The Rise of Central Bank Digital Currencies: Exploring Adoption Determinants and Early Macroeconomic and Well-being Impacts

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Abstract

Using a panel of countries between 2021 and 2023, this paper investigates the rise of Central Bank Digital Currencies (CBDCs) and explores their determinants. First, I document three new patterns: the proportion of countries piloting CBDCs increased from under 10% in 2022 to 25% by early 2024, while those fully launching CBDCs dropped to 2.5%, (b) Wealthier countries are more likely to engage with CBDCs, as evidenced by a 5 percentage point (pp) higher GDP per capita among those piloting or launching these digital currencies, and (c) The likelihood of a country adopting a CBDC has progressively risen with an increase from a 6.7 pp rise in 2021 to 16 pp by 2023. Second, I find no relationship between CBDC adoption and either GDP per capita growth or inflation. These results are robust to exploiting within-country variation and using a synthetic control method based on pre-CBDC characteristics. However, using Gallup's World Poll, I find somewhat negative effects on whether individuals are thriving and their financial well-being. Cumulatively, these results suggest that the economic benefits of CBDCs may be limited and there could be additional unintended consequences on individual well-being. Further work is needed to continue tracking the rollout of CBDC pilots and those that have launched as additional data becomes available.

Keywords: Blockchain, Central Bank Digital Currencies, Economic Growth.

JEL Codes: E42, E52, G28, O33.

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1 Introduction

The rapid development of Central Bank Digital Currencies (CBDCs) has garnered significant attention from policymakers, economists, and financial institutions worldwide. As digital currencies issued by central banks, CBDCs reflect a substantial shift in the financial landscape, promising to improve payment systems and monetary policy (BIS, 2020), but also creating meaningful new risks, such as the monopolization of the commercial banking sector (Fernandez-Villaverde et al., 2021) and erosion of individual privacy. This paper investigates the rise of CBDCs and explores their determinants, focusing on the period between 2021 and 2023.

The motivations for adopting CBDCs vary across countries. Theoretically, lower-income and less stable countries may be more likely to pilot and/or use CBDCs, driven by the need to increase financial inclusion and improve payment efficiency (Boar et al., 2020; Kosse and Mattei, 2023). For instance, the People's Bank of China has been at the forefront of CBDC development, launching the eCNY project to enhance financial inclusion and payment efficiency (Bian et al., 2023a). Similarly, countries like Nigeria and the Bahamas have officially launched CBDCs, albeit with mixed results (Atlantic Council, 2023). Despite the potential benefits, the adoption of CBDCs is not without risks. Financial stability concerns, such as the risk of bank disintermediation and the balancing of privacy with financial crime prevention, are paramount (Infante et al., 2023a; Soderberg et al., 2022). The design choices of CBDCs, such as the hybrid model versus the direct model, therefore, play a crucial role in mitigating these risks (BIS, 2020, 2021).

The discussion of CBDCs is directly relevant for science and technology (S&T) policy due to their technological underpinnings and the significant changes they portend for national and global financial systems. The implementation of CBDCs, as a digital innovation, necessitates robust technological design, cybersecurity, data privacy, and seamless integration with existing financial infrastructures, necessitating careful policy consideration that is typical within the S&T domain. However, given the growing complexity of global information systems and economic interdependencies, there is a theoretical expectation that a decentralized approach to managing CBDCs may be more advantageous and sustainable than a centralized one. Decentralized systems are typically more resilient against single points of failure and can offer enhanced privacy protections, features that are crucial given the centralization risks identified with CBDCs such as potential banking sector monopolization. Additionally, decentralization can provide the flexibility required to cater to diverse economic conditions within a country (Dessein and Santos, 2006; Alonso et al., 2008). By distributing the governance and oversight of CBDCs across multiple decision-making bodies, central banks can leverage local insights for more effective monetary policy application, thus reducing systemic risks and ensuring a balanced approach to national economic management.

Regulatory frameworks are also critical in shaping the adoption and impact of CBDCs. In the United States, the Federal Reserve is still in the exploratory stage, with projects like Project Hamilton and Project Cedar examining the potential uses and implications of CBDCs (Schwarcz, 2022; House, 2022). In contrast, the European Union has progressed to the preparation phase of the digital euro project, focusing on design and distribution aspects (European Commission, 2023a; Bank, 2023). In Asia, the CBDC landscape is diverse, with countries like China, India, and Indonesia actively exploring both retail and wholesale uses of CBDCs (Jahan et al., 2022; of Indonesia, 2022). These initiatives highlight the region's commitment to leveraging digital currencies to promote financial inclusion and economic development.

The primary purpose of this paper is to study the rise of CBDCs and assess their potential effects on economic activity and well-being. The first part of the paper documents three new facts: (a) The proportion of countries piloting CBDCs increased from under 10% in 2022 to 25% by early 2024, while those fully launching CBDCs dropped to 2.5%, (b) Wealthier countries are more likely to engage with CBDCs, as evidenced by a 5 percentage point (pp) higher GDP per capita among those piloting or launching these digital currencies, and (c) The likelihood of a country adopting a CBDC has progressively risen with an increase from a 6.7 pp rise in 2021 to 16 pp by 2023.

The second part of the paper explores the effects of piloting CBDCs on economic activity, measured using log GDP per capita and subjective well-being (SWB). I find that piloting or launching CBDCs is not associated with any differences in annual GDP growth or inflation. In fact, the correlations are null after adding basic country-level controls. The results are robust to using within-country variation, comparing the same country before/after adoption, as well as an entropy balancing weight that matches countries that adopted a CBDC with those that have not based on the third moments of log GDP per capita, log population, and the employment share in agriculture. However, using additional evidence from Gallup's World Poll, I find suggestive evidence of a negative effect of CBDC adoption whether an individual is thriving and financial well-being. These adverse effects are concentrated among those who are younger (age 20-39), males, and lower income respondents. However, these results are sensitive to the inclusion of country fixed effects. These results suggest that traditional macroeconomic indicators may omit important sources of heterogeneity when considering the effects of CBDCs, which is at odds with the prevailing wisdom that they promote financial inclusion and well-being.

This paper contributes to the growing body of literature on CBDCs by examining their determinants and economic impacts. The bulk of the literature on the potential benefits of CBDCs has been largely conceptual. For instance, Boar et al. (2020) discuss the potential for greater financial access among the under-banked.[1] Kosse and Mattei (2023) also discuss the potential for streamlining international trade through payment system efficiencies. One of the reasons behind such efficiencies stems from programmable payments through smart contracts, i.e. conditions that enable the automatic delivery of payment (Monetary Authority of Singapore, 2023).

However, there are also a wide array of meaningful risks. The Bank for International Settlements (BIS, 2023b) highlights the potential for financial instability through bank disintermediation, which could decrease the availability of bank credit. Fernandez-Villaverde et al. (2021) develop a macroeconomic general equilibrium model with commercial banks to highlight this possibility. Infante et al. (2023b) similarly echo these risks. To mitigate such risks, different CBDC architectures have been considered, including a hybrid model where intermediaries manage customer interactions while central banks maintain a more limited role. This approach contrasts with the direct model where the central bank would handle all aspects of CBDC transactions and record-keeping, potentially exacerbating risks of disintermediation. Privacy concerns versus the need for financial crime prevention presents another significant trade-off for CBDCs, particularly the balance between maintaining user anonymity—which supports financial inclusion and personal privacy—and the necessity to prevent money laundering and terrorist financing (Soderberg et al., 2022). The design of CBDCs could influence their use and adoption: measures such as setting holding or transaction limits could control usage, while innovative designs might allow for tiered user verification levels that offer greater anonymity for smaller transactions. Moreover, the operational and cybersecurity challenges inherent in deploying a digital currency necessitate robust frameworks to ensure the integrity and reliability of CBDC systems (BIS, 2023a).

[1] The Bank for International Settlements has been spearheading several projects, such as Project Dunbar, Project mBridge, and Project Mandala, among others.

2 Background and Conceptual Framework

Central Bank Digital Currencies (CBDCs) reflect a significant intersection of monetary policy and science and technology (S&T) policy. Countries globally are engaging with CBDCs at varying levels, integrating advanced technological frameworks that could potentially reshape financial systems and policy landscapes. The collaborative projects such as Project Hamilton and Project Cedar in the United States explore the implementation of distributed ledger technology (DLT) to enhance the efficiency and security of CBDCs, examining features like privacy, smart contracts, and offline payment capabilities (Federal Reserve Bank of Boston, 2022; Monetary Authority of Singapore, 2023). In the European Union, the digital euro project has moved from a research phase into preparation, focusing on the development of a CBDC platform that meets regulatory requirements and user needs (European Commission, 2023a). The Single Currency Package regulatory framework intends for the digital euro operates as a modern, efficient payment method while maintaining the security and stability of the monetary system (European Commission, 2023b).

China's approach to CBDCs with its digital yuan (eCNY) illustrates another dimension of how S&T policy intersects with financial technology. Launched by the People's Bank of China, the eCNY is designed to operate via a two-tier system, preserving the intermediary role of commercial banks while expanding access to financial services and enhancing payment efficiency (Bian et al., 2023b). India is also actively exploring the potential of CBDCs, with a particular focus on enhancing financial inclusion and modernizing the payment systems. The Reserve Bank of India (RBI) has also initiated trials for both wholesale and retail versions of a digital rupee, aiming to reduce transaction costs and improve the efficiency of the monetary system.

However, the increasing centralization of financial services around national digital currencies introduces new challenges. Centralized CBDC systems risk enhancing government surveillance capabilities and reducing the anonymity traditionally associated with cash transactions. These issues are critical in the context of S&T policy, as they touch on the need for robust cybersecurity measures and the ethical management of digital identities and personal data (Soderberg et al., 2022). Therefore, countries must navigate the trade-offs between innovation in financial technologies and the potential risks associated with increased centralization and surveillance, particularly the risk that these security concerns escalate and chip away at any potential benefits through a deterioration of trust in the monetary system.

There is also a broader question emerging in S&T policy about the efficacy of centralized approaches in an increasingly complex world. Decentralization in S&T policy is crucial for several reasons. First, it allows for greater agility and responsiveness within organizations and systems. As AI continues to permeate various sectors, from healthcare to defense, decentralized decision-making enables faster adaptation to new information and technological advancements. Second, decentralized systems can be better at managing the inherent risks and uncertainties associated with emerging technologies like AI. Coordination challenges are significant in complex environments where traditional centralized approaches may stifle innovation due to slow response times and bureaucratic inertia. Decentralization facilitates a more distributed risk management framework, allowing for localized adjustments and faster iteration on policy and technological solutions.

3 Data and Measurement

3.1 Atlantic Council

The Atlantic Council's Central Bank Digital Currency (CBDC) Tracker offers a dynamic and up-to-date view of the global landscape of CBDC development and implementation (Kumar et al., 2024). It categorizes CBDC projects into four stages: research, development, pilot, and launched, providing a longitudinal summary of each country's progress and the specific nature of their CBDC endeavors. For instance, it details which countries have moved beyond the exploratory phase to actively pilot or fully deploy a digital currency, alongside contextual factors influencing these developments, such as economic stability and technological infrastructure. Table 1 and Figure 1 provide summary statistics, showing that the bulk of countries are either pursuing no development or research (24.34% and 28.31%, respectively). A smaller fraction of countries are piloting (10.85%) and an even smaller have launched a CBDC (5.82%).

The main right-hand-side variable for the analyses that follow is an indicator for whether a country has piloted or launched a CBDC as the main right-hand-side variable. The countries that are piloting a CBDC over the span of time are: Australia, China, Dominica, Ghana, Hong Kong, India, Iran, Kazakhstan, Lithuania, Malaysia, Russia, Saint Kitts and Nevis, Saint Vincent and the Grenadines, Saudi Arabia, Singapore, South Africa, South Korea, Sweden, Thailand, Ukraine, and the United Arab Emirates The countries that have launched a CBDC are: Antigua and Barbuda, Dominica, Grenada, Jamaica, Nigeria, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, and The Bahamas. Most of these countries are small, but several large countries, such as India and China, have made the list.

3.2 Gallup World Poll

This paper also draws upon the World Gallup Poll, which contains surveys from over 150 countries that make up 98% of the world's population based on randomly selected and nationally representative samples. While these surveys are launched multiple times a year in most countries, all countries have the survey administered at least once, barring severe extenuating circumstances. The baseline empirical specification pools all countries together, but the results are robust to restricting the sample to countries observed at least 11 times, as well as to a fully balanced panel, although the standard errors rise marginally. Survey questions are designed to cover a wide array of key indicators, including law & order, food & shelter, job creation, migration, financial well-being, personal health, civic engagement, and evaluative well-being. The description of the survey is adapted from companion work in Makridis (2020) and Makridis (2021) that also draws on the World Poll data on an analogous sample to study religious freedom.

Each questionnaire is translated into the major conversational language in each country. To maximize accessibility, two approaches can be used. The first approach involves completing two independent translations with an independent third party who also has some knowledge of survey research methods who adjudicates the differences. A professional translator will subsequently translate the final version back into the source language. The second approach involves using a translator to translate the survey into the target language and an independent translator back into the source language. An independent third party with knowledge of survey methods will review and make any final translation modifications. Interviewers for each country are instructed to follow the script and not to deviate from the translated language.

Gallup selects quality vendors with experience in survey design and implementation with indepth training sessions with local field staff prior to the start of data collection. Gallup also follows ESOMAR standards for quality control. A supervisor accompanies each interviewer for one full interview within the first two days of interviewing and the supervisor accompanies interviews on a minimum of 5% of subsequent interviews. Interviewers re-contact a minimum of 15% of households to ensure correct execution of random route procedures and within-household selection. Telephone surveys are used in countries where coverage represents at least 80% of the population. Information that is gathered is also standardized so that it is comparable across countries, e.g., education (elementary, secondary, and tertiary) and income.

To measure subjective well-being, I focus on two outcomes. The first is an indicator for whether an individual is thriving. Individuals are surveyed on a scale of 0 to 10 about their current and expected future (in five years) life satisfaction. If an individual reports at least a 7/10 on current life satisfaction and at least an 8/10 on expected future life satisfaction, they are classified as thriving.[2] The second is the financial life index, which measures "respondents' personal economic situations and the economics of the community where they live," comprised of:

- Which one of these phrases comes closest to your own feelings about your household's income these days: living comfortably on present income, getting by on present income, finding it difficult on present income, or finding it very difficult on present income?

- Are you satisfied or dissatisfied with your standard of living, all the things you can buy and

[2] Specifically, the thriving index measures respondents perceptions of where they stand on a ladder scale with steps numbered from 0 to 10, where "0" represents the worst possible life and "10" represents the best possible life. Individuals are "thriving" if they say they presently stand on step 7 or higher of the ladder and expect to stand on step 8 or higher five years from now. Please imagine a ladder, with steps numbered from 0 at the bottom to 10 at the top. The top of the ladder represents the best possible life for you and the bottom of the ladder represents the worst possible life for you. On which step of the ladder would you say you personally feel you stand at this time? Individuals who rate their current lives a "7" or higher AND their future an "8" or higher are "thriving." Individuals are "suffering" if they report their current AND future lives as a "4" and lower.

do?

- Right now, do you feel your standard of living is getting better or getting worse?
- Right now, do you think that economic conditions in the city or area where you live, as a whole, are getting better or getting worse?

3.3 World Bank

I also draw on the World Bank's World Development Indicators (WDI) database, which includes a wide array of global economic and social measures that are useful as either outcome or control variables. In particular, I focus on log per capita gross domestic product (GDP) normalized to constant U.S. dollars as an outcome variable, and population (or population growth), net migration flows, the urban population, and the unemployment rate for males as controls.

4 Descriptive Patterns about CBDCs

Figure 2 begins by plotting the proportion of countries that have piloted or launched a CBDC over time. Starting in 2022, the share that have piloted is less than 10% and the share that have launched is udner 5%. However, by the start of 2024, the proportion that has piloted grew to 25%, whereas the proportion that launched declined to 2.5%. That decline among the launched reflects countries that have pulled back on their CBDC plans.

Table 2 documents the regression results of an indicator for whether a country has adopted or launched a CBDC on country controls and year fixed effects. Contrary to common intuition, there is positive selection into piloting or launching CBDCs: higher income countries tend to do so. Starting in column 1, countries that have piloted or launched have 5 percentage points higher per capita GDP. The subsequent columns saturate the model with additional controls. Countries that have launched or piloted a CBDC have a higher population, but no statistically significant differences in the net migration rate, unemployment rate among males, and the urban population. Moreover, there is a large uptick in adoption over time: the probability is 6.7 pp higher in 2021, relative to 2019-20, which grows to 12.4 pp in 2022 and 16 pp in 2023.

5 The Effects of Piloting or Launching a CBDC

Table 3 documents the main results with GDP per capita growth and the consumer price index (CPI) as the outcome variables. Starting with column 1, countries that have piloted or launched a CBDC have 0.023 percentage points (pp) higher annual GDP growth per capita. However, such a raw correlation could be biased for a variety of reasons, such as reverse causality or omitted variables. Column 2 adds additional country $\times$ year controls, including the net migration rate, the unemployment rate for males, and annual population growth. The coefficient subsequently declines to 0.018 pp. Column 3 adds year fixed effects, which removes the correlation; CBDC pilot or launch is not associated with any change in GDP growth per capita. Column 4 subsequently adds country fixed effects, which exploits within-country variation in the adoption of a CBDC. Again, the coefficient estimate is not statistically significant. These results are robust to using the entropy balancing estimator in column 5, which removes the country fixed effects.

The results with inflation produce similar patterns. Column 6 shows a slight negative effect on the CPI, but it is not statistically significant. It becomes completely insignificant after adding country controls in column 2. The point estimate on CBDC status becomes slightly more economically meaningful in column 3, but remains statistically insignificant (p-value = 0.477), although it again becomes completely insignificant after adding country fixed effects in column 4. Finally, column 5 presents the entropy balancing result, which remains statistically insignificant. These results suggest there is no evidence that a CBDC has positive productivity or price stability effects.

One limitation of these traditional macroeconomic indicators is that they may not reflect the on-the-ground sentiment. Macroeconomic indicators may be especially unreliable in some countries, and they may overlook softer dimensions of well-being, e.g. anxiety and dissatisfaction. I now turn towards the more comprehensive measures of well-being from Gallup. After matching the Gallup, World Bank, and Atlantic Council data, 11.17% of the respondents are in countries that are piloting or launching a CBDC. That is closely in line with the 13.19% of country-year pairs in the matched Atlantic Council and World Bank data.[3] I also re-estimate the entropy balancing weights from before with only the countries that are in the matched sample, and I use the product of the Gallup sample weight and the new entropy balancing weight as the weights in the regressions that follow to ensure that the results are both nationally representative and properly balanced given the imbalanced nature of CBDC adoption.

Table 4 now presents the results with subjective well-being as the outcome variable. Starting with the raw correlation, there is no statistically or economically significant association between CBDC adoption and thriving or financial life. As the model is saturated with demographic controls (columns 2 and 7) and year fixed effects (columns 3 and 8), the coefficient on CBDC adoption becomes slightly negative when the outcome variable is whether the person is thriving, but it is still not statistically significant. When country controls are added in column 4, I find a 0.057

[3] Antigua and Barbuda, Dominica, Grenada, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, and The Bahamas are not included in the World Poll.

percentage point decline in the probability of thriving, which is statistically significant at the 1% level. Finally, when explotiing within-country variation through both country and year fixed effects in columns 5 and 10, the coefficient on CBDC adoption becomes both economically and statistically insignificant for both outcome variables.

Is it possible that the average respondent is not affected, but certain groups are more so? Table 5 examines several dimensions of heterogeneity under the preferred specification containing all the controls, but without country fixed effects, with thriving as the outcome variable. The coefficients on CBDC adoption are more negative for those between ages 20-39 than those 40-60 (-0.06; $p<0.05$ v. -0.044; $p>0.10$). The results are also more negative for males (-0.063; $p<0.05$ v. -0.049; $p<0.05$), and for the lower income (-0.057; $p<0.01$ v. -0.06; $p<0.10$). Table 6 documents these results when the outcome is the financial life index. All coefficients are statistically and economically insignificant, except for the subset of those who are low income (-0.063; $p<0.10$). Tables A.1 and A.2 in the Online Appendix replicate these results with country fixed effects. All coefficients are statistically and economically insignificant with two exceptions: (a) when the outcome is thriving, the coefficient on CBDC adoption is -0.029 for the low income ($p<0.10$), but 0.037 for high income ($p<0.10$), and (b) when the outcome is the financial life index, the coefficient on CBDC adoption is qualitatively similar by income, by not statistically significant. These are relegated to the Online Appendix because they are not the preferred specification.

6 Conclusion

This paper has provided, to my knowledge, the first comprehensive quantitative assessment of the relationship between Central Bank Digital Currencies (CBDCs) on macroeconomic indicators between 2019-2023, such as GDP per capita growth and inflation, and measures of subjective well-being. Despite the theoretical benefits associated with CBDCs, such as enhanced financial inclusion and payment system efficiency, my results suggest that the actual economic benefits of CBDCs are limited with no significant relationship found between CBDC adoption and GDP per capita growth or inflation. However, using Gallup's World Poll, there are potential negative effects on individual well-being, particularly among younger, male, and lower-income demographics.

Put together, while CBDCs hold promise for improving financial infrastructure, their practical implementation and the accompanying risks, such as financial instability due to bank disintermediation and the challenges of balancing privacy with financial crime prevention, necessitate careful consideration and robust policy frameworks. It is crucial for policymakers to consider these findings and adjust their strategies to mitigate risks effectively. Additionally, continued research and data collection on the rollout and long-term impacts of CBDCs are essential to inform future decisions and ensure that CBDCs contribute positively to the global financial system.

Tables and Figures

Table 1: Number of Countries and Percentage Share by CBDC Status

CBDC Status	Number of Countries	Percentage (%)
Inactive	35	9.26
Cancelled	7	1.85
Other	4	1.06
No Development	92	24.34
Research	107	28.31
Development	70	18.52
Pilot	41	10.85
Launched	22	5.82

Notes.—Sources: Atlantic Council, 2021-2023. The table reports the number of countries, and percent share, by different categories of central bank digital currency (CBDC) status.

Table 2: Correlates of Central Bank Digital Currency Adoption

Dep. var. =	Pilot or Launched CBDC					
	(1)	(2)	(3)	(4)	(5)	(6)
log(GDP per capita)	.049***	.058***	.061***	.061***	.058***	.057***
	[.016]	[.017]	[.017]	[.017]	[.021]	[.021]
log(Population)		.028***	.028***	.034***	.034***	.034***
		[.007]	[.007]	[.010]	[.010]	[.010]
Net Migration Rate			-2.057**	.156	.194	.092
			[.886]	[1.005]	[1.052]	[1.027]
Unemployment Rate, Males				.001	.001	.002
				[.003]	[.003]	[.003]
Urban Population					.000	.000
					[.001]	[.001]
Year = 2021						.067***
						[.024]
Year = 2022						.124***
						[.029]
Year = 2023						.160***
						[.034]
R-squared	.03	.08	.09	.09	.09	.14
Sample Size	877	877	877	800	800	800

Notes.—Sources: Atlantic Council and World Bank, 2019-2023. The table reports the coefficients associated with regressions of an indicator for whether the country launched or piloted a CBDC on log GDP per capita, log population, the male unemployment rate, the net migration rate, and the urban population, as well as year fixed effects normalized to 2020. Standard errors are clustered at the country-level.

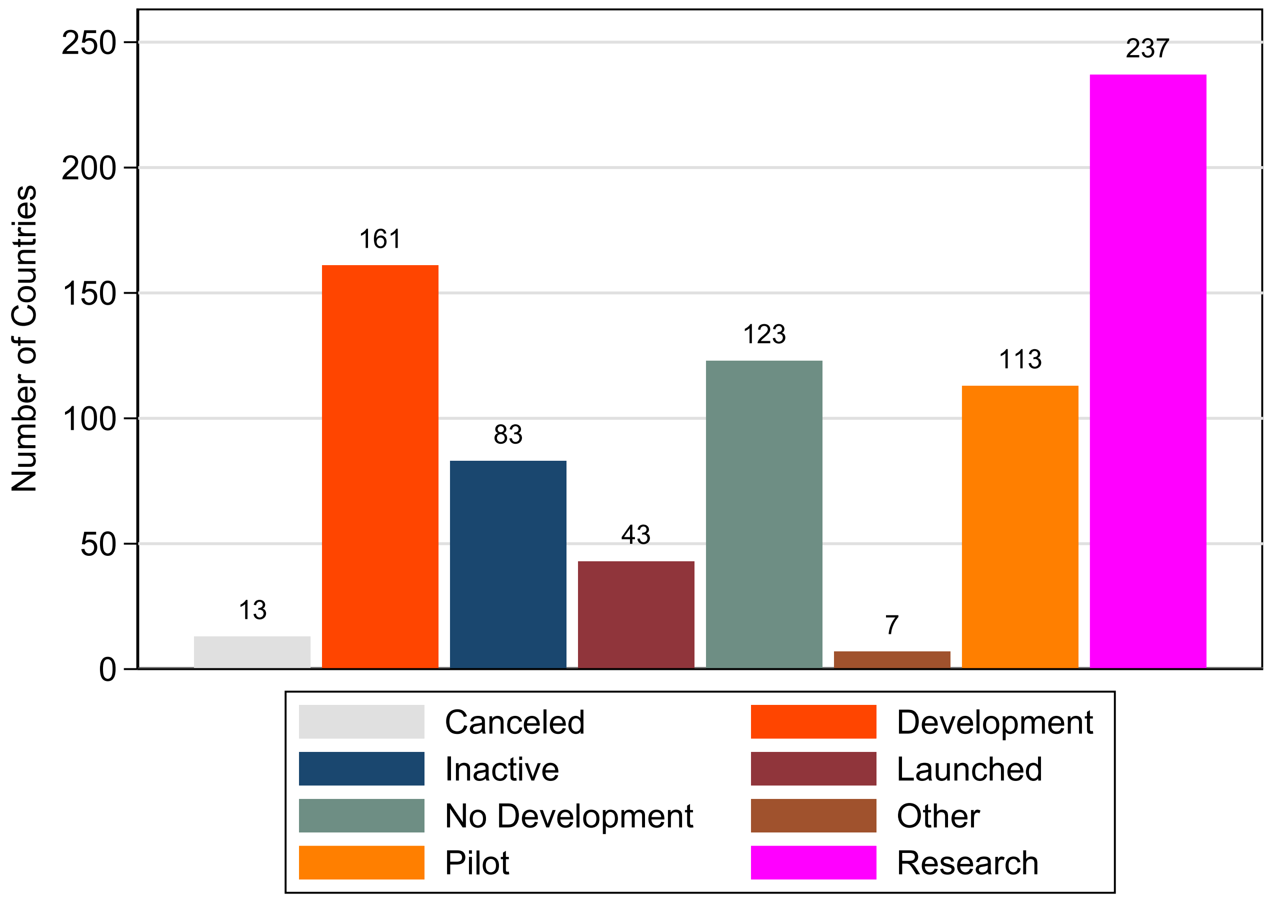

Figure 1: Count

Notes.—Sources: Atlantic Council, 2021-2023. The figure reports the number of countries, and percent share, by different categories of central bank digital currency (CBDC) status, in a visual format.

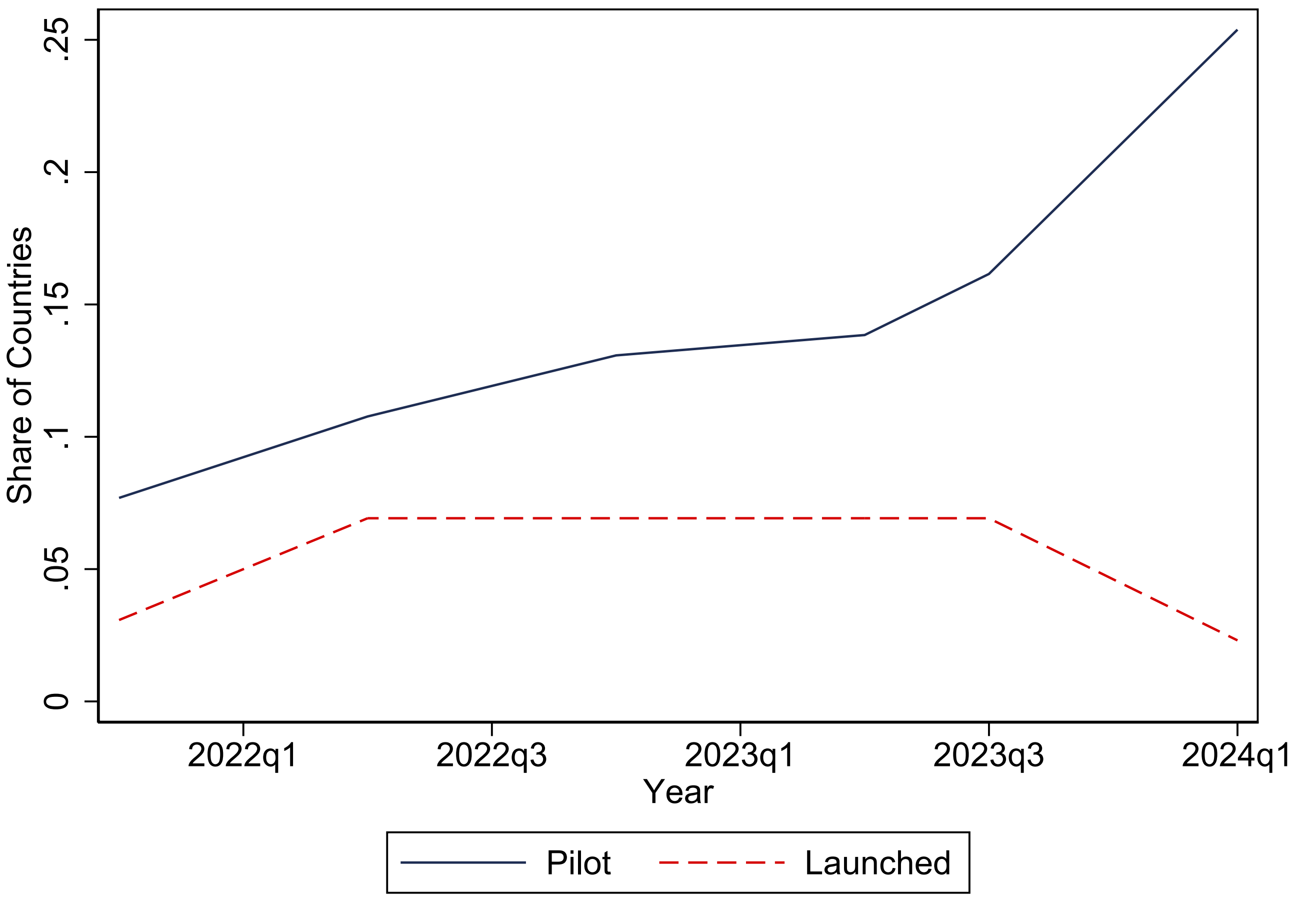

Figure 2: Time Series

Notes.—Sources: Atlantic Council, 2021-2023. The figure reports the proportion of countries that are piloting and/or launching a CBDC by quarter over time.

Table 3: Examining the Effects of Central Bank Digital Currencies on GDP/capita and Inflation

Dep. var. =	Annual GDP Growth					Annual Inflation Growth				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Pilot or Launch CBDC	.023***	.019***	.004	.003	.005	-.013	.002	-.018	.002	-.019
	[.006]	[.006]	[.007]	[.010]	[.006]	[.026]	[.027]	[.032]	[.020]	[.025]
Population Growth		-.805***	-.767***	-1.801***	-.809***		-.764	-.918	.054	-.620
		[.219]	[.212]	[.453]	[.219]		[1.895]	[1.937]	[.374]	[1.725]
Net Migration Rate		.669***	.356	.138	.294		-8.191	-8.150	.238	-9.611
		[.238]	[.305]	[.195]	[.375]		[6.500]	[6.403]	[.406]	[7.155]
Unemployment Rate, Males		-.000	-.000	-.006***	-.000		.003	.003	-.018	.002
		[.000]	[.000]	[.002]	[.000]		[.003]	[.002]	[.017]	[.002]
Urban Population		-.000**	-.000*	-.014	-.000***		-.001	-.001	.010	.000
		[.000]	[.000]	[.013]	[.000]		[.001]	[.001]	[.027]	[.001]
Year = 2021			.033***	.044***	.039***			.008	.021	.022**
			[.006]	[.010]	[.007]			[.016]	[.030]	[.009]
Year = 2022			.018***	.030***	.022***			.070***	.055	.084***
			[.004]	[.012]	[.005]			[.024]	[.050]	[.021]
Year = 2023			.008	.025	.004			.052*	.049	.074***
			[.009]	[.025]	[.004]			[.031]	[.058]	[.024]
R-squared	.01	.03	.25	.36	.44	.00	.05	.06	.67	.16
Sample Size	877	800	800	800	800	806	763	763	761	763
Controls	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Country FE	No	No	No	Yes	No	No	No	No	Yes	No
Balancing Weight	No	No	No	No	Yes	No	No	No	No	Yes

Notes.—Sources: Atlantic Council and World Bank, 2019-2023. The table reports the coefficients associated with regressions of annual GDP per capita growth and the consumer price index (CPI) on an indicator for whether the country launched or piloted a CBDC, conditional on controls, including: population growth, the male unemployment rate, the net migration rate, and the urban population. The entropy balancing estimator from Hainmueller (2012), which is obtained by balancing across treated and control groups based on the first three moments of log per capita GDP, log population, and the first moment (average) share of employment in agriculture. Standard errors are clustered at the country-level.

Table 4: Examining the Effects of Central Bank Digital Currencies on Subjective Well-being

Dep. var. =	Is Thriving					Financial Life Index				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Pilot or Launch CBDC	-.005	-.021	-.046	-.057**	.010	.018	.007	.003	-.003	.021
	[.030]	[.023]	[.028]	[.024]	[.015]	[.028]	[.023]	[.028]	[.026]	[.015]
Age		-.001***	-.001***	-.002***	-.003***		-.002***	-.002***	-.002***	-.002***
		[.001]	[.001]	[.000]	[.000]		[.000]	[.000]	[.000]	[.000]
# Children		-.008***	-.008***	-.004*	-.002		-.012***	-.012***	-.009***	-.008***
		[.003]	[.003]	[.002]	[.001]		[.003]	[.003]	[.002]	[.001]
Secondary Education		.081***	.081***	.051***	.034***		.032***	.033***	.033***	.020***
		[.015]	[.014]	[.009]	[.007]		[.012]	[.011]	[.009]	[.006]
Tertiary Education		.204***	.204***	.162***	.144***		.109***	.111***	.104***	.085***
		[.021]	[.020]	[.016]	[.013]		[.017]	[.017]	[.013]	[.009]
Male		-.036***	-.036***	-.034***	-.031***		.009*	.009*	.010**	.006
		[.006]	[.006]	[.006]	[.006]		[.005]	[.005]	[.005]	[.004]
Married		.010	.011	.021**	.030***		.013**	.013**	.009*	.007
		[.010]	[.010]	[.009]	[.008]		[.005]	[.005]	[.005]	[.005]
Employed		.033***	.033***	.030***	.015***		.018***	.018***	.014**	.009*
		[.007]	[.007]	[.006]	[.004]		[.007]	[.007]	[.006]	[.005]
Full-time		-.002	-.002	-.008	-.001		-.008	-.008	-.013**	-.009**
		[.007]	[.007]	[.007]	[.006]		[.005]	[.005]	[.005]	[.004]
log(Income)		.033***	.033***	.024***	.019***		.031***	.031***	.028***	.026***
		[.004]	[.004]	[.003]	[.002]		[.003]	[.003]	[.003]	[.002]
Year = 2021			-.004	.005	-.022			-.022*	-.032**	-.034**
			[.019]	[.016]	[.015]			[.012]	[.013]	[.015]
Year = 2022			.031*	.025	-.017			-.019	-.026*	-.028
			[.018]	[.017]	[.017]			[.014]	[.014]	[.020]
Year = 2023			.039**	.046***	-.015			-.006	.001	-.014
			[.018]	[.017]	[.019]			[.016]	[.016]	[.024]
R-squared	.00	.06	.06	.09	.13	.00	.09	.09	.10	.18
Sample Size	455998	438304	438304	435802	435802	489992	470888	470888	467908	467908
Demographics	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Country Controls	No	No	No	Yes	Yes	No	No	No	Yes	Yes
Country FE	No	No	No	No	Yes	No	No	No	No	Yes

Notes.—Sources: Atlantic Council, Gallup, World Bank, 2019-2023. The table reports the coefficients associated with regressions of measures of subjective well-being on an indicator for whether the country launched or piloted a CBDC, conditional on individual and country controls, as well as country fixed effects. Demographic controls include: age, number of children, education dummies (secondary and tertiary), male, marital status, employment, full-time status, and log income in international currency. Country controls include: GDP per capita growth, population growth, the male unemployment rate, the net migration rate, and the urban population. Individuals are "thriving" if they say they presently stand on step 7/10 or higher of the ladder and expect to stand on step 8/10 or higher five years from now. The financial life index is comprised of answers to: (a) Which one of these phrases comes closest to your own feelings about your household's income these days: living comfortably on present income, getting by on present income, finding it difficult on present income, or finding it very difficult on present income?; (b) Are you satisfied or dissatisfied with your standard of living, all the things you can buy and do?; (c) Right now, do you feel your standard of living is getting better or getting worse?; (d) Right now, do you think that economic conditions in the city or area where you live, as a whole, are getting better or getting worse? Standard errors are clustered at the country-level and observations are weighted by the product of the Gallup sample weights and an entropy balancing weight obtained on the matched sample of countries following the procedure from Table 3.

Table 5: Heterogeneous Effects of Central Bank Digital Currencies on Thriving

Dep. var. =	Is Thriving					
	Age 20-39	Age 40-60	Male	Female	Low Income	High Income
Pilot or Launch CBDC	-.060**	-.044	-.063**	-.049**	-.057***	-.060*
	[.023]	[.029]	[.026]	[.024]	[.019]	[.035]
Age	-.004***	-.001*	-.002***	-.002***	-.002***	-.002***
	[.001]	[.001]	[.000]	[.000]	[.000]	[.001]
# Children	-.002	-.003	-.003	-.005**	-.001	.001
	[.002]	[.002]	[.002]	[.002]	[.001]	[.004]
Secondary Education	.072***	.053***	.049***	.053***	.031***	.053***
	[.008]	[.011]	[.009]	[.010]	[.007]	[.018]
Tertiary Education	.170***	.197***	.163***	.161***	.113***	.138***
	[.013]	[.019]	[.017]	[.018]	[.021]	[.025]
Male	-.041***	-.042***	.000	.000	-.041***	-.027***
	[.007]	[.008]	[.]	[.]	[.010]	[.007]
Married	.037***	.029***	.019**	.021*	-.012	.049***
	[.011]	[.010]	[.008]	[.011]	[.007]	[.007]
Employed	.037***	.051***	.024***	.035***	.029***	.031***
	[.007]	[.007]	[.006]	[.008]	[.010]	[.008]
Full-time	-.007	.012	-.006	-.009	-.018**	-.009
	[.008]	[.009]	[.007]	[.008]	[.007]	[.010]
log(Income)	.021***	.027***	.026***	.022***	-.001	.089***
	[.003]	[.004]	[.003]	[.002]	[.002]	[.009]
Year = 2021	.010	.012	.009	.001	-.038***	.064**
	[.021]	[.014]	[.015]	[.018]	[.013]	[.029]
Year = 2022	.025	.028*	.029*	.021	.024	.026
	[.022]	[.016]	[.015]	[.019]	[.017]	[.029]
Year = 2023	.050**	.046**	.049***	.044**	.028*	.046
	[.019]	[.018]	[.016]	[.020]	[.015]	[.035]
R-squared	.09	.11	.09	.08	.05	.05
Sample Size	191693	135877	210925	224877	138884	152392
Demographics	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country Controls	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes.—Sources: Atlantic Council, Gallup, World Bank, 2019-2023. The table reports the coefficients associated with regressions of measures of subjective well-being on an indicator for whether the country launched or piloted a CBDC, conditional on individual and country controls (no country fixed effects). Demographic controls include: age, number of children, education dummies (secondary and tertiary), male, marital status, employment, full-time status, and log income in international currency. Country controls include: GDP per capita growth, population growth, the male unemployment rate, the net migration rate, and the urban population. Individuals are "thriving" if they say they presently stand on step 7 or higher of the ladder and expect to stand on step 8 or higher five years from now. High and low income respondents are classified based on partitioning people into high/medium/low groups. Standard errors are clustered at the country-level and observations are weighted by the product of the Gallup sample weights and an entropy balancing weight obtained on the matched sample of countries following the procedure from Table 3.

Table 6: Heterogeneous Effects of Central Bank Digital Currencies on Financial Life Index

Dep. var. =	Financial Life Index					
	Age 20-39	Age 40-60	Male	Female	Low Income	High Income
Pilot or Launch CBDC	.003	.009	-.004	-.001	-.063*	.010
	[.029]	[.027]	[.026]	[.026]	[.034]	[.030]
Age	-.005***	-.001	-.002***	-.002***	-.002***	-.001***
	[.000]	[.000]	[.000]	[.000]	[.000]	[.000]
# Children	-.007***	-.008***	-.007***	-.011***	-.008***	-.007*
	[.003]	[.003]	[.002]	[.002]	[.001]	[.004]
Secondary Education	.042***	.029***	.034***	.033***	.017**	.029**
	[.007]	[.010]	[.008]	[.010]	[.008]	[.014]
Tertiary Education	.109***	.123***	.111***	.098***	.054***	.075***
	[.009]	[.015]	[.012]	[.015]	[.014]	[.016]
Male	.007	-.003	.000	.000	-.002	.011**
	[.008]	[.006]	[.]	[.]	[.008]	[.005]
Married	.031***	.040***	.001	.015***	.006	-.002
	[.007]	[.006]	[.005]	[.006]	[.005]	[.005]
Employed	.030***	.023***	.020***	.012	.024***	.002
	[.007]	[.006]	[.006]	[.008]	[.008]	[.007]
Full-time	-.008	.019***	-.015***	-.011	-.009	-.026***
	[.006]	[.007]	[.005]	[.007]	[.007]	[.007]
log(Income)	.027***	.028***	.030***	.027***	.003	.120***
	[.003]	[.003]	[.003]	[.003]	[.002]	[.012]
Year = 2021	-.035***	-.031**	-.031**	-.033**	-.057***	-.003
	[.012]	[.014]	[.013]	[.013]	[.011]	[.021]
Year = 2022	-.034**	-.026*	-.025	-.028**	-.005	-.034
	[.015]	[.016]	[.016]	[.014]	[.017]	[.022]
Year = 2023	.001	-.009	.003	-.002	.010	-.010
	[.015]	[.019]	[.016]	[.015]	[.016]	[.030]
R-squared	.11	.12	.11	.10	.06	.09
Sample Size	201036	146738	224179	243729	153843	157325
Demographics	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country Controls	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes.—Sources: Atlantic Council, Gallup, World Bank, 2019-2023. The table reports the coefficients associated with regressions of measures of subjective well-being on an indicator for whether the country launched or piloted a CBDC, conditional on individual and country controls (no country fixed effects). Demographic controls include: age, number of children, education dummies (secondary and tertiary), male, marital status, employment, full-time status, and log income in international currency. Country controls include: GDP per capita growth, population growth, the male unemployment rate, the net migration rate, and the urban population. The financial life index is comprised of answers to: (a) Which one of these phrases comes closest to your own feelings about your household's income these days: living comfortably on present income, getting by on present income, finding it difficult on present income, or finding it very difficult on present income?; (b) Are you satisfied or dissatisfied with your standard of living, all the things you can buy and do?; (c) Right now, do you feel your standard of living is getting better or getting worse?; (d) Right now, do you think that economic conditions in the city or area where you live, as a whole, are getting better or getting worse? High and low income respondents are classified based on partitioning people into high/medium/low groups. Standard errors are clustered at the country-level and observations are weighted by the product of the Gallup sample weights and an entropy balancing weight obtained on the matched sample of countries following the procedure from Table 3.

A Online Appendix

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Table A.1: Heterogeneous Effects of Central Bank Digital Currencies on Thriving

Dep. var. =	Is Thriving					
	Age 20-39	Age 40-60	Male	Female	Low Income	High Income
Pilot or Launch CBDC	.003	.012	-.001	.021	-.029*	.037*
	[.018]	[.017]	[.015]	[.017]	[.017]	[.020]
Age	-.004***	-.001***	-.003***	-.003***	-.002***	-.003***
	[.001]	[.000]	[.000]	[.000]	[.000]	[.001]
# Children	-.001	-.003	-.000	-.004**	-.001	.001
	[.002]	[.002]	[.002]	[.002]	[.001]	[.002]
Secondary Education	.058***	.038***	.032***	.037***	.030***	.025*
	[.007]	[.007]	[.006]	[.008]	[.006]	[.015]
Tertiary Education	.167***	.168***	.148***	.140***	.116***	.109***
	[.012]	[.013]	[.013]	[.015]	[.022]	[.021]
Male	-.037***	-.040***	.000	.000	-.037***	-.029***
	[.007]	[.007]	[.]	[.]	[.010]	[.007]
Married	.038***	.047***	.030***	.028**	-.010	.053***
	[.010]	[.008]	[.007]	[.011]	[.007]	[.007]
Employed	.017***	.035***	.018***	.016***	.015**	.020***
	[.005]	[.006]	[.005]	[.005]	[.007]	[.007]
Full-time	.003	.012	.001	-.002	-.013*	-.004
	[.007]	[.007]	[.006]	[.007]	[.007]	[.008]
log(Income)	.020***	.021***	.020***	.019***	-.000	.087***
	[.002]	[.002]	[.002]	[.002]	[.001]	[.007]
Year = 2021	-.010	-.024	-.013	-.030*	-.049***	-.009
	[.018]	[.014]	[.013]	[.018]	[.017]	[.016]
Year = 2022	-.014	-.022	-.008	-.026	.003	-.046**
	[.022]	[.016]	[.016]	[.020]	[.022]	[.019]
Year = 2023	-.003	-.024	-.007	-.023	-.004	-.049*
	[.025]	[.021]	[.018]	[.023]	[.023]	[.025]
R-squared	.15	.16	.14	.13	.07	.11
Sample Size	191693	135877	210925	224877	138884	152392
Demographics	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country Controls	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes.—Sources: Atlantic Council, Gallup, World Bank, 2019-2023. The table reports the coefficients associated with regressions of measures of subjective well-being on an indicator for whether the country launched or piloted a CBDC, conditional on individual and country controls, as well as country fixed effects. Demographic controls include: age, number of children, education dummies (secondary and tertiary), male, marital status, employment, full-time status, and log income in international currency. Country controls include: GDP per capita growth, population growth, the male unemployment rate, the net migration rate, and the urban population. Individuals are "thriving" if they say they presently stand on step 7 or higher of the ladder and expect to stand on step 8 or higher five years from now. High and low income respondents are classified based on partitioning people into high/medium/low groups. Standard errors are clustered at the country-level and observations are weighted by the product of the Gallup sample weights and an entropy balancing weight obtained on the matched sample of countries following the procedure from Table 3.

Table A.2: Heterogeneous Effects of Central Bank Digital Currencies on Financial Life Index

Dep. var. =	Financial Life Index					
	Age 20-39	Age 40-60	Male	Female	Low Income	High Income
Pilot or Launch CBDC	.015	.025	.018	.023	-.022	.035
	[.017]	[.016]	[.016]	[.016]	[.018]	[.021]
Age	-.005***	-.000	-.002***	-.002***	-.002***	-.002***
	[.000]	[.000]	[.000]	[.000]	[.000]	[.000]
# Children	-.007***	-.006***	-.006***	-.010***	-.006***	-.012***
	[.002]	[.002]	[.001]	[.001]	[.001]	[.002]
Secondary Education	.027***	.022***	.022***	.018**	.019***	.004
	[.007]	[.005]	[.005]	[.007]	[.005]	[.010]
Tertiary Education	.093***	.110***	.093***	.078***	.056***	.045***
	[.008]	[.009]	[.008]	[.010]	[.008]	[.012]
Male	.000	-.008	.000	.000	-.004	.005
	[.006]	[.005]	[.]	[.]	[.007]	[.004]
Married	.025***	.038***	-.001	.011**	-.008**	.003
	[.005]	[.006]	[.005]	[.005]	[.004]	[.003]
Employed	.025***	.020***	.017***	.005	.015**	-.000
	[.005]	[.006]	[.005]	[.005]	[.007]	[.004]
Full-time	-.003	.019***	-.012***	-.006	-.009*	-.020***
	[.005]	[.005]	[.004]	[.006]	[.005]	[.006]
log(Income)	.026***	.025***	.027***	.024***	.004**	.110***
	[.002]	[.002]	[.002]	[.002]	[.002]	[.010]
Year = 2021	-.038**	-.032*	-.033**	-.035**	-.054***	-.027**
	[.017]	[.016]	[.017]	[.015]	[.019]	[.013]
Year = 2022	-.035	-.027	-.027	-.030	-.008	-.039
	[.021]	[.020]	[.022]	[.019]	[.015]	[.026]
Year = 2023	-.012	-.021	-.012	-.016	-.006	-.019
	[.024]	[.028]	[.025]	[.024]	[.018]	[.034]
R-squared	.19	.19	.19	.18	.13	.16
Sample Size	201036	146738	224179	243729	153843	157325
Demographics	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country Controls	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes.—Sources: Atlantic Council, Gallup, World Bank, 2019-2023. The table reports the coefficients associated with regressions of measures of subjective well-being on an indicator for whether the country launched or piloted a CBDC, conditional on individual and country controls, as well as country fixed effects. Demographic controls include: age, number of children, education dummies (secondary and tertiary), male, marital status, employment, full-time status, and log income in international currency. Country controls include: GDP per capita growth, population growth, the male unemployment rate, the net migration rate, and the urban population. The financial life index is comprised of answers to: (a) Which one of these phrases comes closest to your own feelings about your household's income these days: living comfortably on present income, getting by on present income, finding it difficult on present income, or finding it very difficult on present income?; (b) Are you satisfied or dissatisfied with your standard of living, all the things you can buy and do?; (c) Right now, do you feel your standard of living is getting better or getting worse?; (d) Right now, do you think that economic conditions in the city or area where you live, as a whole, are getting better or getting worse? High and low income respondents are classified based on partitioning people into high/medium/low groups. Standard errors are clustered at the country-level and observations are weighted by the product of the Gallup sample weights and an entropy balancing weight obtained on the matched sample of countries following the procedure from Table 3.

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