

Financial markets: Productivity, procyclicality, and policy

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1. Introduction

During the decades-long debate on the link between financial markets and the real economy, academics have tended to side either with Joseph Schumpeter's view of the ability of well-developed financial systems to stimulate economic growth, or with Joan Robinson's observation that "where enterprise leads, finance follows".² The experience from the past several decades from emerging as well as industrialized countries has mostly confirmed the first claim, namely, that deeper domestic financial markets improve economic efficiency, lead to better allocation of productive capital, and increase long-term economic growth.³ A similar case has been made for international financial integration, which has been one of the main global phenomenon of the past 20 years or so. A host of empirical analyses has demonstrated that integrated financial systems raise long-term economic growth, improve the allocation of productive resources, foster entrepreneurship and innovation, enhance market discipline, and help countries insure against macroeconomic fluctuations.⁴

At the same time, the frequent financial shocks associated with more dynamic financial industries and more integrated financial markets - especially in view of the recent global crisis - also highlight the contribution of financial markets to macroeconomic risk. Differently put, financial development, broadly speaking, has

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² Robinson, J. "The Generalization of the General Theory." *The rate of interest and other essays*. London: Macmillan, 1952, 67-142.

³ For a seminal empirical contribution, see King, R., and R. Levine, 1993. Finance and growth: Schumpeter might be right. *Quarterly Journal of Economics* 108, 717-737.

⁴ See Agenor, P.-R., 2003. Benefits and costs of international financial integration: Theory and facts. *World Economy* 26, 1089-1118.

implications not only for growth, but also for the variability of growth. The perception has been strong for quite a while in both academic and policy circles that foreign capital, for example, increases volatility both in the financial markets and in the real economy.⁵ Nevertheless, considerably less attention has been devoted to this link than to the finance-and-growth nexus. One simple explanation for this discrepancy is that the favourite measure of variability is the volatility of the growth process, and while the welfare implication of higher growth are obvious, the welfare benefits of removing all of the business cycle volatility are much smaller.⁶ Therefore, while past studies have pointed to a positive relation between growth and volatility,⁷ it has also been customary to include the caveat that the negative effect on welfare from higher growth volatility is fully outweighed by the growth effect. However, recently the literature has moved away from volatility towards higher moments of growth which describe better asymmetric variability, or the probability of rare, abrupt, and large macroeconomic contractions. The argument has been made that changes in consumption uncertainty, which reflect shifts in the probability of economic disaster, can have major implications for welfare. In particular, within a class of models that replicate how asset markets price consumption uncertainty, it is estimated that individuals would be willing to pay very high premia (of the order of 20 percent of GDP each year) in exchange for eliminating all chances for large macroeconomic contractions.⁸ Therefore, it is essential to understand the contribution of finance not just to volatility, but also to tail risk. Recent studies have addressed this point and have found that financial globalization, broadly speaking, increases not just level growth, but also the left-skewness of the distribution of output growth, which – to the degree that output risk is not completely insurable – has important welfare implications.⁹

⁵ Stiglitz, J., 2000. Capital market liberalization, economic growth and instability. *World Development* 28, 1075-1086.

⁶ Lucas, R., 1987. *Models of Business Cycles*. New York: Basil Blackwell.

⁷ Kose, A., Prasad, E., Rogoff, K., and S.-J. Wei, 2003. Effects of financial globalization on developing countries: Some empirical evidence. International Monetary Fund Occasional Paper 220; Levchenko, A., Ranciere, R., and M. Thoenig, 2009. Growth and risk at the industry level: The real effects of financial liberalization. *Journal of Development Economics* 89, 210-222.

⁸ Barro, R., 2006. Rare disasters and asset markets in the twentieth century. *Quarterly Journal of Economics* 121, 823--866.

⁹ Popov, A., 2011. Financial liberalization, growth, and risk. ECB mimeo.

Presumably, such an effect would come from large contractions of output during recessions resulting from financial crises, when the cost of renting productive capital increases and general demand declines. However, there is a number of indirect channels through which “excessive” financial development could affect growth. To name just one, R&D investment tends to decrease during economic downturns. For a while it was widely believed that it was the other way round: during recessions, unproductive activities are scrapped down and the opportunity cost of production increases, making it more lucrative to allocate idle resources to R&D. However, recent evidence has suggested that in fact R&D investment is highly procyclical, implying that firms’ decisions whether to engage in R&D are dominated by short-term gain arguments rather than by the opportunity cost of production.¹⁰ This not just goes against the Schumpeterian view of the cleansing effect of recessions, but it also implies that one channel through which some of the growth effects of finance can be eroded is through the disruption of the innovation process as a result of a more volatile business cycle.

This combined evidence implies that there is a trade-off between a highly vibrant financial sector and the overall stability of the financial system. In fact, some scholars have recently gone as far as to claim that eliminating financial instability altogether can only come at the expense of restricting the same productive forces which are responsible for long-term growth.¹¹ The purpose of macro-prudential regulation then is to alleviate the costs imposed by financial fragility without restricting too much the contribution of deep and interconnected financial markets to long-term economic growth. Ideally, the tools employed would be such as to allow policy makers to forcefully “lean against the wind” during costly booms driven by excessive debt and characterized by no fundamental contribution to long-term growth (like the mid-2000s) while reacting more cautiously during low-cost booms driven by equity finance and characterized by a wave of new technologies (like the dot-com bubble). Of course, there are many pitfalls along the way. To take a purely statistical challenge – is it really possible to distinguish the “good” (Industrial Revolution-type) bubbles from the “bad” (real estate-type bubbles), where “good” and “bad” is defined by the

¹⁰ Barlevy, G., 2007. On the cyclicity of research and development. *American Economic Review* 97, 1131-1164.

¹¹ Ranciere, R., Tornell, A., and F. Westermann, 2008. Systemic crises and growth. *Quarterly Journal of Economics* 123, 359-406.

contribution of the credit boom to long-term economic growth? Or, to take a challenge from the realm of political economy – even if an unproductive boom associated only with cheap mortgage credit and no investment in new technologies can be diagnosed in real time, is it really feasible to act on it? Both consumers and bankers like cheap mortgages, and so governments and regulators, being to a degree captured by their respective interest groups, would be unwilling to act against such bubbles. Finally, a practical challenge is what tool to use, even if the bubble is diagnosed early enough and the political will to act is available? It is unclear if macroprudential regulators will ever have in their arsenal a policy tool as simple and as effective as the repo rates, which central banks throughout the world have been using so successfully to control inflation. To address all these issues, ideally a sound macroprudential framework would be needed, encompassing an authority with a clear mandate, sufficiently independent, and with a set of simple tools whose usefulness and achievements can be easily communicated to the general public.

Below we shall discuss the contribution of financial market to both long-term growth and to the variability of the growth process, and how policy can be used to address the procyclicality of the financial system while maintaining its contribution to long-term growth.

2. Financial markets, growth, and productivity

In general, deep and efficient financial markets improve economic performance both through raising the level of growth¹² and through a more efficient allocation of productive capital¹³, ultimately generating benefits for the society as a whole. Importantly, evidence from emerging markets suggests that for these effects to be realized, a country needs to have a reasonably large financial sector. Therefore, if in any way financial markets have been associated with “threshold” effects in academic thinking in the past, these have been linked to the inefficiencies associated with “too small” (i.e. under-developed) financial markets, when their contribution to economic

¹² Rajan, R., and L. Zingales, 1998. Financial dependence and growth. *American Economic Review* 88, 559-586.

¹³ Wurgler, J., 2000. Financial markets and the allocation of capital. *Journal of Financial Economics* 58, 187-214.

growth has been found to be seriously limited, and even negative.¹⁴ For example, in an international context, it has been well-understood that the positive effects of financial integration only accumulate when the domestic financial system is relatively developed.¹⁵ Important theoretical contributions have also argued that when economic agents dislike risk and investment projects have a sunk cost, financial underdevelopment will result in lower capital accumulation and lower productivity because entrepreneurs will prefer to invest in low-risk low-return projects rather than pursue the most profitable opportunities.¹⁶

That larger financial markets are associated with higher economic efficiency is not a feature of emerging markets only. Consider the long-standing point in academic and policy discussion on the differences in average GDP growth between the U.S. and continental Europe. It has been suggested that deeper financial markets across the Atlantic are to a large extent responsible for the larger increases in productivity, the faster pace of industrial innovation, and the generally more dynamic economy which the U.S. is in possession of relative to the European continent. For example, deeper credit markets are probably responsible for the higher rate of small business creation in the U.S. The divide is especially visible when it comes to the financing of innovative ideas, where the much larger US venture capital industry has been credited over the years with the emergence of whole new industries and such innovative corporate giants like Microsoft, Cisco, Google (to name just a few). Out of the 500 largest companies in the world, there are 26 U.S. ones which have been born after 1975, compared with only 3 European ones.¹⁷ These two aspects of “creative destruction” – new business creation and innovation – are crucial when we come to think of why deeper financial markets can benefit economic growth, and it seems that larger and deeper financial markets stimulate them better.

¹⁴ Demirguc-Kunt, A., Beck, T., and P. Honohan, 2008. *Finance for All? Policies and Pitfalls in Expanding Access*. World Bank: Washington, DC.

¹⁵ Kose, A., Prasad, E., Rogoff, K., and S. Wei, 2004. Financial globalization, growth and volatility in developing countries. NBER Working Papers 10942; Bekaert, G., Harvey, C., and C. Lundblad, 2005. "Does financial liberalization spur growth?" *Journal of Financial Economics* 77, 3-55.

¹⁶ Acemoglu, D., and F. Zilibotti, 1997. Was Prometheus unbound by chance? Risk, diversification, and growth. *Journal of Political Economy* 105, 709-751.

¹⁷ Philippon, T., and N. Veron, 2008. Financing Europe's fast movers. Bruegel Policy brief 2008/01

One financial market that has been singled out recently by economists, in terms of its contribution to productivity and growth, is the venture capital industry. This particular type of financial intermediation is a good case to emphasize the microeconomic channels through which financial activity affects aggregate growth. In particular, while credit markets are a “prime suspect” to investigate while studying the finance-and-growth nexus, banks are often reluctant to finance small young firms because of high uncertainty, information asymmetries, and agency costs. In comparison, venture capitalists are specialized to overcome these problems through the use of staged financing, private contracting, and active monitoring.¹⁸ The involvement of venture capitalists with micro projects should then result in higher innovation through higher survival rates of highly innovative but highly risky projects. Empirical investigations into this question have measured an elasticity of up to 0.09 of ultimately successful patent applications to venture capital investment. Alternatively put, while the ratio of venture capital to industrial R&D averaged less than 3% between 1983 and 1992, VC has accounted for 8% of industrial innovation over that period.¹⁹ More recent investigation with data up to 2008 have broadly confirmed this result.²⁰

The same pattern – that larger financial markets allow countries to better exploit the benefits of innovation in terms of productivity and growth – is observed when one compares European economies. Econometric estimations indicate that improving certain aspects of corporate governance, the efficiency of legal systems in resolving conflicts in financial transactions and some structural features of the less developed European banking sectors is likely to enhance the speed with which the financial system helps to reallocate capital from declining sectors to sectors with good growth potentials.²¹ In this respect, pan-European developments like the introduction of the euro, equity-, bond-, and retail-markets integration, the Second Banking Directive, and national initiatives to foster risk capital markets have contributed substantially towards deepening financial markets and subsequently narrowing these differences. In

¹⁸ Kaplan, S., and P. Stromberg, 2001. Venture capitalists as principals: Contracting, screening, and monitoring. *American Economic Review* 91, 426-430.

¹⁹ Kortum, S., and J. Lerner, 2000. Assessing the contribution of venture capital to innovation. *RAND Journal of Economics* 31, 674-692.

²⁰ Hirukawa, M., and M. Ueda, 2008. Venture capital and industrial “innovation”. CEPR Discussion paper No. 7089.

²¹ Hartmann, P., Heider, F., Lo Duca, M, and E. Papaioannou, 2007. The role of financial markets and innovation in productivity and growth in Europe. ECB Occasional paper 72.

addition, recent ECB research has pointed to the fact that large differences persist among European countries in terms of new business creation and patenting activity, and has concluded that much of this difference can be attributed to more developed credit markets and especially risk capital markets.²²

Another point in order is financial innovation. In principle, financial innovation (in particular, new credit-risk transfer instruments) contributes to economic efficiency by enhancing the diversification of risk. Securitisation, for example, allows risk to be transferred from the originators of the loans to financial investors willing to hold the risk, leading to a more efficient allocation of risk both at national and international levels, at least when symmetric distribution of information prevails. As a consequence, the overall amount of credit available to the non-financial sector expands, funding productive opportunities that were previously shut out of credit markets. Or consider other types of financial innovation, like credit screening techniques and mortgage design. More efficient screening and new credits scoring technologies can vastly improve the allocation of resources to the non-financial sector, which can be linked to investment-related growth.²³ Finally, mortgage design has also been linked to increased consumer welfare, allowing customers previously constrained in credit-markets to accumulate optimal household leverage.

A similar case can be made about the growth and welfare effects of financial integration. Research focusing on capital account openness has found mixed results.²⁴ However, liberalization of capital accounts is less relevant for risk-sharing than equity flows, and articles focusing on equity market liberalization typically find a significant positive growth effect of liberalization (of the order of 1%).²⁵ In addition, by enhancing both consumption and income risk-sharing, financial openness reduces consumption growth volatility.²⁶ The same is true for banking integration which has

²² Popov, A., and P. Roosenboom, 2009. On the real effects of private equity investment: Evidence from new business creation. ECB Working paper 1063.

²³ Michalopoulos, S., Laeven, L., and R. Levine, 2009. Financial innovation and endogenous growth. NBER Working paper 15356.

²⁴ See Eichengreen, B., 2001. Capital account liberalization: What do the cross-country studies tell us? *World Bank Economic Review* 15, 341-365.

²⁵ Bekaert, G., Harvey, C., and C. Lundblad, 2005. Does financial liberalization spur growth? *Journal of Financial Economics* 77, 3-55.

²⁶ Bekaert, G., Harvey, C., and C. Lundblad, 2006. Growth volatility and financial liberalization. *Journal of International Money and Finance* 25, 370-403.

been shown to synchronise country-level business cycles as measured by GDP, employment, and income growth, with the evidence on that coming from both Europe and the U.S.²⁷ Finally, despite the large degree of fragmentation and disintegration they exhibited in the early stages of the crisis, interbank markets' primary role is to provide banks with an efficient risk-sharing tool.

Risk-sharing in turn improves the ability of countries to specialize in their most productive sectors.²⁸ It allows economic agents to better smooth their consumption and investment patterns over time. And while this is mostly true for developing countries, the risk-sharing provided by financial integration and increased foreign capital flows have also benefited relatively developed countries, for which the integration of the central and east European countries since 1989 has served as a prime example. Pre-crisis research had also suggested that the cross-border diversification of large banks improves the soundness of the banking system by making individual bank failures less likely.

Another channel through which financial integration improves stability is the channel of allocative efficiency and economic diversification. Cross-border banking, for instance, tends to improve overall economic performance by making sure that productive capital is channeled towards the most efficient firms, reducing the risk of crises stemming from mispriced investment risk.²⁹ Financial integration in general assists domestic financial systems in allocating resources across industrial sectors in a way which improves the overall diversification of the economy and lowers its volatility. As a result, an optimally diversified economy is less prone to recessions, and so its real sector responds less to the same shock than an economy which relies on just a few sectors.³⁰

3. Financial markets and financial fragility

²⁷ Kalemli-Ozcan, S., Papaioannou, E., and Jose-Luis Peydro, 2009. Financial integration and business cycle synchronization, NBER Working paper 14887; Morgan, D., Rime, B., and P. Strahan, 2004. Bank integration and state business cycles. *Quarterly Journal of Economics* 119, 1555-1585.

²⁸ Kalemli-Ozcan, S., Sorensen, B., and O. Yosha, 2003. Risk sharing and industrial specialization: Regional and international evidence. *American Economic Review* 93, 903-918.

²⁹ Giannetti, M., and S. Ongena, 2009. Financial integration and firm performance: Evidence from foreign bank entry in emerging markets. *Review of Finance* 13, 181-223.

³⁰ Manganelli, S., and A. Popov, 2010. Finance and diversification. ECB Working paper 1259.

The empirical evidence linking financial markets to growth has been so abundant that in 2003, in a discussion of a survey on the subject, one author was prompted to conclude that “[...] In 1993 many people doubted that there was a relation between finance and growth; now very few do.”³¹ At the same time, however, severe global recessions driven by financial crises, like the one we just experienced, tend to throw doubt on such blissfully optimistic evidence. It appears that financial markets have a destabilizing potential. Two separate questions beg for an answer in this regard: Do financial development and integration increase the likelihood of a financial crisis? And if yes, do financial crises have a pronounced negative effect on productivity and growth?

At first sight, there are a number of theoretical arguments pointing to the fact that large and complex financial systems are associated with financial crises. One identified channel of this process is risk-taking. For example, in recent work increased risk-taking before the 2007-08 crisis has been linked to the growth of the financial industry resulting from “excess world saving” in the context of persistent global imbalances. In the wake of the dot-com bubble, the story goes, excess world savings by unsophisticated world investors looking for assets to store value, turned to safe debt investments. In order to accommodate this increased demand, the US financial sector manufactured debt claims out of all kinds of products, explaining the wave of pre-crisis securitization.³² Another theoretical perspective into the same issue offers the following argument: in a financially liberalized economy with limited contract enforcement, systemic risk taking reduces the effective cost of capital and relaxes borrowing constraints. This allows greater investment and generates higher long-term growth, but it raises the probability of a sudden collapse in financial intermediation when a crash occurs. Systemic risk thus increases mean growth even if crises have arbitrarily large output and financial distress costs, implying the co-existence of higher level growth and more frequent crises.³³ A slightly different take, derived from excess rents in the financial sector, has allowed some authors to develop models in

³¹ Zingales, L., 2003. Commentary on “More on Finance and Growth: More Finance, More Growth?” The Federal Reserve Bank of St. Louis *Review* 85, 47-52.

³² Caballero, R., and A. Krishnamurti, 2009. Global Imbalances and Financial Fragility. *American Economic Review* 99, 584-588.

³³ Rancière, R., Tornell, A., and F. Westermann, 2008. Systemic crises and growth. *Quarterly Journal of Economics* 123, 359-406.

which higher relative productivity in the financial sector can endogenously, through the channel of risk-taking, generate boom-bust episodes, with real implications for financial fragility.³⁴

Actual evidence suggesting that deeper and more dynamic financial markets are causally linked to financial crises was relatively sparse before the 2007-08 crisis. While some authors had found that domestic financial development has a marginally positive effect on the probability of recessions,³⁵ others had countered that the measured positive effect of finance on economic downturns disappears once institutional factors are controlled for.³⁶ Industry-level evidence had even suggested that credit market development decreases the magnitude of output declines in sectors with high natural liquidity needs.³⁷ On the other hand, recently some authors have argued that while substantially raising long-term growth and only marginally raising long-term volatility, financial liberalization significantly increases the left-skewness of the distribution of output growth at the industry level, implying a higher recession probability.³⁸ At the same time, a growing literature on early-warning signals had even before the crisis utilized simple statistical methods to link the probability of, for example, banking crises to the size of the financial sector, measured, for example, by credit growth or credit to GDP ratios. In hindsight, such studies did a fairly good job in “predicting” the events from 2007-08.³⁹

This mixed evidence implies important non-linearities involved in the relationship between finance and crisis probability. For example, while financial integration *per se* is not a destabilizing force, stability risks may arise if the driving forces underlying stronger international financial integration reflect global economic imbalances. It is

³⁴ Biais, B., Rochet, J.-C., and P. Wooley, 2009. Rents, learning, and risk in the financial sector and other innovative industries. FMG Discussion paper 632.

³⁵ Easterly, W., Islam, R., and J., Stiglitz, 2000. Shaken and stirred: Explaining growth volatility. B. Pleskovic and J. E. Stiglitz, Annual Bank Conference on Development Economics. Washington D.C.

³⁶ Acemoglu, D., Johnson, S., Robinson, J., and Y. Thaicharoen, 2002. Institutional causes, macroeconomic symptoms: volatility, crises and growth. *Journal of Monetary Economics* 50, 49-123.

³⁷ Raddatz, C., 2006. Liquidity needs and vulnerability to financial underdevelopment. *Journal of Financial Economics* 80, 677-722.

³⁸ Popov, A., 2011. Financial liberalization, growth, and risk. ECB mimeo.

³⁹ Borio, C., and M. Drehmann, 2009. Assessing the risk of banking crises – revisited. *BIS Quarterly Review*, March 2009, 29-46; Detken, C. and F. Smets (2004), “Asset price booms and monetary policy”, in: Horst Siebert (ed.) *Macroeconomic Policies in the World Economy*. Springer, Berlin. 2004. Alessi, L., and C. Detken, 2009. ‘Real time’ early warning indicators for costly boom/bust cycles – a role for global liquidity. ECB Working paper 1039.

reasonable to argue that the pre-crisis boom in US real estate and securitisation markets reflected high foreign demand for safe US assets resulting from “excess world savings” in the context of persistent global imbalances. Consequently, foreign asset demand not only pushed down the US risk-free interest rate but also compressed the risk premia on risky assets. The low cost of financing, in turn, fostered an increase in the level of leverage of the domestic financial sector which exacerbated systemic risk. This interpretation of the events makes an important point: increasing the stability of the global financial system should not be done by pushing back financial globalization, but by first and foremost addressing the problem of the global imbalances.

A second example of the nuances involved in assessing the destabilising potential of financial integration is banking integration. While in principle it is associated with enhanced efficiency, surrounding circumstances, like regulatory arbitrage and lack of transparency in transactions, can exacerbate information problems associated with cross-border banking, and lead to misaligned incentives, increased risk-taking, and underestimation of the social cost of contagion. It has also been observed that while banking integration benefits efficient firms through lower cost of external finance, very rapid integration induces firms to take on excessive leverage, exacerbating the effect of financial crises on the corporate sector.⁴⁰ Finally, cross-border banking has been shown in the context of this crisis to be associated with a transmission of financial distress from banks’ balance sheets to the corporate sector of countries which were not the origins of the shock.⁴¹

What is the effect of such financial fragility on productivity and innovation? On the one hand, we know from standard Schumpeterian theory that recessions have a “cleansing” effect in the sense that inefficient projects, propped up by high demand during good times, are eliminated when demand declines during bad times. More recently, economists have looked at other channels, like search,⁴² technical change,⁴³

⁴⁰ Popov, A., and S. Ongena, 2011. Interbank market integration, loan rates, and firm leverage. *Journal of Banking & Finance* 35, 544-560.

⁴¹ Popov, A., and G. Udell, 2010. Cross-border banking and the international transmission of financial distress during the crisis of 2007-08. ECB working paper 1203.

⁴² Mortensen, D., and C. Pissarides, 1994. Job creation and job destruction in the theory of unemployment. *Review of Economic Studies* 61, 397-415.

⁴³ Aghion, P., and G. Saint-Paul. 1998. Virtues of bad times: Interaction between

and human capital accumulation⁴⁴ to argue that recessions should ideally promote various activities that contribute to long-term productivity and thus to growth. This view is derived from the notion that the opportunity cost of achieving productivity growth is lower in recessions, providing incentive to undertake such activities in downturns. If negative macroeconomic shocks encourage growth-enhancing investments, as this view suggests, economic contractions would tend to be shorter and less persistent than they would be otherwise. Cyclical fluctuations might even contribute positively to welfare if they allow the economy to grow at a lower resource cost. Taken at face value, these arguments imply that recessions play a useful role in fostering growth, and therefore the crisis potential of financial development is not necessarily detrimental to long-term growth.

Unfortunately, recent work has also suggested that the main driver of innovation and productivity growth – R&D investment – is highly procyclical. The simple explanation for that is linked to an externality inherent in the innovation process: a new idea usually benefits rival innovators, who can improve on it or adopt it in full once the patent expires. Therefore, in deciding how much to invest in innovative activities, an entrepreneur weighs heavily the private short-term benefits that accrue to her. The lower benefits of innovation during recessions may lead to innovators failing to fully exploit downturns to carry out innovation at a lower cost. If profits are sufficiently procyclical, innovation can fall enough in recessions to turn R&D procyclical on the basis of this distortion alone. Evidence for the U.S. suggests a very high correlation (0.49) between R&D growth and GDP growth for the period 1958-2003.⁴⁵

Of course, there are less subtle ways in which financial crises disrupt economic growth, other than the disruption of productivity-enhancing investment. The aftermath of busts which follow unsustainable booms are frequently associated with falling housing prices, collapsing equity prices, and lasting declines in output and employment. Under certain circumstances, the negative impact on potential output

productivity growth and economic fluctuations. *Macroeconomic Dynamics* 2, 322–344.

⁴⁴ DeJong, D., and B. Ingram, 2001. The cyclical behavior of skill acquisition. *Review of Economic Dynamics* 4, 536–561.

⁴⁵ Barlevy, G., 2007. On the cyclicity of research and development. *American Economic Review* 97, 1131-1164.

could be long-lasting rather than transitory, for example, because high and persistent unemployment leads to a deterioration of human capital. In addition, financial crises like the recent one tend to generate deteriorations in the fiscal position of many countries. Government debt explodes in the wake of banking crises, fuelled not so much by the cost of recapitalizing the banking systems but by collapsing tax revenue.⁴⁶ Facing gaping budget holes, governments resort to fiscal austerity which directly affects long-term productivity-enhancing activities, like schooling and publicly financed innovation.

One way in which all these considerations manifest themselves in the data is the frequently made empirical claim that the positive relationship between finance and growth breaks down when the financial sector becomes too large. Various authors⁴⁷ have found that in general, the relationship between financial development and economic growth is non-linear: when of moderate size, financial markets strongly promote growth, but when large, or when operating in relatively richer countries, their effect on growth weakens considerably.

4. Regulating financial markets: Crises, procyclicality and macroprudential policy

All this evidence points to a somewhat unsettling conclusion: while a vibrant financial industry is a necessary ingredient for sustainable long-term economic growth, it may also be associated with economic costs in terms of abnormal volatility. This trade-off between efficiency and stability may be an unavoidable fact of life, but it is, of course, still within the reach of policy-makers to skew this trade-off in the right direction. Getting this balance between efficiency and stability right will be an important consideration for the newly established macro-prudential regulators, such as the European Systemic Risk Board for the European Union and the Financial Stability Oversight Council (FSOC) for the United States.

⁴⁶ Reinhart, C., and K. Rogoff, 2009. The aftermath of financial crises. *American Economic Review* 99, 466-472.

⁴⁷ Deidda, L., and B. Fattouh, 2002. Nonlinearity between finance and growth. *Economic Letters* 74, 339-345; Rioja, F., and N. Valev, 2004. Does one size fit all? A reexamination of the finance and growth relationship. *Journal of Development Economics* 74, 429-447; Shen, C., and C. Lee, 2006. Same financial development yet different economic growth - why? *Journal of Money, Credit, and Banking* 38, 1907-1944.

We started this chapter by referring to the long-standing debate between Schumpeter's and Robinson's followers about whether finance causes growth, or the other way round. While the empirical evidence supporting Schumpeter's view is abundant, the arguments we laid out in the previous sections suggest that a more relevant debate to consider may be the implicit one between Schumpeter and Minsky on the efficiency of the economic and financial cycle. Schumpeter's view was that cycles are efficient: because productive ideas do not arrive at a constant rate, economic growth tends to be associated with a boom phase, followed by recessions ensuring that the multitude of unproductive projects, financed during the boom alongside the productive ones, are cleansed from the economy. In this world, finance plays the beneficial role of allocating resources to credit constrained entrepreneurs in possession of ideas which are ultimately valuable to society as a whole. Minsky, however, contended that finance tends to contribute to the boom-bust cycle. His view was that good times give rise to speculative investor euphoria, and soon thereafter debts exceed what borrowers can pay off from their incoming revenues, which in turn leads to a financial crisis. As a result of the collapse of the speculative borrowing bubble, investors – and especially banks – reduce credit availability, even to companies that can afford to borrow, and the economy subsequently contracts.⁴⁸

The mutually reinforcing dynamics between the real and the financial sector hinted at by Minsky and Kindleberger is sometimes referred to as the procyclicality of the financial system. Consistent with this line of thinking, the BIS (2009) in its annual report defines procyclicality as “The mutually reinforcing mechanisms through which the financial system can amplify business cycle fluctuations and possibly cause and exacerbate financial instability”.

{Insert Graphs 1 and 2}

There are many ways to illustrate this procyclicality. Graph 1 plots, for the EMU period, the procyclical development of credit, investment and stock prices relative to GDP and the countercyclical behaviour of the external finance premium. The vertical

⁴⁸ Minsky, H, 1986, *Stabilizing an unstable economy*, New Haven: Yale University Press. See also Kindleberger, C P, 1978, *Manias, panics and crashes: a history of financial crises*, Palgrave Macmillan.

lines indicate the two times when the cost of finance premium reaches its minimum in this period. The first minimum is reached just before the bursting of the dotcom bubble in the first half of 2000. The second minimum is dated just before the start of the financial turmoil in the first half of 2007. So, exactly when at least ex post the risks were the highest, the premium for credit and liquidity risk is the lowest. A similar story (although less clear in the euro area) can be told for mortgage finance, house prices and residential investment as shown in Graph 2.

Of course, one may argue that fundamentals are driving the boom and bust phase. The evidence we reviewed earlier suggests strongly that this is part of the story and also the reason why it will never be very easy to identify a bubble ex ante. For example, one familiar story of the dot-com bubble is that the signs of a new economy with higher productivity and profits due to IT-related innovation leads to booming stock prices, increased investment (to benefit from the higher productivity), more borrowing to finance that investment and an associated increase in debt burdens. Moreover, because the outlook has improved and collateral values are up, the credit risk and the external finance premium is low. This process reverses as some of the good news turns out to be over-optimistic. While the caveat concerning the difference between a debt-based and an equity-based boom is an important one, you can in principle tell similar stories about the development in mortgage markets in the US and many other countries: good fundamentals based on innovation and benign conditions feeding on themselves.

The same two examples - the dot-com bubble of 1990s and the credit expansion of the 2000s - also make it clear that not all boom-bust episodes are the same. While both booms ended in busts, the former cycle hardly had the same negative impact on the real economy, both in terms of benefits and costs. On the benefit side, it was associated with a technological boom, much like the First and Second Industrial Revolutions, which at the time were also associated with a boom-bust cycle. On the cost side, in 2000-01 we saw nothing of the liquidity spirals, asset fire sales, interbank market freezes, and general deleveraging that we experienced in 2007-08. The simple reason for this discrepancy is that the credit boom of the 2000s was driven by debt, while the dot-com bubble was driven by an expansion in equity ownership, and equity is not held in levered portfolios. This fairly obvious difference has prompted some

academics to suggest that an institution which is engaged in “leaning against the wind” should make it a simple rule to act whenever housing prices are increasing rapidly, as such episodes are always accompanied by an accumulation of debt.⁴⁹

Most asset price booms do build on good fundamentals. However, time and again we have learned that at some point these positive developments mutate into excessive credit expansion and risk-taking due to incentive problems, information frictions and coordination issues.⁵⁰ This explains why with the exception of financially repressed economies, procyclical asset price booms and busts are of all times and do not depend on the details of the financial system.⁵¹

Examples of feedback mechanisms between the real and the financial sector that have been brought into the public debate are multiple.

1. Procyclical capital requirements. As institutions incur losses and their capital cushions decline, the terms at which they can raise external funding worsen. This, in turn, can induce them to cut credit expansion and/or dispose of assets, which weakens economic activity, raising the risk of a further deterioration in financial strength.
2. Procyclical collateral (loan to value) and margin requirements. During periods of stress, collateral requirements are likely to make it more difficult to fund existing positions, since increases in risk naturally lead to increases in margin requirements. Downturns lead to higher margin requirements and reduced market liquidity, forcing a general financial retrenchment with obvious implications for real economic activity
3. Endogenous procyclical financial innovation. When things are going well, firms and institutions feel confident in experimenting. They create new, untested instruments that are difficult to understand and value. Financial innovation may therefore create hidden, under-priced risks. As strains develop and the boom begins to wane, the previously unseen risks materialise, deepening the credit crunch that is already under way.

⁴⁹ Hall, R. E., 2011. Presidential address at the American Economic Association Annual Meeting.

⁵⁰ Reinhart, K., and K., Rogoff, 2010. *This Time Is Different: Eight Centuries of Financial Folly*. Princeton University Press, Princeton: NJ.

⁵¹ See, for example, De Bandt, O., P. Hartmann and J.L. Peydro Alcalde (2009), “Systemic risk: An update”, in Berger et al (eds), *Oxford Handbook of Banking*, Oxford University Press and Bank of England (2009), *The role of macroprudential policy*, A discussion paper, November 2009.

4. Procyclical behavioural mechanisms such as herding behaviour, information cascades, bouts of optimism and pessimism and confidence multiplier.⁵²
5. Procyclical measurement of risk. Historical estimates of short-term volatility, asset and default correlations, probabilities of default and loss given default, all move procyclically. As a result, measures of risk often spike once tensions arise, triggering strains, but may be quite low even as vulnerabilities and risk build up during the expansion phase.
6. Procyclical policies. For example, if the boom is initially driven by positive supply developments, inflationary tendencies may remain very subdued for a while leading to low interest rates and an increased search for yields. Similarly, boom times are times of strong government revenues and an overestimation of the structural position of the government.
7. Procyclical compensation schemes and short-term horizons.
8. Procyclical risk taking due to moral hazard problems related to insurance mechanisms and “too big to fail” issues. Etc.

One implication of the fact that procyclicality has many facets is that also the policy response to deal with it has to be comprehensive and multi-faceted and ideally targeted to the sources of market failures and externalities. This is, of course, what the global reform agenda initiated by the G-20 and discussed at the Financial Stability Board and other multilateral institutions is all about. Some measures deal with regulation, e.g. the recent agreement of the oversight group of the Basle Committee to set up a framework for countercyclical capital buffers above the minimum requirement and a minimum global standard for funding liquidity. Other measures have to do with strengthening the market infrastructure and its transparency, such as measures to enhance the transparency of new financial instruments or counteract the procyclical behaviour of margin requirements by moving OTC (Over-The-Counter) markets to Central CounterParties (CCPs). Still other measures, such as regulation geared at Systemically Important Financial Institutions (SIFIs) are geared at reducing the problem of moral hazard related to the “too big to fail” issue.

⁵² Akerlof, G., and R. Shiller, 2009. *Animal Spirits: How Human Psychology Drives the Economy, and Why It Matters for Global Capitalism*. Princeton University Press, Princeton: NJ.

A second observation is that because of the systemic and multi-faceted nature of the procyclicality, a consensus has formed that there is a need for a new macro-prudential policy framework.⁵³ We listed a number of challenges for a successful macroprudential policy in the beginning: the need for one strong and independent authority rather than a fragmented set of players captured by various national interests; the need for a simple and effective policy tool; and the will of politicians and national authorities to actually implement the recommendations of that authority. In view of the discussion so far of the role of financial systems in promoting growth, we can now add to this list another challenge: what exactly would the mandate of that authority be? Is it to eliminate the incidence of rare and wide-spread financial crises which lead to large and abrupt macroeconomic contractions? Or is it to smooth the business cycle? Given our summary of the costs of crises in terms of growth, productivity, and consumer welfare, it looks like the former is the desirable mandate. However, it may simply not be feasible to eliminate all crises.

The establishment of a new macro-prudential policy framework geared at the surveillance of the financial system and the reduction of systemic risk is consistent with Tinbergen's assignment problem that there should be as many policy instruments as objectives. In Europe, the macro-prudential policy will be pursued by the newly established European Systemic Risk Board (ESRB), which will issue risk warning and make policy recommendations. The ECB and other central banks play an important role in this risk board because of their macro perspective, their independence, their emphasis on sustainability and a medium-term orientation and their intimate knowledge of financial markets, infrastructures and institutions. One success factor will be the effective sharing of information necessary for a comprehensive surveillance of the financial system.

In line with Tinbergen's principle and the effective assignment of policies, monetary policy should continue to primarily focus on maintaining price stability over the medium term. Doing anything else risks overburdening the monetary policy

⁵³ See Crockett, A. 2000, "Marrying the micro- and macro-prudential dimensions of financial stability", Remarks before the Eleventh International Conference of Banking Supervisors, Basel, September, for an early exposition of this need. More recently, On the academic side, see Brunnermeier, M., Crockett, A., Goodhart, C., Persaud, A., and H. Shin, 2009, *The Fundamental Principles of Financial Regulation*, Geneva: International Center for Monetary and Banking Studies. On the the policy side, see the Report by the de Larosiere Group, Brussels, 25 February 2009.

instrument and undermining the central bank's independence. However, this does not mean that monetary policy can ignore financial stability. First, Art 105(5) of the EU Treaty says that one of the ECB's tasks is to contribute to the promotion of financial stability. Second, monetary policy needs to take into account the effects of the financial system on the transmission mechanism and the shocks that come from the financial system. Both monetary policy and macro-prudential policies affect the cost of financing and therefore will tend to interact. Third, it is also good to hear Milton Friedman's advice: Avoid that monetary policy itself becomes itself a source of instability. Recently, there has been quite a bit of empirical evidence that keeping interest rates too low for too long encourages risk-taking behaviour and therefore may sow the seeds of the next crisis. Finally, to the extent that macro prudential tools are unlikely to completely eliminate procyclical behaviour, a leaning against the wind strategy may not be a bad idea. Through its medium-term orientation and its two-pillar approach including the monetary analysis, the ECB's monetary policy strategy provides a natural framework to lean against credit driven boom-bust cycles even if this means trading off a bit of disinflation now against greater stability in the medium term. Of course, in the light of our previous discussion, a number of questions remain. Will small changes in interest rates be effective in reducing the build-up of imbalances?⁵⁴ Can we identify costly credit/asset price booms?⁵⁵ Recent empirical

⁵⁴ For recent evidence, see Ioannidou, V. P., S. Ongena and J.-L. Peydró (2009). "Monetary Policy, Risk-taking and Pricing: Evidence from a Quasi Natural Experiment," European Banking Center Discussion Paper No. 2009-04S; Jiménez, G., S. Ongena, J.-L. Peydró and J. Saurina (2009), "Hazardous Times for Monetary Policy: What Do Twenty-three Million Bank Loans Say About the Effects of Monetary Policy on Credit Risk?", CEPR Discussion Paper No. 6514; and Maddaloni, A. and J.-L. Peydró (2010). "Bank Risk-taking, Securitization, Supervision, and Low Interest Rates: Evidence from Lending Standards," ECB Working Paper series.

Maddaloni, A. and J.-L. Peydró (2010). "Bank Risk-taking, Securitization, Supervision, and Low Interest Rates: Evidence from Lending Standards," forthcoming in the ECB Working Paper series.

Jarocinski, M. and F. Smets (2008). "House Prices and the Stance of Monetary Policy," ECB Working Paper No. 891.

Jiménez, G., S. Ongena, J.-L. Peydró and J. Saurina (2009), "Hazardous Times for Monetary Policy: What Do Twenty-three Million Bank Loans Say About the Effects of Monetary Policy on Credit Risk?", CEPR Discussion Paper No. 6514.

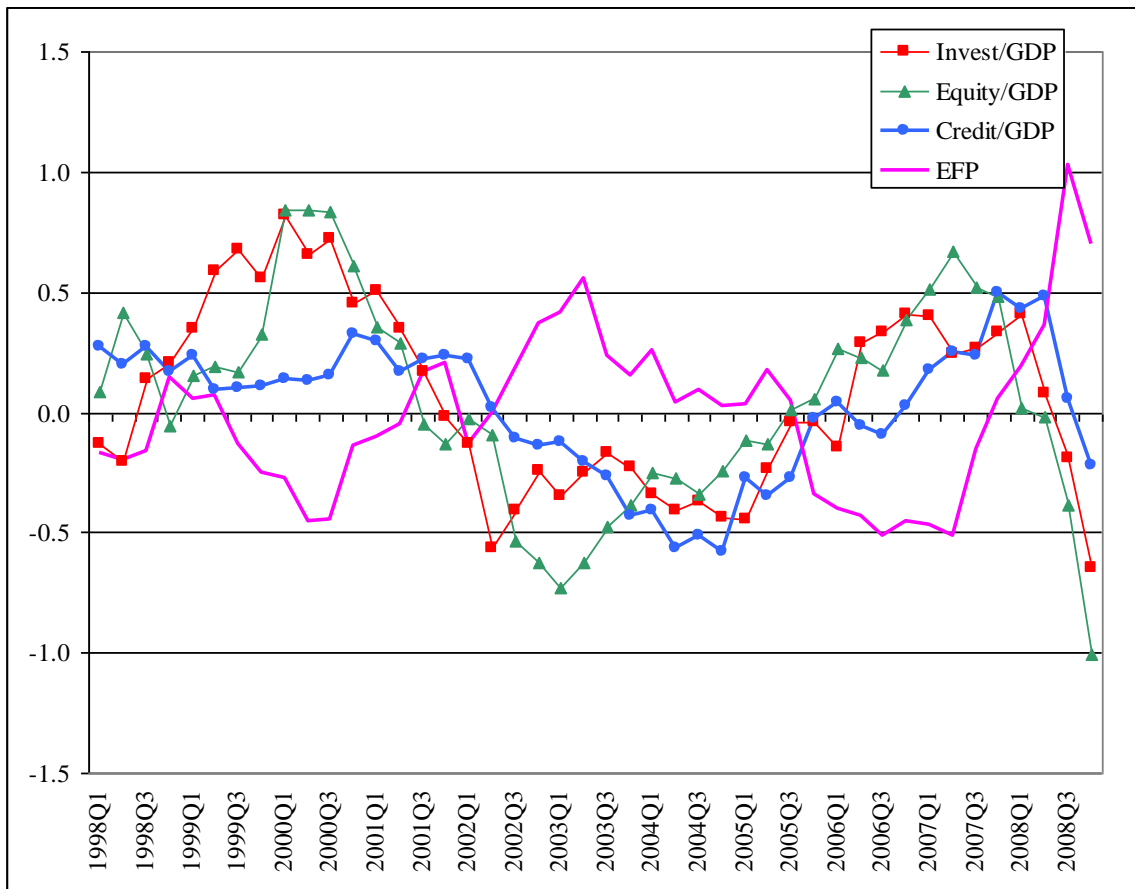
Maddaloni, A. and J.-L. Peydró (2010). "Bank Risk-taking, Securitization, Supervision, and Low Interest Rates: Evidence from Lending Standards," forthcoming in the ECB Working Paper series.

and theoretical evidence, as well as the experience with the current crisis does suggest that the burden of the proof has shifted in favour of a leaning against the wind policy.

In conclusion, based on a review of theory and evidence we have argued in this chapter that while a vibrant financial sector contributes to sustainable, long-term growth, it may also increase the probability of financial crises and their large economic costs. An important goal of the newly established macro-prudential authorities will be to increase the resilience of the financial sector and thereby reduce the risk of a systemic collapse without endangering the vital role it plays in sustaining long-term growth.

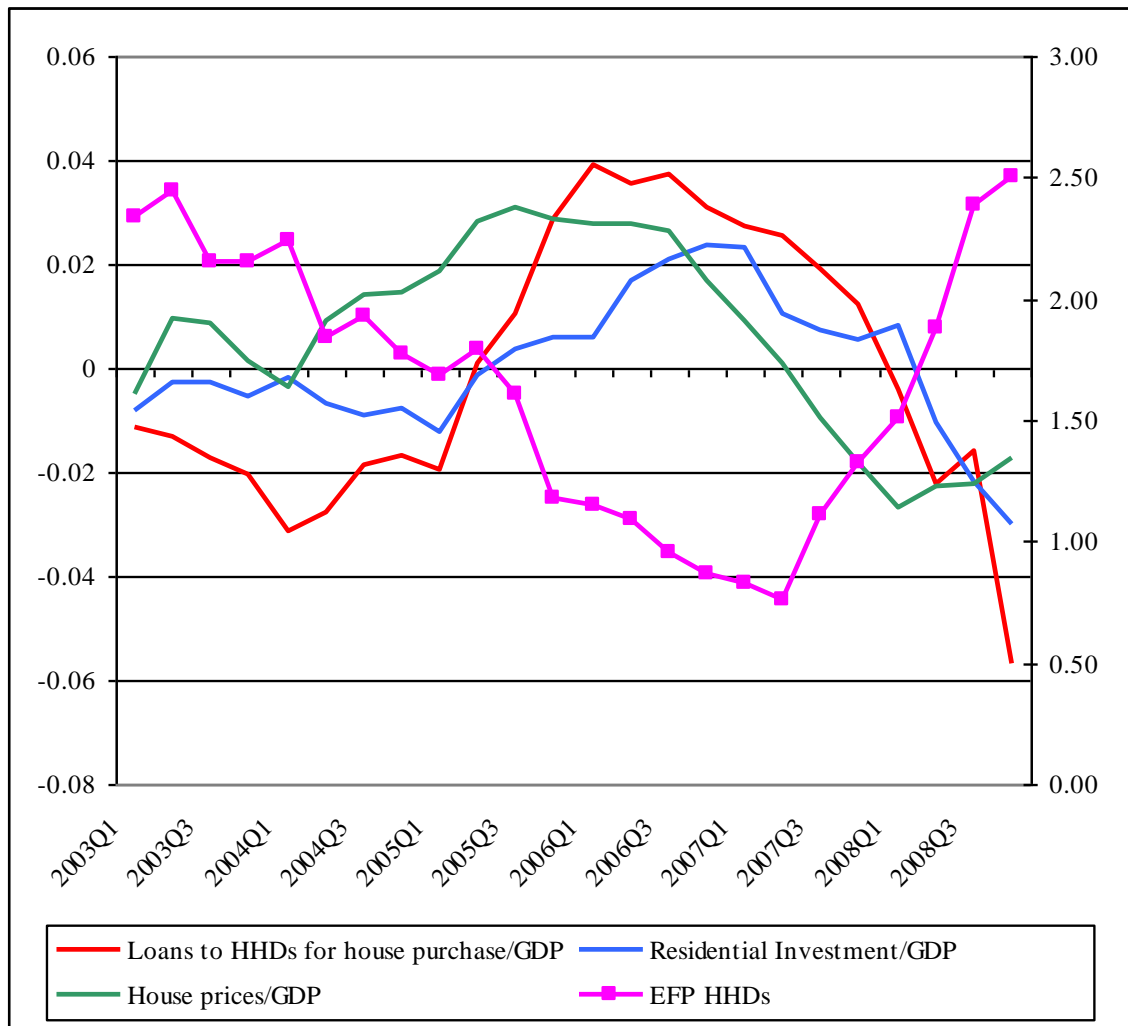
⁵⁵ See Alessi, L. and C. Detken, 2009, “Real-time Early Warning Indicators for Costly Asset Price Boom/bust Cycles - A Role for Global Liquidity,” ECB Working Paper No. 1039.

Graph 1: Credit, investment, equity prices and the external finance premium in the euro area corporate investment market



Adapted from Christiano L., R. Motto and M. Rostagno, 2008. "Monetary Policy and Stock Market Boom-Bust Cycles," ECB Working Paper No. 955.

Graph 2: Credit, investment, house prices and the external finance premium in the euro area housing market.



Source: ECB calculations