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La Biometrica – a next level payment system: a conceptual view

Abstract

Almost everyone agrees that present day banking systems and payment authorization techniques are far from perfect. This qualitative and conceptual paper attempts to redefine some roles of the central bank in financial systems and economic stability and proposes a new and innovative banking system authorization process. This new process will help to curb most financial irregularities and banking failures by offering central banks a draconian interventionist technique in retail banking that could shape the future structural development of the financial system and the economy and curtail crises. Identity is key to banking. It should, therefore, be of utmost importance that a good banking system be identity based. Hence, one should use a biometric authentication system for access control and operational management by a reorganization of the modus operandi in bank processing systems.

Keywords: biometric payment system, biometric banking, financial innovation.
JEL Classification: E42, E49, E58, Q55.

Introduction

Without a doubt, the current financial systems need improvement. Politicians and central banks have worked hard for success in financial systems with bailouts and regulation. The regulation of the banking and financial services sector has been the leading cause of innovation or the lack of it. A very popular belief amongst academics is that innovation and deregulation in the financial markets lead to intensive and extensive re-examination of the conduct of monetary policy actions where innovative products exist. Re-examining the conduct of monetary policies will imply a re-definition of the modus operandi in central banks.

A common theme in financial innovations is the effort to reduce the risk caused by the heightened volatility of interest rates. This paper proposes the establishment of a financial innovation that intends to impact the conduct of a central bank's management information system concerning its relations with investment banks and its role in the implementation of retail banking functions. As I have proposed earlier (Ishola, 2013), central banks' acquisition of retail and other commercial banking functions from commercial banks should leave us with two types of banks – central banks and investment banks.

A definition of financial innovation will help the understanding of the concepts to be presented in this paper. In recent times, there has been an outpouring of literature on how financial innovation should be defined. While some researchers like Gubler (2011) may argue that financial innovation processes give rise to relatively inefficient new markets because their concept of financial innovation has been blurred by non-altruistic economic systems, I say a true financial innovation must be born out of the desire to improve the financial system from an altruistic perspective. So, in this paper, I would like financial innovation to be thought of as a practical reality force responsible for driving financial systems worldwide towards financial and economic efficiency – a process change in the management information system of money.

Section 1 of this paper will include some historical facts and forces that may underlie the need for La Biometrica, and Section 2 will provide an explanation of this financial innovation. Section 3 will comprise my concluding remarks while Final Section discusses policy implications of La Biometrica as well as suggestions for future research.

1. Some history and forces underlying this financial innovation

My main concern, in this paper, is with innovation, which requires placing transformational events in their proper sequence of occurrence. Some of us have a few factors to blame for the Great Depression. Factors like excessive competition in the provision of banking services and the speculative activities and conflicts of interest were born out of active participation of commercial banks in investment banking since the 1920s. After the Great Depression, regulatory systems were designed to correct the weaknesses in the banking industry. The main elements of the banking legislation of the early 1930s included the separation of commercial and investment banking (whereby commercial banks were prohibited by the U.S. Banking Act of 1933 from engaging in most underwriting and other investment banking activities because it was perceived that commercial banks would invest, primarily, in short-term, self-liquidating commercial loans and other liquid assets), restrictions on the payment of interest on deposits; deposit insurance and restrictions on entry; and the maintenance of geographic restrictions on branching, were designed to create a smoothly running banking system without "wild cat" banks.

The question of whether or not banks should be absolutely controlled by federal governments had been a long standing politico-economic debate and it is still not resolved. My proposed national banking system

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(Ishola, 2013) had been practiced in the past by quite a few countries, Broaddus (1985) helps us to understand. One of them, the United States of America, chartered two banks, the First Bank of the United States from 1791 until 1811 and the Second Bank of the United States from 1816 until 1836. These banks had outlets all over the country and exercised central banking functions, but were, unfortunately, targets for people who sought to restrict the growth of the federal government.

Kroszner and Rajan (1994) disagreed with the idea that the practice of commercial and investment banking should be mutually exclusive, but agreed that concealed or misrepresented information in the case of Chase National Bank through the financing of the acquisition of the Fox Motion Picture Company by General Theaters and Equipments in 1929 involved a conflict of interest. There is no doubt that conflict of interest is responsible for the incentive and the ability of commercial banks to defraud public investors and depositors (as in the recent case of Cyprus) by mis- and under-representing the quality of the issue they underwrite.

As far back as the time of Ricardian economists, the balance between savings and investment was a major concern among political economists and governments. The government's ability to gauge and monitor the growth of savings may maximize the sum total of the utility function of the nation. Neoclassical economics focused relentlessly on utility maximization. It is high time we propagated altruism. Simon (1993) showed that intelligent altruists are fitter than unintelligent and selfish individuals. He explained that, since the finitude of rationality is ineradicable and because intelligent altruists benefit more from their docility, they will be fitter than intelligent and selfish individuals. Altruism will, therefore, supersede selfishness.

The financial crises of recent times have again highlighted the paramount influence of stable financial systems and demonstrated the inadequacy of the status quo measures of central, retail and investment banks. During a talk in September 2010, Thomas Jordan, the vice president of the Swiss National Bank, expressed that monetary policy measures and instruments alone are inadequate for an effective check and prevention of systemic crises, and made his position clear that a strategy geared towards medium and long run price stability is vital for the implementation of monetary policies. A stable financial system is a necessary prerequisite for price stability, he said.

Banking failures are also to blame for financial crises. Rolnick and Weber (1984) explained that the exposure to term structure risk was responsible for most free bank failures. The net worth of banks was affected by falling asset prices because free banks held state bonds and other risky assets as a large portion of their portfolios – what they term as the falling asset price explanation of free bank failures. We have seen bank failures similar to the type experienced in the free banking era (1837-1863) again and again. The continuing fear is that some of these banks will close below par.

Further, the impact of contagion cannot be overemphasized. Kroszner and Rajan (1994) claimed that the Glass-Steagall Act of 1933 put an end to the trend towards universal banking by prohibiting the involvement of commercial banks in the securities business, but failed to analyze the impact of the contagion brought about by moral hazard and information asymmetries as a product of the excessive greed born out of the profit-maximizing motive of commercial banks doubling as investment banks.

Goodhart (2011), in his attempt to help us better understand the future roles of central banks, raised a question on whether or not central banks should be in charge of systemic financial stability. His answer depended on the essence of central bank as an institution. Most of us will agree with his expression that the traditional focus of stabilization had been the central bank's lending capacity and ability to create liquidity. As it had been over time, complications always arose when the mandate of (some of) the institutions in charge of liquidity management differed from that of the financial stability authority. It is highly necessary for a financial stability authority to be given sole command over liquidity management. While I agree strongly with his emphasis that central banks should work closely with governments to better serve systemic stabilization role, I disagree with his statement that central banks should not take the lead on questions about innovation, product design and safety.

Human societies are motivated by financial and economic gains. Our perception on economic gains changes, however, since our experiences and expectations are continually modified by outliers in trends and new developments. Broaddus (1985) explained that accelerated technological progress in the computer and communications industries as well as a secular increase in the inflation rates accompanied by high and volatile interest rates were very significant factors in the motivation behind financial innovation.

For governments, tax revenue changes could be a force to reckon with for this financial innovation, in addition to reduction of deadweight transaction costs resulting from the presence of several finan-

cial intermediaries and commercial bank charges. Merton (1995) believed that innovation would, at least, continue at the pace it did before 1995 because of improving technology and reduced transaction and learning costs. The cost of learning the new and more sophisticated system is concave with respect to the number of people learning the system (see Figure 1).

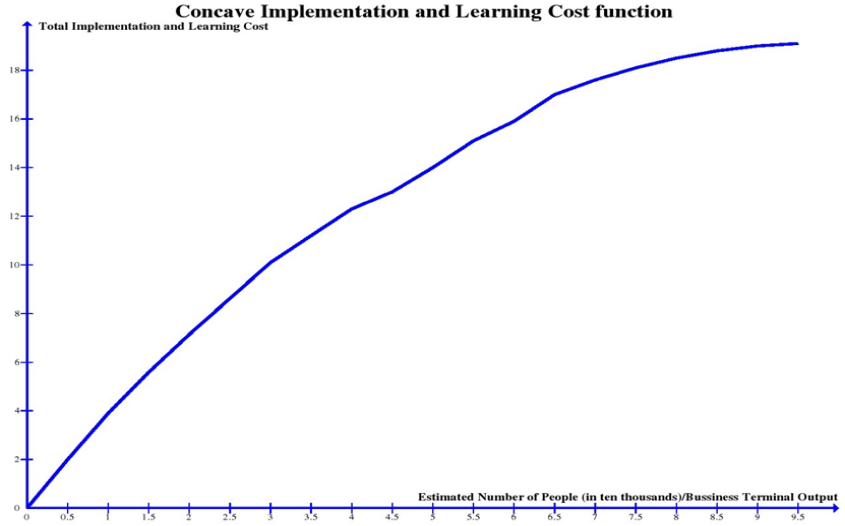

Fig. 1. A computer sketch derived from conceptual expectation of the total implementation and learning cost with respect to estimated number of business terminal output units

2. La Biometrica

This Section explains how the biometric authentication payment system, La Biometrica, should work. First, central banks must decide which type, or which combination of biometric identifications (face, iris, fingerprint, ear, retina scanning) they intend to use. Then, the chosen biometric should be captured by live scanning for each user, and template accounts set up and stored in the central automated payment clearing house. As soon as a user places his/her biometric on a biometric scanner in any payment (processing) outlet, a match will be established with the person's records if it already exists; the request will be authorized or rejected, depending on the instructions for or against the user. If the user's biometric is not recognized, she or he becomes a new user and a new record will be extracted and processed so that the biometric template for the new individual may be enrolled in the system. Next, the template, with other templates collected from several biometric houses (BHs), is sent for processing at the biometric process centers (BPCs) and stored in the centralized repository for the biometric region. Then, plug-in access should be provided to business terminal output (BTO) units for querying. Details of all historical financial records should be recorded as part of the details of the individual whose biometric data have been taken.

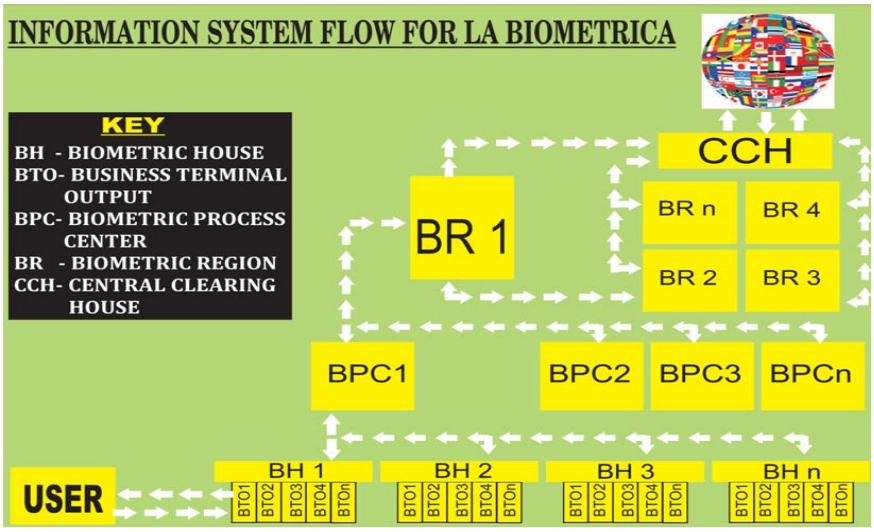

Fig. 2. Drawing derived from a conceptual expectation of information system flow

Biometric authentication technologies like face, finger, hand, iris and speech recognition are a means of identifying and verifying personal identity by measuring and analyzing unique human physical

or behavioral characteristics. These technologies are commercially available and already in use, mostly, for security and law enforcement. This pattern recognition system operates by acquiring biometric data from individuals, then, extracts a feature set from the acquired data and compares it set against sets in a database.

The advantage of a biometric payment authentication system is that it processes transactions very rapidly, and the transaction costs are significantly lower (about 75%) than the use of payment cards. It also enables speedier checkouts and improves security (Ishola, 2013). Ratha et al. (2001) outlined the underlying strengths of biometrics-based authentication by showing how the consequences of insecure authentication may be catastrophic.

La Biometrica proposes a separation of commercial from investment banking. The adoption of La Biometrica would not be the first time commercial and investment banking would be separated. The Glass-Steagall Act of 1933 initiated it. Another instance was the National Banking Act of 1864, which did not permit banks to handle common stocks of any kind. In addition, La Biometrica proposes its own rules for investment banks and their relations with central banks.

No investment bank should declare more in asset worth and dividends than its total investment sum. At any time should an investment bank fail to remit dividends promised to investors, by the date promised, all rights and privileges of such bank to its wealth and assets should be taken from it and appropriated by the central bank. After all debts owed to investors have been settled by the receiver (the central bank), the balance of the assets and funds from its wealth may be put to better use for the country's infrastructure, manufacturing or other development as the government deems fit, they could be auctioned to some other willing, able and non-defaulting investment bank(s).

Since individuals will have to be responsible for upholding the central banks which are implementing the provisions of La Biometrica, it is of utmost importance to avoid a clash of interests (individual versus national). For this reason, no employee of the central bank shall be an officer, director, or shareholder of any investment bank, and, before holding a position in the central bank, a person shall attest under oath that s/he has complied and will comply with this requirement. Any such officer violating this rule should be immediately relieved of her/his duties, and her/his assets relinquished and appropriated to the central bank.

The central bank will serve as the sole rule-making and financial regulatory agency for investment banks and advisers, clearing agencies, statistical rating organizations, securities information processors, commodities futures trading commission, foreign exchange dealers, swap execution facilities, and other financial institutions.

If an investment bank is to merge with or acquire other investment banks, the financial stability clause of the Dodd-Frank Act should be borrowed so that any risk of the proposed acquisition or merger does not negatively affect the financial or economic stability of the country and its financial system. The Dodd-Frank Act of 2010 was designed to promote financial stability and protect consumers from abusive financial services practices.

There should be an end to progressive taxes and equal access to varying amounts of capital. This would impose fairness in credit access without discriminating against people by income class or social rankings. Over time, the poor or the owners of rather small capitals enjoy less access to capital and have been continually oppressed under the pretense of justice because the rich and middle class, through the various banking requirements and checks, have oligopolized access to credit while the poor remain locked in the "no credit access" inferior status. Economists have often agreed that equality breeds equality, and, in a similar manner, inequality breeds inequality. Countries like France have passed oppression policies that will make the rich give more to treasury in their effort to make their country more egalitarian. These kinds of laws will only make the suppliers of wage labor more dependent on social security welfare provisions, since the richer will take care of the provision of public goods, no matter what, thanks to the government.

As most of us understand, the difficulty of recovering capital is a reason for the restriction of equitable access to capital. How hard could it be to recover capital if credit was given with absolute care and a very high probability of return? Why, then, do we have bad debts? Most individuals who borrow money do so for selfish, non-altruistic reasons. La Biometrica promotes altruism, and the truth of the matter is that borrowing by individuals and corporations must stop, unless if it is for altruistic purposes. Another reason for this is that entities who can borrow money do not have to borrow money because they have collateral and, instead of borrowing, may convert the collateral to capital from equity or investment.

In this organization, there will be more banking outlets but a smaller geographical area for the whole banking process, since the centralized clearing house and its regional offices will serve as monitors for all the La Biometrica branches throughout the nation.

Protection against repudiation is absolutely guaranteed with biometric authentication. It is my conviction that most people in this modern, sophisticated world believe that the traditional authentication policy based on credit card name + number + expiry date + card verification code (CVC) combination or user Ios + passwords + security question(s) combination has become inadequate, since these details may be easily transmitted off-the-web.

Liu and Silverman (2001) explained that the security field uses three different types of authentication: something you know (a password, personal identification number (PIN), or a security question); something you have (a smart card, a token or a card key); or something you are (a biometric). They further discussed a major problem with biometrics – how and where to store the user's template. Storage of user templates involves a great deal of privacy and confidentiality concerns. Von Graevenitz (2007) suggested that replacing possession (cards) and knowledge (pins) authentication with only biometrics for more convenience does not automatically lead to a higher security level. He, however, proposed that the optimal application of biometric authentication in the financial industry should still require at least one more authentication method combined with knowledge and or possession features or that is demanding two biometric features. He proposed further that creating a central database with biometric data would be quite critical under privacy laws in relation to payment systems and ATMs (for the case of La Biometrica, BTOs). Therefore, biometric authentication should be combined with smart cards in order to fulfill the high expectations in biometric technologies in the finance and banking sectors.

One could argue that any system may be subject to attacks. Password authentication systems are prone to brute force dictionary attacks. Biometric authentication systems, however, require considerable time and technical know-how, and they may need a security agent's involvement to be compromized. If an attack is to be premeditated on a biometric authentication system, an arrest will be imminent because the response time of a near-by security implementation agency will be shorter than the time needed to implement the security break, unless the security agency will be party to the break.

In addition, biometric details are intrinsic properties of the respective individuals that own them. They are, therefore, difficult to forge or duplicate (except through cloning, which is illegal), and may not be lost or stolen. The biometric device to be used should have the minimum possible false acceptance rate (FAR) of all current technologies at the time of implementation. The FAR of a biometric device is the percentage of imposters incorrectly matched to a valid user's biometric.

A valid argument could be the case of error incidences due to aging, cuts or scars, but biometrics do not change as an individual ages. In any case, correction measures can be in place for the immediate correction of new features as soon as they are detected. There should be traces of identification elements like DNA that can still match an individual with his/her template. An edit of the biometric should be initiated and the user re-enrolled with the same template as he/she had before the error.

On the matters of security, it is important to prevent coercion at BHs on BTOs. These should be heavily guarded with several access level permissions and authorization at the BR level. For example, let us imagine a scenario where a system administrator is to enroll a user at a BTO in his BH of domicile, but a gun points to his head to match the template to an illegitimate user. The solution should be clear and simple. The enrollment process could be done several times. For example, the user should be required to report at another time, on a different day and with a cross-check enrollment by another system administrator. At this second time, however, the whole employee base at the user's BH of domicile should have been completely replaced from head to bottom. There should be a random BH, BPC, BR staff assignment shuffling and reshuffling at regular intervals (say, biannually) to avoid compromizing system administrators by any kind of suasion from individuals with ill will or from desperation for control, espionage and fraud. Also, no one from staff should be assigned to the same BH more than once during a La Biometrica enrollment season. This system also separates central bank staff understanding and participation in any season and ensures that, throughout the enrollment life cycle of any user, no one may be able to replicate any detail (even if such technologies exist) of any single user.

I agree that, in case of breach to a national biometric authenticated financial system, replaceability will be a problem, and if data are used for ill will, there may be a systemic collapse – a term La Biometrica hopes to erase from the Economics lexicon. If, for example, the CCH was destroyed by an act of God or exploded by terrorists or taken over by armed robbers, recovery of template records should be easy. First, all CCHs must have a continually updated replica of template records in a secure location as a back-up plan which can be switched to in case of breach to the CCH. Second, the field of computer forensics has developed to such an extent that data may be recovered from a physically damaged data source, provided the data source is within reach. Third, for privacy reasons, an emergency enrollment season may be called and template val-

ues regenerated. Theft, malfunction or destruction of hardware at BHs can be solved by terminal replacement.

Conclusion

This paper is proposing the establishment of a financial innovation that intends to impact the conduct of a central bank's management information system with respect to its relations with investment banks and its role in retail banking functions implementation. To establish a better understanding of financial innovation, the meaning of the term needs to be properly defined in the context of its purpose. Financial innovation can be thought of as a practical reality force responsible for driving financial systems worldwide towards financial and economic efficiency – a process change in the management information system of money. The proposed system, La Biometrica, employs altruism in its quest to achieve a perfectly secure system of financial and banking system administration. It proposes a world with only two types of banks – central banks and investment banks. Commercial and retail banks will be non-existent, and the central bank will be the sole financial regulatory institution in charge of systemic financial stability, financial innovation and product design and safety.

Policy implications and suggestions for future research

For once, inappropriate use of bank credit for speculative trading will no longer be a possibility, since commercial banks will no longer exist and the other non-central banks (investment banks) will be closely monitored for compliance with due practices. The concepts presented in this paper and the conclusions which can be drawn from it suggest several avenues for future research on central banking policies and management information systems, as well as the relationship between central banks, investment banks and investors. One area of research suggested earlier in this paper will be concerned with the risks investment banks may now undertake in the new light of the non-existence of commercial banks. Regulation of investment banks may, from the commencement of La Biometrica, be a national subject of concern.

Significant control measures can be imposed on investment banks. For example, the ceiling or prohibition of interest rates in certain sectors may be as it was during the time of Henry VIII (Adam Smith, 1949). There should not be a difference between the legal interest rate and the market rate. The singular interest rate should be a pre "marked up" determined rate for bank investors and shareholders. According to Adam Smith and neoclassical economists, the higher the profits of stock (interest rates), the lower the wages of labor and the more ruined a country becomes.

Central banks will be able to achieve inflation targets a lot better than they have been because they will no longer forego operational independence to vary short term interest rates, since commercial banks will no longer exist. And, as always, moral suasion will be very important for public education and the implementation of La Biometrica. Ease of integration and relative low cost of implementing biometric systems is a plus.

Since commercial banks will, then, be non-existent, appropriation of bank taxes is an additional or saved revenue. For the purposes of taxation and the declaration of dividends, investment banks should be made to declare their asset worth periodically, and a wealth tax and capital gains tax should be remitted to the government treasury. This can be used for national growth and development.

An area for future research will be the investigation of the possibility of a systemic collapse ensuing from the compromise of the centralized clearing house for biometric payment and process authentication. Also, what happens in remote, unattended, plug-in applications to La Biometrica found in web based e-commerce and point of sale (POS) terminals? Will hackers have enough time to make several attempts and damage the equipment, or violate the integrity of a remote client before they are detected?

Crotty (2009) blames the recent global financial crises on badly regulated and flawed institutions and practices of a globally integrated system of international and interconnected bank conglomerates. I believe that, whenever fashions change, people flow with the trend. Will these international and interconnected banks not reorganize their operations so that they control the majority of the shares in investment banks and, therefore, garner enough power to compete with, or frustrate, central banks in the implementation of monetary policies? What worries me is that the central bank's control of foreign direct investment (FDIs) and investor confidence may be heavily compromized.

Looking forward, we have a lot to discover in the relationship between a fully operational central retail banking with biometric payment authentication systems, and in the impact of open market operations on the market.

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Appendix

BH: Biometric House.

BPC: Biometric Process Center.

BR: Biometric Region.

BTO: Biometric Terminal Output.

CCH: Central Clearing House.

Enrollment season: The interim between the start of enrollment and its close.

Enrollment: The process of collecting biometric data from a user and, then, converting it to a template for future reference.

False Acceptance Rate (FAR): The percentage of imposters incorrectly matched to a valid user's biometric.

Process: The act of collecting user biometric data and, then, storing them in a template for future access.

Template: A mathematical representation of biometric data.

User: A citizen of a country where La Biometrica is implemented.

Verification: The authentication process whereby a biometric system matches captured biometric against its unique stored template value.