	8.56

The figure shows the differences in the values of our variables, before and after controlling for outside factors.

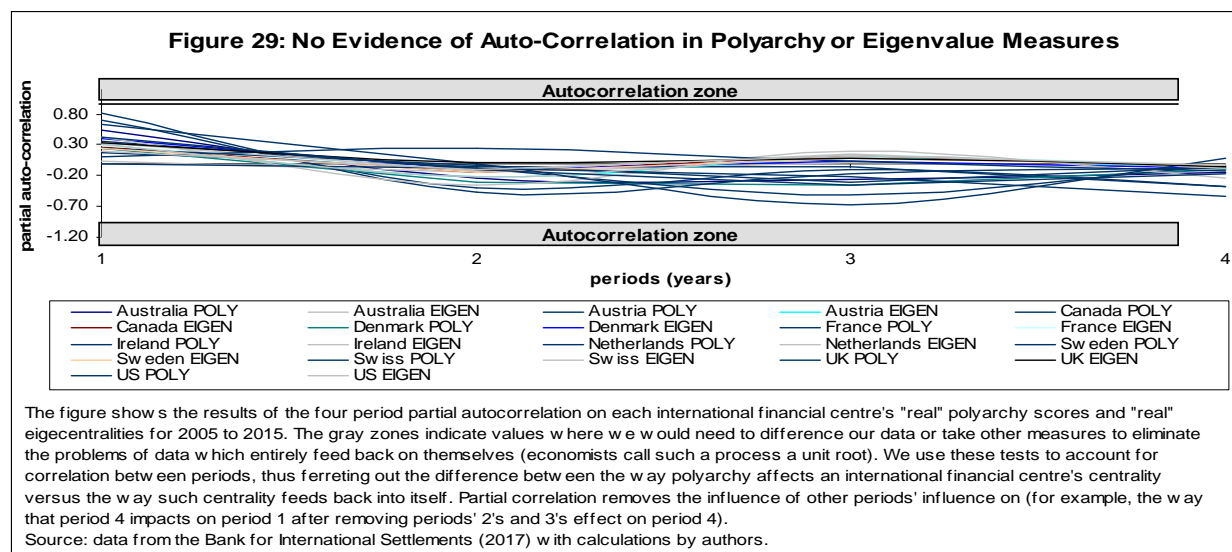
“Pure” variables refer to variables calculated as the ‘error’ or residual of the regression analysis we described earlier, adjusting for the effects of macroeconomic and other factors. We provide data for voice and entropy, two variables which we will discuss in more detail as we test the robustness of our analysis.

* We rescaled these changes to maintain the same scale as the other data.

Changes over time

Even after finding the “pure” values of polyarchy and eigencentralities, we still need to make sure that any correlation between these variables does not arise from inertia. If a country's polyarchy in any year depends mostly on such polyarchy in the previous year (or years) before, then such a dependence on the past can block out any attempt to correlate such polyarchy with the network importance of the jurisdiction and its partner/competitor jurisdictions. Figure 29 shows the extent of such inertia – which economists call auto-correlation – for select

jurisdictions' eigencentality and polyarchy. We observe no value approaches one (1) – the value at which last year's polyarchy equals this year's polyarchy.¹³⁵



We can then look at how each country's polyarchy-eigencentality adjusted over the decade. Figure 30 shows some examples of our data. The left hand side of the figure shows Australia's polyarchy compared with its own eigencentality. We observe a hill-like pattern in this one example of Australia's polyarchy compared with the jurisdiction's own eigencentality.¹³⁶ Australia's eigencentality and polyarchy have risen together for lower levels of the country's eigencentality. As Australia gains prominence in global international networks, polyarchy fell. We similarly show one example of the way Australia's polyarchy changed as Denmark's eigencentality changed in the right part of the figure. In this particular outcome, Australia's polyarchy increased as Denmark eigencentality rose. The trend on the bottom of the figure shows the way that Australia's polyarchy responded to a change in its eigencentality – for various levels of its eigencentality. Such a figure – called a 'spider plot' – shows the way that polyarchy reacts to a jurisdiction's eigencentality over all possible states of these variables.

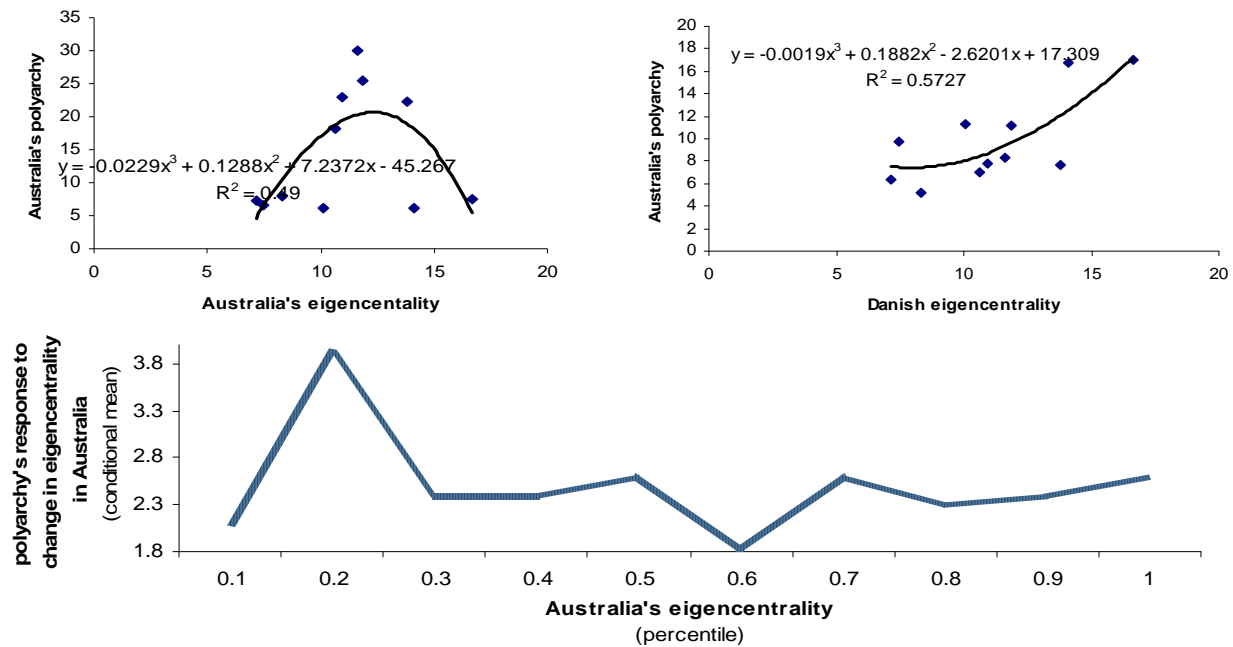
The "spider" graph in the last part of the figure shows a similar trend – adjusting for the randomness of these variables. Namely, this spider graph shows the results over 1,000 simulations – ensuring that the final relationship roughly depicts the relationship without very wide confidence intervals leading away from this line. Yet, this method of analysis treats

¹³⁵ The "1" we refer to comes from the formula $y_t = \theta y_{t-1} + \varepsilon$ where y_t refers polyarchy (for example) at time period t . The θ in this equation thus refers to the extent that last year's y depends on this year's y . A value of 1 means that last year's polyarchy completely explains this year's polyarchy (and values less than 1 describe 'inertia' as we've referred to it).

¹³⁶ We use the phrase "in this one example" because Bayesians acknowledge that these data represent one possible realisation of a broader relationship that we can not directly observe. Imagine Australia existing in multiple universes – and a correlation between polyarchy and eigencentality in each alternate universe/dimension. Some correlations will resemble the one we observe in the figure – others less. By summing up over all these possibilities, we can uncover the deeper structural relationship between these variables. For a more technical, though easy to understand, explanation, see Elena Medova, Bayesian Analysis and Markov chain Monte Carlo Simulation, Cambridge Judge Business School Working Paper 10/2007, 2007, available [online](#).

different observations from different years as random draws from a deeper relationship between these two variables. Such a procedure gives a snapshot picture, by using data collected over time.

Figure 30: The Relationships Between Polyarchy and Eigencentality
(Actual and Bayesian)



The figure shows the relationship between Australia's polyarchy and eigencentality from 2005 to 2015 as an example of the methods we used in this study. The top left panel shows a simple correlation of these variables for Australia. The top right panel shows the simple actual correlation between Australia's polyarchy and Denmark's eigencentality. The bottom curve – called a spider plot – shows the conditional mean of the way Australia's polyarchy changed for changes in its eigencentality, over various levels of such eigencentality. In this figure, changes in Australian polyarchy, compared with changes in eigencentality rose when Australia did not occupy too central a position in global financial networks (ie possessed low eigencentality). Such polyarchy increases the slowest at medium levels of eigencentality – supporting the model we presented in the previous section of our paper. The figure shows the relationship over 1,000 simulations – and does not change when we rerun the simulations (namely we have a consistent parameter). Think of the figure as fitting regression lines on polyarchy and eigencentality when dividing eigencentality into sub-samples by size.

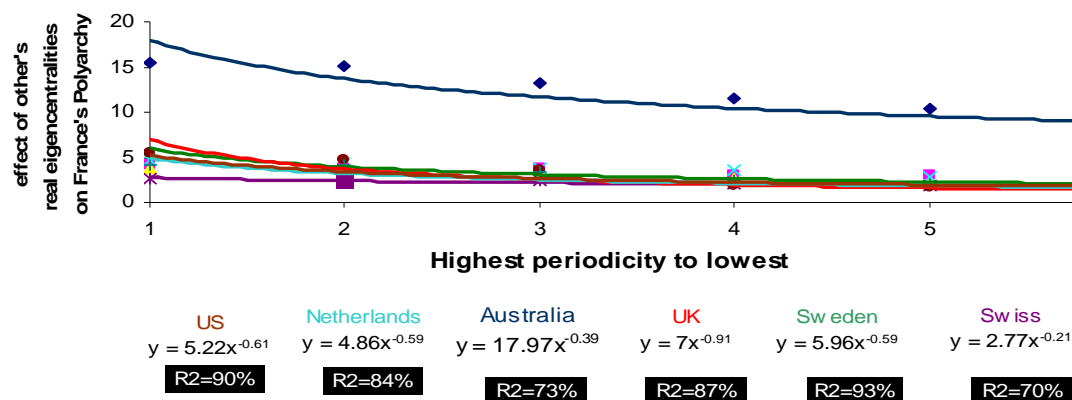
We should explain further the importance of the spider plot. If the top part of Figure 30 shows one realisation of the way Australia's polyarchy changed as the jurisdiction's eigencentality changed from 2005 to 2015, we could imagine “alternate universes.” We could imagine these data come from distributions which we can not see. We saw these data – but we could have easily seen other data too. The spider plot presents a Bayesian analysis of these variables. We resampled randomly 1,000 times from the historical data and the likely distribution generating these data.¹³⁷

¹³⁷ Resampling refers to bootstrapping and Monte Carlo simulation. Bootstrapping refers to sampling the historical data again and again at random. Monte Carlo simulation refers to fitting a distribution around the historical data, and choosing data at random from the distribution. We treat them as the same only because Monte Carlo sampling produces many of the same data bootstrapping does (they use the same base data). Clearly, we can resample from these data as often as we wish.

Over all these samples, we obtained the stable relationship between the way polyarchy changes compared with eigencentality – for various levels of eigencentality. Such analysis allows us to see how polyarchy might change its response, as eigencentality changes. We could (and do!) conduct similar analyses for all pairs of polyarchy and eigencentality between international financial centres – providing a detailed map of political change in response to financial competitiveness.

What about adjustment over time? Polyarchy must respond to different eigencentralities – both the jurisdiction's own eigencentality, as well as the centrality of its partner/competitor jurisdictions. Figure 31 shows the way we can differentiate between these effects, using a type of analysis known as Fourier Spectral Analysis. Such an analysis looks for wave patterns in each dataset. Longer waves mean an effect takes longer to appear. Looking at France's reaction to the increasing eigencentality for the jurisdictions shown in the figure, we see that polyarchy responds most in the short-term (in 1 to 2 years). After that, polyarchy responds very minutely. France's polyarchy responds more to Australia's increased competitiveness (as measured by increased eigencentality) than to the other jurisdictions – making Australia somehow a more important rival for France – even if French politicians and financiers do not recognise Australia as such a rival. By tracking the extent of these changes over time, we can observe how our detailed map of political change in response to financial competitiveness changes over time.

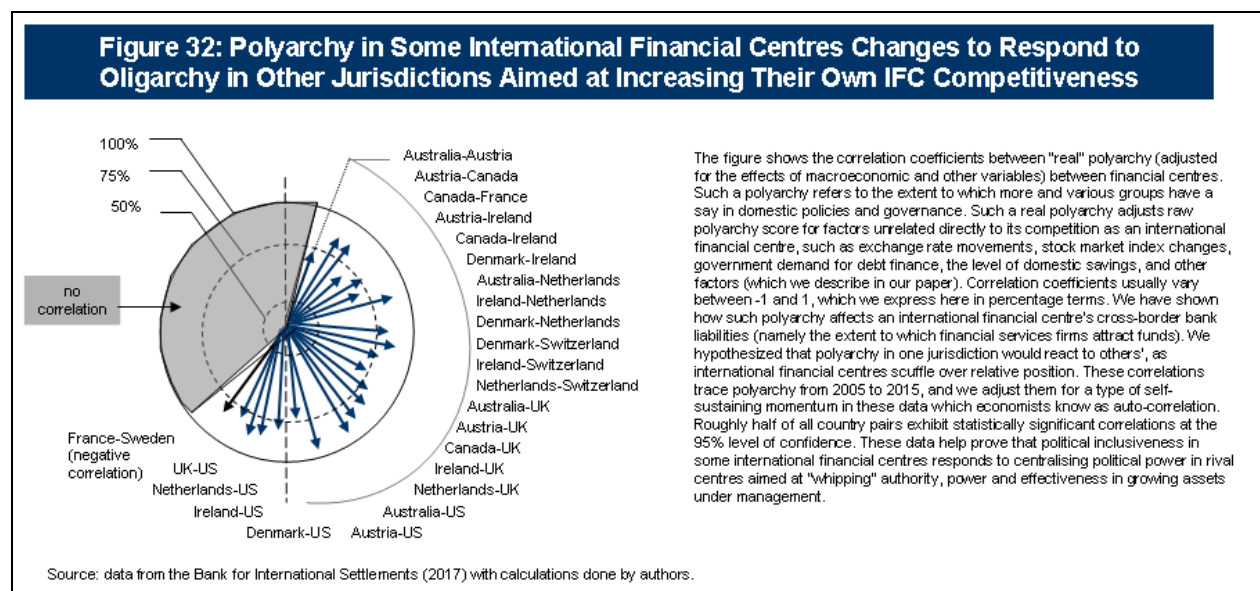
Figure 31: The Way France's Polyarchy Adjusted to the Increasing Centrality of Other Financial Centres



How does the polyarchy of a country (in this case France) react to the increasing centrality of partners'/competitors' financial centres over the years (from 2005 to 2015)? The figure shows the way that way that French polyarchy 'correlated' with changes in the eigencentality of the jurisdictions shown in the figure for the same period. Such a correlation changes with time. We show the short-term, middle term and long-term reactions as a 2 year, 2.5 year, 3.33 year, 5 year and 10 year reaction to changes in these eigencentralities. Unlike an impulse response curve (which looks at the effects over time of a single, sudden shock like a one-time change in such eigencentality), these curves show the periodic reaction (for example the longer term 5 year effect separating out the 2 year effects on their own). The equations in the figure show the decline in response from these 2 year to 10 year reactions as a function of time. The R2 shows how well our estimated decline in response over time matches the data (with 100% representing perfect matching and 0% representing no match at all). **This analysis can detect changes in causality (namely whether polyarchy responds to – or actually causes – changes in eigencentality of other financial centres.** Specifically, we look at the 'gain' in a bivariate Fourier time series analysis for the periods shown, with 'coherency' of each period provided the R2s we report in the figure.

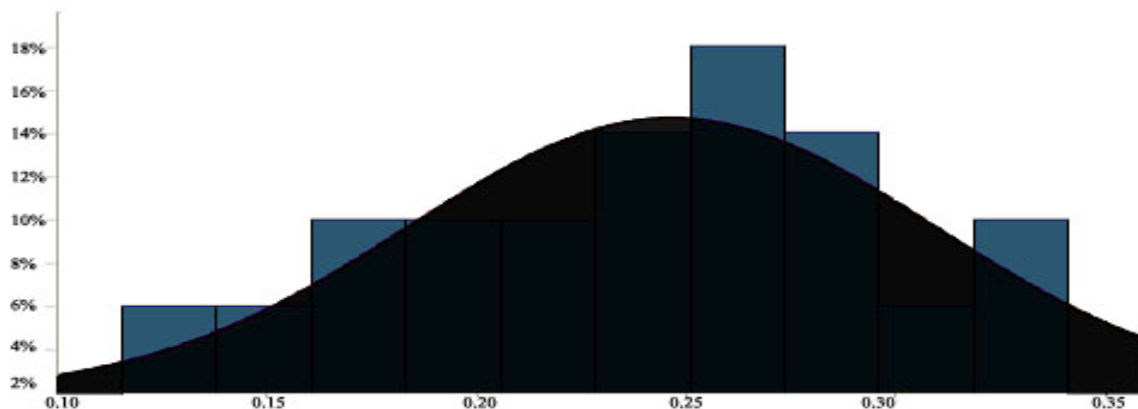
Does Polyarchy React to a Financial Centre's Centrality?

Before analysing our main research question, we should ask what effect did changes in polyarchy in one financial centre have in/on other financial centres? Figure 32 shows the correlations between the polyarchies of several of the countries we studied. In all cases, except one, polyarchy in one jurisdiction met with more inclusiveness in other jurisdictions – after adjusting for numerous factors and trends that could have affected these countries simultaneously. By removing these outside effects, we could be increasingly sure that financial centres reacted to each other – rather than international macroeconomic changes which would have caused all these jurisdictions' politicians and financial elites to restrict (or not) polyarchy. About half of these jurisdictions exhibited statistically significant correlations – for a level of statistical significance when we should only expect to observe about 5% of these polyarchies to have statistically significant correlations with each other.



How do we know these correlations actually represent something more than just random chance? Maybe we could collect data from these countries 10 years from now, and see a different pattern? Figure 33 shows the correlation between countries' polyarchy if we could draw data from 1,000 "alternate universes." Namely, we fit a pattern to all these countries' polyarchies and simulated the same variability and correlation structure in polyarchy that these data actually exhibited from 2005 to 2015. We see that, for all countries in our study, the correlation between one country's polyarchy and another's comes to about 0.25 on a scale ranging from -1 to 1. In other words, changes in a country's polyarchy 'explains' or 'accounts for' about 25% of its peer countries' polyarchy. Even a sceptic must accept that the polyarchy of one financial centre affects others.

**Figure 33: Changes in the Polyarchy of Other Financial Centres Explains about 25% of a Jurisdiction's Own Change
(Bayesian Approach)**



The figure shows the distribution of correlation coefficients across all pairs of financial centres' polyarchy scores in our study. We calculated this Bayesian statistic as follows. First, we fit an auto-regressive model to polyarchy in both jurisdictions of each of 54 pairs of countries, simulating what other possible evolutions of these polyarchy scores could have happened over a 10 year period. We then calculated, for each pair, a correlation coefficient – which changed randomly according to the random variation measured in the auto-regression of each pair of polyarchies. We then averaged all of these correlation coefficients to arrive at a single average correlation. Finally, we simulated 1,000 alternative 10 year periods – arriving at one average correlation coefficient across all pairs of countries for each of the 1,000 alternative periods. We show the distribution of these 1,000 averages (a Normal distribution centred at 0.25 and with a standard deviation of 0.06) as the black bell curve. We show a random sample of 44 of these averages as the blue bars just to see how one particular draw might look like. The Normal Distribution actually scored highest on the Akaike Information Criterion which helps statisticians decide which distribution best fits the data. The main message from the figure is that these data must be correlated (the alternative of 'no correlation' has less than a 0.01% likelihood of being true).

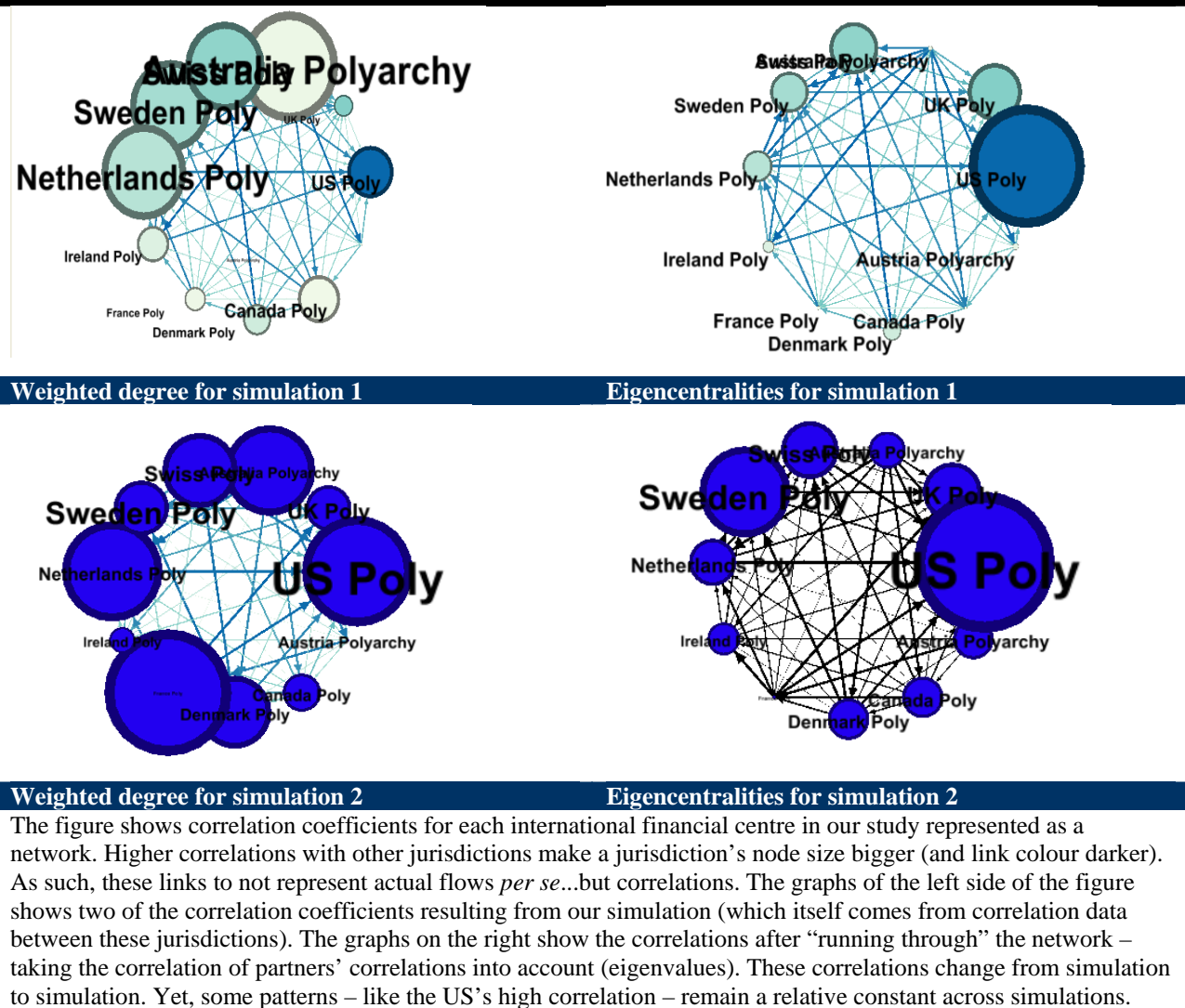
How exactly does such polyarchy flow through the international financial centre networks? We do not show the results of all the simulations we ran – simulations which attempt to track which jurisdictions account for more or less influence overall. Yet, we show the outlines of such influence in Figure 34. The figure shows the correlation between polyarchies for the jurisdictions we studied, with larger nodes representing those jurisdictions with larger overall correlations of their polyarchy with those of other financial centres. The left part of the figure shows one of these correlations before using eigencentralities to see how the correlations between the correlations of various financial centres' polyarchy work themselves out.¹³⁸ Looking only at correlations as links with a 'weighted degree', we observe the US having a relatively low correlation with other financial centres (remember the correlation we show appears at random from a fixed distribution and other correlations may vary a bit from this one).¹³⁹ Even though the US's correlation came out relatively low in this first simulation, we see that – after accounting for all these correlations and having correlations in polyarchy “work their way out” through the network; the US's polyarchy again correlates highly with other jurisdictions (as shown on the right side of the

¹³⁸ Recall the eigencentality algorithm traces through the entire effect of polyarchy across the entire network, for all jurisdictions. Some might object to using a network to show these correlations. However, we use the figure to illustrate our methodology – rather than to draw any specific conclusions.

¹³⁹ The correlation coefficients provide the weights for each of these links. As we described previously, the actual data we observed historically represent only one “draw” from an unobserved population. By continuous resampling, we hope to trace out this unobserved distribution of financial centres' polyarchy and the way it changes over time.

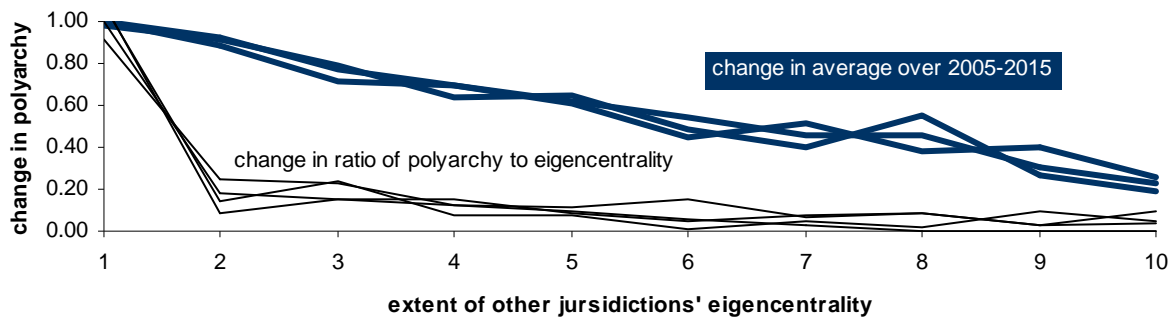
figure). The difference between the left-hand side and the right-hand side of the upper part of the figure thus give us an idea about how changes in polyarchy ripple through to the US (and changes in the US to ripple outward). In the lower part of the figure, we show a second simulation; showing a higher correlation for the US with other jurisdictions – a correlation which remained high after accounting for the way such influence flows across the network. Some countries will change their correlations from simulation to simulation (depending on the strength of the original correlations with their peers). Yet, some jurisdictions will predominantly account for the overall 25% correlation coefficient between jurisdictions which we described in the previous figure.

Figure 34: The US Becomes More Polycratic as a Polyarchy “Wave” Moves its Way Through the International Financial Network



How does polyarchy adjust to changes in other financial centres' eigencentality? Figure 35 shows the conditional distribution between these two variables. In other words, how do changes at low levels of eigencentality – versus high levels -- affect changes in polyarchy? For all countries, higher eigencentality levels corresponds to lower levels of polyarchy. Looking at the way polyarchy changes to eigencentality, as a percent of eigencentality itself, we see a different relationship. Polyarchy drops most quickly at small levels of eigencentality. Presumably, rivals need to adjust their polyarchy quickly, before growing international financial centres become a too much a threat.

Figure 35: Polyarchy Decreases as Rivals Become More Central to/in Financial Networks



The figure shows the way that polyarchy in international financial centres changed as their partners' eigencentralities changed. Such a graph depicts a *conditional distribution* – the distribution of polyarchy for every level of partners' eigencentralities. Polyarchy falls across international financial centres as their peers'/rivals' eigencentralities rise. The blue lines show the results of several resampling rounds. The black lines show the distribution of the quotient of polyarchy and eigencentralities as the dependent variable (thus removing the effect of eigencentralities' 'size effects').

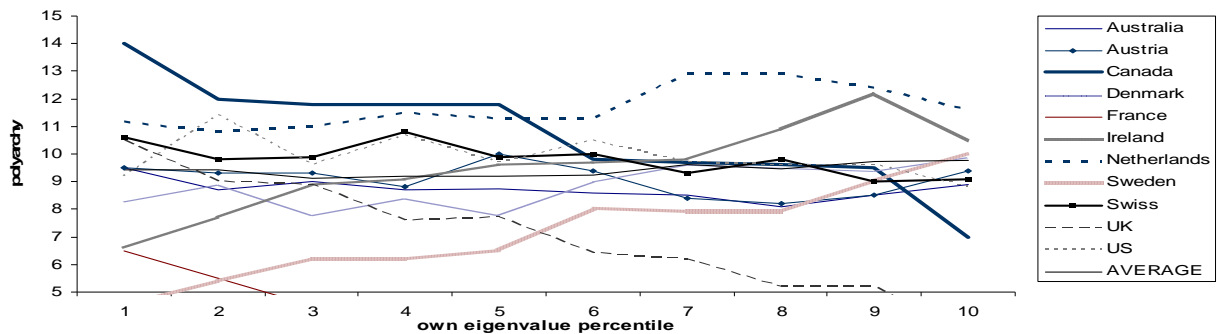
Where do we see the “innovation effect” in our data? According to our model, we would expect financial centres to start innovating when rivals become very large. Yet, in the data above, we see only a negative reaction to rivals' growth. Namely, polyarchy always seems to shrink – no matter how big rivals grow. To find such an effect, we must look at the way international financial centres' polyarchy responds to their own centrality – logical, as all “politics is local” (to coin the phrase).¹⁴⁰

Polyarchy (and thus possibly innovation) increases as a jurisdiction's own eigencentralities rise – though not for every financial centre. Figure 36 shows the same conditional probabilities of a high or low polyarchy score for low or high eigencentralities values in/of a jurisdiction. We see that, for countries like Ireland and Sweden, polyarchy rose quickly as these jurisdictions' own eigencentralities rose over time. In cases like the US and Switzerland, polyarchy fell slightly. Figure 37 shows these relationships more clearly. In that figure, we plot the first three years' polyarchy and the final three years' average as a percent of the 10 year average. We show which countries' polyarchy scores rose as their own eigencentralities rose – versus those jurisdictions that

¹⁴⁰ As an international financial centre grows and becomes a more central part of the world economy, such size affects the centre's local politics and the extent of competition with other centres. Beyond a certain size, some financial centres' financial institutions may be able/asked to handle transactions too large for other jurisdictions. In other words, larger financial centres may experience higher levels of competition – thus resulting in new political interests and polyarchies previously absent. See James Hines, *International Financial Centers and the World Economy, Society of Trust and Estate Practitioners Report 2009*, 2009, available [online](#).

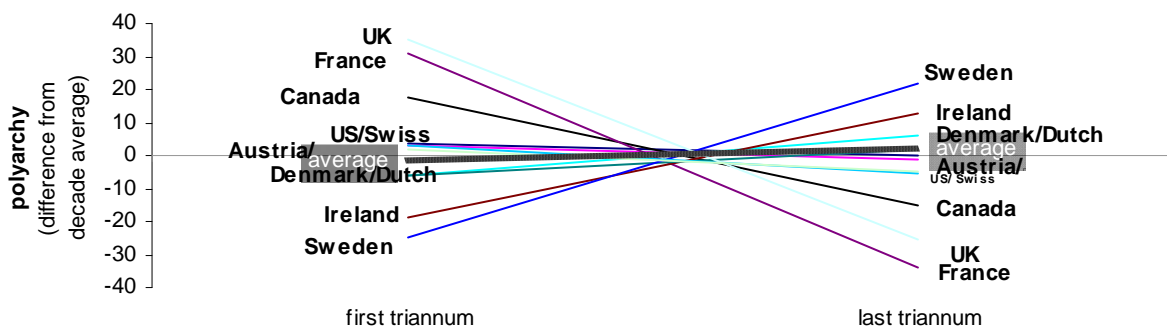
fell. Because these trends come from 1,000 simulations based on our data, we can reliably conclude that these patterns do not simply represent an accident of history (or one outcome among many). Bayesian estimation allows us to present data “robust” to any particular case or situation.

Figure 36. Own Responses to Own Eigencentality



The figure shows the polyarchy of jurisdictions as their eigencentality varies across time. When more central to international financial networks, many jurisdiction’s polyarchy rose – exhibiting the “innovation” effect we hypothesized in our model. Yet, not every jurisdiction displayed this pattern. Some reasons for the lack of such a response may include our short time period (only 10 years), bad data on polyarchy, our model is wrong or at least wrong for some jurisdictions.

Figure 37: Some Countries Became More Polyartic as their own Eigencentality Rose



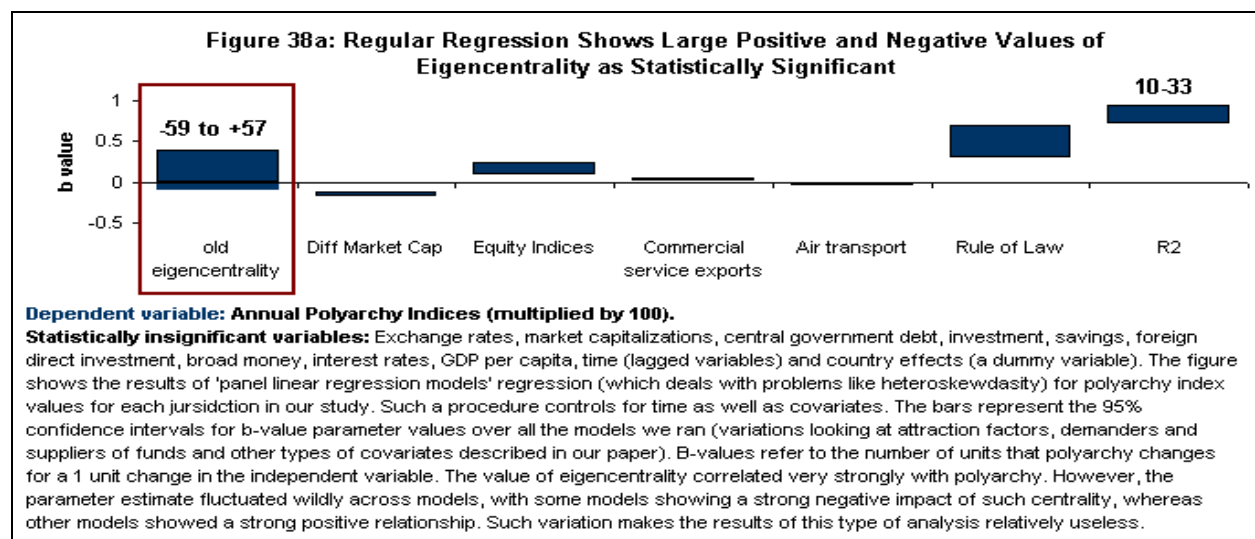
The figure shows the change in polyarchy for increasingly higher levels of eigencentality. We first looked at the correlation between each jurisdiction’s own polyarchy and eigencentality. Next we simulated 1,000 times changes along the distributions defining these scores to arrive at a conditional distribution for polyarchy (conditional on eigencentality) – as shown in the figure above. To calculate these changes, we took the average scores for the first 3 years and last 3 years of the decade long series. We divided these scores by the decade average and multiplied by 100. The resulting Bayesian values show the way these financial centres’ polyarchy changes with their own eigencentality.

To sum up our analysis, we have found support for our model of democratic (polyartic) change in international financial centres. While we “cheated” – by relying on decades of experience and various studies pointing to the roles of polyarchy and financial network centrality, no one has tested such a relationship using quantitative methods before. We found that jurisdictions use polyarchy (and politics more generally) as a method of developing their own international financial centres – and to react to the development of other financial centres in the international financial centre network. We found that a jurisdiction’s own development causes polyartic

change in large financial centres more often than foreign centres – likely a response to remain competitive.

How Reliable Are These Results?

How reliable are our results? One way to assess the quality of our study consists of comparing our results with those obtainable by other/ordinary methods. For most studies like this, standard practice consists of running regressions (or some variation of regression) to see if eigencentality correlates statistically significantly with polyarchy. We ran a normal series (or panel) of panel regressions – dividing models into several types.¹⁴¹ Figure 38a shows the results of these regressions. “Old” eigencentality refers to the eigencentralities we obtained, before removing the influence of any other variables. In theory, this regression would result in the same relationship between polyarchy and eigencentality we found earlier – as regression treats each variable separately (independently). Yet, we see that the parameter telling us how much jurisdictions’ eigencentralities affected their polyarchy could swing about wildly – depending on the model. Such a model, overall, describes most of the variation in polyarchy (as shown by the R2 statistic).¹⁴² Yet, even after controlling for time and country-specific effects, regression can not even distinguish whether a positive or negative relationship exists between eigencentality and polyarchy.

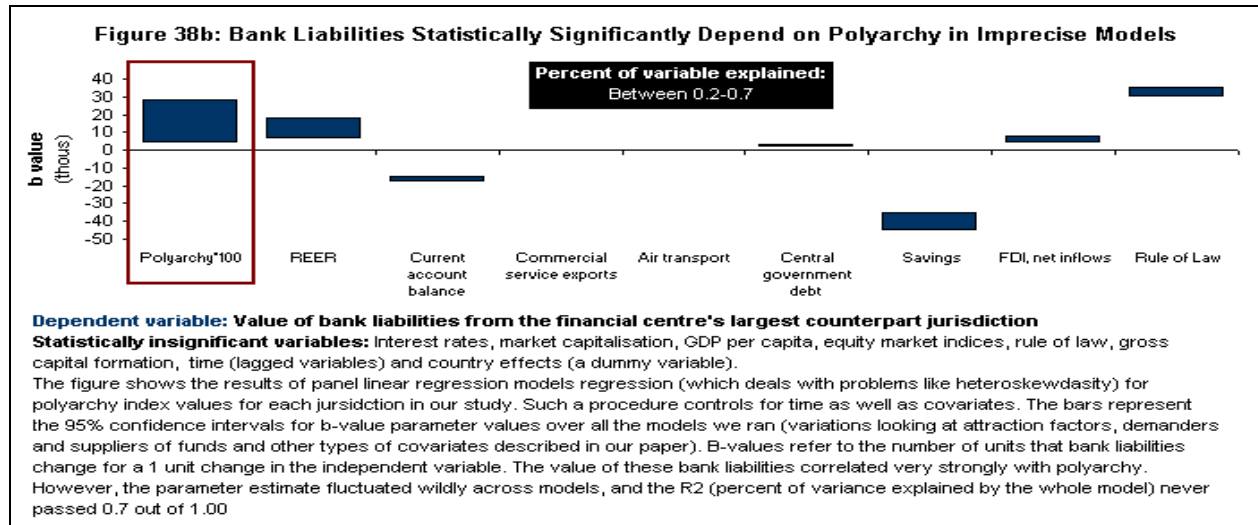


What about our decision to use eigencentralities instead of bank liabilities directly as a measure of financial centres’ importance in global financial centre networks? We previously explained the philosophical reasons for using centrality, instead of bank liabilities directly. Figure 38b shows a

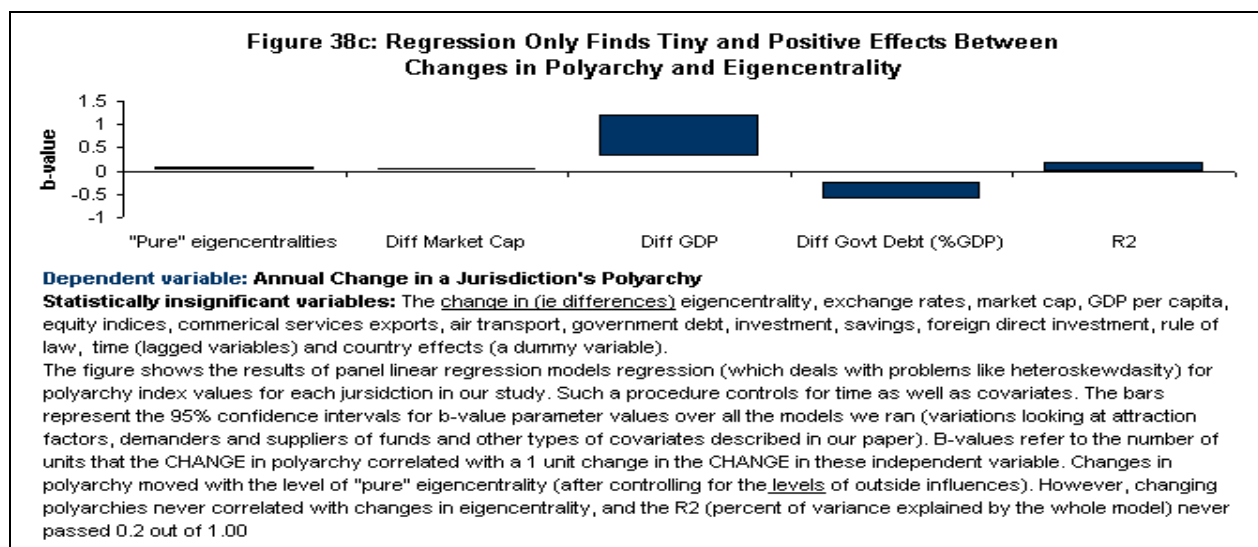
¹⁴¹ A panel of regressions refers to a set of regressions – usually compared and having several variables in common. Panel regression, as a technique, refers to regression which accounts for the influence of time – and variables’ past measurements. Common practice consists of using different variables together (inspired by some model or view of the world), particularly as regression results can change radically as the influence of other variables plays havoc on regression parameters across models. We discussed the types of models we regress in the methods section of this paper.

¹⁴² R-squared should measure the percent of total variation explained by a particular model/regression. We say “should” because numerous situations cause unreliable R-squared statistics.

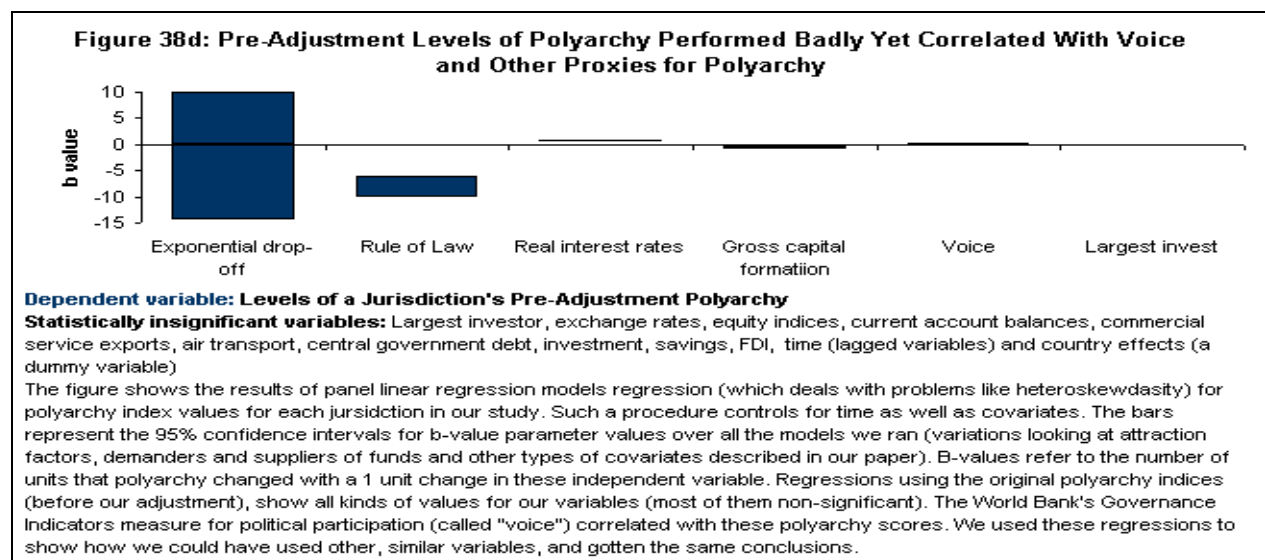
practical reason why using these flows would not have helped. Polyarchy positively correlates with these bank liabilities (namely those from each jurisdiction's largest counterpart). Yet, even after controlling for other factors, the overall model performs poorly – as measured by R-squared. The large uncertainty around our estimate of polyarchy's influence on such liabilities further shows how poorly such regression models would work.



Maybe if we looked at rates of change – instead of levels – our regression models would perform better? Because of the impact of time (and the influence of both variables' pasts and other factors we do not observe), most econometricians regress rates of change. Figure 38c shows the effects of such a regression. We look at changes in our other variables for consistency (ie looking at the change in market capitalisation over one year). Eigencentralities have a positive relationship with the way polyarchy changes in particular jurisdictions; though, not very much – again as judged by the uncertainty/low value of eigencentrality and the R2. Unfortunately, simply differencing our variables wouldn't fix this analysis.

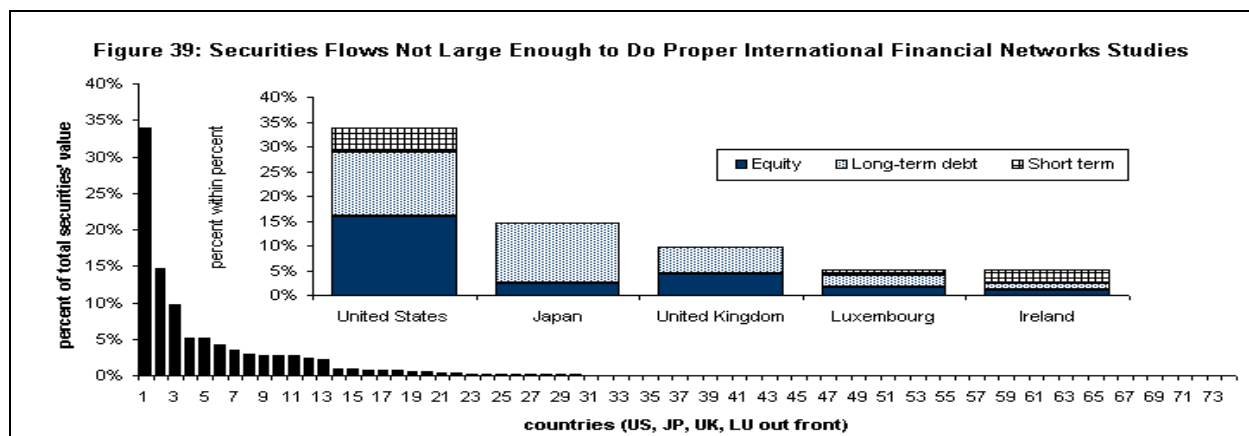


Maybe we used the wrong variables? Perhaps other measures for such political inclusion, such as the World Bank's "voice" variable, would perform better? Figure 38d shows the results of regressions looking at the relationship between voice (as one example of such a variable) and polyarchy. We see a positive correlation (suggesting substituting polyarchy for a similar measure would lead to similar results). Unfortunately, without adjusting polyarchy for the influence of other variables, polyarchy has no predictive power in explaining differences in bank liabilities from an international financial centre's counterpart jurisdictions (we describe such differences as the exponential drop-off in such liabilities and explain what we mean by this above and also in our methods section). We could do the same analysis using different measures of centrality (and we calculated all these jurisdictions' authority and hub values, Pagerank value and clustering coefficient).¹⁴³ In all these cases, the high correlation between these variables leads to the same conclusions. Simply swapping out our variables for others probably would not change our results.

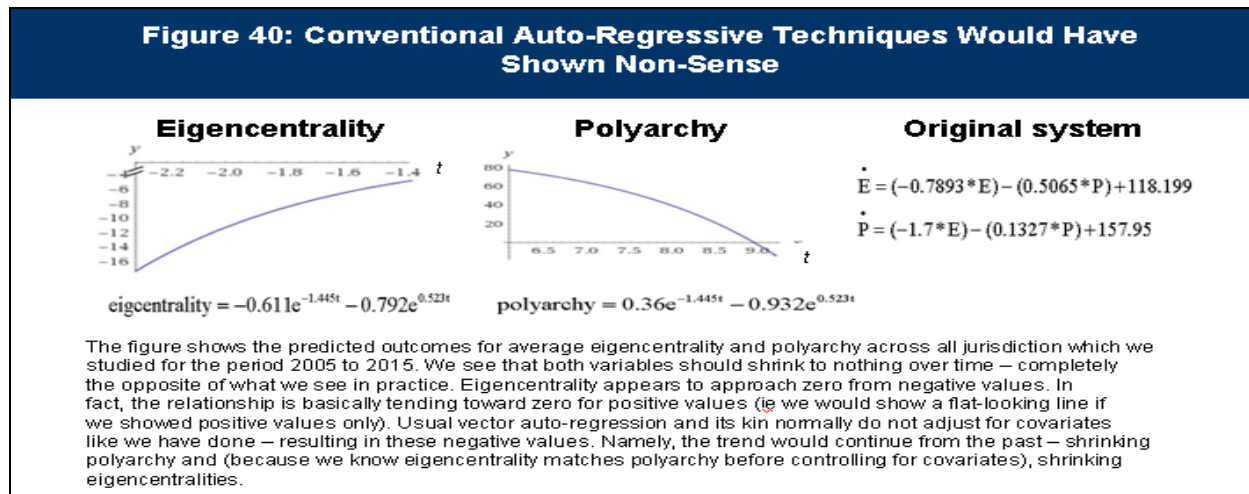


Maybe we should have used other measures of financial centre's success – like the sale (or even purchase) of equities, short-term and long-term debt from its peer international financial centres? Figure 39 shows why we can not use securities trading as a measure of financial centres' success. For Australia in 2015, we see only five jurisdictions make-up more than 90% of its securities' buyers. Among those centres, we see a seeming specialisation between financial centres' purchases of Australian stocks (US and UK as major buyers), rather than long-term bonds (with Japan as a major buyer). But so what? What do we learn by finding out that very polyartic jurisdictions buy more equities than debt (for example)? Such an exercise would waste time, and provide little insight into our question.

¹⁴³ These represent different measures of a network. Authority and hub metrics roughly correspond to the extent to which a financial centre serves as the final destination for bank liabilities (after maybe passing through several jurisdictions). A jurisdiction's hub metric tells how much a centre 'refers out' liabilities. The Pagerank algorithm provides a better measure for centrality when groups of jurisdictions do not connect to each other (not a problem in our dataset where almost every jurisdiction had some relation with every other). The clustering coefficient refers to the extent to which other financial centres choose to place money with one particular jurisdiction's financial institutions – rather than another's.



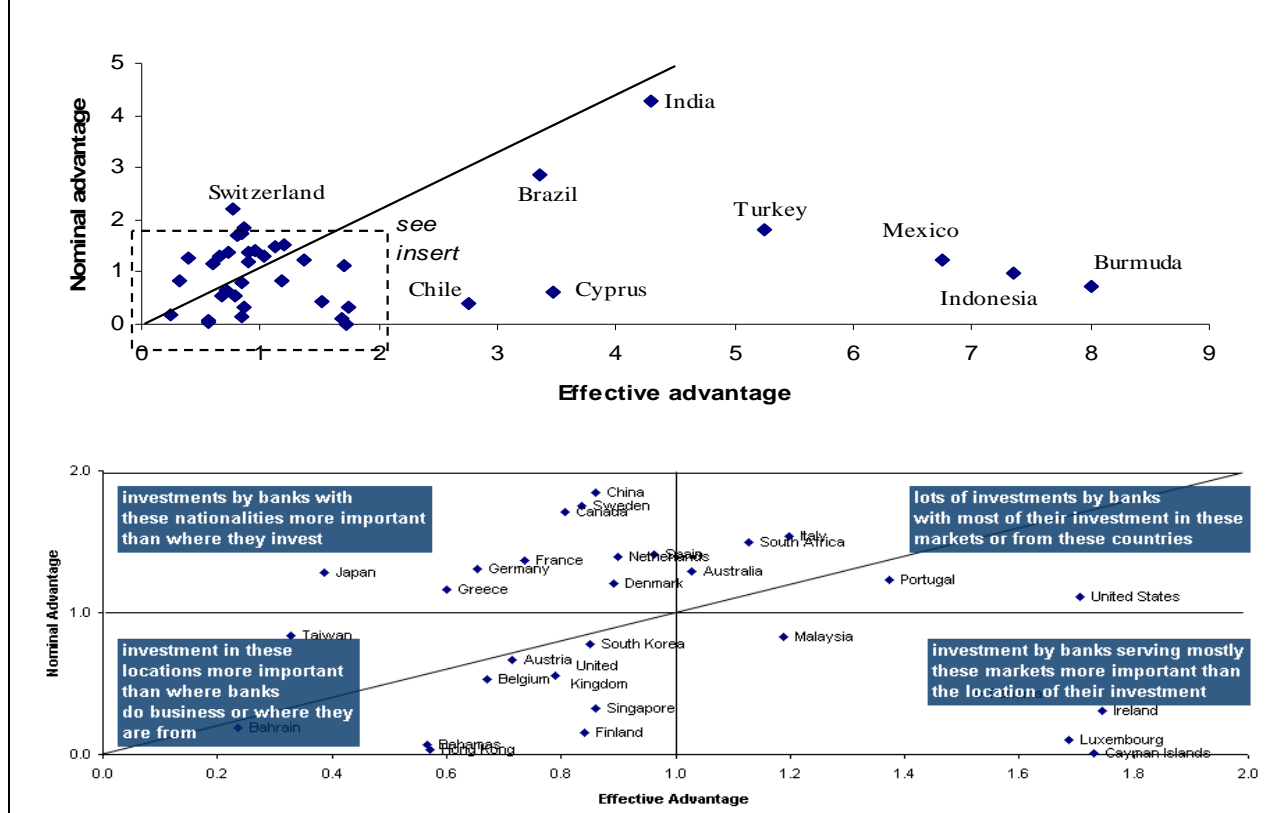
What about typical time series methods – like vector auto-regression and auto-regression/moving average methods? Could we have found better or more parsimonious explanations using these popular methods? Figure 40 shows the outcome of vector-autoregression for the annual average values of eigencentralty and polyarchy, averaged across countries for each year. Even this simple model predicts that polyarchy falls as eigencentralty falls over time. Such a method shows us what we already have seen (polyarchy fell across time for the jurisdictions we studied). Eigencentralty correlates with this falling polyarchy, so naturally time series methods would find a similar pattern (particularly as vector auto-regression and similar methods do not control for outside variables as we do). Again, these methods lead nowhere – possible explaining why so few people have researched this question.



A final objection might state that financial institutions operate in places far removed from their host countries. Just because the Cayman Islands attract large amounts of cross-border bank liabilities, does not mean its companies ultimately profit. A financial institution's nationality and residency can differ greatly from its location (which our data track). For example, the US investment house Morgan Stanley can incorporate a British Virgin Islands holding corporation to operate in Hong Kong. Whose polyarchy is important in a case like this? Figure 41 shows the extent to which financial institutions' nationalities (and thus the possibly likely final destination of funds ultimately repatriated to them) differ from locations and residencies. Effective advantage

refers to a jurisdiction's ability to attract more funds from foreign banks than their own banks can attract. Clearly – barring large geopolitical events - polyarchy in the British Virgin Islands would not affect a French bank differently than a US one.¹⁴⁴ Maybe Switzerland's high polyarchy gives its nationals an advantage in foreign locales? If that were true, then China (the next largest beneficiary of the “nationality effects” reported in the figure) should have similar levels of polyarchy. Mexico's polyarchy does not encourage companies to incorporate there, and then operate in South America (for example).¹⁴⁵ Mexico's effective advantage clearly depends on polyarchy effects at home. **Polyarchy works on a territorial basis.**

Figure 41: Whose Jurisdiction's Banks Rely More on Economic Clout Rather Than Their Nationality in Cross Border Finance?



¹⁴⁴ An almost universal consensus exists that financial firm ownership impacts on its profitability abroad. One must tortuously argue that polyarchy in the country of bank's foreign owners might affect the law, culture, and thus operation of these institutions. Such an argument though strains at credulity. For one study out of tens of thousands looking at the effects of corporate nationality and/or the nationality of corporate owners on financial firm competitiveness/profitability, see Stijn Claessens and Neeltje van Horen, Being a Foreigner Among Domestic Banks: Asset or Liability? *National Bank of the Netherlands Working Paper 224*, 2009, available [online](#).

¹⁴⁵ Again, one might make a tortured argument that companies of democratic jurisdictions receive more political and diplomatic assistance in operating abroad than autocratic companies do (as politicians seek to influence corporate voters). Most of the empirical work looking at this question, though, focuses on China. See Jiang-yong Lu, Xiao-hui Liu, Mike Wright, Igor Filatotchev, International Experience and FDI Location Choices of Chinese Firms: The Moderating Effects of Home Country Government Support and Host Country Institutions, *Journal of International Business Studies* 45(4): 428–449, 2014, available [online](#).

Figure 41 Continued: Jurisdictions Ranked by Ratios of Effective Advantage to Nominal Advantage

Jurisdictions With Net EFFECTIVE Advantage							
Bermuda	7.28	Cayman Islands	1.72	Hong Kong	0.54	Portugal	0.14
Indonesia	6.36	Luxembourg	1.59	Singapore	0.54	Belgium	0.14
Mexico	5.51	Ireland	1.43	Brazil	0.51	South Korea	0.07
Turkey	3.45	Panama	1.10	Bahamas	0.50	Bahrain	0.05
Cyprus	2.84	Finland	0.69	Malaysia	0.36	Austria	0.05
Chile	2.35	United States	0.59	United Kingdom	0.24	India	0.01
Jurisdictions With Net NOMINAL Advantage							
Switzerland	-1.46	Japan	-0.90	Taiwan	-0.51	Italy	-0.34
China	-0.98	Germany	-0.65	Netherlands	-0.49	Denmark	-0.32
Sweden	-0.92	France	-0.63	Spain	-0.44	Australia	-0.26
Canada	-0.90	Greece	-0.56	South Africa	-0.37		

The figure shows the extent to which the value of a jurisdiction's cross-border banks' claims based on residence and/or nationality exceed the value based on location. In other words, rather than looking at where a bank physically invests abroad (location), we look at the "nominal" nationality of that bank (where the bank is legally registered) and its "effective" nationality (where it does the most business). We calculate these figures by taking the cross-border claims in 2016's last quarter and finding the ratio of banks' claims defined by these banks' main jurisdiction of business and location, as well as the ratio claims for banks defined by these banks' nationality and location. Thus, we might measure the investments of a French bank (defined by nationality), with most of its business done in Luxembourg (defined as residence) located in Canada (location). A ratio of one (1) for France would mean that the value of French cross-border investments by nationality would equal the value of investments made in France. In the graph above, we note those jurisdictions with ratios less than one – indicating that "value" of location exceed the value of investments defined by banks' nationality or principal place of business. The table below the graph subtracts these two ratios (value of banks' assets defined by the nationality of the bank and the location of investment as the first ratio and the value of banks' assets defined by the principal market of the bank and the location of investment as the second ratio). Such a difference gives the extent to which each jurisdiction serves as a principal place of investment for banks world-wide compared with national identification of a bank.

Source: Bank for International Settlements (BIS) Locational Banking Statistics database.

In summary, standard methods of econometrics seem very unlikely to produce the kind of analyses we have done. To the extent they are able, these other methods support of findings. Without adjusting polyarchy and/or bank liabilities for macroeconomic and other variables, any analysis of our research question would likely contain serious errors. Even with these adjustments, and by using Bayesian methods, we have at least constructed an argument for polyarchy's role in international financial centre competitiveness.

Conclusion

International financial centres like Doha, Dubai, Shanghai, and even more recently Moscow and Istanbul, seem to show that limits on national and/or local democracy help promote financial centre growth. New York and London, the world's two leading international financial centres, sit in relatively democratic jurisdictions. Yet, even historians could argue that their growth came from government/political support – not from freely democratic, autonomous development. What do the data say?

In this paper, we have looked at the role of polyarchy (and thus increased democracy) in aiding the development of an international financial centre. We find support for decades of theorising that financial centres' rely on increased autocracy (less polyarchy) to help grow out their financial centres. Yet, these results do not support more autocratic (or even authoritarian!) government. The successful international financial centres of today limited polyarchy in the past (if even ever so slightly) in order to help grow out their financial centres.¹⁴⁶ Yet, they also enfranchised other groups in their polyarchy to generate political support for the financial centre, bring in new ideas and financial innovations, and balance out national economic growth. These financial centres' policymakers restricted and expanded polyarchy (either intentionally or unintentionally) to grow their financial centres.¹⁴⁷

At the heart of our methodology lies the comparison of polyarchy and a financial centre's centrality in the international network of financial centres. We looked at the growth of these financial centres as the extent to which they attracted more funds from abroad (specifically cross-border bank liabilities). We looked at their centrality by computing network graphs and calculating a robust form of such centrality known as 'eigencentality.' We found that polyarchy decreases as other international financial centres' centrality in the global financial centre network expands. Such polyarchy – when used by some very central jurisdictions to remain central – “spreads.” And despite the evidence from the last 10 years, our model predicts that polyarchy should increase in many jurisdictions over time because financial centres rely on increasingly polyartic governance as a way to foster financial innovation through increased participation by non-previously powerful sectors. Yet, growth in an international financial centre's centrality in global financial networks relies – in the shorter term -- on tapering polyarchy. Decreases in polyarchy have probably helped financial centres get ahead, depending on the centre and the time.

Our results inform several debates of the day. Activists for or against Britain's exit from the European Union (Brexit) or Hong Kong's total reunification with China in 2047 and others praise or condemn the effects of polyartic government on their financial centres' performance. Yet, before our study, they had little empirical evidence for doing so. Our study suggests that they should try to choose a level of democracy or polyarchy which maximises the performance of their financial centre overall. Instead, they should worry about when polyarchy changes vis-a-vis other financial centres. The mixed equilibrium our model predicts – namely that successful financial centres should adjust their polyarchy counter-cyclically with other centres – means that no level of polyarchy will always be best for a financial centre. Hong Kong's success as an international financial centre – like Britain's – will depend on whether they restrict or expand polyarchy at the right time in response to other financial centres. Little surprise there.

¹⁴⁶ Changes in our polyarchy dataset occurred in such small intervals that we had to multiply the original variable by 100 to derive large enough changes needed to compare with the other variables in our study. We do not want to give the impression that these financial centres went through large-scale political change during the time of our study.

¹⁴⁷ Our study did not look at optimal policy responses (or even equilibrium ones). Thus, we can not say what policymakers *should* do, only what they *did* do.

Appendix I: A Model of Domestic Political Change and a Model of Network Change

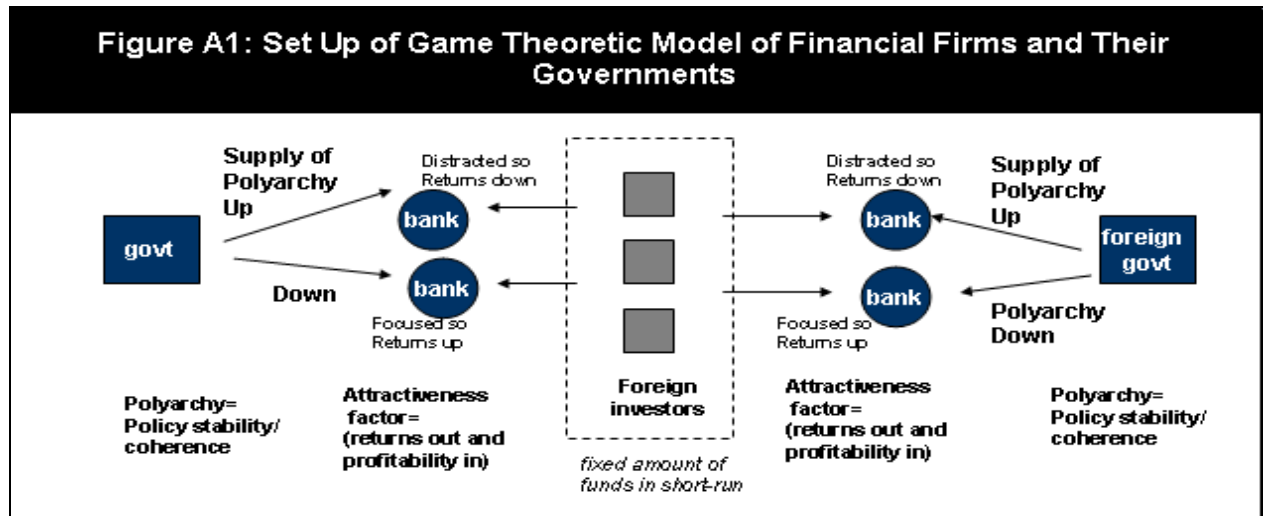
The micro-foundations of financial assets versus polyarchy

We start our model with a game played between government and banks. Figure A1 shows the set-up for this game. We assume each financial centre i (or wannabe financial centre) has a government able to supply some level of polyarchy P . Let's start with a level $P(0)$. Let's imagine the government may supply a bit more or a bit less polyarchy (labelled in the figure A1 as 'up' and 'down' respectively). As we have already described in detail in our main paper, more polyarchy reduces banks' profits due to a distracted policy agenda less able to focus on the best financial policies, less policy coherence and likely instability. If we use a representative bank to replace the all banks in a jurisdiction, then equation (1) shows the way that more polyarchy affects the value of foreign assets on the local jurisdiction's banks' profitability. Polyarchy affects these assets through a parameter ϕ which affects the marginal size of polyarchy's effect on these assets. The parameter λ describes the banks' specific ability to turn these policies into profits. We set the profits and costs at a numeraire of 1 to avoid complexity.¹⁴⁸ Equation (2) gives the return to these banks as a fraction of change in foreign assets.

$$A_i = \left(\frac{1}{\lambda}\right) A^{\phi(P(j))} \quad \text{for } i \in (0,1) \quad j \in (0,1) \quad \text{and} \quad \phi(P_H) > \phi(P_L) \quad (1)$$

$$r = \frac{dA}{dP} = \left(\frac{\phi}{\lambda}\right) \left(\frac{A^{\phi(H)}}{\ln A}\right) \quad \text{and} \quad R = \int_{j-\min}^{j-\max} \frac{dA}{dP} = \left(\frac{\phi}{\lambda}\right) \left(\frac{A^{\phi(H)}}{\ln A}\right) \quad (2)$$

If we allow two symmetric countries to compete for these assets, then the foreign bank profits r^* depend on $P^*(j)$ such that $\phi^* < \phi$ if $j^* < j$. In other words, the jurisdiction with the lower polyarchy, in this local setting, wins more foreign assets.



¹⁴⁸ For example, we could have set profits as $(r-c)A-C$, with r representing a productivity/pass-through parameter, c as marginal costs and C as fixed costs. However, at some level a coefficient in front of A would equal $A-C$.

The government plays a similar game, though in reverse. As equation (3) shows, the amount of political capital governments earn (and want to maximise) comes to K_i for each financial centre's i governments. More polyarchy increases the government's political capital directly (through a parameter β) and indirectly through its banking constituencies (their political power δ which rises as a function of their foreign assets under management A . Remember though that these assets fall with increasing amounts of polyarchy (at least in this short-term local setting). If welfare W represents the changes in this political capital, then equation (4) describes the sum of such welfare. The optimal condition clearly obtains when $W = R$, as described by equation (5). After some manipulating, equation (6) shows the best level of assets for a country. With some slight rearranging, the second part of equation (6) shows the optimal amount of polyarchy. In theory, we can simply replace the words “innovation effect” in Figure 14 with the words “political capital” effect, and still have derived a sufficiently grounded model for our purposes. However, we want something more game-theoretical.

$$K_i = \beta P(j) + \delta A^{\varphi(P(j))} \quad \text{for } i \in (0,1) \quad j \in (0,1) \quad \text{and} \quad \varphi(P_H) > \varphi(P_L) \quad (3)$$

$$W = \int_{j-\min}^{j-\max} \frac{dK}{dP} dP = \beta + \frac{\varphi \delta A^{\varphi(P(j))}}{\ln A} \quad (4)$$

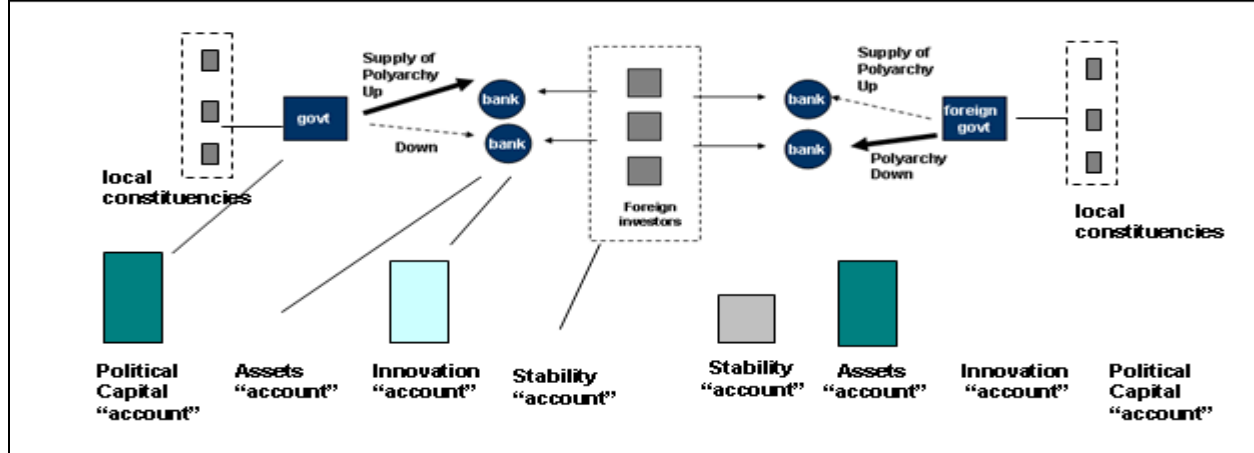
$$R = \int_{j-\min}^{j-\max} \frac{dA}{dP} = \left(\frac{\varphi}{\lambda} \right) \left(\frac{A^{\varphi(H)}}{\ln A} \right) = W = \int_{j-\min}^{j-\max} \frac{dK}{dP} dP = \beta + \frac{\varphi \delta A^{\varphi(P(j))}}{\ln A} \quad (5)$$

$$A_i^\circ = \left(\frac{\lambda \beta}{\varphi(1-\delta)} \right)^{\frac{1}{(9-1)}} \quad \text{and} \quad P(j) = \varphi^{-1}(P(j)) = \frac{\lambda \beta A_i^{(1-9)}}{(1-\delta)} \quad (6)$$

The additional game theoretic element to our model comes in through the innovation effects we have not yet modelled. To start off this part of the analysis, let's imagine desired outputs of our game – as we show in Figure A2. Government tries to maximise its political capital. Financial institutions want to maximise assets under management. The foreign investors – that we have assumed simply take the highest returns (until now) – also want a certain degree of stability. We need one of these players to demand less polyarchy (investors) in order to more simply balance out the demand for more polyarchy from financial firms looking for innovations. Let's make innovation I a simple decreasing function of polyarchy and an increasing proportion of time t , while ω is the extent to which innovation ‘accumulates’ in an account when polyarchy rises. The more polyarchy – and the longer polyarchy stays down – the more potential innovation the jurisdiction has to “spend.” If $I = P^{\omega t}$, then let's set $A = I^{1/\psi}$ in order to make such asset accumulation a simple function of such innovation, and thus $A = P^{(\omega t)/\psi}$.

$$A = \lambda P^{\frac{\omega t}{\psi \varphi(P(j))}} \quad \text{and} \quad \frac{dA}{dP} = \lambda P^{\frac{\omega t - \psi \varphi(P(j))}{\psi \varphi(P(j))}} + \frac{\lambda \omega t}{\psi} \frac{P^{\frac{\omega t}{\psi \varphi(P(j))}}}{\ln P} \quad (7)$$

Figure A2: First Round Returns in Our Game Theoretic Model

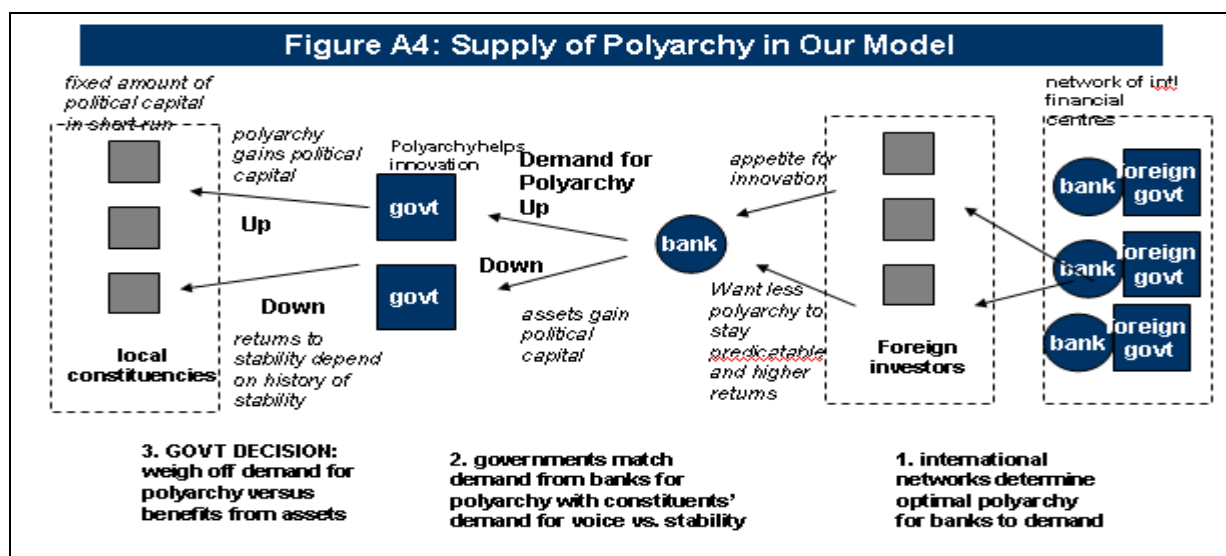
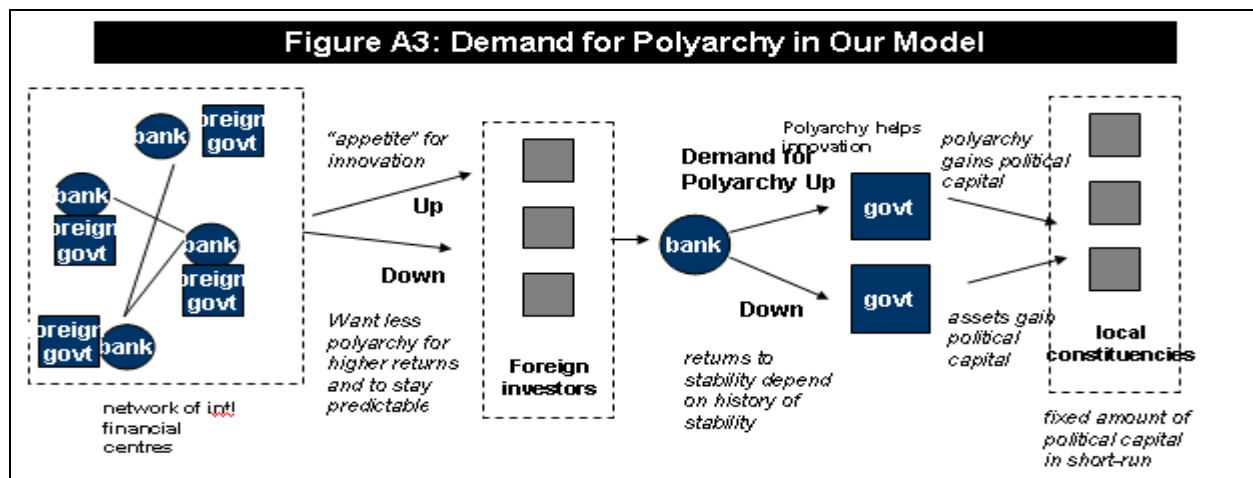


Foreign investors' love of stability represents the last (though actually unused part) of our model. Let's further imagine that foreign investors feel more stable (with S as a some kind of "stock" of stable feelings like animal feelings) as polyarchy decreases in the countries they invest in. If ρ represents the increasing instability they feel as they put more assets into a country with a certain level of polyarchy, then $S = P \exp(-\rho A)$. But just setting the derivative equal to this instability parameter gives us equation (8) – a short-cut to sure. However, as we do not use these equations in simulations or in applied work, we allow ourselves to take this simplifying short-cut. With this equation, we have defined all four stock levels of our model – political capital and assets which we use in this model and innovation and stability which remain running in the background (and which future scholars may wish to theorise further).

$$\frac{dA}{dP} = \lambda P^{\frac{\omega t + \psi \phi(P(j))}{\psi \phi(P(j))}} \left(1 + \frac{\omega t}{\psi} \right) \cdot \left(\frac{P}{\ln P} \right) - \rho \quad (8)$$

Supply and demand for polyarchy, innovation and investment assets

With the micro-foundations for the supply and demand for investment assets and polyarchy in place, we can define the supply and demand for these variables. Figure A3 traces the argument for demand for polyarchy in our model. From the interaction in the network of international financial centres, we can imagine an "exogenous" demand for innovation and stability (which we make endogenous for now to make our argument easier to follow). Our foreign investors respond mechanically to the trade-off between innovation and stability -- as defined in equation (8)). The bank in local jurisdiction, facing this level of demand for polyarchy, communicates this level to the government. Government then looks at the demand for polyarchy from its constituencies, and decides on a level of polyarchy which maximises its welfare – as we have stated in equations (1) and (3) representing demand by banks and government constituencies respectively. As Figure A4 shows, the government responds with a 'supply' of polyarchy – ranging from somewhere between perfect autocracy and perfect democracy. As we described in Figure A2, higher polyarchy (for example) may reduce financial firms' competitiveness and thus r . Yet, these firms' 'innovation account' rises, allowing them to draw on such innovation to increase assets when costs/benefits shift in the global financial network.



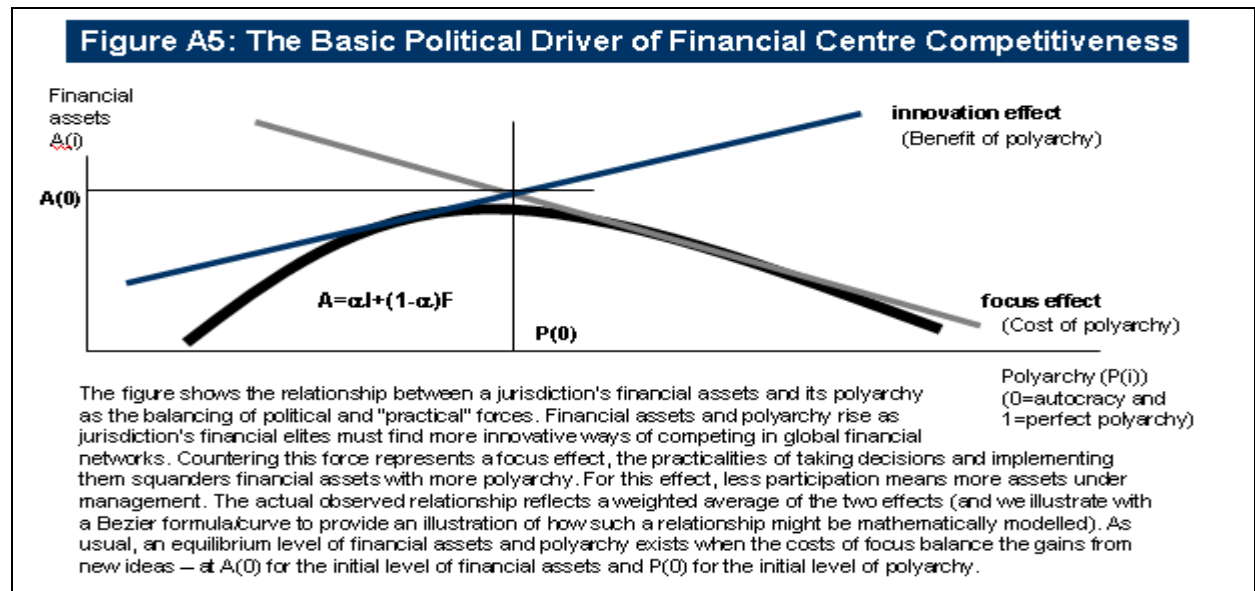
The supply and demand for polyarchy in each jurisdiction thus balance each other for every jurisdiction. Figure A5 shows how we move from a game based on sets of actors, to a continuous decision by each game player. The government response of more polyarchy has two effects on financial firms. First, they lose assets by having a lower profitability r for higher levels of polyarchy (as shown by the downward curve marked 'focus effect'). Second, they gain assets, to the extent they have saved up a stock of innovation I , which only increases as polyarchy increases. Naturally, the trade-off between these two effects depends on the parameters we have described in the model above. Yet, the joint effect results in the level A_1^* and $P(j)$ which we defined in equation (6). Instead of assuming j 'states' of increasing and decreasing polyarchy, we can make j a continuous input – thus making P also a continuous variable. The formulae do not change in the move from discrete sets of policies to a continuous range of polyarchies.

How do we draw out the asset curve in bold and separate out the two effects into focus and innovation effects respectively? Equation (9) shows the effects of differentiating the first part of equation (6) by polyarchy's effect on assets ϕ . At the optimum, such polyarchy works out to a relatively simple expression of the way that capital accumulation increases politicians' political capital δ and the way that polyarchy affects assets θ . Equation (10) shows this expression – which reaches its maximum value at 0.5 (pretty much as shown in the figure). Setting equation (6) equal to the Bezier curve we describe in the figure, the relatively mix a of innovation and focus – if we could imagine putting in concrete amounts of such variables – would come out to the expression shown in equation 11.

$$\frac{dA^\circ}{d\phi} = \frac{1}{(\vartheta - 1)} \left(\frac{\lambda\beta}{\phi(1-\delta)} \right)^{\frac{(2-\vartheta)}{(\vartheta-1)}} + \left(\frac{\lambda\beta}{\phi^2(1-\delta)} \right)^{\frac{1}{(\vartheta-1)}} \quad (9)$$

$$\phi = \frac{1}{(1-\vartheta)} \left(\frac{(1-\vartheta)}{(1-\delta)} \right)^{\frac{\vartheta}{\vartheta+1}} \quad (10)$$

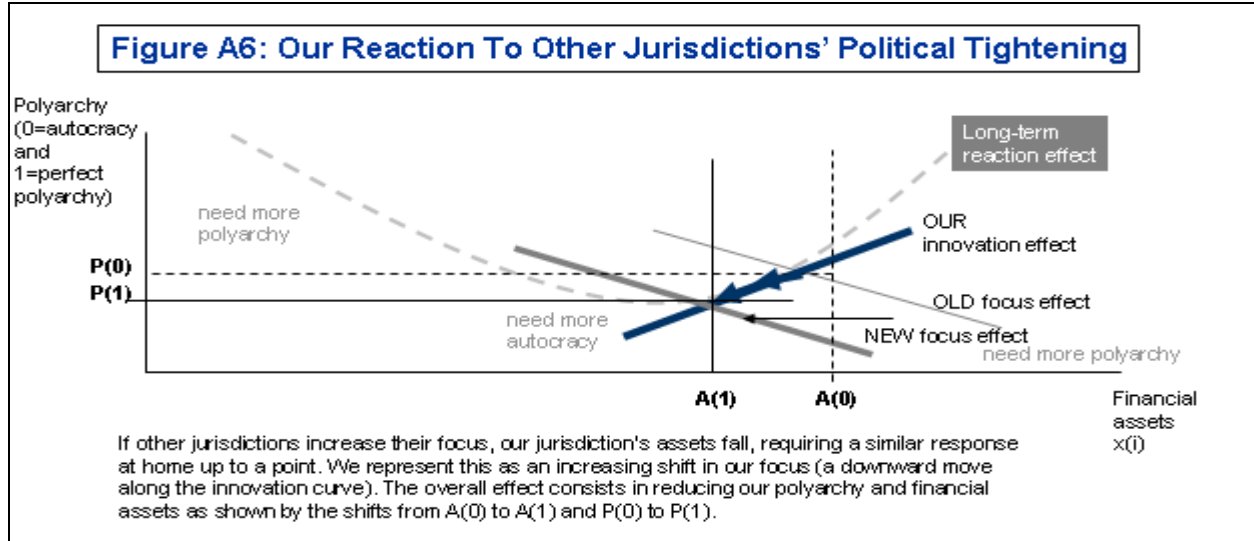
$$\alpha = \frac{\phi(1-\delta) - \beta\lambda^2}{\beta\lambda(\phi - \lambda)} \quad (11)$$



In order to figure out the effect of a foreign jurisdiction's reactions, we first need to introduce some modifications to our model. The easiest way to do this consists of letting assets adjust according to $P(j) + P^*(l)$ where P^* represents the foreign nearest jurisdiction's level of polyarchy l such that $l < j$. For example, for 20 financial centres in the global network, the only jurisdiction to worry about – for the purposes of our calculation – is the one with the next highest level of polyarchy ($\phi + \phi^*$).¹⁴⁹ Such a easy simplification has the simultaneous effect of reducing polyarchy levels for every level of our old polyarchy and reducing assets. Figure 6 shows the

¹⁴⁹ We add the foreign jurisdiction's polyarchy as higher levels of polyarchy in equation (1) make assets fall. The foreign jurisdiction 'accounts' for this move as a decrease on their side.

effect geometrically as a simple shift in our innovation curve. The other jurisdiction gains $A(1) - A(0)$ assets – at our expense.¹⁵⁰



Portraying the entire network's polyarchy, innovation and assets thus becomes an exercise in matrix mechanics. Let \mathbf{A} represent a matrix of foreign assets under management (the accumulation of a stock value) and \mathbf{I} the matrix for the innovation stock for each country (we do not model political capital and stability as we do not look at these in our analysis of our research question). Namely, we don't track how popular governments are or preferences for stability. Let's imagine a network of 3 countries to illustrate our model. If π_{im} equals the percent each i jurisdiction has attracted from jurisdiction m in the global race of all assets under management \bar{a} (where π_i equals the proportion of that jurisdiction's total assets or $\sum \pi_i = 1$ for every i), then we can portray jurisdiction's i assets as $[a_{i1} \ a_{i2} \ a_{i3}] = \bar{a} \cdot [\pi_{i1} \ \pi_{i2} \ \pi_{i3}]$ and the whole matrix \mathbf{A} and the corresponding polyarchy \mathbf{P} , as well as the amount of innovation each jurisdiction has stored up as \mathbf{I} . (as shown in equation (12))

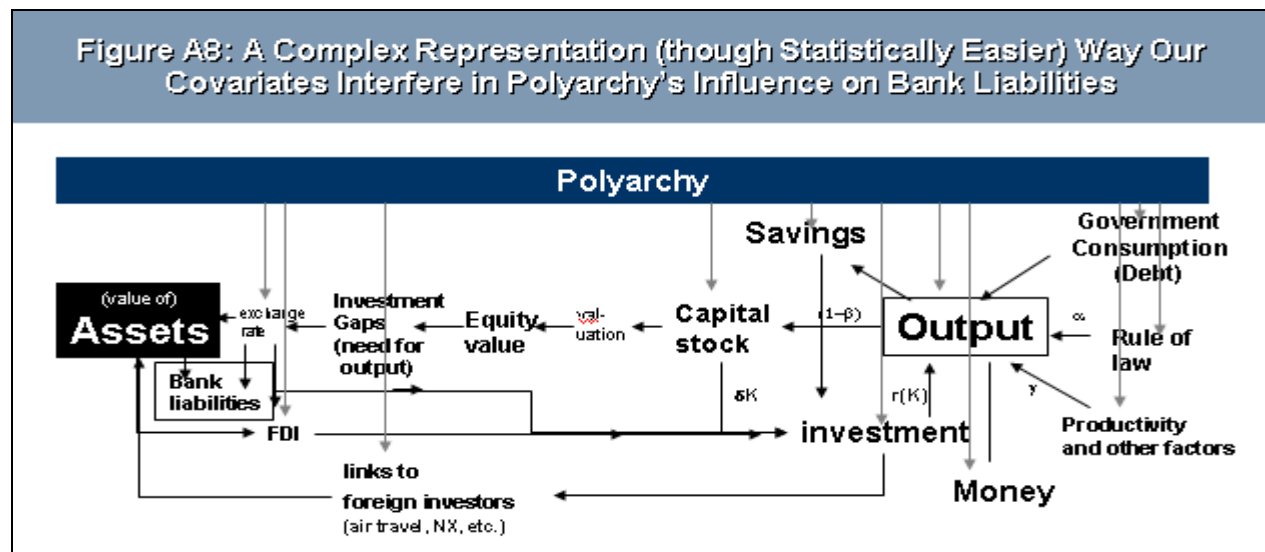
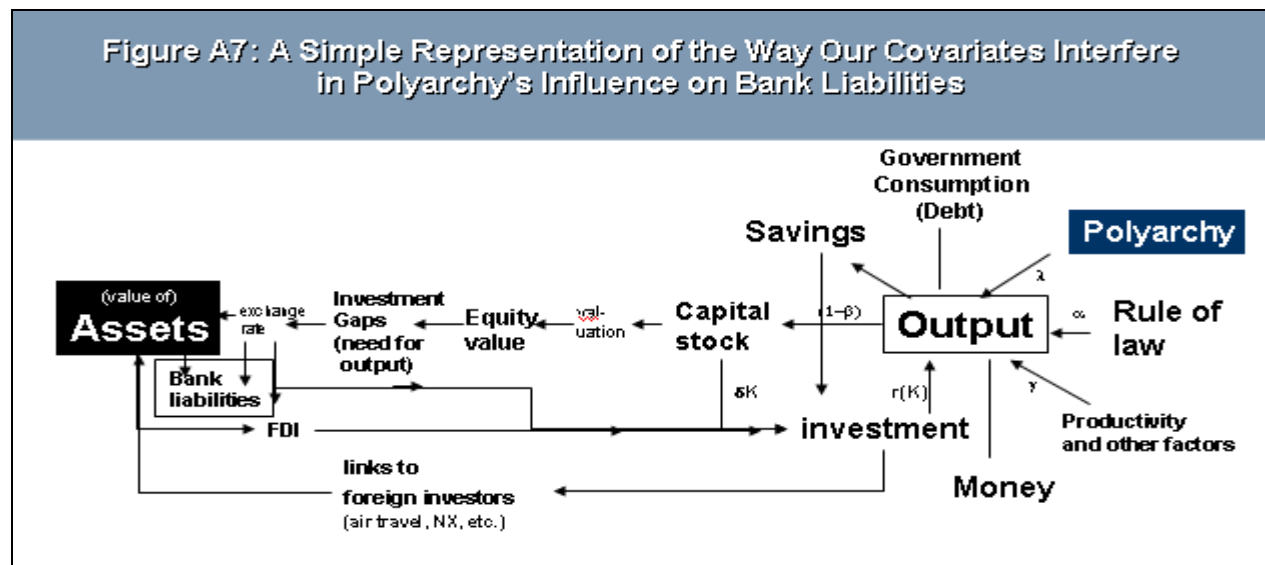
$$\begin{array}{c} \text{country} \\ \mathbf{A} = \end{array} \begin{array}{ccc} & 1 & 2 & 3 \\ \begin{array}{c} 1 \\ 2 \\ 3 \end{array} & \begin{array}{c} a_{11} \\ a_{21} \\ a_{31} \end{array} & \begin{array}{c} a_{12} \\ a_{22} \\ a_{32} \end{array} & \begin{array}{c} a_{13} \\ a_{23} \\ a_{33} \end{array} \end{array} \text{ and } \begin{array}{c} \begin{array}{ccc} & 1 & 2 & 3 \\ \begin{array}{c} 1 \\ 2 \\ 3 \end{array} & \begin{array}{c} i_{11} \\ i_{21} \\ i_{31} \end{array} & \begin{array}{c} i_{12} \\ i_{22} \\ i_{32} \end{array} & \begin{array}{c} i_{13} \\ i_{23} \\ i_{33} \end{array} \end{array} = \begin{array}{c} \begin{array}{ccc} & 1 & 2 & 3 \\ \begin{array}{c} 1 \\ 2 \\ 3 \end{array} & \begin{array}{c} p_{11} \\ p_{21} \\ p_{31} \end{array} & \begin{array}{c} p_{12} \\ p_{22} \\ p_{32} \end{array} & \begin{array}{c} p_{13} \\ p_{23} \\ p_{33} \end{array} \end{array} \quad (12)$$

Modelling the interference from covariates

What effects would macroeconomic and other factors have on polyarchy and cross-border bank liabilities? Polyarchy affects banks' ability to attract foreign funds (through regulations) as we described above. Yet, such polyarchy naturally affects the other parts of the economy. Figure A7 shows a relatively simple model of the economy – and the way that other variables can interfere with our understanding of polyarchy's influence on cross-border bank liabilities (and visa-versa).

¹⁵⁰Mathematically, such a move would just decrease the foreign country's equation (1) by the appropriate amount.

Polyarchy, in the minds of most economists, probably enters the economy in the same way other political factors do – in the production function. Using the standard production function $Y = aL^gK^g$, polyarchy mainly enters through a – total factor productivity.¹⁵¹ Yet, we could look at the effect such polyarchy in another way. As illustrated by Figure A8, and as already discussed in our literature review, polyarchy determines the amount of national debt, the likely propensity to invest, and even policies affect exchange rates and foreign direct investment directly. Whether polyarchy enters into these variables indirectly (by affecting upstream output) or directly (by ‘raining’ on all our variables), the result remains the same. Polyarchy has an effect on these variables in the short-run. These variables almost certainly have an endogenous effect on polyarchy in the longer-run.



¹⁵¹ For readers confused by the equation (or what it means), any simple textbook will explain the basics. Thus, we do not even bother defining the variables from this equation. We use the equation as a heuristic to remind our likely readers about something they (you) have already seen.

Appendix II: Details of Econometric Procedures and Results

Fitting the macro and other factors to the data

How do we match our model of macroeconomic and other factors into an econometric procedure? Figure B1 shows the variables we used in our study. We divide these variables into the groupings we use as we conduct our empirical analysis. For example, our group of macroeconomic factors may strike as important academics who believe that nominal prices affect the flows of these cross-border liabilities. In contrast, financial economists might view such liabilities as the residual of any funding not available domestically (a proposition we test with our suppliers of funds group of variables). Thus figure thus describes these variables and what they mean.

How can we transform these variables in terms of the model we have already presented? In our model, cross-border assets flow as the result of decisions about polyarchy in a jurisdiction and several structural variables. At the end of the previous section, we explained why we could see these variables as a composite called Q . In other words, $Q=f(a, M, F, s, K, D, d, (X-M), r, Y, w, i, e)$. If we take log values of the level of these liabilities – as described in equation (6) – we get equation (13). If we use these quantities in econometric estimation, we would obtain something like equation (14) – where we substitute the previous beta by b in order so we do not confuse the standard beta notation to represent regression slope coefficients. We see that – even before worrying about the way that ϕ transforms P into assets, our regression coefficients would likely omit the $(\theta-1)^{-1}$. Regression would – according to our model – absorb all our structural parameters into the regression intercept (shown in the bracketed term in equation (14)).

$$\ln A_i^\circ = \left[\frac{\ln(\lambda\beta)}{(\vartheta-1)} - \frac{\ln(1-\delta)}{(\vartheta-1)} \right] + \ln Q - \frac{1}{(\vartheta-1)} \ln \phi \quad (13)$$

$$\ln A_i^\circ = \left[\frac{\ln(\lambda b)}{(\vartheta-1)} - \frac{\ln(1-\delta)}{(\vartheta-1)} \right] + \beta_1 \ln Q - \frac{\beta_2}{(\vartheta-1)} \ln \phi \quad (14)$$

In practice, we did not make these modifications for two reasons. First, we only care about the sign of our parameter β_2 – not its absolute value. Nothing in the structural parameter θ should shift in each jurisdiction across time periods. The parameter only has the effect of scaling our beta estimate. Second, we do not look at log values because these values do not come out very differently from estimating levels. We thus show the values of our variables to make reading our paper easier.

Figure B1: Variables Used in Our Analysis and their Model Equivalents

Variable	Symbol	Description
Polyarchy (we multiplied by 100 to make compatible with other variables)	P	The V-Dem's index of polyarchy, which measures "the extent to which electoral democracy in its fullest sense achieved." Source: https://www.v-dem.net/en/data/data-version-7-1/
Cross-border bank liabilities	A	Assess funds places with a jurisdiction's financial institutions. Liabilities in this context refer to what we would refer to in common parlance as assets (under management). If banks buy shares with profits, these are assets. If they take deposits which they later repay, these are liabilities.
Macroeconomic factors – exchange rates and interest rates both can affect the flows of funds by affecting returns for/to foreign investors. Higher interest rates and appreciation both would enrich foreigners, without anything in the real economy happening.		
Real exchange rates	e	Exchange rates adjusted for prices.
Real interest rates	i	Interest rates adjusted for inflation and measured in percentage
Attraction factors – variables which affect demand for foreign securities. Rising equity indices make (and show how) these investments more valuable. GDP per capita and market capitalisation shows the depth of equity and real markets respectively. Deeper markets usually imply more liquidity and thus more safety.		
Market capitalization	ωK	The amount of money put into stock market securities, measured as a percent of GDP, and hopefully likely a fraction of other 'physical' capital.
GDP per capita	Y	Measured in current US dollars
Stock market value	rK	The value of jurisdiction's S&P Global Equity indices, likely in the longer run to reflect capital's productivity (hopefully).
Connectivity factors - these variables gauge the extent to which one jurisdiction has contact with another. Current account balances show how much they trade. If capital accounts must go in the opposite direction as current accounts, then imports and exports directly affect our model. Commercial service exports show demand for services (with such services usually needing direct contact or at least knowledge of the foreign market). Air transport similarly measures knowledge and even tourist demand for a country's currency.		
Current account balance	(X-M)	Measured as a share of GDP
Commercial service exports	f	in billions of US dollars.
Air transport	d	in millions of passengers.
Demanders of funds – measures how demand for funds might, independent of bank attractiveness, affect the attractiveness of a place for these cross-border liabilities. Large government debts require finance (some of which comes from abroad). Gross capital formation measures real investment, the real productive motor driving demand for such funds.		
Central government debt	D	as percent of GDP.
Investment	K	Gross capital formation as percent of GDP.
Suppliers of funds – rivals for these banks providing these liabilities for later lending/use. Savings provide more domestic financial resources, reducing the need for foreign resources. Foreign direct investment provides funds for earmarked projects (though these liabilities might actually represent some of these investments). Broad money growth provides liquidity from the central bank, as a competitor for supplier of funds.		
Savings	sK	Gross domestic savings as percent of GDP.
Foreign Direct Investment	Z	Net flows of such investment as percent of GDP
Broad money growth	M	growth expressed in annual percentage terms.
Institutional factors – institutions affect where investors would place their funds. Rule of law thus proxies broader norms and laws designed to protect property rights and fair play.		
Rule of Law	a	An index based on a survey of surveys. For more, see: http://databank.worldbank.org/data/databases/rule-of-law

Sources: Polyarchy comes from V-Dem, cross-border bank liabilities from the Bank for International Settlements, and all other variables come from the World Bank.

Polyarchy hardly seems to measure the extent to which multiple groups participate in political decisions – particularly the politics of specialised regulations like financial regulations. Does such a measure at least partially capture multiple groups in decision-making – particularly in much of the world where such participation occurs behind closed doors? Figure B2a shows the way we represent the variable in this study – as an intermediating case between perfect democracy and perfect autocracy. The variable contains freedom of association (which cabals and other insider groups do not rely upon). Clean elections probably reflect a broader propensity to allow for rivalry (a proxy for a very relevant propensity). Freedom of expression in public life often correlates with such freedoms in private sphere (such as in organisations). Such freedom thus probably proxies the extent to which multiple groups of insiders can express their preferences. An elected executive and suffrage more generally show s propensity for allowing very minority groups (or even one person) the chance to exercise power. Yet, these sub-components probably weight little in our overall proxy.

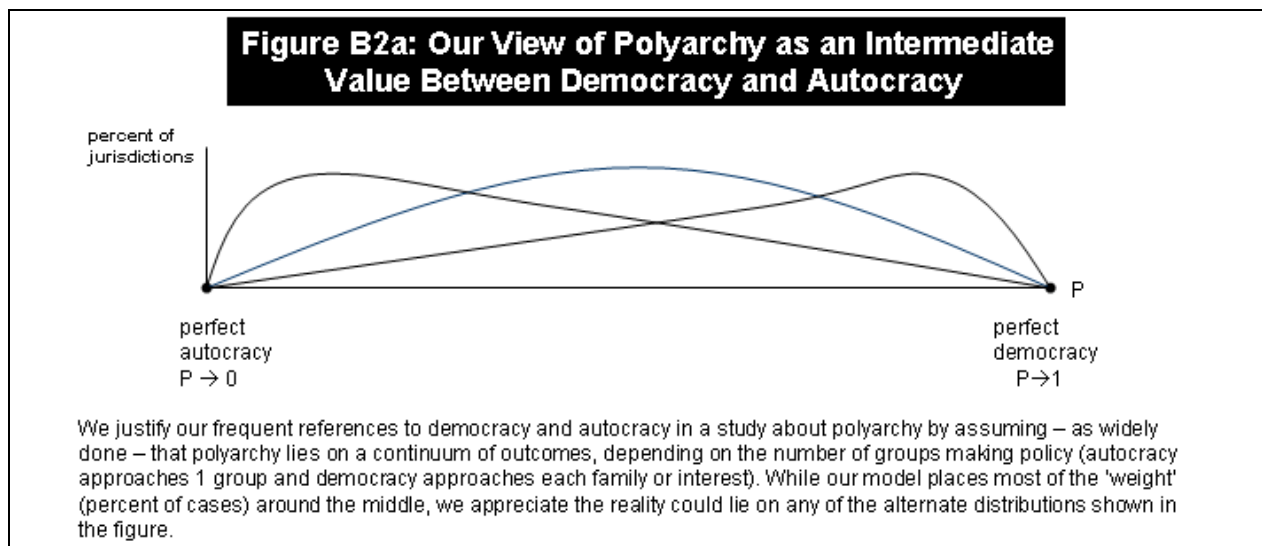
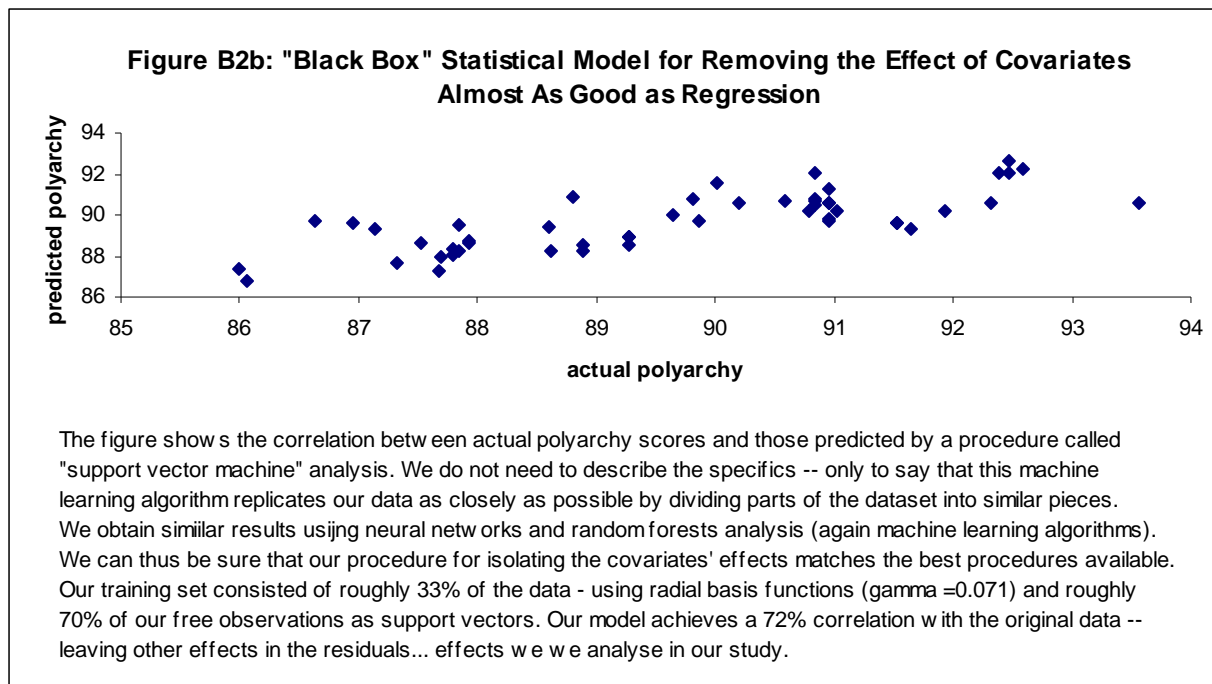


Figure B3 shows the empirical and modeling reasons why we treat all the outside covariates as one variable Q . In this figure, we show the correlation between polyarchies predicted by our model and those observed in the real world. While our model does make mistakes, we showed how these estimates do not vary much from those obtained using machine learning techniques. These techniques treat the dataset as one large construct – splitting it into pieces which the algorithm can usefully correlate. Thus, from an empirical view, we only need to scale polyarchy and cross-border bank liabilities by some parameter reflecting the effect of such Q – which we have modeled as independent of any effect of polyarchy in equation (14).



Variables used to create network data

Which variables mattered most for building and rebuilding the international matrix of cross-border bank liabilities? In the first regression panel, we show the effect of our covariates on the extent to which cross-border bank liabilities 'drop-off' based on the rank a jurisdiction holds as a supplier of these liabilities. Figure B3 shows linear models analysis – a type of linear regression which takes care of problems we discussed in our paper. In this simple type of analysis, real exchange rates and interest rates fail to explain these differences – highlighting the primacy of real variables over nominal ones (a theme that reemerges constantly in this study).¹⁵² The size of the economy (broadly speaking) and the quality of its institutions have the largest predictive power on these ranks. Figure B4 tells a slightly different story. Statistically significant variables representing connectivity (in goods and people) seems to explain the lead jurisdiction placing these cross-border liabilities. Domestic investment seems to harm the prospects of attracting such funds – and savings as well (though not statistically significant). The residuals from these regressions should explain that these variables do not. We used these residuals in our study.

¹⁵² Even a cursory review of working papers available online shows many economists do not even look for their effects any longer. For one example, see Carlos Andres and Peter Rowland, Determinants of Investment Flows into Emerging Markets, *Columbian Central Bank Working Paper 313*, 2003, available [online](#).

Figure B3: Regression on Exponential Relationship Between Banking Liabilities of Counterpart Jurisdictions
(statistically significant variables in bold with parameter values' standard deviations in gray and all dependent variables adjusted to be independent of each other)*

Model	Macro	Attract	Connect	Demand	Supply	Overall*
Intercept	-0.5118	-0.51225	-0.38662	-0.30121	-0.39798	-0.46444
	0.144035	0.019126	0.009638	0.071639	0.023547	0.011669
Real exchange rates	0.002121					
	0.001415					
Annual difference in exchange rates	0.000003					
	0.00002					
Real interest rate (%)	-0.00177					
	0.001295					
Market capitalisation		0.000549				0.000496
		0.000102				0.000084
GDP per capita		0.003999				
		0.000455				
Change in S&P Global Equity Indices		-0.00024				
		0.000205				
Current account balance			0.004913			
			0.001564			
Commercial service exports			0.000815			0.00051
			0.000096			0.000086
Air transport			-0.00043			-0.00033
			0.00008			0.000064
Central government debt				0.000238		
				0.000325		
Gross capital formation				-0.00051		
				0.002624		
Savings					-0.00177	
					0.000891	
Foreign Direct Investment					0.003265	
					0.002023	
Broad money growth					0.000609	
					0.000938	
Rule of Law					0.097999	0.057217
					0.007184	0.007254

The figure shows the b-values (not beta values) for linear analysis using the variable we described as “exponential drop off” as the dependent variable. B-values measure the number of units (percent) change such an effect has, rather than measuring such changes in standard deviation terms (ie as the number of standard deviations a dependent variable reacts for a 1 standard deviation change in the independent variable).

* Independent of each other refers to the orthogonally we described in the main part of our paper. We mapped our variables onto an equal number of orthogonal factors in order to remove the high amount of correlation between all of our variables.

Figure B4: Regression on Lead Counterpart Jurisdiction Providing the Largest Banking Liabilities

(statistically significant parameter values in bold with standard deviations below them in gray)

Model	Mixed	Mixed	Mixed
Intercept	1489961	902856.1	120072.7
	205618.2	118968.3	296585.4
Commercial service exports	1218	1150.8	
	362.4	136.1	
Savings	-8144	-40994.2	
	8188	4770	
Central government debt	-6737		7178.3
	2053.8		1789.6
Gross capital formation	-42390		-36508.2
	9249.3		9871.7
Air transport	603		
	205.5		
Rule of Law	164512	177301.1	
	76839.9	30302.5	
GDP per capita	-5515		17473.4
	5034.6		2339.4
Current account balance (% of GDP)		19734.2	-29424.5
		4886.1	5521.3

How much money did these lead liabilities providers and their followers-up provide in reality and according to the adjustments given by the regressions above? Figure B5a shows an example of one country, for one year. In 2005, Australia received about \$35,000 in these cross-border bank liabilities from US-based natural and legal persons (people and companies). Our regression analysis though tells us the jurisdiction should have received \$107,000 from the US – if we hold the relevant variables constant. Figure B5b shows lead investor for jurisdictions we analysed in this study – remembering that these jurisdictions should reflect or represent financial centres in some way. The figure only shows one value for Australia in 2005 – namely the US’s \$35,000 placement in cross-border liabilities. The figure similarly ‘stacks’ all jurisdictions’ placement of funds, showing the lead placer and the drop-off coefficient as a decay coefficient. Such a figure gives the reader an idea of how much these data changed due to our ‘corrections.’ For negative values, we reversed the direction of these financial flows. Namely, if the UK, as Ireland’s pre-adjusted largest liabilities provider sent \$287,000 in 2005, and should have sent -\$507,000 – we simply reverse the direction of this flow for the purpose of making our network graphs.

Figure B5a: Example of BIS original bank liabilities data before and after controlling for outside effects

Reporting jurisdiction	Counterpart country	Amount	New Largest	Reporting jurisdiction	Counterpart country	Amount	New Largest
Australia	US	35110	106743	Australia	Cayman Islands	71	1262
Australia	UK	8588	79405	Australia	Bermuda	58	939
Australia	Singapore	5421	59069	Australia	Israel	37	698
Australia	Hong Kong	5308	43941	Australia	South Korea	36	519
Australia	Germany	4346	32687	Australia	Denmark	24	386
Australia	Netherlands	3550	24315	Australia	Luxembourg	23	287
Australia	Japan	3528	18088	Australia	Jordan	22	214
Australia	New Zealand	2085	13456	Australia	Norway	21	159
Australia	Taiwan	1523	10009	Australia	UAE	20	118
Australia	China	691	7446	Australia	Austria	16	88
Australia	Canada	649	5539	Australia	Bahamas	4	65
Australia	Sweden	189	4120	Australia	Guernsey	4	49
Australia	Switzerland	178	3065	Australia	Jersey	3	36
Australia	Ireland	146	2280	Australia	Morocco	1	27
Australia	South Africa	122	1696	Australia	Qatar	1	20

The figure shows the value of funds in US dollars deposited by Australians in the countries shown about for only one year (2005). We show our “corrected” amount next to these figures, as the amount which would be deposited if not for the effect of macroeconomic and other outside factors.

Figure B5b: Data Used to Figure Out How Much Money Foreigners Put in Banks

		Observed		Predicted				Observed		Predicted	
Country Name	Year	Largest invest (thous)	Old decay	New Largest Invest	New Decays	Country Name	Year	Largest invest	Old decay	New Largest Invest	New Decays
Australia	2005	35.1	-0.350	106.7	-0.295	South Africa	2010	6.68	-0.326	66.2	-0.331
Belgium	2005	142.9	-0.225	112.3	-0.314	South Korea	2010	29.3	-0.390	-215.8	-0.327
Brazil	2005	11.8	-0.399	28.8	-0.454	Switzerland	2010	159.9	-0.187	188.8	-0.218
France	2005	316.0	-0.236	429.3	-0.268	United States	2010	12,8/8.8	-0.284	1,146.8	-0.276
Ireland	2005	289.9	-0.321	-507.6	-0.320	Australia	2011	44.6	-0.282	57.8	-0.319
Mexico	2005	1406	-0.617	-15.1	-0.455	Austria	2011	56.0	-0.298	231.4	-0.327
Netherlands	2005	182.0	-0.259	229.6	-0.268	Belgium	2011	101.7	-0.232	246.4	-0.313
South Korea	2005	13.7	-0.326	-255.3	-0.340	Brazil	2011	47.5	-0.418	19.9	-0.456
Switzerland	2005	163.9	-0.203	302.2	-0.197	Canada	2011	59.5	-0.438	317.5	-0.291
United King.	2005	635.0	-0.175	808.1	-0.211	France	2011	483.6	-0.268	570.6	-0.253
United States	2005	714.5	-0.260	748.5	-0.360	Ireland	2011	177.0	-0.340	-127.2	-0.322
Australia	2006	23.7	-0.295	74.7	-0.280	Mexico	2011	11.7	-0.521	-60.3	-0.482
Belgium	2006	136.5	-0.208	93.3	-0.306	Netherlands	2011	221.8	-0.249	374.1	-0.268
Brazil	2006	16.7	-0.404	40.3	-0.447	South Africa	2011	6.0	-0.307	58.8	-0.362
France	2006	483.1	-0.243	438.3	-0.251	South Korea	2011	33.5	-0.397	-199.4	-0.335
Ireland	2006	406.8	-0.341	-419.9	-0.304	Switzerland	2011	149.7	-0.188	50.7	-0.241
Mexico	2006	3.6	-0.580	-83.0	-0.458	United States	2011	116.34	-0.266	1,223.6	-0.257
Netherlands	2006	232.5	-0.274	246.0	-0.257	Australia	2012	5.57	-0.284	37.0	-0.320
South Korea	2006	30.8	-0.353	-244.1	-0.346	Austria	2012	5.85	-0.324	237.0	-0.326
Switzerland	2006	148.9	-0.182	215.1	-0.177	Belgium	2012	7.32	-0.205	298.5	-0.307
UK	2006	780.2	-0.175	842.9	-0.176	Brazil	2012	4.25	-0.403	52.0	-0.461
United States	2006	990.4	-0.270	801.6	-0.334	Canada	2012	23.41	-0.463	304.3	-0.292
Australia	2007	34.7	-0.286	37.1	-0.277	France	2012	42.96	-0.251	565.1	-0.252
Austria	2007	55.2	-0.250	208.2	-0.289	Ireland	2012	11.28	-0.336	-106.4	-0.323
Belgium	2007	200.24	-0.217	92.0	-0.303	Mexico	2012	.79	-0.498	-100.6	-0.480
Brazil	2007	2.3	-0.373	-3.0	-0.432	Netherlands	2012	22.42	-0.260	418.7	-0.266

Figure B5b Continued

Country Name	Year	Largest invest (thous)	Old decay	New Largest Invest	New Decays	Country Name	Year	Largest invest	Old decay	New Largest Invest	New Decays
Canada	2007	6.0	-0.375	250.2	-0.261	South Africa	2012	.77	-0.326	82.1	-0.346
France	2007	65.9	-0.240	447.2	-0.239	South Korea	2012	1.15	-0.311	-108.3	-0.325
Ireland	2007	50.1	-0.327	-332.0	-0.309	Switzerland	2012	11.50	-0.176	133.3	-0.227
Mexico	2007	.3	-0.546	-86.3	-0.463	United States	2012	10.061	-0.258	1,216.1	-0.239
Netherlands	2007	33.4	-0.277	199.3	-0.246	Australia	2013	.465	-0.271	98.5	-0.324
South Korea	2007	3.4	-0.338	-195.1	-0.324	Austria	2013	.648	-0.328	260.3	-0.325
Switzerland	2007	32.0	-0.206	75.0	-0.179	Belgium	2013	.692	-0.206	323.6	-0.299
United King.	2007	97.64	-0.173	869.5	-0.165	Brazil	2013	.302	-0.467	75.9	-0.470
United States	2007	11.4	-0.274	918.6	-0.306	Canada	2013	2.245	-0.448	296.8	-0.294
Australia	2008	.27	-0.304	81.4	-0.321	France	2013	4.139	-0.246	592.6	-0.238
Austria	2008	.59	-0.284	227.4	-0.311	Ireland	2013	1.228	-0.382	-67.4	-0.309
Belgium	2008	1.57	-0.230	159.5	-0.318	Mexico	2013	.133	-0.525	-70.8	-0.483
Brazil	2008	.22	-0.391	-31.1	-0.464	Netherlands	2013	1.544	-0.258	400.9	-0.257
Canada	2008	.67	-0.426	252.6	-0.303	South Africa	2013	52	-0.298	59.9	-0.332
France	2008	5.32	-0.243	492.1	-0.251	South Korea	2013	55	-0.296	-84.5	-0.336
Ireland	2008	4.16	-0.322	-162.1	-0.330	Switzerland	2013	1.058	-0.180	156.7	-0.208
Mexico	2008	.92	-0.539	-140.2	-0.483	United States	2013	1.1890	-0.253	1,227.2	-0.210
Netherlands	2008	2.62	-0.266	182.2	-0.277	Australia	2014	.987	-0.283	143.5	-0.318
South Korea	2008	.38	-0.356	-184.0	-0.350	Austria	2014	.727	-0.322	266.4	-0.323
Switzerland	2008	1.62	-0.189	-92.7	-0.232	Belgium	2014	.717	-0.196	316.5	-0.291
United King.	2008	8.66	-0.183	894.7	-0.205	Brazil	2014	.439	-0.440	121.9	-0.474
United States	2008	1.22	-0.266	1041.4	-0.298	Canada	2014	.961	-0.357	322.2	-0.290
Australia	2009	.337	-0.302	4.8	-0.292	France	2014	.3164	-0.239	619.1	-0.232
Austria	2009	.497	-0.258	272.9	-0.321	Ireland	2014	.116	-0.378	-194.2	-0.310
Belgium	2009	.1541	-0.231	250.0	-0.310	Switzerland	2014	.760	-0.176	136.8	-0.203
Brazil	2009	.611	-0.366	122.5	-0.440	United States	2014	.15747	-0.243	1,275.3	-0.190
Canada	2009	.422	-0.426	399.7	-0.281	Australia	2015	.7952	-0.284	160.1	-0.329
France	2009	.4695	-0.255	551.1	-0.261	Austria	2015	1664	-0.303	208.0	-0.334
Ireland	2009	.4559	-0.359	-117.1	-0.332	Belgium	2015	5323	-0.195	279.2	-0.294
Mexico	2009	.775	-0.541	-77.1	-0.471	Brazil	2015	9577	-0.432	176.0	-0.490
Netherlands	2009	.2622	-0.278	325.9	-0.269	Canada	2015	0219	-0.341	373.8	-0.308
South Africa	2009	.724	-0.350	21.4	-0.318	France	2015	4590	-0.239	571.3	-0.250
South Korea	2009	.748	-0.391	-124.0	-0.333	Ireland	2015	6902	-0.375	-615.5	-0.323
Switzerland	2009	.1624	-0.189	76.7	-0.222	Mexico	2015	8023	-0.506	-66.3	-0.489
United States	2009	.11732	-0.284	1094.5	-0.294	Netherlands	2015	8269	-0.294	355.2	-0.255
Australia	2010	.5281	-0.285	101.4	-0.298	South Africa	2015	9415	-0.314	44.7	-0.356
Austria	2010	.8197	-0.302	275.2	-0.323	South Korea	2015	2688	-0.313	-140.2	-0.352
Belgium	2010	.1507	-0.231	289.7	-0.309	Spain	2015	5952	-0.328	302.8	-0.352
Brazil	2010	.8688	-0.399	25.6	-0.437	Switzerland	2015	.4465	-0.209	178.5	-0.206
Canada	2010	.7363	-0.467	352.2	-0.277	United States	2015	.7189	-0.236	1,260.4	-0.208
France	2010	.3516	-0.246	565.7	-0.257						
Ireland	2010	.7796	-0.353	-53.4	-0.333						
Mexico	2010	.0842	-0.598	-42.0	-0.476						
Netherlands	2010	.4009	-0.272	333.9	-0.266						

Matrix Statistics for Banking Liability Data

Jurisdictions often changed their network position radically as a result of these adjustments. Figure B6 shows the pre-adjustment average eigencentrality, cluster centrality, Pagerank, authority and hub values for the jurisdictions we studied. Figure B7 shows these values after our adjustments on a year-by-year basis. In this way, interested readers can see – or use – these data.

Figure B6: Multiple Matrix Statistics Before Adjustment

Eigenvalue centrality		cluster centrality		Pagerank average		Authority		Hub	
Germany	99.97	Jordan	86.26	UK	3.83	Germany	19.76	Ireland	56.75
Japan	99.51	Qatar	84.23	US	3.73	Japan	19.53	US	55.69
Singapore	98.89	Bermuda	80.24	Germany	3.61	Singapore	19.36	Isle of Man	55.16
Hong Kong	98.39	New Zealand	79.76	Canada	3.37	Canada	19.34	Guernsey	53.68
Norway	96.04	UAE	73.57	Switzerland	3.36	Hong Kong	19.22	Brazil	53.05
Bermuda	95.87	Israel	72.99	France	3.32	Norway	19.03	Finland	52.28
Canada	95.00	Morocco	71.21	Netherlands	3.24	Netherlands	18.98	Chile	50.81
China	94.56	Bahamas	70.25	Japan	3.23	UK	18.80	Mexico	50.71
Netherlands	94.05	Norway	68.55	Singapore	3.16	Switzerland	18.64	Canada	48.82
UK	93.62	Singapore	68.15	Ireland	3.14	France	18.55	Belgium	48.50
Ireland	93.61	Cayman Islands	67.81	Hong Kong	3.13	US	18.54	Jersey	47.92
Switzerland	93.61	China	66.97	Luxembourg	3.05	China	18.41	Luxembourg	47.81
US	93.59	Germany	66.16	Cayman Islands	2.98	Sweden	18.37	Switzerland	47.80
Luxembourg	93.08	Hong Kong	65.54	China	2.87	Cayman Islands	18.26	France	47.80
Australia	92.60	Japan	63.30	Sweden	2.81	Ireland	18.24	UK	47.79
France	91.98	Mexico	60.38	Australia	2.70	Luxembourg	18.21	Denmark	47.20
Austria	91.16	South Africa	58.86	Bahamas	2.57	Austria	18.17	Sweden	47.02
South Africa	90.79	Greece	58.79	Norway	2.53	Denmark	17.94	Netherlands	46.25
Israel	90.43	Netherlands	56.12	Bermuda	2.52	Australia	17.82	Austria	45.03
Cayman Islands	90.29	Isle of Man	53.36	Austria	2.49	South Africa	17.71	South Africa	40.24
Denmark	89.88	Finland	53.20	Denmark	2.48	Bahamas	17.21	Greece	39.56
Sweden	89.42	Guernsey	52.96	Jersey	2.48	Taiwan	17.19	Taiwan	38.58
UAE	88.25	Brazil	52.58	UAE	2.41	Israel	17.18	Australia	38.53
Taiwan	88.05	Chile	51.91	Taiwan	2.40	South Korea	17.18	South Korea	36.62
New Zealand	88.00	Canada	51.13	South Africa	2.37	Bermuda	17.11	Bahamas	36.36
South Korea	87.91	Austria	49.77	South Korea	2.30	UAE	16.82	Cayman Islands	36.36
Bahamas	86.31	Belgium	47.98	Israel	2.29	New Zealand	16.08	Germany	36.36
Jersey	85.10	South Korea	47.06	Guernsey	2.27	Jersey	15.36	Japan	36.36
Jordan	79.21	Jersey	46.03	New Zealand	2.07	Guernsey	14.67	Morocco	33.89
Guernsey	77.71	US	45.27	Jordan	1.93	Morocco	13.82	Bermuda	27.27
Morocco	74.59	Taiwan	44.61	Qatar	1.92	Jordan	13.81	Israel	27.27
Qatar	73.21	Denmark	44.44	Morocco	1.81	Qatar	13.07	Jordan	27.27
Belgium	0.00	Australia	44.29	Belgium	1.26	Belgium	0.00	New Zealand	27.27
Brazil	0.00	Luxembourg	43.51	Brazil	1.26	Brazil	0.00	Norway	27.27
Chile	0.00	Switzerland	43.01	Chile	1.26	Chile	0.00	Qatar	27.27
Finland	0.00	France	42.82	Finland	1.26	Finland	0.00	UAE	27.27
Greece	0.00	UK	42.72	Greece	1.26	Greece	0.00	Hong Kong	21.94
Isle of Man	0.00	Ireland	42.36	Isle of Man	1.26	Isle of Man	0.00	China	18.18
Macao	0.00	Sweden	42.27	Macao	1.26	Macao	0.00	Singapore	18.18
Mexico	0.00	Macao	14.97	Mexico	1.26	Mexico	0.00	Spain	12.98
Spain	0.00	Spain	9.75	Spain	1.26	Spain	0.00	Macao	5.64

Figure B7: Multiple Matrix Statistics After Adjustment

Country	Year	authority	hub	page-ranks	cluster-ing	eigen-	authority	year	authoity	hub	page-rank	cluster	eigen
Australia	2005	0.164	0.354	0.005	0.223	0.134	South Korea	2010	0.234	0.025	0.245	0.310	0.889
Belgium	2005		0.375	0.005	0.220		Sweden	2010	0.178	0.040	0.010	0.591	0.178
Brazil	2005		0.284	0.005	0.316		Switzerland	2010	0.169	0.361	0.011	0.238	0.178
Canada	2005	0.188	0.040	0.006	0.582	0.161	United Kingdom	2010	0.193	0.040	0.012	0.614	0.208
China	2005	0.188	0.040	0.006	0.582	0.161	United States	2010	0.171	0.336	0.012	0.268	0.178
Denmark	2005	0.188	0.031	0.006	0.656	0.161	Australia	2011	0.169	0.353	0.010	0.251	0.175
Finland	2005			0.005			Austria	2011	0.178	0.043	0.010	0.600	0.175
France	2005	0.139	0.374	0.006	0.218	0.111	Belgium	2011	0.000	0.361	0.008	0.235	0.000
Germany	2005	0.188	0.040	0.006	0.582	0.161	Brazil	2011	0.000	0.291	0.008	0.332	0.000
Greece	2005			0.005			Canada	2011	0.178	0.220	0.011	0.385	0.175
Hungary	2005						Denmark	2011	0.178	0.043	0.010	0.600	0.175
Ireland	2005	0.236	0.016	0.396	0.237	1.000	Finland	2011	0.000	0.000	0.008	0.000	0.000
Israel	2005	0.148	0.031	0.005	0.679	0.132	France	2011	0.154	0.362	0.011	0.242	0.149
Mexico	2005	0.133		0.012	0.500	0.290	Ireland	2011	0.245	0.016	0.192	0.251	1.000
Morocco	2005	0.148	0.016	0.005	0.714	0.132	Mexico	2011	0.167	0.000	0.170	0.293	0.762
Netherlands	2005	0.167	0.316	0.006	0.275	0.134	Netherlands	2011	0.172	0.310	0.011	0.307	0.175
South Korea	2005	0.230	0.016	0.381	0.289	0.885	Qatar	2011	0.094	0.032	0.009	0.633	0.087
Sweden	2005	0.188	0.040	0.006	0.582	0.161	Singapore	2011	0.192	0.043	0.011	0.614	0.204
Switzerland	2005	0.163	0.373	0.006	0.217	0.134	South Africa	2011	0.156	0.334	0.009	0.257	0.149
United Kingdom	2005	0.163	0.373	0.006	0.217	0.134	South Korea	2011	0.238	0.027	0.252	0.297	0.910
United States	2005	0.165	0.336	0.006	0.255	0.134	Sweden	2011	0.178	0.043	0.010	0.600	0.175
Australia	2006	0.143	0.363	0.005	0.228	0.133	Switzerland	2011	0.169	0.361	0.011	0.241	0.175
Belgium	2006	0.000	0.370	0.005	0.223	0.000	United Kingdom	2011	0.192	0.043	0.012	0.614	0.204
Brazil	2006	0.000	0.271	0.005	0.290	0.000	United States	2011	0.170	0.337	0.012	0.270	0.175
Denmark	2006	0.168	0.044	0.006	0.644	0.159	Australia	2012	0.147	0.355	0.011	0.244	0.167
Finland	2006	0.000	0.000	0.005	0.000	0.000	Austria	2012	0.172	0.044	0.011	0.609	0.168
France	2006	0.161	0.370	0.006	0.225	0.134	Belgium	2012	0.000	0.352	0.009	0.241	0.000
Ireland	2006	0.241	0.016	0.391	0.228	1.000	Brazil	2012	0.000	0.293	0.009	0.282	0.000
Mexico	2006	0.172	0.000	0.020	0.375	0.465	Canada	2012	0.172	0.251	0.012	0.371	0.168
Netherlands	2006	0.165	0.315	0.006	0.284	0.134	Denmark	2012	0.189	0.044	0.011	0.629	0.196
South Korea	2006	0.236	0.016	0.376	0.279	0.895	Finland	2012	0.000	0.000	0.009	0.000	0.000
Sweden	2006	0.186	0.044	0.006	0.591	0.160	France	2012	0.166	0.354	0.012	0.251	0.168
Switzerland	2006	0.161	0.370	0.006	0.225	0.134	Ireland	2012	0.247	0.028	0.183	0.256	0.991
United Kingdom	2006	0.161	0.370	0.006	0.225	0.134	Mexico	2012	0.197	0.000	0.203	0.308	1.000
United States	2006	0.163	0.343	0.006	0.252	0.134	Netherlands	2012	0.169	0.301	0.012	0.316	0.168
Australia	2007	0.157	0.369	0.011	0.241	0.171	South Africa	2012	0.152	0.322	0.010	0.297	0.144
Austria	2007	0.163	0.057	0.011	0.609	0.171	South Korea	2012	0.241	0.029	0.190	0.298	0.908
Belgium	2007	0.000	0.353	0.009	0.243	0.000	Sweden	2012	0.172	0.044	0.011	0.609	0.168

Brazil	2007	0.201	0.000	0.096	0.379	0.845	Switzerland	2012	0.166	0.354	0.012	0.251	0.168
Canada	2007	0.163	0.278	0.011	0.330	0.171	United Kingdom	2012	0.189	0.044	0.013	0.629	0.196
Denmark	2007	0.163	0.043	0.011	0.656	0.171	United States	2012	0.166	0.344	0.013	0.259	0.168
Finland	2007	0.000	0.000	0.009	0.000	0.000	Australia	2013	0.180	0.219	0.028	0.453	0.939
France	2007	0.157	0.369	0.012	0.241	0.171	Austria	2013	0.182	0.206	0.025	0.447	0.882
Ireland	2007	0.241	0.028	0.185	0.246	1.000	Belgium	2013	0.000	0.227	0.012	0.495	0.000
Mexico	2007	0.188	0.000	0.114	0.458	0.575	Brazil	2013	0.000	0.169	0.012	0.547	0.000
Netherlands	2007	0.160	0.312	0.012	0.302	0.171	Canada	2013	0.191	0.140	0.034	0.513	0.940
South Korea	2007	0.233	0.041	0.194	0.308	0.857	Denmark	2013	0.166	0.208	0.024	0.482	0.828
Sweden	2007	0.163	0.044	0.011	0.667	0.171	Finland	2013	0.000	0.159	0.012	0.541	0.000
Switzerland	2007	0.157	0.369	0.012	0.241	0.171	France	2013	0.180	0.219	0.033	0.454	0.939
United Kingdom	2007	0.157	0.369	0.012	0.241	0.171	Ireland	2013	0.181	0.219	0.031	0.432	0.939
United States	2007	0.158	0.341	0.012	0.269	0.171	Mexico	2013	0.000	0.197	0.012	0.561	0.000
Australia	2008	0.146	0.363	0.011	0.237	0.119	Netherlands	2013	0.188	0.181	0.032	0.526	0.939
Austria	2008	0.154	0.076	0.011	0.622	0.119	South Africa	2013	0.187	0.201	0.025	0.485	0.939
Belgium	2008	0.000	0.366	0.009	0.233	0.000	South Korea	2013	0.174	0.220	0.024	0.455	0.892
Brazil	2008	0.219	0.000	0.135	0.294	0.982	Sweden	2013	0.183	0.213	0.028	0.435	0.883
Canada	2008	0.154	0.248	0.011	0.405	0.119	Switzerland	2013	0.187	0.219	0.034	0.445	0.939
China	2008	0.172	0.076	0.011	0.645	0.143	United Kingdom	2013	0.187	0.219	0.039	0.445	0.939
Denmark	2008	0.154	0.090	0.011	0.573	0.119	United States	2013	0.181	0.213	0.038	0.455	0.939
Finland	2008	0.000	0.000	0.009	0.000	0.000	Australia	2014	0.160	0.323		0.266	0.284
France	2008	0.145	0.386	0.011	0.234	0.119	Austria	2014	0.191	0.010		0.712	0.364
Ireland	2008	0.294	0.069	0.138	0.236	1.000	Belgium	2014	0.000	0.322		0.260	0.000
Mexico	2008	0.200	0.000	0.083	0.462	0.662	Brazil	2014	0.000	0.267		0.323	0.000
Netherlands	2008	0.148	0.334	0.011	0.295	0.119	Canada	2014	0.175	0.276		0.303	0.322
South Korea	2008	0.275	0.057	0.112	0.302	0.899	Denmark	2014	0.191	0.010		0.712	0.364
Sweden	2008	0.154	0.090	0.011	0.573	0.119	Finland	2014	0.000	0.000		0.000	0.000
Switzerland	2008	0.294	0.069	0.138	0.236	1.000	France	2014	0.160	0.323		0.266	0.284
United Kingdom	2008	0.145	0.386	0.011	0.234	0.119	Ireland	2014	0.172	0.322		0.265	0.322
United States	2008	0.146	0.362	0.011	0.262	0.119	Mexico	2014	0.164	0.000		0.368	1.000
Australia	2009	0.149	0.355	0.010	0.241	0.176	Netherlands	2014	0.179	0.205		0.349	0.322
Austria	2009	0.177	0.042	0.009	0.591	0.177	South Africa	2014	0.146	0.296		0.296	0.245
Belgium	2009	0.000	0.361	0.008	0.236	0.000	South Korea	2014	0.160	0.323		0.266	0.284
Brazil	2009	0.000	0.301	0.008	0.280	0.000	Spain	2014	0.000	0.000		0.000	0.000
Canada	2009	0.177	0.230	0.010	0.383	0.177	Sweden	2014	0.175	0.010		0.773	0.363
Denmark	2009	0.177	0.042	0.009	0.591	0.177	Switzerland	2014	0.172	0.322		0.265	0.322
Finland	2009	0.000	0.000	0.008	0.000	0.000	United Kingdom	2014	0.191	0.010		0.712	0.364
France	2009	0.169	0.360	0.011	0.239	0.177	United States	2014	0.173	0.314		0.275	0.322
Ireland	2009	0.242	0.026	0.280	0.253	1.000	Australia	2015	0.130	0.355	0.010	0.252	0.135
Mexico	2009	0.157	0.000	0.146	0.371	0.653	Austria	2015	0.187	0.044	0.011	0.614	0.187

Netherlands	2009	0.172	0.308	0.010	0.302	0.177	Belgium	2015	0.000	0.351	0.009	0.249	0.000
South Africa	2009	0.156	0.327	0.009	0.270	0.152	Brazil	2015	0.000	0.265	0.009	0.267	0.000
South Korea	2009	0.239	0.016	0.216	0.286	0.935	Canada	2015	0.168	0.305	0.011	0.291	0.159
Sweden	2009	0.177	0.042	0.009	0.591	0.177	Denmark	2015	0.170	0.044	0.010	0.673	0.185
Switzerland	2009	0.169	0.360	0.010	0.239	0.177	Finland	2015	0.000	0.000	0.009	0.000	0.000
United Kingdom	2009	0.193	0.042	0.011	0.614	0.207	France	2015	0.165	0.353	0.012	0.256	0.159
United States	2009	0.171	0.335	0.011	0.269	0.177	Germany	2015	0.187	0.044	0.012	0.614	0.187
Australia	2010	0.170	0.352	0.011	0.238	0.178	Ireland	2015	0.249	0.029	0.191	0.260	1.000
Austria	2010	0.178	0.040	0.010	0.591	0.178	Mexico	2015	0.197	0.000	0.190	0.323	0.974
Belgium	2010	0.000	0.363	0.008	0.235	0.000	Netherlands	2015	0.170	0.268	0.011	0.342	0.159
Brazil	2010	0.000	0.302	0.008	0.318	0.000	South Africa	2015	0.149	0.328	0.010	0.282	0.158
Canada	2010	0.178	0.230	0.011	0.383	0.178	South Korea	2015	0.249	0.029	0.212	0.260	1.000
Denmark	2010	0.178	0.040	0.010	0.591	0.178	Spain	2015	0.000	0.000	0.009	0.000	0.000
Finland	2010	0.000	0.000	0.008	0.000	0.000	Sweden	2015	0.168	0.044	0.011	0.591	0.159
France	2010	0.169	0.361	0.012	0.238	0.178	Switzerland	2015	0.165	0.353	0.011	0.256	0.159
Ireland	2010	0.240	0.015	0.181	0.253	1.000	United Kingdom	2015	0.187	0.044	0.013	0.614	0.187
Mexico	2010	0.134	0.000	0.178	0.313	0.639	United States	2015	0.145	0.345	0.012	0.266	0.136
Netherlands	2010	0.173	0.309	0.011	0.303	0.178							
South Africa	2010	0.156	0.329	0.010	0.271	0.152							

Polyarchy and Importance to the Financial Network

What did our polyarchy and eigencentality statistics look like? Figure B8 gives the summary statistics. Figure B9 shows specific average values for each jurisdiction.

Figure B8: Summary Statistics for Our Adjusted Variables

Factor	N	Mean	Std. Dev	Min	Max
“Pure” Main Variables					
Pure Polyarchy	160	18.81	11.15	0	119.4
Pure Authority	156	17.88	3.08	9.4	29.37
Pure Hub	167	20.66	14.08	0	38.57
Pure Pagerank	173	4.29	8.00	0.5	39.58
Pure Cluster Coefficient	178	38.23	15.74	21.7	77.27
Pure Eigenvalue	156	37.80	33.28	8.7	100
Differences					
DIFF in Pure Polyarchy	141	.75	5.27	-7.5	45.51
DIFF Pure Authority	134	-6.89	397.26	-2186.8	1643.29
DIFF Pure Hub	146	-11.30	956.75	-3438.7	3012.66
DIFF Pure Pagerank	162	-7.79	516.23	-2061	2117.2
DIFF Pure Cluster Coefficient	146	2.23	1269	-5411	5411
DIFF Pure Eigenvalue	130	63.68	3646.9	-10000	10000

Figure B9: Comparison of the Values of Main Variables Used for Our Study

Country	N Valid	Polyarchy *100	PURE Polyarchy	Largest invest	Exponential drop-off	old eigen-centralit y	new eigenvalue	Change in new eigen-centralit y	Invest Entropic Measure * 100
Australia	11	89.24 (1.7)	17.52 (3.9)	42154.27 (11175.0)	-0.29 (0.0)	92.60 (1.8)	23.73 (23.7)	0.58 (3422.7)	12.01 (1.3)
Austria	9	86.09 (0.60)	17.82 (1.41)	54175.44 (5552.20)	-0.30 (0.03)		26.91 (23.97)	20.01 (3412.49)	18.89 (4.60)
Belgium	11	87.86 (1.09)	11.79 (2.21)	279200.00 (572802.76)	-0.22 (0.01)				9.39 (0.84)
Brazil	11	87.80 (1.00)	18.19 (2.46)	32471.27 (14700.43)	-0.41 (0.03)		91.32 (9.70)	-528.76 (8499.91)	15.85 (1.68)
Canada	10	87.13 (0.42)	21.42 (1.55)	116645.33 (75324.79)	-0.42 (0.05)	94.50 (1.96)	25.70 (24.56)	-14.37 (3798.37)	36.88 (5.16)
China	2	10.64 (0.08)				94.06 (0.67)	15.19 (1.30)		10.89 (0.02)
Denmark	11	90.72 (0.65)	17.46 (1.95)	39631.27 (7665.36)	-0.28 (0.02)	89.88 (3.77)	24.67 (20.24)	24.25 (2692.17)	11.23 (0.90)
Finland	11	88.85 (1.16)	17.86 (3.47)	46746.27 (25403.25)	-0.50 (0.11)	0.00 (0.00)			21.29 (3.24)
France	11	92.07 (1.16)	7.61 (4.35)	453223.55 (98055.49)	-0.25 (0.01)	91.98 (2.96)	23.54 (23.77)	48.04 (3411.82)	11.14 (0.72)
Germany	2	88.26 (3.68)	26.50 (9.99)			99.96 (0.06)	17.40 (1.82)		
Ireland	11	88.21 (1.51)	18.77 (5.64)	257207.36 (155608.04)	-0.35 (0.02)	93.61 (0.57)	93.20 (20.33)	0.00 (4595.12)	17.78 (1.37)
Mexico	11	68.43 (2.13)		7111.55 (3900.43)	-0.54 (0.04)	0.00 (0.00)	70.19 (23.70)	683.96 (4803.32)	32.24 (3.97)
Netherlands	11	87.97 (0.91)	23.33 (2.38)	225970.00 (61850.85)	-0.28 (0.03)	94.05 (0.86)	24.33 (23.69)	25.26 (3349.80)	12.07 (1.44)
South Africa	7	76.05 (1.92)		7992.29 (1667.45)	-0.32 (0.02)		27.71 (29.42)	11.32 (4736.95)	23.71 (4.83)
South Korea	11	78.01 (3.69)	52.41 (4.92)	22911.45 (11248.57)	-0.34 (0.04)	87.91 (4.72)	85.05 (19.15)	115.33 (3144.38)	11.93 (0.82)
Spain	2	84.82 (2.21)	21.10 (4.71)	115990.00 (28338.01)	-0.33 (0.00)				18.48 (1.55)
Sweden	11	91.29 (0.79)	13.99 (1.78)	36442.36 (6027.00)	-0.28 (0.03)	89.42 (2.50)	24.68 (21.98)	-1.71 (3032.80)	11.50 (1.61)
Switzerland	11	91.38 (0.91)	19.59 (2.25)	157381.18 (61060.28)	-0.19 (0.01)	93.61 (0.56)	32.34 (32.37)	25.26 (5129.32)	7.83 (1.03)
United Kingdom	11	91.28 (1.74)	13.71 (6.16)	969798.36 (195964.81)	-0.19 (0.01)	93.62 (0.57)	26.05 (23.45)	52.77 (3206.49)	7.24 (0.54)
United States	11	90.37 (1.85)	19.59 (4.54)	1077583.64 (165903.9)	-0.26 (0.02)	93.59 (0.55)	24.11 (23.77)	1.54 (3361.37)	14.12 (1.44)

Regressions for Robustness

We ran standard regressions to see if we could duplicate the results we obtained using our complicated procedure of finding adjusted polyarchies and network eigencentralities. Figure B10 and Figure B11 shows the regression results using the models we have already described.

Figure B10: Regression on Polyarchy and Largest Liabilities Placer

Polyarchy (bold=significant)	Macro	Attact+ Connect	Supply+ Demand	Largest invest (bold=significant)	Model 1	Model 2	Model 3
Intercept	82.57	78.42			-2413432	-642151	-1012050
	8.83	5.28			698870.2	293510.1	914911.8
old eigencentrality	-0.59	-0.32	0.20				
	0.06	0.07	0.08				
Real Exchange Rates	0.04			Real Exchange Rates	10235		
	0.08				4381.8		
Market capitalisation		0.00		Market capitalization.	-54		
		0.01			594.1		
Diff erence in Market Cap.		-0.09					
		0.03					
S&P Global Equity Indices (annual change)		0.12		S&P Global Equity Indices	-197		
		0.04			1066.5		
Commercial service exports		0.03		Commercial service exports		2410	
		0.01				251.9	
Air transport		-0.02		Air transport		-468	
		0.01				198.4	
Central government debt			0.00	Central government debt			2524
			0.02				1094.9
Gross capital formation			-0.19	Gross capital formation			1658
			0.11				10349.8
Savings			-0.09	Savings			-30344
			0.06				5113
FDI			0.07	FDI			6275
			0.08				2288.8
Broad money growth			0.01				
			0.04				
Real interest rate			-0.31	Real interest rate	-6237		
			0.32		6064.3		
GDP per capita			0.1	GDP per capita	-614		
			0.09		4791.5		
Broad money growth			0.03				
			0.1				
				Current Account		-12155	
						3899.2	
				Polyarchy *100	20191	7663	18556
					8908	3748.2	8984.8
Rule of Law	31.51	21.27	11.66	Rule of Law		-13904	108309
	2.06	1.80	1.26			31676.8	51204.5

Figure B11: Regression Results on Alternative Measures of Centrality

Invest entropy	Model 1	Model 2	Model 3	Change in new eigencentality and diff in pure poly	Model 1	Model 2
Intercept	45.63	30.39	13.38	Intercept	-0.75	1.01
	12.00	5.68	17.37		0.61	0.37
Polyarchy*100	0.08	-0.12	0.03	Change new eigencentality	0.00	0.00
	0.08	0.07	0.16		0.00	0.00
Real Exchange Rates	-0.18			Diff REER	0.00	
	0.11				0.00	
Real interest rate (%)	-0.49			Real interest rate	0.05	
	0.12				0.05	
Market cap. (% of GDP)	-0.03			Diff Market Cap	0.04	
	0.02				0.02	
GDP per capita	-0.33			Diff GDP per capita	0.61	
	0.08				0.30	
S&P Global Equity Indices (annual % change)	0.02			S&P Global Equity Indices	-0.03	
	0.03				0.02	
Current account balance (% of GDP)		-0.60				
		0.14				
Commercial service exports \$b		-0.04				-0.01
		0.01				0.02
Air transport, millions of passengers carried		0.02				0.00
		0.01				0.04
Central government debt			-0.03	Diff Central govt debt		-0.29
			0.04			0.06
Gross capital formation			0.48	Gross Capital Formation		-0.05
			0.21			0.05
Savings			-0.29	Diff Gross domestic savings	-0.02	
			0.12		0.20	
FDI			-0.03	Diff FDI	-0.01	
			0.14		0.03	
Broad money growth			-0.19			
			0.07			
Rule of Law		-0.13	-2.90	Diff RoL *100		0.01
		1.04	0.89			0.06

Figure B12: Attempts to Find Significance in Differenced Variables

Difference in pure poly and new eigenvalue	Model 1	Model 2	Model 3	Diff in invest and pure polyarchy	Model 1	Model 2	Model 3
Intercept	-8.53	0.65	-1.62	Intercept	-1.44	0.81	1.20
	5.19	3.41	5.47		1.39	1.82	0.60
Nw eigenvalues	0.03	0.05	0.05	Invest Entropic Measure * 100		0.00	-0.02
	0.01	0.02	0.02			0.05	0.08
REER	0.06						0.04
	0.05						
Diff REER	0.00			Diff REER	0.00		
	0.00				0.00		
Real interest rate (%)	0.02			Real interest rates		0.11	
	0.09					0.04	
Market cap. (% of GDP)	0.01			Market cap		0.01	
	0.01					0.01	
Diff Market Cap	0.04			Diff Market Cap		0.02	
	0.02					0.01	
GDP per capita	0.01						
	0.06						
Diff GDP	0.50			Diff GDP		0.09	
	0.27					0.51	
S&P Global Equity Ind.	-0.03			S&P Index			0.02
	0.02						0.02
Current account balance		0.20					0.13
		0.12					0.12
Commercial service exports		0.00					0.00
		0.01					0.01
Diff Commercial service exports		0.01					0.02
		0.04					0.05
Air transport		0.00					0.00
		0.01					0.01
Diff air passengers		-0.05					-0.02
		0.07					0.07
Rule of Law		-1.63					
		1.77					

Figure B12 Continued

Difference in pure poly and new eigenvalue	Model 1	Model 2	Model 3	Diff in invest and pure polyarchy	Model 1	Model 2	Model 3
Change in rule of law times 100		-0.01		Change in rule of law times 100			-0.04
		0.10					0.04
Central government debt (% of GDP)			0.02				
			0.03				
Diff Govt Debt (%GDP)			-0.38	Diff Govt Debt (%GDP)			-0.27
			0.10				0.05
Gross capital formation			0.15				
			0.19				
Diff Gross capital formation			-0.05	Diff in Invest	0.00	0.00	0.00
			0.06		0.00	0.00	0.00
Savings (% GDP)			-0.10				
			0.13				
Diff Gross domestic savings (% of GDP)			-0.13	Diff Gross domestic savings (% of GDP)			-0.08
			0.37				0.21
FDI			0.18				
			0.17				
Diff FDI			-0.06				-0.02
			0.14				0.04
Broad money growth (annual %)			-0.11				
			0.09				

Figure B13: Use of Alternative Measures Like Voice

Polyarchy, invest/dropoff	Model 1	Model 2	Model 3	Polyarchy, invest/dropoff	Model 1	Model 2	Model 3
Intercept	63.45	70.14	82.74	Commercial service exports		0.01	
	3.99	2.21	5.62			0.01	
Voice	0.12	0.20	0.09	Air transport		0.00	
	0.01	0.02	0.01			0.00	
Largest invest	0.00	0.00	0.00	Rule of Law		-5.46	
	0.00	0.00	0.00			1.29	
Exponential drop-off	1.17	4.89	-13.80	Central govt debt			0.01
	3.66	3.55	7.53				0.02
Real interest rate (%)	0.43			Gross capital formation			-0.43
	0.03						0.12
Market cap. (% of GDP)	0.01			Savings			-0.04
	0.00						0.10
GDP per capita	0.06			FDI			0.17
	0.03						0.09
S&P Global Equity Indices	0.00			Broad money growth			0.10
	0.01						0.04
Current account balance		-0.15					
		0.07					