Chapter

Digital and Digitalized Economy in EMs: A Focus on Turkey

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Abstract

Covid-19 still pressures global economies. Pandemic has seriously damaged both macro and micro indicators of countries. Economies try to accelerate their efforts towards a digital new normal in order to preserve their activities. Decreasing trust in monetary authorities and tools as a side effect of global financial crisis, decreasing demand for cash as a precaution towards virus, increasing demand for fast payment, increasing search for yield, search for a trustless, cost saving, peer to peer financial system accelerates the progress of creative destructors. The way to leapfrog developed countries requires benefiting more from digitalization. Governments, central banks, financial institutions and corporations that are aware of this swift transformation are in an effort to adapt the system to take the lead. This study aims to explore leading game changers, potential use cases and their potential impacts on EMs with a special focus on Turkey.

Keywords: cryptocurrencies, blockchain, distributed ledger technologies, ICTs, digital economy, digitalization, Covid-19, EMs, Turkey

1. Introduction

World economies are struggling with an ambiguous challenge, Covid-19, till the first quarter of 2020. Governments have locked down a majority of their economic activities in order to control and prevent the spread of virus in their economies. Countries have closed their borders and minimized their trade activities as precautions. They have simultaneously implemented several quarantine measures to their citizens.

In a few months, pandemic has brought the global economy to a catastrophic halt by introducing a wall between supply and demand. Still, world economies try to fight this invisible enemy while trying to adapt new conditions under several limitations which is referred to as "new normal".

Uncertainty, which is the basic outcome of the pandemic is still a crucial problem. According to World Uncertainty Index [1], global uncertainty has increased significantly since 2012 for all 143 countries covered by the Index. Though it has unwinded by the second quarter of 2020, after a sky-high reached by the first quarter, it seems to stay as a serious threat for global economies for the coming quarters unless a widely used effective treatment and/or a vaccine is found.

Almost every sector has affected from Covid-19 negatively. In order to support economies on the fiscal side, governments have implemented several measures such as subsidizing corporations, forbidding layoffs, deferring debt and tax payments for a specific period. Simultaneously central banks employed

conventional and nonconventional policies to prevent spillover effect of the crisis from real sector to the financial sector. For this reason, United States Fed has continued monetary easing and reached a balance sheet of almost 7 trillion dollars as of August 2020, from a level of almost 4. 3 trillion dollars of March 2020. Likewise, European Central Bank has announced a €1,350 billion pandemic emergency purchase programme (PEPP) to lower borrowing cost and increase lending in the euro zone [2].

Physical distancing and testing, tracing and isolating are the main instruments to fight the spread of the virus. However, these instruments create additional costs to economies. While waiting for good news, OECD published an economic outlook covering a potential single-hit and a double-hit scenario for the coming period. According to both scenarios, global economic activity seems not to turn back to pre-Covid-19 level in the short-run. Moreover, by the end of 2021, loss of income is expected to exceed that of any previous recessions over the last 100 years excluding wartimes. Restrictions in terms of mobilization, production, trade and investment have started to re-rotate the globalized world economies towards nationalization and reshape the way of doing business.

EMs deserve a closer look since they have several acute problems that have recurred during this period. Declining commodity prices, capital outflows, weaker consumer demand, decreasing investment, import and export, decreasing resources to fight Covid-19, decreasing consumer and business confidence, increasing government and corporate debt ratios and eventually, as a reflection of all these factors negative or low growth rates are the major challenges that EMs should confront.

During lockdowns some corporations benefit from teleworking which has made employment considerably sustainable especially for some sectors. For some others, lockdowns have deteriorated inequality among workers especially in EMs. Governments have tried to find solutions to the problem in the short-run with limited resources which seems impossible to sustain in the medium and long run. Monetary and fiscal policies are coordinated carefully as they would harm macro indicators more which are already fragile for some time.

Economic agents use alternative ways to fulfill their responsibilities such as teleworking, distance education, online meetings, increased e-commerce and telehealth. Since hygiene has turned out to be a very critical factor, countries like China has started to quarantine paper money as a way to fight the virus. Additionally, people have opted to use less money but more online banking to carry out their financial transactions. Some of the central banks like Central Bank of China have accelerated their preparations to shift digital money as this is a good time for rerailing. Observing the decreasing demand for cash, European Central Bank put digital money on its agenda and try to make a decision whether it is time to introduce digital Euro as a complement to cash in order to keep up with the digital transformation [3].

During the past two quarters with Covid-19, corporations have discovered that works can be done without being in an office. Moreover, they have seen that there is a crucial saving dimension of teleworking in terms of decreasing general expenditures and several cost items. Corporate meetings are started to be held online. Periodical meetings in terms of planning, budget, marketing, monitoring etc. have started to be held as digital meetings. Financial institutions have confronted with the necessity of further digitalization in lending activities. Manufacturing and trade finance corporations have found that supply-chain could be vulnerable as it depends overwhelmingly on human force. So, they have realized the importance of moving activities to digital which can make them more independent but which also requires

considerable amount of investment to technology. Governments have found that there are several areas that could be moved to digital for non-stop functioning of economies under crisis environments.

In brief, we can state that in today's fast-moving world there is no reversal to pre-Covid-19 environment so the only way is to adapt "digital new normal". The more countries shift their activities to digital the more they will perform without interruption. It should be expected that there are pros and cons of this change. In this study, we will try to shed light to game changers such as cryptocurrency, blockchain and distributed ledger technology. We try to explore impacts of this game-changers on the economic development of EMs with a special focus on Turkey. Study proceeds as follows: Section 2 presents digital economy. Section 3 introduces blockchain implementations in business. Section 4 analyzes literature on digitalization and growth nexus. Section 5 focuses on Turkey. Concluding remarks are presented in Section 6.

2. Digital economy

Digital economy refers to a broad range of economic activities that use digitized information as key factors of production. Interconnectedness between individuals, businesses, data, processes and machines that arise from internet, mobile technology and internet of things (IoT) compose the backbone of digital economy [4]. Bukht and Heeks [5] highlight several definitions of digital economy as a reflection of the times and practices that this concept has emerged. They define digital economy as the part of economic output derived only from digital technologies with a business model based on digital goods and services. Due to the measurement problem of digital economy they suggest to use digitalized economy on a widest scale, which comprise use of Information and Telecommunication Technologies (ICTs) in all economic fields. In the study, when it's difficult to separate these two concepts we opt to use digitalized economy to see the big picture.

Digitalized economy has started to change traditional approaches and processes in terms of business structures, firm interactions, consumer behaviors, information and goods and services especially since the onset of industry 4.0. which refers to technological transformation from embedded systems to cyber physical systems. Bitcoin is one of the financial instruments of the digital economy. It is a private, decentralized digital currency. It has first developed in 2008 and has become operational by 2009 [6]. Bitcoin is not backed by a government decree. There is no authority that is in charge of its supply. Bitcoin has a network that consists of computers covering the entire system. As a section of data in a massive database, it is just like a computer file that is assigned to a certain owner's digital address. It operates using peer-to-peer networking that eliminates the intermediary so that the exchange can be realized directly between parties. Users have digital wallets so they can trade between themselves. System employs cryptography to maintain the anonymity of its users to secure the transactions and to control the creation of additional units of currency, namely the "cryptocurrency" [7]. Game theory is another factor that ensures the security of the process by mathematically modeling behaviors of strategic decision maker units.

There are thousands of cryptocurrencies with different marketcaps. Yet, majority of cryptocurrencies are almost clones of bitcoin and referred to as 'altcoins'. On the other side, there are a number of cryptocurrencies that share common features of bitcoin but also have innovative features that provide substantial differences [8] such as stablecoins.

In one sense, blockchain is the underlying technology of bitcoin. We can call it as a public ledger that keeps the history of each transaction. Blockchain is sustained by participating computers which verify transactions in chunks called "blocks" and relay them across the network [9]. Validation process relies on data being encrypted using algorithmic hashing. Encrypted value is a series of numbers and letters that does not share similarity with the original data, and is called "hash". Cryptocurrency mining involves working with this hash. Proof-of-work is a distributed consensus algorithm that Bitcoin's blockchain network participants use to agree on the contents of a blockchain to create and hash blocks together. When the computer in a network employs proof-of-work for mining, it needs to solve a challenging mathematical problem. If the computer which is also named as node, successfully solves the problem, it must then be verified by other nodes in the network. Following this step, the transaction is deemed to be verified and completed, and the miner that solved the problem is rewarded by bitcoins. Mining requires a considerable computational power so to ease this difficulty, another consensus algorithm named proof-of-stake is employed by validators for minting but not for mining to determine valid transactions. In proof of stake, cryptocurrency amount in wallets are crucial to create blocks. The amount of cryptocurrency in wallets determines power of validators and the shares of validators within the system. So, cryptocurrencies are held not to make transactions but to get the right to create blocks in the system.

Proof of work and proof of stake are the leading consensus algorithms that are used. Yet, there are almost 80 other consensus mechanisms with different features such as proof of space, proof of burn and proof of activity. Most important functions of consensus algorithms are their prevention of double blockchain creation and double expenditure.

Blockchain, being the first and most popular example of distributed ledger technology is also a subsection of distributed database. Major difference between blockchain and distributed ledger technology is the way they form data.

Blockchain has some characteristics such as decentralization, persistency, anonymity and auditability. Being decentralized, blockchain does not require a third party. As a persistent system it is almost impossible to delete a transaction from the system when it is added to the chain. Besides, system quickly detects invalid transactions. Though there is no 100% anonymity, users interact via their generated addresses. If it is required, system may enable tracking transactions, as each transaction is dependent to one another [10].

There are different blockchain systems that can be listed as; public blockchain, private blockchain and consortium blockchain. In public blockchain, all records are open to public and anyone could join the consensus process. Consortium blockchain enables participation of just a group of nodes in the consensus process. Finally, private blockchain allows only nodes of a specific organization to participate the consensus mechanism [11].

Public blockchain attract interest of communities and users since it is open to everyone's participation. Though, consortium blockchain is generally used for businesses [10].

3. Blockchain implementations in business

Like agricultural revolution, industrial revolution was also backed by technology which enabled economic agents to produce more efficiently and made manufacturers more productive.

Transformation of industrial production can be divided into periods. The first period, where machines were operated by power of steam and water instead of human labor was defined as Industry 1.0. The second period where electricity, motors and invention of assembly line enabled producers to produce more efficiently was defined as Industry 2.0. Industry 3.0. was backed by computers, electronics so by automated production systems which raised significant cost saving and Industry 4.0. of today, denotes an integrated system of automation, internet of things and digital services that enables efficiency and flexibility in working processes. Developed as a multi-functional technology in 2008, blockchain has a big creative destruction potential that seems to reconfigure almost all aspects of society and way of doing things. Evolution of this technology can also be examined in periods. Namely, blockchain 1.0 presents currency and digital payment systems of cryptocurrencies. Blockchain 2.0 presents contracts for extensive transactions such as bonds, derivative products, smart property and smart contracts. Finally, Blockchain 3.0 introduces blockchain implementations especially in the areas of government, health, science, agriculture and culture [12].

A survey made by Cambridge University in 2017 covering data from over 200 companies, central banks and public sector organizations reveals the fact that much of the blockchain use cases are related to banking and finance which is followed by government, insurance and healthcare [13]. This result is quite understandable since jurisdictions and financial institutions are well aware the place of this creative destructors in global competition. In the current environment, blockchain technology offers solutions in a wide range of fields such as digital currency and tokens, digital identity verification, Know Your Customer (KYC), payment and cross-border payment, stock exchange transactions, trade finance, tax collection and management, microfinance, syndicated loans, crowdfunding, accounting, audit, reporting, hedge funds, voting, supply chain and all other fields that require trust between parties [14]. In a survey covered over 800 executives, World Economic Forum recorded that 58% of respondents expect 10% of GDP to be stored on the blockchain by 2025; and 73% of those surveyed expect tax to be first collected by a government via blockchain in 2023 [15]. Development of blockchain suggests a growth path that is far from linear and it signals the possibility to reach the stage of mainstream adoption by 2025 [16].

During the global financial crisis, a considerable number of economic agents have lost their trust in global financial system, its actors and its tools. On the other side, expectations for a fast, transparent, pseudonymous and cost-effective peer-peer payment system which would be processed 24/7 have raised significantly. Investors, in search for yield, have looked for alternative investment vehicles. Moreover, under Covid-19, economic agents have started to decrease their demand for cash because of the concern that cash may transmit the virus. These concerns and expectations have accelerated the intent to move towards digital payments [17].

Based on the ideas of Tobin [18], the concept of central bank digital currency has developed and discussed by a group of central banks. The idea of general purpose or retail central bank digital money is presented as a central bank liability, for the use of individuals and for non-financial corporations in less developed economies. On the contrary, wholesale central bank digital money concept is developed for the settlement between financial institutions of more advanced economies. Nevertheless, central bank digital currency project is still in the experimentation phase and no jurisdiction is announced to issue a central bank digital currency at the moment. Although there are several ongoing projects like E-dollar of Canada, E-euro of ECB, E-ringgit of Malaysia, E-rouble of Russia and E-rupiah of Indonesia we should note that China is at the most advanced stage of its project, Digital

Currency Electronic Payments (DC/EP). Several countries declared their intent to use central bank digital currency as a complement to cash if they would realize the project [19]. Implementation of the process is expected to differ across countries according to their economic readiness, expectations and technical platforms. Apart from central bank digital currency project, central banks closely follow the developments on cryptocurrencies and underlying technologies in order to fasten and improve their transaction processes to preserve their roles in the digital new normal. Capital markets and wholesale banks globally cooperate with financial technology companies in experimenting distributed ledger technologies to eliminate expensive processes so to increase efficiency and transparency and to reduce costs. They also focus to the potential of smart contracts to increase automation in several areas. Cong and He [20], designed a trade finance transaction diagram covering all sides of the transaction. They suggest that smart contracts can shrink informational asymmetry and may add welfare and customer surplus through increased entry and competition.

Syndicated loan facility is another field that may benefit from blockchain technology. As an international financing method with a transaction volume of almost 5 trillion dollars globally [21], a large group of lenders work together to provide funds to a borrower. Participants act according to terms and conditions of the loan agreement. At maturity, parties of the agreement may agree to roll over the loan. So, blockchain may add value to the process by increasing transparency, speed, and by decreasing bureaucracy and cost. Smart contracts can be included to the system since participants act according to loan contracts with specific terms and conditions.

Microfinance institutions may replace conventional banking institutions in underdeveloped regions when customers deem ineligible for banking services. In Nigeria, an open-source platform, Stellar and a microfinancing software provider, Oradian built a platform for providing financial products and services to the users. With a user profile of over 90% female customers, the project reveals the potential of blockchain technology in the development of rural systems and economic empowerment of women in developing countries [22]. According to World Bank estimates, almost one billion people over the world do not have any legally recognized identification. Besides, almost 3.5 billion people have some kind of legally recognized identification but have limited ability to use it. While the remaining 3.2 billion have a legally recognized identity and participate in the digital economy they may have problems in online. Technology may increase financial inclusion of those who do not have a legally recognized identification and increase these groups' access to financial services, government benefits, and labor markets which will lead to a saving of time and money. From institutions and government's perspective, an increasing digital footprint of users means saved cost and time, increased GDP, increased labor productivity, expanded tax base, decreased fraud and further steps to a formal and deeper financial system [23].

Increasing digitalization in finance is expected to create some positive effects for emerging countries. According to the estimates, almost 1.5 billion people is expected to access financial services. Governments are expected to save almost 100 billion dollars from the decreasing leakage and increasing tax revenue. Financial institutions are expected to save almost 400 billion dollars annually from direct costs. Emerging economies are expected to reach an annual increase in their GDP by almost 4 trillion dollars by 2025. Almost two thirds of the increase is expected from productivity of businesses and government due to digital payments. One third would arise from financial inclusion of individuals and SMEs and the rest would stem from saved time that would enable increasing hours of work. Increased GDP is expected to create 95 million jobs across all sectors [24].

Jurisdictions and leading technology companies enhance their investments on this technology as they have already discovered the potential and have anticipated to share in its future. Although global patent filings remained limited during the first years of blockchain, they have considerably increased as of 2016. By the third quarter of 2019, number of patents filed globally has reached almost 6.000. Leading countries in the patent race are China with 3.200 patent applications and USA with 1.300 applications. These countries are followed by United Kingdom, Germany, Japan and Canada [25].

4. Literature on digitalization and growth nexus

Since developing and emerging countries lag behind the developed ones, the way for developing and emerging counties to leapfrog the developed nations is reaching advanced technology. Yet in our case, it is quite difficult to analyze the specific effects of blockchain and digital economy on growth indicators. As highlighted by Bukht and Heeks [5], measuring proceeds of digital economy and separating it from ICT is quite impossible across countries and between different periods. So, we opt to focus ICT and growth nexus and use the concept of digitalization instead of ICT.

Burlamaqui and Kattel [26], defines technology leapfrogging as the adaption of advanced technology in a specific area. This concept overwhelmingly addresses the developing and emerging countries and it has been suggested that developing countries do not have any alternative in technology adoption, except to leapfrog to new and advanced technologies [27–29]. Literature on the relationship between ICT diffusion and economic growth is recent and it goes back to 1980s. Though theories predict a positive effect of digitalization on growth across countries, empirical studies produced mixed results.

Dewan and Kraemer [30] suggest a positive relation between digitalization and growth according to the data of 14 developing and 22 developed countries collected for years 1985–1993. However, results differ between developed and developing countries with respect to structure of returns from technological capital investments. While there is positive effect of capital stock on GDP growth in developed countries it is insignificant for the developing ones. Pohjola [31], performs his study based on an expectation that benefits from digitalization accrue as an improvement in productivity and economic growth. Based on a data of 42 countries for the period of 1985–1999, he finds that results differ between USA and the rest. While use of technology significantly impact the performance of the USA economy, evidence for other countries is reported as weak. Another interesting finding is that relationship is not statistically significant for the subsamples of industrial or high-income countries. Papaioannou and Dimelis [32] in their study comprising 42 developed and developing countries for 1993–2001 analyze the impact of digitalization on labor productivity growth. Findings of the study present high impact for developed countries than developing ones. Commander, Harrison and Filho [33] work with around 1000 manufacturing firms from Brazil and India with data of 2005 and they report a significant relation of technology and productivity in both countries. In India specific analysis, results suggest that poor infrastructure quality and labor market policy are associated with low return on investment and low levels of technology adoption. Dedrick, Kraemer, and Shih [34] work with a data set consists of 45 upper-income developing and developed countries for the period 1994–2007. They find that upper-income developing countries have significantly positive gains from technology in the recent period as they increase their investment more and as they gain more experience in the use of information technologies. They suggest

that productivity effects of digitalization are bound to country specific factors which comprise human capital, foreign direct investment and quality and cost of technological infrastructure. Sassi and Goaied [35], analyze both the impact of financial development and digitalization on economic growth in Middle East and North Africa (MENA) countries for years, 1960–2009. The interaction between digital penetration and financial development is found positive and significant in the empirical study. This implies that economies in MENA region can benefit from financial development only when a specific level of digitalization is reached. Cirera, Lage, and Sabetti [36] examine the firm-level data for a sample of six Sub-Saharan African countries. Although there is a huge gap in terms of digitalization between these group of countries and developed ones, results of the study point a considerable heterogeneity among samples. Findings reveal that digitalization has an important impact on production and innovation for all these countries but final impact depends on the degree of the novelty that is introduced in firm base. Luo and Bu [37] study how digitalization improves the productivity of emerging economies by analyzing 6236 firms from 27 emerging economies. They argue that technology enhances productivity since it leads to effective knowledge sharing and integration. They further argue that emerging economies' level of economic development, institutionalization and qualified infrastructure would affect the level digitalization that contributes to knowledge management and thus to firm performance. Authors suggest that technology would enhance productivity in an emerging economy when the said economy is less economically developed. Niebel [38], in a recent research based on a sample of 59 countries for the period of 1995–2010 indicates that developing and emerging countries are not gained more from investments in digitalization than developed ones.

Some studies [39–42] provide that digitalization could impose negative impacts on employment and labor market in developing countries. This literature argues that the rapid digitalization eliminates unskilled workers and exclude poor since they are not qualified, so it will increase poverty and income inequalities. Besides, they argue that digitalization provides more advantages to developed countries to compete with developing countries in their local markets.

There are few empirical studies on digitalization and growth nexus for Turkey. Yaprakli and Saglam [43] examine this relationship for the period of 1980–2008. According to results, economic growth is positively affected by digitalization in the short and long run. However, contribution to economic growth from this channel is less than that of other product factors in Turkey. Kılıçaslan et al. [44] examine the impact of digitalization on labor productivity growth in Turkish manufacturing industry for the period of 2003–2012. They report that the impact of digitalization on productivity is larger by about 25 to 50% than that of conventional capital. In a recent study, Sarıdogan and Kaya [45], find a positive relation between digitalization and economic performance for years 1998–2017 for 28 EU members and Turkey.

Empirical studies across countries reveal heterogeneous results. From our standpoint, this could be the result of differing countries, samples, time periods and measurement techniques.

5. A focus on Turkey

Turkey is a dynamic emerging country with an average growth rate of around 4–5%. Though banking sector has an overwhelming share in the financial system, capital markets are progressing to reach a well-deserved place. Search for yield in a negative real interest environment, especially under Covid-19, leads local investors to alternative investment tools. Results from an international survey conducted with

1000 respondents in 2019 reveal the enthusiasm of Turkey towards cryptocurrencies and its underlying technologies. Index of positive attitudes towards cryptocurrencies is reported as 62% for Turkey while it is 20% for Germany, 24% for France and 24% for United Kingdom. 46% of Turkish respondents states their preference for a cashless society when the ratio is 22% in total Europe. 55% of Turkish respondents denote their personal efforts to learn the mechanism of cryptocurrency while it is 26% in Germany, 20% in France and 22% in United Kingdom [46]. Turkish authorities have a positive attitude towards cryptocurrency and blockchain technology, as well. For the time being there is no specific regulation about the use of cryptocurrencies. In order to make clear the difference, it is stated that cryptocurrency cannot be deem as an electronic money under The Law on Payment and Securities Settlement Systems, Payment Services and Electronic Money Institutions numbered 6493 [47].

Yet, in the Eleventh Development Plan, Turkish authorities declared their intent to introduce a blockchain based central bank digital currency within four years. Blockchain technology is planned to be used especially on transportation and custom services. Improving technological infrastructure and processes to benefit more from digitalization for the improvement of government services is aimed in the medium-run [48]. To synchronize the flow of information among Borsa Istanbul, Istanbul Settlement and Custody Bank and Central Securities Depository of the Turkish capital markets, Borsa Istanbul has developed Turkey's first financial blockchain based project in 2018. The project that was designed under Know Your Customer concept enables addition of new customers, editing of information and management of documentation in the blockchain network [49]. Istanbul Settlement and Custody Bank developed a blockchain based "BiGA Digital Gold" Project, in 2019. It was established as the first known blockchain network with the contribution of participating banks in Turkey. In this project, gold that is physically stored in Borsa Istanbul is converted to BiGA and transferred to the BiGA Platform by issuing method. With this method, the transformation and reconciliation between the digital asset and the physical asset is possible. Gold balances can be transferred between participating banks 24/7 through the platform provided by Istanbul Settlement and Custody Bank via their own systems [50]. As another example of milestone to the increasing efforts on blockchain, Isbank, a major Turkish bank, joined a global blockchain platform, R3's Corda, and completed an international trade finance transaction with Commerzbank based on distributed ledger technology. Trade transaction data was distributed only to the parties along the workflow of trade, making the settlement process much quicker and more efficient. It is also possible to integrate third parties into the data flow where required by banks and trade partners. All parties involved were able to communicate and view trading data simultaneously [51].

Akbank, another leading Turkish bank entered a business partnership with Ripple in 2017 to benefit from the transparency and low-cost provided by Ripple in international money transfers [52]. Aktif Bank, a large investment bank in Turkey has incorporated Attivo Bilisim to invest in the crypto-asset service industry. As the second bank-backed exchange around the world and structured by Attivo, Bitmatrix Crypto-Assets Trading Platform provides the crypto-assets custody service as of 2019 [53].

6. Conclusion

In this study we try to shed light to the transformation of economies and the role of creative destructors in this change. Covid-19 has served as a catalyst and accelerated the transition towards digital new normal. Central banks' digital currency

project, cryptocurrencies and distributed ledger technologies take the lead in this period. We have focused on the use cases of blockchain in business. Emerging countries try to benefit from digitalization to leapfrog the developed countries and to take their positions in the digital race. Yet, there are still issues to be solved such as defining new technologies, structuring regulations, tax collection, cyber security, fraud and energy consumption in digitalization. Besides, cooperation among countries would help developing common directives, regulations and implementations which could boost benefits from digitalization.

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