Digital finance and shared prosperity: paths forward

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Introduction

Technological innovations like big data, artificial intelligence (AI) and distributed ledger technology (DLT) are gaining ground – in both the financial sector and the real economy. This is visible in digital payments, in online lending and insurance, and in applications of DLT in crypto and decentralised finance (DeFi).

The technologies can contribute to "democratising" access to finance. But they can also increase concentration and market power and trigger new types of discrimination and segmentation. To assess the net impact, one must look at all aspects of the existing technological transformation, and be guided by precisely more data and evidence. Going forward – despite the rhetoric of some – neither utopia nor dystopia is inevitable. What matters is how digital technologies are applied, and in particular what role public policy will play.

The technological advances in digital finance can help to dramatically reduce the cost of processing information and to expand the set of available contracts – including in (social) insurance. This could, in principle, help to smooth consumption and enhance welfare, alleviating poverty traps. Yet grasping this potential requires joint work by the public and private sectors, with consideration to incentivising compatible mechanism designs and to data privacy.

These remarks consider how digital technologies can be applied: first in financial services, second in the broader economy and third in social policies. In particular, we will lay out paths forward for how new technology could be harnessed to reduce inequality and lead to more widely shared prosperity.

Digital finance

Since at least 2013, commentators have been discussing a technological revolution in financial services. Financial technology, or fintech, has grown rapidly. Indeed, new digital technologies are

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being applied in payments, credit, savings, insurance and beyond – with great promise to improve efficiency and access to financial services (Philippon (2016)).

Some applications have promoted dramatic progress in financial inclusion, bringing hundreds of millions of people into the global financial system. For example, World Bank data show that in 2021, a full 76% of adults had access to a transaction account, compared with only 51% a decade before (Demirgüç-Kunt et al (2022)). Much of this relates to the growth of mobile money and other new, non-bank payment services based on mobile phones. Notably, digital payments and digital finance apps were adopted even more widely during the Covid-19 pandemic (Auer et al (2022)).

This type of innovation can have profoundly positive implications for users. For example, researchers such as Suri and Jack (2014) show that in Kenya, the use of mobile money is associated with greater resilience to financial shocks. Mobile money helps households to better smooth their consumption and escape poverty. Sinha et al (2023) show how public digital architectures in India can allow for greater competition and innovative services that benefit poor users in particular.

Still, other financial innovations could lead to new forms of exclusion and concentration of wealth (Pereira da Silva et al (2019)). For example, new types of digital lending based on big data could bring relative disadvantage to some groups – particularly those for whom data are scarcer. There is a literature on algorithmic bias, showing how machine learning techniques could lead to worse outcomes for some users (see eg O'Neil (2016)). And there are growing concerns about the market power of some digital platform providers, such as big techs. With market power comes an ability to extract rents from users and, if it is not addressed by proper regulation, to violate users' privacy.

Concerns are also visible in new applications of DLT in financial services, for instance in crypto and DeFi. Proponents of DeFi claim it will democratise finance. They say that retail investors can gain exposure to new investment products, small farmers can use smart contracts for parametric crop insurance and small businesses could in principle access credit and accept payments at lower cost (Ramachandran et al (2022)). Yet to date, crypto and DeFi have not delivered on these promises. What they have done is concentrate wealth among insiders, at the expense of ordinary investors. For instance, BIS research shows that a full three quarters of crypto investors have probably lost money on their investments in countries around the world (Cornelli et al (2023)). In recent shocks, large holders of bitcoin were often selling their coins while smaller investors continued to pour in. Meanwhile, in DeFi, which aims to run entirely through self-executing smart contracts, there are in practice many centralised entities that continue to collect rents (Aramonte et al (2021)).

It is an important policy question how applications of DLT in finance will develop going forward. But the same technologies can also be applied in other areas, including the real economy and social policies.

The digital economy

Beyond finance, technologies like big data and AI are having a profound impact on outcomes in the real economy. By lowering the cost of storing, computing and transmitting data, digital technologies can help to reduce information asymmetries, as well as search and verification costs (Goldfarb and

Tucker (2019)). This can increase allocative efficiency, and even allow for new forms of exchange, such as online e-commerce and other remote services.

These applications can create economic opportunity, including for small and medium-sized enterprises (SMEs) and for specific, low-income groups in the informal sector of the economy. As just one example, digital platforms and remote payments in Brazil have allowed singers in rural areas to sell personalised song messages to clients in cities, using smartphones. When a client wants to wish a loved one a happy birthday or mark another special occasion, they can send a detailed request through an online platform, receive an audio recording and make a remote payment. This illustrates how new technologies can create markets that did not exist previously, helping to overcome geographical distance.

AI refers to systems which are able to perform tasks that traditionally have required human intelligence. New applications like ChatGPT are garnering a lot of attention, given their impressive ability to generate text and images, and to propose outcomes and responses for users with great plausibility. In many countries, AI has already allowed for greater international trade in high-tech services, such as online advertising, translation or professional services. Yet there is evidence that investment in AI is associated with a higher income share for the top decile, and lower income shares for the middle and bottom deciles of the income distribution (Mishra et al (2023)).

To bring benefits, AI needs forward-thinking public policies. In particular, if its progress is not conducted pari passu with analysis of implications for the semi-skilled (and even skilled) segment of labour markets, there is the potential for another round of rapid labour substitution related to skills-biased technical change (Acemoglu (2002)). This had already contributed to specific pockets of unemployment and wage inequality in recent decades, as labour was displaced before the possibilities of re-training and job substitution could be put in place (Pereira da Silva et al (2022)). Going forward, AI may make it easier to automate some tasks – for instance, to replace long-haul trucking with self-driving cars, to automate the work of paralegals in law offices and to replace human cashiers with payments based on facial recognition. We would expect to see higher wages for specialised professions such as data scientists and programmers who apply AI in their work and achieve much higher productivity. Therefore it requires some form of policy coordination to foster new job creation, together with a number of issues to tackle around training and new skills acquisition. This would be needed to avoid a spiral of lower wages for less skilled labour, and now for various segments of workers with even a medium-high level of education.

Digital social policy

There are undoubtedly great benefits, but also risks and costs, associated with technological transformation in our societies. In order for changes to occur smoothly, a general equilibrium analysis of changing labour markets is needed. This can help to understand the respective pace of reductions in semi-skilled (and even skilled) labour demand vis-à-vis balancing and growth in other labour market segments. Without such analysis, and corresponding policy actions, we may inadvertently run the risk of entering a world with greater income inequality (Pereira da Silva et al (2022)). Despite existing fiscal safety nets, economies could end up with some pockets of entrenched unemployment hysteresis, even if we manage to establish an overall macroeconomic

growth path. Therefore, there is the question of how public policy responds, and in particular what role new technologies could play in the social safety net – or digital social policy.

In many countries today, the social safety net aims to protect welfare and reduce risks for vulnerable individuals and groups in society. In particular, it helps to smooth cyclical events related to the business cycle and demographic changes – through instruments such as unemployment insurance and public pensions. In addition, we also learned how to smooth large-scale, systemic shocks through fiscal and monetary policy responses. Many of these policies, built up since the late 19th century in Europe and expanded over the 20th and 21st centuries around the world, help vulnerable individuals and households to compensate for temporary sudden drops in consumption. This is important, as such drops can be very damaging. These policies also help to avoid "poverty traps", whereby the poor fall into self-reinforcing situations that cause and maintain poverty (see eg Liao et al (2022)).

Yet in many countries, the social safety net is under strain. The expansion of social benefits, despite progress in targeting or means testing, has resulted in fiscal outlays that are often very sizeable and growing. Social demands have grown naturally, and budgets have institutional rigidities. For example, once introduced, some benefits can be very difficult to alter or phase out, even when their introduction was motivated by a temporary systemic shock (eg Covid, the price effects of the war in Ukraine). And in many cases, they target those who are most in need only with some imperfection, friction or lags.

Big data, AI and DLT could each offer opportunities to better target social policy. They could create incentive-compatible mechanisms to better pool risk. Specifically, the availability of new data, and the technology to process such data, reduce a number of older impediments to improve the effectiveness of public policy interventions.

For example, in villages in Thailand, many households suffer from volatility in their income from agricultural and wage-earning activities. Due to internal migration in the past decades, they may lack access to traditional family networks and gift-giving, which otherwise help households to recover from adverse shocks and smooth consumption. Private insurance is often very expensive, due to the lack of reliable information and the high cost of collecting it (Karaivanov and Townsend (2014)).

With digital technologies that reduce the cost of data collection and processing, it may be possible for these Thai villagers to gain greater access to (social) insurance coverage. Administrative e-records of wages can be complemented with information on agricultural production (and even weather conditions) to create a verifiable overview of a household's financial condition. For business owners, there may be digital records of revenues and expenses. These can be shared in order to demonstrate a firm's financial condition.

This information, available from digital platforms and potentially a shared, distributed ledger, could allow transfers to be better targeted. The cost of verification could be dramatically reduced. This could allow for much cheaper and more efficient risk pooling than previously. Properly designed saving and borrowing regimes can help to align incentives and reduce moral hazard.

Looking ahead, Karaivanov et al (2023) show several potential benefits from digital technologies in social policies. First, the gains from these new social safety nets with digital technologies remain very large when compared with existing social policies and/or reliance on individual savings, in the absence of cooperation. These gains would be largest for SMEs and households which have limited family networks and/or access to financial services. Second, better insurance against income shocks would limit the occurrences of poverty traps for these economic agents. As a side benefit, it would imply a more stable business cycle and lower inequality in income and opportunity. Finally, such safety nets can be set up in financial apps that are coded to overcome the typical asymmetric information hurdles that have, so far, undermined the spread of these welfare improving safety nets.

Of course, there is a risk that the reliance on big data and incentives could become very intrusive. It may be that villagers do not want all the information about their wage earnings and farm yields to be too widely available. They may fear Orwellian state surveillance and constraints on individual decision-making. Yet here, too, technological and institutional design can help to mitigate these risks (Uhlig et al (2023)). For example, advances in encryption can help individuals to have control over private data and only share aggregates with others, or only selected data for specific, pre-defined purposes. Data-sharing can be time-bound, such that access is revoked when it is no longer needed. It may even be possible to perform computations on private data sets without seeing the individual, underlying data.

These technological solutions must go hand in hand with adequate institutional design, in both the public and private sectors. This is crucial when deciding how to collect and process data. Well designed frameworks are needed to credibly design safeguards and privacy measures in line with end users' interests and preferences.

Overall, if designed properly, digitally enabled social policies can complement private financial services that help to pool risk and promote greater welfare for the population. They may achieve better consumption smoothing and risk pooling at lower overall cost. This, in turn, could enhance the social safety net and its applicability for the digital economy.

The economic mechanisms behind digital social policy

Let us look a little more deeply into the economic mechanisms behind digital social policy. From a broader policy perspective, digital finance and technology can complement existing social policy design. What is in place currently is, to simplify, a more centralised, top-down allocation of fiscal resources, which are always subject to cyclical fluctuations and political economy disputes. Even with improved targeting, the existing social safety net approaches are less capable of addressing idiosyncratic events in a decentralised, bottom-up, cooperative fashion. Despite automatic stabilisers, existing policies also have implementation lags. These lags are due to the need to identify macro triggers for their deployment (eg large crises). Finally, they run into perennial discussions about moral hazard and potential confrontation over entitlements since their financing comes from the overall pool of fiscal revenues from taxation.

Of course, it is important also to improve broader social safety nets. We are not suggesting any substitution or a reduction of existing coverage and funding. But alongside improvements to current policies, which can enhance the quality of public spending, one promising research programme

would be on how to make the two approaches complementary – so that risk-sharing becomes part of policy design with the benefit of new technologies. This could help to increase the resilience of SMEs and low-income households to income shocks in a timely, cooperative, decentralised way.

Notably, this approach would help tackle the idiosyncratic income risk that is currently prevalent for many households, SMES and even some larger corporates. Various institutions have emerged to limit its extent, from financial markets that allow saving and borrowing to social insurance and well-established social policies for unemployment, health risks and old age, all of which provide effective means to smooth households' income. However, despite these mechanisms, many economies have seen a steady increase in inequality of income and opportunities, including geographical inequality (eg access to public goods across the same jurisdiction).

Moreover, this increase reflects in part that individuals and households with lower skills and income are subject to the combination of larger idiosyncratic and macroeconomic income risks. In advanced economies (AEs), not only is the average unemployment rate of low-skilled workers higher, but it also increases by more in recessions. In emerging market and developing economies (EMDEs), where social safety nets are less developed, the income of the self-employed and workers in informal markets is subject to severe cyclical shocks.

With bad luck, these individuals may slide into poverty traps that spill over to the next generation, thus lowering potential growth and deepening economic downturns. Income volatility can be triggered by events or accidents (sudden unemployment, family breakup, poor health etc). Some are related to the business cycle, but others are idiosyncratic shocks hitting workers and households. Income volatility increases precarity in social conditions and the risk of falling back into poverty despite existing public social safety nets. Higher occurrence of economic insecurity is empirically more prevalent among the poor income groups in society. That also increases the link between economic insecurity and the rise in economic inequality.

At the economy-wide level, crises and large capital outflows can compound macroeconomic income risks by reducing financial resources for institutional social safety nets. As various crises illustrate, fiscal adjustments made under urgency are usually done across the board. Meanwhile, as the euro area sovereign debt crisis has shown, AEs may be subject to similar (albeit less severe) risks to the financing of their older and more complete social safety nets. In a nutshell, existing safety nets are either subject to cyclical volatility, underdeveloped, less effective or all of the above.

Why is this so? One hypothesis is that broad-based social policies, as mentioned above were designed without the availability of detailed information about individuals and households. Therefore, these policies had to be broad-based and of a macroeconomic nature. Even after the emergence of more granular data such as household surveys, policies tended to rely on existing frameworks. Therefore, the institutions and interventions that were developed subsequently continued these trends. Perhaps another reason is related to the cost of reliable information about the situation of individuals and households. It was often difficult to verify an individual's financial situation and whether their claim for protection was indeed justified and true. The fact that gift-based assistance favours specific family links tends to confirm this possibility, where trust plays a role.

However, recent technological developments allow more sophisticated interventions that process more granular data on individual characteristics at very low cost. Indeed, the collapse of the cost of processing information, thanks to big data, breakthroughs in cryptography, DLT and "smart" digital contracts could allow incentive-compatible contracts rooted in mechanism design. Applying these elements in social policy could allow for new possibilities, and thus lead to benefits in addressing both idiosyncratic and economy-wide risks.

Conclusion

Digital technologies present both opportunities and risks to achieving widely shared prosperity. Applications from digital finance, the broader digital economy and digital social policy show how policymakers can harness technologies to achieve more equitable outcomes. Achieving this will not be easy. It will require joint work between the public and private sectors. In particular, sound institutions and democratic oversight will be needed to promote user privacy and to create mechanisms that align incentives with the social optimum. Yet with the right policies, the potential dividends to society are large.

References

Acemoglu, D (2002): "Technical change, inequality, and the labor market", *Journal of Economic Literature*, vol 40, no 1, pp 7–72.

Aramonte, S, W Q Huang and A Schrimpf (2021): "DeFi risks and the decentralisation illusion", *BIS Quarterly Review*, December, pp 21–36.

Auer, R, G Cornelli and J Frost (2022):"The pandemic, cash and retail payment behaviour: insights from the future of payments database", *BIS Working Papers*, no 1055, December.

Cornelli, G, S Doerr, J Frost and L Gambacorta (2023): "Crypto shocks and retail losses", *BIS Bulletin*, no 69, February.

Demirgüç-Kunt, A, L Klapper, D Singer and S Ansar (2022): *The Global Findex Database 2021: financial inclusion, digital payments, and resilience in the age of COVID-19*, World Bank.

Goldfarb, A and C Tucker (2019): "Digital economics", *Journal of Economic Literature*, vol 57, no 1, pp 3–43.

Karaivanov, A and R Townsend (2014): "Dynamic financial constraints: distinguishing mechanism design from exogenously incomplete regimes", *Econometrica*, vol 82, pp 887–959.

Karaivanov, A, L A Pereira da Silva, B Mojon and R Townsend (2023): "Digital safety nets: a roadmap", mimeo, forthcoming.

Liao, P, X Zhang and W L Zhang (2022): "Endogenous health risks, poverty traps, and the roles of health insurance in poverty alleviation", *Health Economics Review*, vol 12, no 25.

Mishra, S, G Cornelli and J Frost (2023): "Artificial intelligence, services globalisation and income inequality", mimeo.

O'Neil, C (2016): *Weapons of math destruction: how big data increases inequality and threatens democracy*, Crown Books.

Pereira da Silva, L, J Frost and L Gambacorta (2019): "Welfare implications of digital financial innovation", based on remarks at the Santander International Banking Conference, 5 November.

Pereira da Silva, L, E Kharroubi, E Kohlscheen, M Lombardi and B Mojon (2022): *Inequality hysteresis*, Bank for International Settlements.

Philippon, T (2016): "The FinTech opportunity", *NBER Working Paper*, no 22476, August.

Ramachandran, A, C Harvey and J Santoro (2022): *DeFi and the future of finance*, Wiley.

Sinha, S, G Cornelli, J Frost, L Gambacorta and R Townsend (2023): "Industrial organisation of digital payments in India", mimeo.

Suri, T and W Jack (2014): "Risk sharing and transaction costs: evidence from Kenya's mobile money revolution", *American Economic Review*, vol 104, no 1, pp 183–223.

Uhlig, H, M Alonso and J Frost (2023): "Digital payments and privacy – escaping the panopticon", *Georgetown Journal of International Affairs*, forthcoming.