



Policy Brief

NUMBER 1, 2022

Overview

Policy makers are confronted with a “perfect storm”. The deadliest pandemic in one hundred years and the conflict in Ukraine have triggered a period of radical uncertainty related to poverty reversals, geopolitical risk, and climate change at the backdrop of funding gaps for the implementation of the Sustainable Development Goals agenda in Developing Countries. A renewed focus on the triangle innovation, finance and sustainability will enrich the analytical framework of innovation studies with a deeper understanding of the prominent role of financial structures in innovation dynamics during the transition to sustainable development. But delivering on this agenda requires a determined effort to understand the systemic challenges arising from financial constraints and innovation driven solutions for the provision of global public goods.

Written by Anthony Bartzokas,
UNU-MERIT

© United Nations University 2022
ISBN 978-92-808-5012-3

Licensed under the Creative Commons
Deed ‘Attribution-NonCommercial-
NoDerivs 2.5’

The views expressed in this publication
are those of the authors and do not
necessarily reflect the views of United
Nations University.



Finance and Innovation: From Joseph Alois Schumpeter to Rhino Bonds

“Credit operations of whatever shape or kind do affect the working of the monetary system; more important, they do affect the working of the capitalist engine – so much as to become an essential part of it without which the rest cannot be understood at all” (Schumpeter 1954: 302).

“This innovative bond leverages capital markets to raise funds from private investors without adding to South Africa’s sovereign debt. It is another example of support to boost South Africa’s biodiversity economy, nature-based tourism industry, and benefits for local communities.” (World Bank press release for the issuance of the first Rhino bond, March 31, 2022).

Over the years, economic theories have offered different and, in some cases, contradictory approaches on the relationship between finance and innovation¹. Proponents of the «bright side» in this debate suggest that financial innovations have the potential to provide a more efficient allocation of resources and innovation financing is associated with the convergence of growth opportunities and actual growth, especially for industries that are more dependent on external finance. Advocates of the «dark side» underline that financial innovation is associated with higher volatility, systemic bank fragility and higher bank losses during economic crises. Therefore, innovations have the potential to negatively impact the solvency of the financial system and the growth prospects of the economy².

A firm level perspective offers a more granular approach. In an economy with an imperfect financial market, firms face constraints to the quantity of capital they can deploy. Subsequently, financial frictions can reduce productivity via three channels. First, they may distort entry and technology adoption decisions and thus reduce the productivity of individual producers. On the contrary, the fluidity of capital markets enables the rapid development of new, high-tech sectors and revitalised established sectors. Second, financial frictions may generate differences in the returns to capital across individual producers, and thus efficiency losses due to misallocation. Third, economists have long puzzled over why so little capital from



advanced countries, with saturated capital markets and limited investment opportunities, is flowing to developing countries, with high growth potential and abundant investment opportunities. We can argue that restricted access to financial globalization may have a heterogeneous effect not only across different groups of firms (e.g., small versus large) but also across countries³.

Furthermore, the outbreak of the Covid-19 pandemic sparked unprecedented aggregate demand and supply shocks across the globe. Currently, the international economic system is experiencing serious setbacks in investment and employment due to lockdowns, stalling trade and elevated risks. In response, a plethora of fiscal support measures for both households and firms and monetary stimulus policies have been launched to combat the economic fallout, with financial systems as a conduit of these policies. The challenge ahead is to better understand whether financial intermediaries amplify or mitigate real economic shocks, and how agents in the financial system can ensure effective and efficient investment allocation towards value creation over time. The policy relevance of this perspective is evident given the long-term technology transformation in response to climate change, the digitalisation of labour and recently deglobalisation trends. The mounting interest in green finance has also laid bare our limited understanding of the relation between finance and the environment. Are deeper financial systems detrimental to the environment as they fuel economic growth and the emission of pollutants? Or can finance help to steer firms, and economies, towards more sustainable growth paths?

One interesting puzzle in this overall debate is the reluctant

participation of innovation scholars, inspired by Joseph Alois Schumpeter. The research agenda of innovation studies is focusing on trajectories of technological change with the introduction of broader frameworks for the enrichment of causality links suggested by mainstream theories. With a few notable exceptions, the evolution of the investment practise in finance, from credit transactions in the writing of Schumpeter to financial structures in every aspect of the economic system, has been overlooked⁴. Given the contribution of technological change to economic growth, it is important to ask whether finance promotes growth by fostering innovation and thus influencing the direction of technological change⁵. Finance plays a fundamental role in technological change and innovation. The availability of financial capital and the organization of financial markets strongly influence the way new technologies are deployed and new techno-economic paradigms emerge.

The issue of fundings gaps during the implementation of Sustainable Development Goals (SDG) is at the core of this rethinking. Indeed, this debate has profound policy relevance for the prospects of sustainable development in the world economy. After the global financial crisis, a G20 Eminent Persons Group report called for development finance to be refocused on helping countries to strengthen innovation capacity and human capital for the introduction of productivity enhancing and SDG friendly investment as the foundations for an attractive investment climate, job creation and social stability⁶. World leaders have committed to 17 SDGs by 2030 and the scale of funding needed is enormous⁷. An extra annual spending is necessary between now and 2030: some \$500 billion in low-income

About the Author

Anthony Bartzokas is a professorial Fellow at UNU-MERIT, Visiting Professor in Practice at the LSE and Associate Professor at the University of Athens with extensive experience in academia, policy relevant research and development finance. He has worked on financial systems, corporate investment, and innovation dynamics combined with real-life exposure to investment decisions and financial markets during his tenure as executive board director at the European Bank for Reconstruction and Development.

His current research focus is on finance and innovation and is motivated by the erosion and the differential impact of global public goods, the prominent role of financial structures in innovation dynamics, and the value added of policy relevant research for long term investment decisions.

Contact Prof. Dr. Bartzokas at: bartzokas@merit.unu.edu



countries and \$2.1 trillion in emerging market economies. Multilateral Development Banks (MDB) and other Development Finance Institutions (DFI) provide annual financial commitments of around \$130-140 billion per year to Low and Middle-Income Countries, less than 5% of the actual SDG and climate investment needs in those countries. Additional inflow of capital from commercial investors remains challenging. The median sovereign risk rating of Low- and Middle-Income Countries is “B”. Almost all investors either cannot take or are reluctant to take “B” risk - they seek “BB” and “BBB” risk. To mobilize private investment at scale requires industrial “de-risking” mobilization solutions to create those “BB” and “BBB.” Against this background, the biggest challenge for global financial markets today is how to channel the vast pools of savings that are now invested in low or (even negative) yield fixed-income assets—as much as \$17 trillion—to investments in developing countries.

Time is running short and policy makers are confronted with a “perfect storm”. The deadliest pandemic in 100 years and the conflict in Ukraine have triggered a period of radical uncertainty related to poverty reversals, food security and climate change at the backdrop of eroded fiscal space. Most of these elements will continue and some, such as climate change, are likely to produce long-lasting attrition of global public goods⁸.

This does not mean that it is inevitable to miss the SDG targets. The erosion of global public goods calls for a sustainability agenda aiming at innovation driven solutions for sustainable development. From the supply side, new technologies and innovations are converging in new ways to change

how people live, work, and organize their lives. However, and despite significant efforts, we are lagging from having viable and cost-effective technological solutions for global public goods. There are three challenges in the post pandemic state of play of relevant innovation dynamics⁹. First, there is the technical improvement of existing but still economically inefficient technological alternatives. These technologies work, and are demonstrably improving over time, but may require considerable calibration in a post-COVID environment. Second, there is a need to develop large-scale radically new technologies that are not yet fully on the horizon, such as new antibiotic agents, or new materials. Third, the diffusion of innovation to developing countries often involves significant capital investments and is an uncertain, risky undertaking, which makes project structuring even more difficult.

New challenges have emerged and the allocation of capital and risk mitigation is at the core of economic governance and policy making for sustainable investment¹⁰. Turning to innovation financing, a narrow path is emerging, induced by recent geopolitical developments. From the supply side, new players have entered credit and risk capital markets with green transition priorities. From the demand side, corporates with access to international capital markets are responsible for the bulk of investable projects in the reconfiguration of production networks. Ultimately, the drag from many parts of governance structures and framework conditions in these areas is weaker than the thrust of innovation dynamics and there is a compelling need for policy to facilitate their development¹¹. We should not underestimate problems related to project implementation and resources mobilisation. The imbal-



ance between supply and demand of resources for the provision of global public goods is most pronounced in developing countries, where significant external financing is needed. Market risk and coordination failures are prevalent in areas such as project finance and skills availability respectively. And the 26th Climate Change Conference confirmed that key outstanding issues for effective international co-operation needed to implement the Paris Agreement remain up in the air.

Global funding structures for sustainability are changing and deep knowledge of the investment practise in an interconnected world is a rare commodity among policy makers and impact investors. Several influential reports confirm that well targeted financial instruments are catalytic in blending financial engineering insights and allocation of capital considerations¹². The innovation studies perspective has a record of novel contributions on socioeconomic aspects of technological change. Indeed, previous experience suggests that the development of formal evolutionary economics models, comprehensive databases and statistical techniques has allowed innovation studies scholars to start disentangling the mechanisms of innovation dynamics by tapping the potential of micro data for the analysis of firm level growth, sectoral trajectories, and overall framework conditions in developing countries with valuable insights for innovation driven growth and the knowledge economy¹³. A renewed focus of innovation scholars on the triangle innovation, finance and sustainability will enhance the analytical framework of innovation studies with a deeper understanding of the prominent role of financial structures in innovation dynamics during the transition to sustainable development. The emphasis on context specificity and learning

capabilities can improve the search process for investment priorities, especially for green transition and bottom of the pyramid applications. This bottom-up approach will feed in the policy making process when financial instruments and innovative projects are tested, adapted, and co-created at a small scale to evaluate their scaling-up potential. Local governments gain a sense of the technical, financial, and economic parameters before entering the investment phase and local actors accumulate knowledge to develop and fine-tune investment projects in anticipation of future risks and market opportunities.

These challenges call for capacity building, interdisciplinary policy relevant research and better integration between scholars of innovation, policy makers and the private sector. Further analytical and empirical work is needed on the relative importance of these considerations and how we can integrate the focus on innovation, finance and sustainability in thematic priorities and specific investment financing operations. This line of policy relevant research will inform a selective scaling-up of financial innovations for sustainable development in the Global South. But achieving this vision requires a determined effort to understand the systemic challenges arising from financial constraints and innovation driven solutions for the provision of global public goods.



References

Bertrand Badre (2018) *Can finance save the world?* Berrett-Koehler Publishers.

Thorsten Beck, Tao Chenb, Chen Linc, and Frank M. Song (2016) Financial innovation: The bright and the dark sides. *Journal of Banking and Finance*, Vol. 72, November, pp. 28–51.

G-20 Eminent Persons Group on Global Financial Governance (2018) *Making the Global Financial System Work for all*. October 2018.

Yuriy Gorodnichenko and Monika Schnitzer (2013) Financial Constraints and Innovation: Why Poor Countries Don't Catch Up. *Journal of the European Economic Association*, Vol. 11, No. 5, pp. 1115-1152.

Hsu, Po-Hsuan, Xuan Tian, and Yan Xu. 2014. "Financial Development and Innovation: Cross-Country Evidence." *Journal of Financial Economics*, Vol. 112, No. 1, pp. 116–35.

Andreas A. Jobst (2018) *Credit Risk Dynamics of Infrastructure Investment Considerations for Financial Regulators*. World Bank, Policy Research Working paper no 8373.

Mary O'Sullivan (2006) *Finance and Innovation*, in Jan Fagerberg and David C. Mowery (eds) *The Oxford Handbook of Innovation*. Oxford University Press.

Carlota Perez (2002), *Technological Revolutions and Financial Capital: The Dynamics of Bubbles and Golden Ages*, Cheltenham, UK and Northampton, Mass.: Edward Elgar.

Joseph Alois Schumpeter (1954). *History of Economic Analysis*. London: Allen & Unwin.

Edward Steinmueller (2013) *Innovation Studies at Maturity* in Jan Fagerberg, Ben R. Martin, and Esben S. Andersen (eds) *Innovation Studies: Evolution and Future Challenges*. Oxford University Press.

Nicholas Stern (2021) *G7 leadership for sustainable, resilient and inclusive economic recovery and growth*. An independent report requested by the UK Prime Minister for the G7.

United Nations-Department of Economic and Social Affairs (2022) *Financing for Sustainable Development Report*. Report of the Inter-agency Task Force on Financing for Development.

World Intellectual Property Report (2022) *The direction of innovation*. Geneva: WIPO.



Footnotes

1. This relationship has two dimensions: financial innovation and innovation financing. Financial innovation is the creation and diffusion of new financial products, processes, markets, and institutions; Innovation financing is the supply of credit and risk capital for the introduction of innovation in the economy.
2. For a balanced presentation of the opposing views, see Beck, et. al (2016).
3. For the role of finance in catching up dynamics, see Gorodnichenko and Schnitzer (2013).
4. Perez (2002) provides a high-level treatment of the interplay between production capital and financial capital in the long run, while O'Sullivan (2006) captures the challenge of incorporating the complexities of finance in innovation studies.
5. For a mainstream attempt to address these issues from a financial systems perspective, see Hsu, et. al (2014).
6. G-20 Eminent Persons Group on Global Financial Governance Report: Making the Global Financial System Work for all. October 2018.
7. See, UN-DESA (2022).
8. The concept of global public goods was introduced in the economic literature by international organizations such as the United Nations Development Programme and the World Bank. This concept is the successor to the classic argument for production of public goods which have two fundamental characteristics: non-rivalry in consumption (one individual's consumption does not reduce the consumption of others) and non-exclusion (it is difficult or impossible to prevent an individual who does not pay from using a good). Global public goods are distinct from national public goods because the group of beneficiaries is spread across the world.
9. See, World Intellectual Property Report (2022).
10. The efficacy of risk mitigation at project level, drives upwards the level of investment, especially in infrastructure projects. See, Jobst (2018). Furthermore, in a recent and yet unpublished G20 independent review, MDBs are encouraged to revisit their capital adequacy frameworks to enable substantial scaling up of lending capacity.
11. For examples of the contribution of financial innovations in this kind of realignments, see Badre (2018).
12. For a comprehensive review, see Stern (2021).
13. For a cautious stock taking, see Steinmueller (2013) and other more upbeat contributions in the same volume.



UNITED NATIONS
UNIVERSITY

UNU-MERIT

The United Nations University – Maastricht Economic and Social Research Institute on Innovation and Technology (UNU-MERIT) is a research and training institute of United Nations University based in Maastricht in the south of the Netherlands. The institute, which collaborates closely with Maastricht University, carries out research and training on a range of social, political and economic factors that drive economic development in a global perspective. Overall the institute functions as a unique research centre and graduate school for around 100 PhD fellows and 140 Master's students. It is also a UN think tank addressing a broad range of policy questions on science, innovation and democratic governance.

INSIDE:

Policy Brief

Finance and Innovation: From Joseph Alois Schumpeter to Rhino Bonds

Policy makers are confronted with a “perfect storm”. The deadliest pandemic in one hundred years and the conflict in Ukraine have triggered a period of radical uncertainty related to poverty reversals, geopolitical risk, and climate change at the backdrop of funding gaps for the implementation of the Sustainable Development Goals agenda in Developing Countries.

United Nations University -
Maastricht Economic and
Social Research Institute on
Innovation and Technology
Bosstraat 24
6211 AX Maastricht
The Netherlands

UNU-MERIT

UNITED NATIONS
UNIVERSITY

