

Arauz, Andrés; Garratt, Rod; Ramos F., Diego F.

## Article

# Dinero Electrónico: The rise and fall of Ecuador's central bank digital currency

Latin American Journal of Central Banking (LAJCB)

## Provided in Cooperation with:

Center for Latin American Monetary Studies, Mexico City

*Suggested Citation:* Arauz, Andrés; Garratt, Rod; Ramos F., Diego F. (2021) : Dinero Electrónico: The rise and fall of Ecuador's central bank digital currency, Latin American Journal of Central Banking (LAJCB), ISSN 2666-1438, Elsevier, Amsterdam, Vol. 2, Iss. 2, pp. 1-10, <https://doi.org/10.1016/j.latcb.2021.100030>

This Version is available at:

<https://hdl.handle.net/10419/336323>

### Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

### Terms of use:

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*



<https://creativecommons.org/licenses/by-nc-nd/4.0/>



Contents lists available at ScienceDirect

## Latin American Journal of Central Banking

journal homepage: [www.elsevier.com/locate/latchb](http://www.elsevier.com/locate/latchb)

# Dinero Electrónico: The rise and fall of Ecuador's central bank digital currency



Andrés Arauz<sup>a</sup>, Rodney Garratt<sup>b,\*</sup>, Diego F. Ramos F.<sup>c</sup>

<sup>a</sup> División de Estudios de Posgrado de la Facultad de Economía, Universidad Nacional Autónoma de México, Mexico

<sup>b</sup> University of California, Santa Barbara, United States

<sup>c</sup> Departamento de Ciencias Económicas, Administrativas y de Comercio, Escuela Politécnica del Ejército (ESPE), Ecuador

## ABSTRACT

Dinero Electrónico was a mobile payment system developed by the Banco Central del Ecuador that allowed citizens to transfer USD balances in real-time from person to person using basic cell phones. The program operated between 2014 and 2018. Key drivers of the program were increasing financial inclusion and reducing the need for the central bank to hold and distribute large quantities of USD notes. We discuss reasons why the program was ultimately discontinued, including opposition to the program from private banks, and outline lessons learned.

## 1. Introduction

There is currently considerable interest in central bank digital currencies (CBDCs).<sup>1</sup> This interest stems, in large part, from the decline in cash use for transaction purposes, which has been ongoing over the last several years in many developed countries.<sup>2</sup> In countries such as Sweden and Canada, central banks are actively assessing options, including the introduction of a CBDC, to address a potential future in which cash use is no longer viable for the majority of consumer transactions.<sup>3</sup> Important factors leading to the decline in cash use are the rise in e-commerce, which necessitates electronic payments, as well as improvements in contactless payment technologies that facilitate fast digital payment in person-to-business transactions and improvements in mobile payment platforms that facilitate person-to-person transfers. A notable example of the latter is SWISH, which facilitates transfers of commercial bank deposits in Sweden and has been adopted by more than 60% of the Swedish population.

Without a doubt, convenience, speed and cost are important considerations factoring into the move toward electronic payments. Recent events surrounding the COVID-19 pandemic may accelerate these trends as peoples' willingness to handle cash may be waning (Auer et al., 2020a). As policy makers try to assess the benefits and risks of CBDCs (Bank of England, 2020), researchers at central banks and academic institutions have contributed to the discussion with theoretical works on monetary policy implications, disintermediation and financial stability implications (Bordo and Levin, 2017; Andolfatto, 2019; Bindseil, 2019; Chiu et al., 2019; Keister and Sanches, 2019; Fernández-Villaverde et al., 2020; Schilling et al., 2020 and Garratt and Zhu, 2021).

However, when it comes to actual implementation, there is no substitute for experience. In this article, we provide a detailed account of the Ecuadorian experience with Dinero Electrónico (DE). DE was a mobile payment system developed by the Banco Central del Ecuador (Central Bank of Ecuador; hereafter, BCE) that allowed citizens to transfer money in real-time from person to

\* Corresponding author.

E-mail addresses: [andres.arauz@comunidad.unam.mx](mailto:andres.arauz@comunidad.unam.mx) (A. Arauz), [garratt@ucsb.edu](mailto:garratt@ucsb.edu) (R. Garratt), [dframos5@espe.edu.ec](mailto:dframos5@espe.edu.ec) (D.F. Ramos F.).

<sup>1</sup> See Bech and Garratt (2017) and Bank for International Settlements (2018) for a definition. In this article, CBDC refers to any form (centralized account or decentralized crypto) of publicly available, electronic, currency that is a direct liability of the central bank.

<sup>2</sup> The decline of cash and possible negative implications is discussed in a recent issue of this journal; see McAndrews (2020).

<sup>3</sup> See the Riksbank's e-krona Project Report 1 and 2 (Riksbank, 2017 and Riksbank, 2018) and the speech by the Deputy Governor of the Bank of Canada (Lane, 2020).

<https://doi.org/10.1016/j.latchb.2021.100030>

Received 14 October 2020; Received in revised form 18 February 2021; Accepted 2 March 2021

Available online 16 June 2021

2666-1438/© 2021 The Authors. Published by Elsevier B.V. on behalf of Center for Latin American Monetary Studies. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

person using the Unstructured Supplementary Service Data (USSD) protocol.<sup>4</sup> DE accounts were denominated in USD. Given that Ecuador uses the USD as its official currency (Ecuador does not print its own bank notes), and because accounts were initiated and maintained by the BCE, calling DE a CBDC is reasonable.<sup>5</sup> As far as we know, DE is the first CBDC based on a mobile platform.<sup>6</sup>

DE operated from 2014 to 2018. Using information from various governmental institutions in real-time made registering easy. Citizens of Ecuador could open an account by accessing the dial-in protocol, registering their national identity number and answering security questions. People deposited or withdrew hard currency by going to designated transaction centers. DE involved real-time, low-value, gross settlement. At its peak, it had 500,000 users.

In what follows, we outline some of the original motivations for DE. Some of these issues are unique to Ecuador, but others are equally relevant to many countries considering CBDC. We then discuss the actual implementation of DE. This includes discussion of the underlying technologies, but also the roles played by the central bank, commercial banks, government agencies and the public. As one might imagine, DE had its supporters and critics. We discuss some of the major issues media outlets raised and address the validity of these concerns and the official responses. These criticisms offer a glimpse into public reactions any future government will likely face in launching a CBDC.

In Section II, we outline the history and motivation behind the launching of DE. In Section III, we discuss the implementation. The discussion includes a timeline of key events, as well as relevant statistics. In Section IV, we present six criticisms launched by the public and provide responses. In Section V, we conclude.

## 2. History and motivation

### 2.1. History

Ecuador was dollarized in 2000. At that time, the monetary base consisted almost entirely of cumulative balance-of-payment (BoP) surpluses and US notes in circulation. BoP surpluses were based largely on oil revenue and remittances. However, the 2008 oil shock resulted in a BoP deficit and a shortage of physical cash (Cueva, 2019). Beginning in 2008, the BCE carried out three initiatives to restrict the use of the dollar, and hence, to reduce pressure on that currency. First, the government issued low denomination electronic securities/T-bills that were intended to be used as currency to make payments. The government tried paying government contractors with these securities, but did not change the regulations to allow taxes or other government obligations to be covered using them, and they were not successful as money. These securities were not usually traded on the secondary market, and when they were, sellers had to hire securities brokers and had to sell them at steep discounts (almost 20 percentage points below nominal value; Vela, 2016, pp. 59–60). However, since January 2016, the Ecuadorian Internal Revenue Service has accepted T-bills for tax payments,<sup>7</sup> and as a result, T-bills have become successful as money, as determined by trading volume and a low discount rate of around 2.3% (Villagomez, 2018, pp. 50–56). This experiment demonstrated the value of issuing liabilities that could be used for tax-paying purposes, as well as the importance of transactional ease of use for liquidity purposes.

The second attempt was FactoRepo, a B2B accounts-receivable invoice clearing initiative launched in 2009 that sought to reduce liquidity needs of small producers and entrepreneurs by settling on a net basis. After combining invoices issued between a buyer and a seller, the system issued “bond points” to the net creditor equal to their surplus value. The receiver of the bonds thus had immediate liquidity that could be used in advance of the actual payment of the invoice (Legard, 2011, p. 66).

The FactoRepo prototype was evaluated in a simulation using tax data on transactions. The simulation revealed three stylized facts about the Ecuadorean economy. First, it showed a large concentration of liquidity in few firms. Second, it demonstrated that supply chains quickly reach importers. Third, many formal businesses do not pay for their agricultural raw materials with invoices. These three facts would have put pressure on the net creditors. Thus, the BCE would have required a contingency fund to backstop the system to convert the surplus points into cash (Cook, 2010). Legal complications regarding the backstop function aborted the project after the prototype phase.

Third, there was a central bank mobile money initiative. The original design was labeled “Mobile Payment Systems.” Regulations for the “mobile money” of the mobile payment system were issued in January 2011. Legislation dictated that these mobile money accounts would be maintained by the central bank and available to all citizens 18 and older, regardless of whether they had a commercial bank account.<sup>8</sup>

<sup>4</sup> USSD messaging is free, requires no data plan and no top-up phone balance is required. This meant anyone with a cell phone, not just people with smartphones, could utilize this system. Although few people in Ecuador had smartphones at this time, mobile penetration was already high.

<sup>5</sup> Our designation is consistent with multiple publications (e.g. Auer and Boehme, 2020; Auer et al., 2020b; Todd and Rogers, 2020) that classify DE as a CBDC. Footnote 1 of Bank for International Settlements (2020) would exclude DE as a CBDC because it was not issued in Ecuador’s own sovereign currency. In the terminology of Auer and Boehme (2020) DE is a direct CBDC.

<sup>6</sup> The first CBDC of any form appears to be the Avant smart card system created by the Bank of Finland in the 1990s (Grym, 2020). Avant was a stored-value card that was issued to replace coins and low denomination bank notes. Avant smart cards were prefunded and offered anonymity to the user. However, despite early technological and cost advantages, this technology never achieved sufficient popularity and the cards were discontinued in 2003.

<sup>7</sup> Resolución NAC-DGERCGC16-00000010, available at: <https://www.sri.gob.ec/web/guest/pagos-con-tbc>

<sup>8</sup> On January 10, 2011, Diego Borja, then President of the Central Bank Board, signed Regulación Nro. 017-2011, which established the “*billetera móvil*,” stating explicitly that every person of legal age can activate their *billeteras móviles*, no matter whether they had an active account in any national financial institution (SECCION III, Art. 1); thus, it demanded that the Central Bank create a “transactional record” (SECCION I, Art. 1, literal e) independent of any account in any other financial institution.

The initial launch of DE followed in 2012. However, DE was rolled back because private banks disagreed with a central bank-centered model (Spurrier, 2012).<sup>9</sup> The platform name was changed to Sistema de Pago Móvil, and new legislation provided for a system that only allowed for transfers or payments from current deposit or basic accounts (SECCION III, Art. 3) previously created in any financial institution that participated in the Sistema Red de Redes (SECCION III, Art. 1). Meanwhile, a non-bank correspondent bank framework, led by Ecuador's two largest private banks, was in the pipeline at the Bank Superintendency. That framework, labeled "Mony," allowed for private electronic money to be issued by Ecuador's largest private bank and to circulate in only one of the telephone operators. The Sistema de Pago Móvil and Mony were mobile systems for moving commercial bank deposits (not unlike any mobile payment system of any financial institution in the world) that did not involve the creation of central-bank-issued mobile money.

On February 28, 2014, the original DE legislation was reinstated.<sup>10</sup> These changes turned the DE initiative back into a central-bank-issued mobile money scheme. The new system, with some improvements including payment system integration, operated until 2018.

## 2.2. Motivation

Official or de jure dollarization is the adoption of a foreign unit of account as the currency of legal tender. The main characteristic, in terms of the monetary operation, implies that the state – through the central bank – is responsible for the conversion of domestic bank book money into foreign-issued notes and coins, from xenodollars to dollars.<sup>11</sup>

Conversion from xenodollars into USD is costly for the BCE. Obviously, the BCE cannot print USD to meet conversion requests. Instead, it has to acquire USD by selling other assets. Hence, every xenodollar converted into dollar banknotes implies a drain on the official reserve holdings of the BCE. Payments made using xenodollars require fewer USD because commercial bank deposits are created by banks and only need to be fractionally backed by USD. Hence, the smaller the share of cash payments, the less burden placed on the BCE.

A survey by Econestad (2011) estimated that 82% of all retail payments in Ecuador were settled in cash and only 10% were bank transfers. BCE ultimately reached the conclusion that the best way to reduce the drain of its reserves due to reliance on USD banknotes was to extend its domestic electronic payment system by improving financial inclusion.

In 2011, Santiago Vásquez Cazar authored a paper (Cazar, 2011), with a title that can be translated into English as "The Transformative Power of the Mobile Money: Successful Models of Mobile Money in Developing Nations," which provided a guide to implementing a digital currency scheme in Ecuador. The author states that Ecuador's social and economic characteristics revealed a need for financial inclusion that could be successfully addressed through electronic money.

Financial inclusion generally refers to the availability and equality of opportunities to access financial services; in this case, we are focusing on access to a specific digital means of payment, DE. Financial inclusion in DE was facilitated by making it easy to sign up and use and keeping fees low. In fact, by 2009 the BCE had already laid the foundation for a successful implementation of DE through the creation of an auspicious institutional framework. In 2009, the BCE opened a public service called Sistema de Pagos Interbancario (SPI), which facilitates money transfers to savings and credit cooperatives. SPI decreased transaction costs on remittances paid by migrant workers from around the world by up to 80% by eliminating the need to use a private bank as an intermediary.

Before 2009, only private banks had authorization to access the SPI. The inspiration for DE was that if exchange between cooperatives could be done without intermediation, then the same should be possible among citizens. This is how the project known as DE arose: It was intended to be a mechanism that made it easier for citizens to carry out transactions amongst themselves without the need to resort to the procedures and fees of an intermediary financial institution.

Vásquez concludes the following:

The Banco Central del Ecuador, based on the study of the different models of mobile money worldwide, and given the social and economic characteristics of Ecuador, has generated a central model of electronic money issuance that aims to generate a virtuous system of circulation of liquidity that decreases the cost of access to money, facilitates access to financial services and promotes national production, especially in the sectors of the popular and solidarity economy [our translation]. (Vásquez, 2011, 39)

The great advantage of digitizing USD, as proposed and implemented by the BCE, was its absolute simplicity of access: users did not require Internet access, did not have to pay charges for the use of the cell phone line, and did not need to make an initial

<sup>9</sup> After Pedro Delgado became President of the Central Bank Board on March 29, 2012, he signed Regulación Nro. 024-2012, which repealed and replaced Regulación Nro. 017-2011.

<sup>10</sup> Central Bank Board President Diego Martínez signed Regulación Nro. 055-2014, which recalled and improved Regulación Nro. 017-2011, stating that DE could only be issued by the Central Bank (CAPITULO 1, Art. 1.1, literal d) and that it involved the creation of a "virtual record" for each user (CAPITULO 1, Art. 1.7).

<sup>11</sup> Xenodollars are bank-issued money that exist on the books (as liabilities) of banks in jurisdictions outside the United States and are denominated in dollars. The term was originally proposed by *The Economist* magazine in 1996 as a replacement for the etymologically incorrect "Eurodollar" (Kaminska, 2016). Dollars are notes and coins issued by the Federal Reserve of the United States, along with customer deposits in banks and other depository institutions (for simplicity, "banks") in the United States. Although central-bank-issued dollar bills are legal tender and tend to be hierarchically superior to bank dollars, the lender-of-last-resort monetary institution guarantees the one-to-one conversion between the two (Minsky, 2008).

deposit or fill out any application. Users also did not need to have previously used a financial service. The only requirement was a cell phone operating through any one of the nationwide carriers and the person's identity card, whose data was used to confirm the identity of the citizen and link them to the phone number. This was possible because a USSD gateway was granted to the Central Bank; the connection of the carriers was mandatory due to regulatory coordination between the telco regulator and the central bank (Arcotel, 2011). Additionally, the rates for the service were tremendously competitive: By not requiring a financial intermediary and having a much larger potential number of users, rates were much lower than those for similar transfers through private banking.

DE was to be fully backed by holdings of USD denominated assets, but not necessarily banknotes. The holdings could be US Treasuries or bank deposits in foreign banks (such as the Bank for International Settlements). The amount of USD banknotes required in the DE regime was determined by a simple predictive model based on historical data of the banking system's need for banknotes. As soon as a large enough excess amount of banknotes was identified to make transport costs reasonable, they would be shipped to the US and credited electronically to the BCE's account at the Federal Reserve Bank of New York.

To sum up, DE allowed the BCE to behave, in some aspects, like a commercial bank in a fractional reserve system.<sup>12</sup> BCE issued liabilities (i.e., DE account balances) as part of a balanced budget sheet. It held actual USD banknotes that were sufficient to meet expected cash withdrawals. Indeed, holding other assets (e.g., US treasuries or deposits abroad in money market funds or in foreign banks) was more profitable for the BCE, but more importantly, such collateral was more liquid in terms of the international payment system. Holding a room full of USD banknotes is not helpful if the BCE needs to make an immediate payment to Switzerland. Having the money deposited in an account abroad was more liquid for international payment purposes.

### 3. Timeline and implementation

DE was available for public use on February 27, 2015, with 9285 active accounts (Tapia, 2015). DE used the USSD protocol (Escobar, 2015, p. 60), which was important in terms of financial inclusion because the protocol allowed any mobile phone, not necessarily a smartphone, to access the system.

The process to activate an account was simple. The account was activated with a balance of 0.00 USD. Users were able to add money into the system in the same way that they would make a deposit at a bank to use checks or debit cards. There were roughly 200 cash-in/loading outlets, including Banco del Pacífico (a state-owned bank) and the BCE offices. After a while, Mi Comisariato and Almacenes TIA (two of the biggest retailers in Ecuador, with chains of stores nationwide) joined the system as cash-in/loading outlets and accepted DE as payment.

Transaction fees were competitive (Moncayo Lara and Reis, 2015, p. 35) and transactions were executed through a real-time gross settlement system, meaning transfers occurred instantly. Transfers of less than 1.00 USD between two individual accounts of the DE system involved a fee<sup>13</sup> of 0.015 USD, transfers between 1.00 USD and 11 USD involved a fee of 0.02 USD; the most expensive transfers, between 2001 USD and 9000 USD, involved a fee of 0.15 USD. In contrast, an interbank transfer between two individual bank accounts could cost up to 0.45 USD<sup>14</sup> and involved delayed net settlement (processed within 24 to 48 h). A transfer from a DE account to a private bank account cost 0.25 USD. The fee for processing payments (not between citizens, but between a citizen and a firm) through DE was 0.02 USD for transactions of less than 10.00 USD, and 0.20 USD for transactions of more than 100.00 USD (up to 9000.00 USD). In contrast, the commissions for credit cards range from 4.5 to 10% of the value of the sale (Tapia and Castillo, 2018) and the payment could be processed with a delay.

It was hoped that DE would serve multiple practical purposes. For example, there were initiatives to use it for public transportation (Banco Central del Ecuador, 2015) with the aid of special devices (Ecuavisa, 2015). DE was also employed for online purchases (Notimundo, 2016). DE even facilitated the provision of some e-government services, such as the issuance of IDs (El Universo, 2017). In 2017, the Ecuadorian government, NGOs and private firms organized the Hackathon HACK153 to develop solutions using DE: 28 innovations resulted from this campaign (Hack153, 2017).<sup>15</sup> There was even a proposal to initiate nano-credits using DE (Navisoand Yépez, 2018).

As seen in Figs. 1 and 2, the number of citizen accounts increased seven times in two years (January 2016 to December 2017), and the amount of money in DE accounts seemed to be growing until the government announced the end of DE. Following the earthquake of 2016, the Ecuadorian government launched a program whereby DE users received a rebate of 2 percentage points off the VAT they paid on goods (1 percentage point off if the payment was made on debit or credit cards). This program was intended to increase the use of DE and ran until the law that ended the DE was approved. An increase in usage followed the devolution of VAT in 2016, but this was mostly due to an increase in usage by current users, rather than the addition of new users (Rivadeneira et al., 2020). It

<sup>12</sup> Ecuador has a fractional reserve system for its private banks. Deposits in private bank accounts in Ecuador, which are used for debit card transactions, are backed by at least 2% USD reserves at the Central Bank and around 30% of minimum reserves in different liquid instruments, of which 65% have to be in the domestic financial system, including cash. In contrast, coins that circulate within the national borders and that are not accepted outside Ecuador are not backed by US dollar bills held by the BCE.

<sup>13</sup> All DE fees in this paragraph are as stated in *Resolución No. 005-2014-M*, November 6, 2014 (<https://www.seps.gob.ec/documents/20181/25522/Resolucion0052014M.pdf/ecd0f0d1-9b7e-4f73-9324-cc851a55d28d>)

<sup>14</sup> As stated in *Resolución No. JB-2014-3084* ([http://oidprd.sbs.gob.ec/medios/PORTALDOCS/downloads/normativa/2014/resol\\_JB-2014-3084.pdf](http://oidprd.sbs.gob.ec/medios/PORTALDOCS/downloads/normativa/2014/resol_JB-2014-3084.pdf))

<sup>15</sup> BCE was "the world's first central bank to open and publish the digital cash platform's standards and establish an API for innovators to develop new solutions for rural financial access, transport, web applications and so on" (Arauz, 2019).

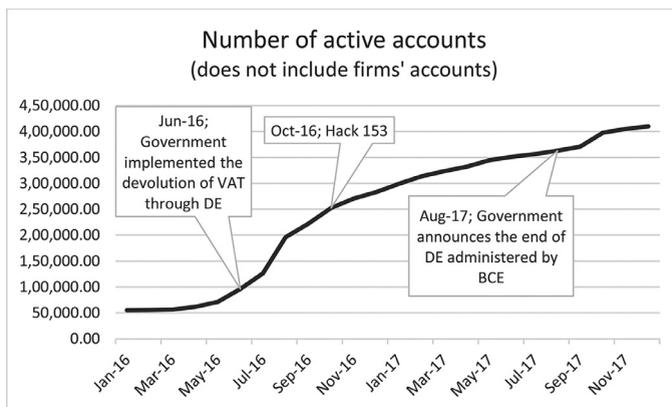


Fig. 1. Number of DE accounts.

Source: Adapted by the authors from Roman Martinez (2018, p. 39).

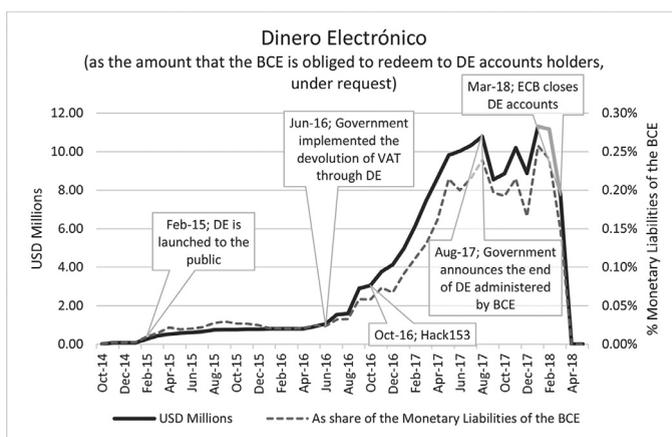


Fig. 2. Amounts in DE accounts.

Source: Adapted by the authors from Banco Central del Ecuador (BCE), “Información Estadística Mensual” (“Monthly Statistical Information”), No. 1962, 1966, 1978, 1990, 2002. Available at <https://contenido.bce.fin.ec/home1/estadisticas/bolmensual/IE Mensual.jsp>.

must be noted that until December 2017, 71% of the accounts were not used at all, and only 10% were used to make payments for goods and services, including public services (El Universo, 2017, December 3).

In August 2017, the national government decided the BCE would no longer administer the system (Anone August 30, 2017b) and that private banks would administer it instead. According to Silva (2017), this was an agreement between the banking system and the new government.

The acquiescence of the National Assembly to a presidential veto on December 27, 2017, was the decisive document that determined the end of the DE. The veto was proposed under the debates for the *Ley Orgánica para la Reactivación de la Economía, Fortalecimiento de la Dolarización y Modernización de la Gestión Financiera* (which could be translated as Organic Law for Economic Recovery, Dollarization Strengthening, and Financial Management Modernization). By the end of March 2018, the Ecuadorian DE had come to an end.

#### 4. Criticisms and responses

DE received continuous criticisms, usually in the form of public commentary but also some academic writings. Regarding the latter, some authors claimed that the banking sector was competitive enough and that nothing coming from the government could be more efficient (Espinosa Goded et al., 2014).

What follows is a non-exhaustive compilation of criticisms, mostly from local news agencies, and some responses to these concerns.

##### 4.1. Criticism 1: DE is not fully backed, so it is a parallel currency

Some Ecuadorian analysts stated that DE was designed to be a parallel or sovereign currency (Vallejo, 2017) that was intended to cover the fiscal shortfall (El Universo, 2014, June 1) and thus put dollarization at risk (Fundación 1000 hojas, 2017). Critics such

as the local association of private banks (Asobanca, 2016) challenged whether DE was backed 100% by cash, arguing that if it was not, then DE was a new form of sovereign currency.

Although DE was not fully backed by USD, it was fully backed by USD-denominated assets. According to article 101 of the *Código Orgánico Monetario y Financiero* (2014) – the highest-ranking law in monetary issues in Ecuador – DE was fully backed by liquid assets of the Banco Central. This policy was reaffirmed in an official ruling: Resolución Nro. 274-2016 of the *Junta de Política y Regulación Monetaria y Financiera* (art. 5). Moreover, DE was readily convertible to USD on demand. The holder of DE had a direct claim on USD banknotes, which made DE distinct from a typical “sovereign” or “fiat” currency. Some critical analysts argued that because DE was a claim on the BCE’s holdings of US dollars, and not a digital representation of a domestic fiat currency, that DE was not devoid of credit risk, and this may have induced some consumers to perceive it as more risky than other means of payment.<sup>16</sup> This perceived risk could have been a factor that led some consumers not to adopt DE.

#### 4.2. Criticism 2: DE cannot be used to make international payments

Another criticism was that DE could not be used to make international payments. This criticism was true, but it was not by design. DE worked throughout Ecuador because all of the mobile telecom operators in Ecuador were participants, yet no operators abroad were participants. These same limitations are observed with any other means of payment: banks require correspondents abroad to make transfers abroad, and their debit cards work only in ATMs that have agreements with their international strategic allies. Remittances from abroad could be received directly in DE, demonstrating that the limitation was only technological.

This restriction was a consequence of DE having grown from an existing system (SPI). Operational features inherited from existing systems are likely to be a common aspect of any new CBDC implementation, as systems are rarely built from scratch; even when they are, they likely contain off-the-shelf features.<sup>17</sup>

#### 4.3. Criticism 3: DE facilitates criminal activity

This argument arose from a combination of misleading news. In particular, an article from *Bloomberg* compared DE to Bitcoin.<sup>18</sup> This claim was rebutted by Ecuadorian authorities (BCE, 2014). In fact, an argument can be made that DE deters crime. It was designed to be traceable due to regulatory requirements. All transfers automatically record the identities of the sender and receiver, so it would be easy to criminally investigate the origin and recipient of any transfer. Additionally, “the fact that its users must be citizens of the country, and that sending and receiving money requires an Ecuadorian mobile phone service, effectively eliminates the possibility of illegal international digital cash flows” (Riesenfeld, 2015, par. 12).

#### 4.4. Criticism 4: DE has the potential to be a surveillance program

Alejandro Salas, then the regional director for the Americas of Transparency International, when interviewed by *The Guardian* (2014, par. 15), stated:

This can become a huge invasion of privacy because with electronic banking you can follow, even detect where the person is, and how much the person is spending. It has the potential to be a surveillance program.

Although all of the information was stored, it was handled automatically by the platform, requiring minimal human intervention, unless a judicial provision to disclose the information was presented (i.e., if authorities suspected DE was being used for illegal purposes). Thus, one can argue that there was no inherent surveillance problem associated with DE.

It is also worth mentioning that same concerns regarding data exploitation apply to information used for Internet transfers, debit cards, credit cards, credit history and emails. This is evident from recent discussions surrounding Facebook and concerns arising locally in the context of a scandal of misuse of personal information by a company owned by the then-Ecuadorian general secretary of the President’s Office in 2018 (Plan V, 2018). The case has been made that the central bank is a better steward of payments data than a private corporation would be (Lagarde, 2018).<sup>19</sup>

#### 4.5. Criticism 5: the government might force public procurement suppliers or the public in general to receive transfers from DE

One expression of this concern is as follows (White, 2014, 16):

The government insists that its new system will be “voluntary.” But when the state gives itself a monopoly on a service, blocking individuals from the voluntary choice to use another provider, the option to “take it or leave it” is not fully voluntary. If the government sincerely wishes to help the poor and unbanked, it should let private providers enter the competition, which will drive down the fees that the poor and unbanked will have to pay.

<sup>16</sup> <https://www.eluniverso.com/noticias/2014/06/04/nota/3054751/se-reglamenta-respaldo-emitir-dinero-electronico/>

<sup>17</sup> The new Canadian large value payment system, Lynx, is based on a system provided by SIA (Società Interbancaria per l’Automazione) that had limited flexibility in terms of some design attributes.

<sup>18</sup> At the time there were media reports that cash and bitcoin (or similar currencies) were the preferred means of payment for certain illicit activities such as smuggling, money laundering and human trafficking (El País, 2017).

<sup>19</sup> These sentiments are echoed in Garratt and van Oordt, 2021 and Garratt and Lee (2021).

If it desired, a government could require that firms accept a particular form of currency. Such discussions have arisen with regards to cash in places like Norway, Denmark and Sweden.<sup>20</sup> In the United States, Massachusetts and New Jersey have laws that require merchants to accept cash, and similar laws have been passed at the municipal level in cities such as San Francisco and Philadelphia.<sup>21</sup> However, very few (if any) sovereign states dictate exclusive methods of payment. In Ecuador, all public officials and many private employees are obliged to open accounts at private financial institutions for safety reasons. Moreover, government statements at the time supported the use of private payment systems in combination with DE (*El Mercurio* 2016, April 7). During the time when DE was circulated in Ecuador, several electronic payment systems were available to users (debit cards, credit cards, electronic transfers, mobile banking payments and so on).

#### 4.6. Criticism 6. DE can only be used to purchase “digital soup.”

Because cash payments were pervasive at the time when DE was launched and because many people were less comfortable with using electronic payments, skeptics who were trying to undermine DE were able to gain some traction with the assertion that because DE was digital, and hence not “real,” it could not be used to buy real things. According to two of the authors’ own recollections, the phrase “digital soup” was used to suggest that DE could not be used to buy anything of value. This criticism could have been applied to any form of digital money, but this anecdote provides a valuable lesson that adequate consumer education must accompany any launch of an unfamiliar financial product.

### 5. Final thoughts

When DE was launched, it generally was believed that DE would be widely adopted and generate “positive stimulus for the domestic economy” (*Andresen, 2014*). Ultimately, however, the scale of the deployment was not large enough, and the initiative never reached its full potential. It is well known from the literature on technology adoption in the presence of network externalities that a technology’s superiority does not, in itself, ensure adoption (see *Katz and Shapiro, 1986* as a general reference and *Gowrisankaran and Stavins, 2004* for an application to ACH electronic payments in the United States). DE needed to generate a critical mass of users (households and firms) that saw sufficient benefit in its use and would defend its permanence. Multiple areas existed where improved implementation might have made a difference.

#### 5.1. Enabling the ecosystem

The number of cash-in/loading outlets was limited, and some of them required the user to wait in line. In contrast, there are thousands of points to top-up (i.e. buy) air-time for mobile phones nationwide, including small convenience stores, drug stores, and even individual sellers waiting at traffic lights and using their own cell phones to sell cell phone credit. A small number of companies control the system for mobile phone top-up. DE could have used the same scheme, as was originally designed for the 2011 version, perhaps through an agreement with wholesale top-up resellers that had already implemented such a scheme.

Additionally, given that there was no fee for small transactions, every DE user had the potential to be a DE top-up charge agent and arbitrageur: they could receive an amount in cash and transfer it by DE. This mechanism was not announced explicitly by the Banco Central, and many users did not realize it was feasible and convenient.

Finally, cashing in was still cumbersome for users in rural areas that were not covered by any of the previously mentioned institutions. Additionally, users from urban areas often had to stand in the same line with regular bank and retail customers in order to load money into their DE accounts.

#### 5.2. Using DE for public-sector expenditures

Some public institutions’ expenditures could have been made in DE, including the payment of overtime, per diem disbursements and the like. The government announced that public workers could request a portion of their salary to be transferred automatically to DE accounts. However, the public institutions never developed a standardized procedure for doing so. As a result, in 2017, only 490 public workers (roughly 0.1%) received their salary in DE accounts (*El Comercio* 2017).

#### 5.3. Commercial bank opposition

Incumbent banks perceived DE to be a threat to their payment business. The perceived threats included loss of revenue from processing payments and a potential reduction in the size of their customer base. The incumbent banks were vociferous in calling out the possibility of an evolution of DE into a sovereign currency (*Asobanca n.d.*), which implied a de facto de-dollarization that would bring inflation and instability to the Ecuadorian economy. This was the banks’ main public criticism, as clearly stated by the BCE’s general manager: “[they] wanted to mix the use of a payment system available in mobile phones with a de-dollarization

<sup>20</sup> <https://www.nytimes.com/2018/11/21/business/sweden-cashless-society.html>

<sup>21</sup> <https://www.lexisnexis.com/en-us/products/state-net/news/2019/07/08/new-laws-require-merchants-to-take-cash.page>

**Table 1**  
Comparison between BIMO (as proposed in 2019) and DE (as of its end in 2017).

Features			BIMO	DE
Technology requirements	Internet		Yes	No
	Smartphone		Yes	No
Other requirements	Bank account		Yes (basic accounts can be opened without documentation).	No
Transaction limits			USD50 per transaction, USD100 per day, USD300 per month.	No
Backing	Backed by		Private banks' deposit accounts	Liquid assets of BCE
	Redeemed by		Private banks	BCE
Provider			BANRED	BCE
Settlement			Real-time gross	Real-time gross
Fees (USD)	Transaction between participants (individuals, not firms)	USD0.01–5.00	0.09	Free
		USD5.01–10.00	0.09	0.02
		USD10.01–50.00	0.09	0.10
		USD50.01–100.00	Not available	0.10
		USD100.01–9000.01	Not available	0.20
	Redeeming at an ATM		0.45	0.35

Source: Previous paragraph, Resoluciones of the Junta de Política y Regulación Monetaria y Financiera: Resolución No. 274–2016-M, Resolución No. 533–2019-F, with elaborations by the authors.

process” (La Hora 2016). Ultimately, the banking sector’s opposition contributed significantly to DE’s demise, as admitted by the new government’s BCE general manager (Artola, 2017).

The Ecuadorian experience suggests that the support or acquiescence of the private banking sector is crucial to the success of any CBDC initiative. Indeed, most advocates of CBDC do not seek to undermine their two-tier banking systems.<sup>22</sup> Rather, they see CBDC as a potentially necessary evolution of their strategy to meet their existing mandate to provide payment services.<sup>23</sup>

Many countries are simultaneously working with their commercial banks to modernize their retail-payment systems, and at the same time they are contemplating CBDCs. As DE demonstrates, this could create a tension that will be difficult to manage if not properly addressed.

#### 5.4. Incentives for adoption

DE accounts were activated with a balance of 0.00 USD. Arguably, in order to jump start the use of DE, individual users should have been incentivized with positive starting balances in new accounts. Coronado and Potter (Coronado and Potter, 2020) advocate this policy in their proposal for a new type of regulated entity called a digital payment provider. These entities would be narrow banks that provide accounts to the public in near-central bank money. The accounts would be, as the authors suggest, similar to the synthetic CBDC proposed by Adrian and Mancini-Griffoli (2019). Coronado and Potter propose seeding the digital accounts with an initial grant of \$500.

#### 5.5. Financial inclusion

The goal of financial inclusion is now in the hands of the private banks. BIMO is a mobile wallet developed by Banred, a clearing-house owned by a consortium of banks, for people with bank accounts in Ecuador. People without existing bank accounts can open an account in a few minutes, without submitting any documentation (The Business Year/Ecuador 2020, p. 73). Table 1 provides a comparison of BIMO and DE.

The BIMO system was launched in October 2019. As of May 2020, 96% of BIMO’s 89,000 accounts were associated with previously existing savings and checking accounts, while only 4% were new accounts created within BIMO. As of July 2020, BIMO had not reached 50,000 downloads in Google Play<sup>24</sup> (compared with the 100,000 accounts that DE had before the devolution of VAT through DE was implemented; see Fig. 2). Whether this new system will better serve consumers’ needs remains to be seen.

#### Declaration of Competing Interest

No conflicts of interest.

<sup>22</sup> Multiple studies have addressed the design features of CBDCs that help to preserve the two-tiered banking structure. See, for example, Kumhof and Noone (2018) and Kahn, Rivadeneira and Wong (2018) and Bindseil (2020).

<sup>23</sup> See also the recent collaborative report on CBDCs (Bank for International Settlements, 2020).

<sup>24</sup> <https://web.archive.org/web/20200720042955/https://play.google.com/store/apps/details?id=banred.twinnovateit.com.bimo&hl=en>

## References

- Adrian, T., Mancini-Griffoli, T., 2019. The Rise of Digital Money. International Monetary Fund, Washington FinTech Notes No. 19/001 (July 15).
- Andolfatto, D., 2019. Assessing the Impact of Central Bank Digital Currency on Private Banks. Federal Reserve Bank of St. Louis Working Paper Series.
- Andresen, T., 2014. The central bank with an expanded role in a purely electronic monetary system. *Real World Economics Review* (68) 66. <http://www.paecon.net/PAEReview/issue68/whole68.pdf>.
- Arauz, A., 2019. The Data of Money. The Transnational Institute January 28.
- Arcotel, 2011. Memoria Técnica de la Solicitud del Permiso para la Explotación de Servicios de Valor Agregado para la Operación del Sistema de Pagos y Transacciones Móviles. Solicitante: Banco Central Del Ecuador.
- Artola, V., 2017. "Verónica Artola: 'No estamos cediendo ante la banca'." *Revista Líderes*. 18 September 2017.
- Auer, R., Boehme, R., 2020. The technology of retail central bank digital currency. *BIS Quarterly Review* (March) 85–100 March.
- Auer, R., Cornelli, G., Frost, J., 2020a. COVID-19, cash, and the future of payments. *BIS Bull. No. 3*. April.
- Asobanca, 2016. "Posición Frente Al Dinero Electrónico." June 4. <http://asobanca.org.ec/prensa/noticias/posicion-frente-al-dinero-electronico>
- Auer, R., Cornelli, G., Frost, J., 2020b. "Rise of the central bank digital currencies: drivers, approaches and technologies." *BIS Working Papers* No 880. August.
- Bank of England 2020, "Central bank digital currency opportunities, challenges and design." March 2020, Discussion Paper.
- Bank for International Settlements 2020, "Central bank digital currencies: foundational principles and core features." Report no 1 in a series of collaborations from a group of central banks.
- Bindseil, U., 2019. Central bank digital currency: financial system implications and control. *Int. J. Political Econ.* 48 (4), 303–335.
- Bindseil, U., 2020. "Tiered CBDC and the financial system." ECB Working Paper Series No. 2351
- BCE (Banco Central del Ecuador). 2014. DBCE-0360-2014.
- Banco Central del Ecuador, 2015. *Loja, Ciudad Pionera en el uso del Dinero Electrónico*. Mar 13.
- Bech, M., Garratt, R., 2017. Central Bank Cryptocurrencies. *BIS Quarterly Review* 55–70 Sept.:
- Bordo, M.D., Levin, A.T., 2017. *Central Bank Digital Currency and the Future of Monetary Policy*. Hoover Institution Economics Working Paper 17104.
- Cazar, Santiago Vásquez. 2011. "El poder transformador del dinero móvil: modelos exitosos de dinero móvil en países en desarrollo." *Apuntes De Economía* No. 60, November.
- Chiu, J., Davoodalhosseini, M., Jiang, J., Zhu, Y., 2019. "Central bank digital currency and banking." Working paper.
- Cook, C., 2010. Comment "The future of capitalism – profits and growth." *Oil Drum*. April 16.
- Coronado, J., Potter, S., 2020. Reviving the potency of monetary policy with recession insurance bonds. *Peterson Institute for International Economics Policy Brief* 20-5.
- Cueva, S., Díaz, J.P., 2019. "The case of Ecuador." *Becker Friedman Institute Working paper*, January.
- Econestad, 2011. "Estudio de Mercado para Determinar las Potencialidades de uso del Dinero Móvil en la Población Urbana y Rural del Ecuador 2012"
- Ecuavisa, 2015. "Transporte urbano en loja comienza funcionar con dinero electrónico." April 13.
- Escobar, C., 2015. *Estudio De La Implementación de Una Red De Dinero Electrónico a Través de La Plataforma Celular En El Ecuador, Comparándola con El Uso De Tarjetas de Débito*. Master diss. Pontificia Universidad Católica del Ecuador.
- Espinosa Goded, L., Paredes, P., 2014. "Dinero electrónico: inocente chaucera o peligroso nuevo dinero?" *Koyuntura*. No. 5. May 2014: 1-7.
- Fernández-Villaverde, J., Sanches, D., Schilling, L., Uhlig, H., 2020. "Central bank digital currency: central banking for all?" *NBER Working Paper # 26753*, February. Fundación 1000 hojas. 2017. "León Roldós Alerta Sobre el Riesgo del Dinero Electrónico para la Dolarización." April 29.
- Garratt, R. Lee, M., 2021. "Monetizing privacy." *Federal Reserve Bank of New York Staff Reports*, Number 958, January.
- Garratt, R., van Oordt, M., 2021. Privacy as a public good: a case for electronic cash. *Journal of Political Economy* 129 (6). doi:10.1086/714133, forthcoming.
- Garratt, R., Zhu, H., 2021. *On Interest-Bearing Central Bank Digital Currency with Heterogeneous Banks*. Mimeo.
- Gowrisankaran, G., Stavins, J., 2004. Network externalities and technology adoption: lessons from electronic payments. *RAND J. Econ.* 35, 260–276.
- Grym, A., 2020. Lessons learned from the world's first CBDC. *Bank Finland Economics Review* 8. doi:http://nbn-resolving.de/urn:nbn:fi:bof-202009152340.
- Hack153, 2017. "Resultados."
- Kahn, C., Rivadeneyra, F. Wong, T.-N., 2108. "Should the Central Bank Issue e-Money?" *Federal Reserve Bank of St. Louis Working Paper Working Paper* 2019-003A.
- Kaminska, I., 2016. *Remembering the Xeno Market*. *Financial Times – Alphaville* 15 April 2016.
- Katz, M.L., Shapiro, C., 1986. Technology adoption in the presence of network externalities. *J. Political Econ.* 94 (4), 822–841.
- Notimundo, 2016. "Supertienda Ecuador: una herramienta digital que impulsa el mercado nacional"; April 13th.
- Keister, T., Sanches, D., 2019. "Should Central Banks Issue Digital Currency?" *Federal Reserve Bank of Philadelphia Working Paper* 16-32, June.
- Kumhof, M., Noone, C., 2018. "Central bank digital currencies - design principles and balance sheet implications." *Bank of England, Staff WP No. 725*.
- Lagarde, C., 2018. "Winds of change: the case for new digital currency." *Speech*.
- Lane, T., 2020. *Money and Payments in the Digital Age*. CFA Montréal Fintech RDV2020 February.
- Legard, N., 2011. *Nueva Arquitectura Financiera para el Desarrollo en América Latina y Ecuador*. *Universitas* 14. Enero/Junio, pp. 43–71.
- McAndrews, J., 2020. The case for cash. *Latin American Journal of Central Banking* 1 (1–4) Volumelssus.
- Minsky, H., 1986. *Stabilizing an Unstable Economy*. Yale University Press, New Haven.
- Moncayo Lara, J., Reis, M., 2015. Un Análisis inicial del dinero electrónico en Ecuador y su impacto en la inclusión financiera. *Cuestiones Econ.* 1 (25), 13–43.
- Navisoy Yépez, J., 2018. *Propuesta De Nano Créditos En Ecuador Dirigida a Estudiantes Universitarios y Comerciantes Informales*. Undergraduate diss. Pontificia Universidad Católica del Ecuador.
- Riksbank, "E-krona Project, Report 1," 2017.
- Riksbank, "E-krona Project, Report 2," 2018.
- Riesenfeld, L., 2015. "Podrá la Moneda Virtual de Ecuador Impedir el Lavado de Dinero?" *InSightCrime*. April 13.
- Rivadeneyra, I., Suthers, D.D., Juarez, R., 2020. *Mobile Money Networks with Tax-Incentives*. Mimeo.
- Schilling, L., Fernández-Villaverde, J. Uhlig, H., 2020. "Central bank digital currency: when price and bank stability collide." *NBER Working Paper #28237*, December.
- Silva, S., 2017. "Acuerdos con la Banca". September 5. Accessed September 18.
- Spurrier, W., 2012. "¿BCE Emitirá Dinero Electrónico? Analisis Semanal. Año XLII #06. February 14, 2012.
- Tapia, E., 2015. "Las 10 cosas que debe saber acerca del dinero electrónico." *El Comercio*. March 3.
- Tapia, E., Castillo, A., 2018. "Locales deben aceptar todas las tarjetas." *El Comercio*. March 24.
- Todd, R., Rogers, M., 2020. *A Global Look at Central Bank Digital Currencies. From Iteration to Implementation*. The Block, Research August.
- Vallejo, A., 2017. "Por qué no, el dinero electrónico." *El Comercio*. May 26.
- Vásquez, S., 2011. *El Papel Transformador Del Dinero Móvil: Modelos Exitosos De Dinero Móvil en Países en Desarrollo*. Banco Central del Ecuador. *Apuntes de Economía*.
- Vela, M., 2016. *Debo y pagaré en papeles*. *Revista Gestión* n 234.
- Villagómez, M., 2018. *Los Títulos del Banco Central (TBC) Como Medio de Pago de Obligaciones y el Equilibrio de la Caja Fiscal en el Ecuador 2016* Masters' Thesis. Universidad Técnica de Ambato.
- White, L., 2014. *Dollarization and Free Choice in Currency*. Department of Economics; George Mason University Working Paper No. 14-44.
- La Hora, 2016. "BCE: dinero electrónico no despega por culpa de otros." September 17.
- The Guardian, 2014. "Ecuador's 'digital currency' explained." September 11.
- Anone "La banca privada manejará el dinero Electrónicos." *El Comercio*. August 30, 2017.
- Plan, V., 2018. "La polémica por los descuentos de GEA reaviva por debate por la privacidad de los datos." October 22.
- El Mercurio, 2016. "Por qué incentivar el uso de medios electrónicos de pago." April 7.

El País, 2017. "Por qué los ciberdelincuentes utilizan bitcoins para pedir los rescates." September 27.  
 El Universo, 2014. "Respaldo de dinero electrónico, en debate en Ecuador." June 1.  
[El Comercio](#), 2017. "Sueldo de 490 empleados, en dinero electrónico". Redacción Negocios. 27 January.  
 El Universo, 2017. "1.310 certificados electrónicos ha emitido el Registro Civil en su página web." July 20.  
 Bank for International Settlements. 2018. "Central Bank Digital Currencies" March.

### *Further guidance and evidence for our readers*

Arauz, A., 2018. "Asobanca no se compromete a meta de \$800 millones en reducción de billetes." Observatorio De La Dolarización. January 4.  
 Vistazo, 2019. "Transacciones con billetera móvil tendrán límites diarios". August 20.  
 Anone "71% de cuentas de dinero electrónico, sin uso en Ecuador". El Universo. December 3, 2017.  
 BBC, 2014. "Ecuador Gives Details of New Digital Currency." August 30.  
 BCE (Banco Central del Ecuador). 2021 n.d. "Proyecto BID – BCE No. ATN/ME-10389-EC." Accessed June 21, 2019.  
[Delaney, R., 2018. Sweden to Bring Forward Launch of State-Backed Digital Currency e-Krona. NewsBTC October 26.](#)  
 Deloitte, 2019. "Chasing cashless? The Rise of Mobile Wallets in the Nordics."  
 Dennehy, J., 2015. "Ecuador launches new digital currency – but most residents know little about it." The Guardian; February 26.  
 Dyson, B., Hodgson, G., 2016. "Digital cash. Why central banks should start issuing electronic money." Positivemoney.org.  
 Ecuavisa, 2016. "Beneficio de devolución del iva será a través de dinero electrónico." June 9.  
 Arauz, A. 2017. "Dinero Electrónico estatal en el mundo." Observatorio De La Dolarización. December 22.  
[Hanking, A., 2018. A Central Bank Digital Currency Could be Around the Corner, if you Believe the IMF. MarketWatch November 14.](#)  
[Hodgson, G., 2014. State Issued Digital Currency in Ecuador?. PositiveMoney September 1.](#)  
 Ketterer, J., Andrade, G., 2016. "Digital central bank money and the unbundling of the banking function." IDB Discussion Paper. No. IDB-DP-449.  
 Mancini-Griffoli, T., Martínez Peria, M., Agur, I., Ari, A., Kiff, J. Popescu, A., Rochon, C., 2018. "Casting light on central bank digital currency." IMF Staff Discussion Note. SDN/18/08.  
[Meaning, J., Dyson, B., Barker, J., Clayton, E., 2018. Broadening Narrow Money: monetary Policy with a Central Bank Digital Currency. Bank of England Staff Working Paper.](#)  
[O' Grady, M., 2014. Ecuador's phony bitcoin ploy. Wall Street Journal August 24.](#)  
 Román Martínez, M., 2018. El Dinero Electrónico, Como Medio De Pago en El Sector Público del Ecuador. Master diss. Universidad Central del Ecuador.  
 Rosenfeld, E., 2015. "Ecuador becomes the first country to roll out its own digital cash." CNBC. February 9.  
[Silva, M., 2019. Con la Billetera Móvil se Podrá usar Hasta USD 1 576 Mensuales. El Comercio August 20.](#)  
 Superintendencia de Bancos y Seguros . 2014. "Medición del uso y Acceso a los Servicios y Productos Financieros del Ecuador."  
 SRI 2021 n.d. "Devolución del IVA por uso de Medios Electrónicos de Pago".  
 Sveriges Riskbank 2018. "Ingves: the e-Krona and the payments of the future." November 6.  
 Tapia, E., 2019. "Junta monetaria aprobó la tarifa para transacciones en billetera móvil." El Comercio. August 14.  
 World Bank Group, Bill & Melinda Gates Foundation, Better Than Cash Alliance. 2014. "The opportunity of digitizing payments."  
[Wyss, J., 2015. Ecuador's New Virtual Currency is a Source of Pride, Worry. Miami Herald August 12.](#)  
 Metro Ecuador, 2016. "Bancos privados deben sumarse al dinero electrónico." December 14.  
 El Telégrafo, 2018. "Bimo reemplazará al dinero electrónico." January 5.  
 Anone "El sistema de Dinero Electrónicos dejará de ser administrado por el Banco Central." El Telégrafo. August 30, 2017.  
 Anone "Julio José Prado sobre dinero electrónico: "Objetivos son crear una nueva plataforma para la banca privada y un ecosistema de pagos para reducir uso del efectivo" (AUDIO)." EcuadorInmediato. September 6, 2017.  
 Anone "Julio José Prado: La tarifa de e-dinero solo cubrirá costos operativos." El Universo. September 6, 2017.  
 Dialoguemos, 2018. "La banca privada estaría lista a trabajar en dos meses con el dinero electrónico a través de Banred". January 4.  
 El Comercio, 2019. "La billetera móvil ya funciona." October 4.