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Heba Mekawy
Economics Department - FEPS, FUE, heba.mekawy@fue.edu.eg

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Development of the Payment Systems: An Economic Need or a Technological Deed[1]

Heba Ashraf Mekawy
Department of Economics, Faculty of Economics and Political Science
Future University in Egypt

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Corresponding Author:

Heba Ashraf Mekawy
Heba.mekawy@fue.edu.eg

ABSTRACT

This paper is mainly concerned with showing most of the economic aspects related to both banking transactions, payments, and eventually the payment systems and their development. The economic aspects are discussed on both the macroeconomic and the microeconomic one as well. The discussion in the paper also covers the economic implications of the payment systems and the economic rationale behind their development. The paper has concluded that the economic need of the financial market is the main driver behind the development of payment systems. They also serve as outcomes concerning the well-functioning of the financial market. Thus, the technological development of payment systems is more of a means to achieve market needs rather than an automatic process that is purely driven by continuous technological updates.

[1] This paper is extracted from my Ph.D. dissertation on Banking Transactions Landscape, at the Department of Economics, Faculty of Economics and Political Science – Cairo University. This paper was extracted and specifically tailored for publication in this journal, Future Journal of Social Science.

I. Introduction

Payment systems have long been treated from a technological perspective to mediate the payments that are executed in the financial market. However, with the constant technological update in the banking and financial field economic aspects started to force themselves on the scene as a reason and an outcome. Mostly all the updates of the payment systems follow an economic rationale and motive rather than being only based on technological aspects and concerns. Payment systems are designed to ease the processing of banking transactions where the banking transactions and the payments themselves were not treated in literature with much interest as they are considered a consequence of the transaction, which means it is the actual execution of the transaction by transferring money from one side to the other.

After the financial crisis in 2008 and the awakening of risks such as liquidity risk and systemic risk which were known but were not heavily tested until then. Banking transactions and their payments gained importance in literature, and this has increased day after the other with technological progress in payment systems. This paper aims at answering a question concerning whether the economic aspects of payment systems are worth being taken into consideration in the process of development of the payment systems or is it only a consequence of technological progress. The methodology used in the paper is a theoretical approach to collecting all the related theories and relations between banking transactions and their menus from an economic perspective in addition to discussing the quantitative rationale behind some implications of the payment systems that are driven by economic needs from the financial market.

Thus, the paper is divided into three parts, first, an investigation of the economic aspects of banking transactions in general the second part deals with theeconomic perspective of the payment system and the final report examines the economic implication of the technological update of transactions and payment systems as well.

II. Economic Aspects of banking Transactions

This part will deal with the macroeconomic review for the related aspects of banking transactions and payments especially the ones that are related to the central bank's role and policy issues. This is besides the microeconomic perspective especially in explaining the network effects of payment systems, transaction costs, moral hazard, economies of scale, and scope that are related to the development and expansion of the banking transactions and payments landscape.

i. Macroeconomic Aspect of Banking Transactions

There are macro-economic aspects of the banking transactions related to policy terms and the central bank operations as follows:

1) Monetary Policy Issues

When it comes to banking transactions and payments the primary economic issue that comes to mind is the monetary policy and how related factors such as money supply demand and inflation are affected.

a. Money Supply:

Since the money supply is defined as a stock of money that comprised the total amount of monetary assets available in an economy at a certain time which includes the monetary aggregates, majorly the payments are done either from cash or demand deposits in banks by diverse ways of executing the payments. With advanced banking transactions, other

compositions of money supply like monetary aggregates are affected by such advancement (ex: treasury bills) (HKM Authority, Quarterly Bulletin 2002, 17-18).

Banking transactions and payments that result from it have a direct effect on the money supply. Payments are a form of changing money from being a stock with the payer to a flow in the banking sector and the economy and the supply of money is thus the source of that flow. Consequently, the money supply stays in the form of a stock up till a transaction is executed and some of it is used in a payment to assure the transaction completion. If there is a significant percentage of the money supply is used in payment execution this would consequently raise the velocity of money tremendously and thus its turnover is expected to be high.

Consequently, the banking transactions and payments affect the whole economic activity This is clear by applying the well-known exchange equation $MV = PT$ [2]which reflects that (M) money supply multiplied by the velocity of money is equal to the price level multiplied by the number of transactions (Humphrey, Volume 23-260, 18-19). The right-hand side reflects the aggregate level of economic activity (which can use GDP as an indicator). Payments executed instantaneously by turn will allow raising the velocity of money in the economy and given that GDP is nearly fixed along the year so by raising the velocity of money will cause the money supply to decrease to maintain the balance of the equation (Humphrey, Volume 23-260, 18-19). All this requires effective payment systems to conduct payment execution efficiently, safely, and with no delays.

b. Money Demand:

Money demand is defined as the desire of individuals or institutions (banks for example) to hold assets in money terms usually cash and demand deposits (very liquid assets). The definitions can also be extended to assets that can be liquidized into money to include the other monetary aggregates other than the monetary base (Introduction to Monetary Policy, Section 1).

Since banking transactions and payments must be done in money terms so the demand for money is usually affected by its size and expansion. Theoretically, Keynes (Chapter 2, The Demand for Money) in explaining money demand has mentioned motives that affect the demand for money one of them is the precautionary motive where people keep money due to future changes and uncertainty. There is also the speculative motive where the demand for money is dedicated to future investments. Finally, the transaction motive, here people and institutions (in this context banks) demand money to conduct the transactions n conclude them with payments. This motive is a daily inevitable and yet subject to increase with the widening of the landscape of transactions. The demand for money in this case is called theoretical transaction demand and it is very much linked with timing, the period needed for payment execution, payment instruments, and innovation.

A payment instrument (ECB: Payments and Market Glossary, accessed date 2022) is a tool or a set of procedures enabling the transfer of funds from the payer to the payee. It is believed that "there are varieties of payment instruments, each with its characteristics depending on the type of relationship and transaction between the payer and the payee" (ECB: Payments and Market Glossary, accessed date 30 Nov. 2022). There are direct cash payments (paper money and coins) that are executed on spot instantly and finally. Consequently, the payee can immediately use the cash received for further cash payments. Furthermore, "there are also non-cash payments; one of its important examples is the transfer of funds between bank accounts" (ECB: Payments and Market Glossary, accessed date 2022). Through this instrument, the payer (the bank or a customer through his bank) initiates a fund transfer from

[2] Classic monetarist equation of money supply by Irving Fisher

his bank account to credit a payee's bank account. The accounts of the two transaction sides may be held with a single bank or with different banks.

There is another classification for some noncash payments the Credit-based ("credit push") instruments which are a type of instrument that directly add credit to the bank accounts and is processed by the payer, this type includes intra- account bank transfers also referred to as direct credit. While there is also debit-based ("debit pull") instruments which are debit tools that deduct from the payer account in favor of the payee. Consequently, among the main debit-based payment instruments are direct debits, card payments, and cheques (ECB: Payments and Market Glossary, accessed date 2022).

Another classification for the means of payments is being in a physical form as cheques or an electronic one such as the various electronic transfers or mixes of both physical forms and has electronically stored values such as cards. One of the fast-emerging electronic means of payments especially in the last ten years is electronic money ("e-money") (Kokkola, European Central Bank 2010). It is considered money as it has a monetary value that is represented as a claim on the issuer that stores the monetary value issued on an electronic device and is then used as an accepted means of payment (Kokkola, European Central Bank 2010, 25-33).

Thus, the payment instrument innovation can increase the demand for money in its broad definition (other than cash) and its various forms. This allows for raising the rate of payments and consequently the transactions. This can also promote payment landscape expansion either horizontally across borders or vertically within various markets. Consequently, given the disadvantages of holding cash (ex: the opportunity cost of forgone interest) the central banks are interested in guaranteeing the smooth functioning of payment systems and in the incentive effects of system design that serve the efficient use of money and liquidity in the economy (Payments and Monetary and Financial Stability, 6-7).

c. Inflation:

Inflation is a continuous rise in the general level of prices for goods and services in an economy for a prolonged period. This means that there will be an implication over the purchasing power of money. In cases of increasing inflation rates, the purchasing power of money erodes leaving the payer with the need to pay more amounts for the same goods and services (Dwivedi 2007, 389-390).

According to the definition, inflation is a particularly important associating issue and concern given the execution of banking transactions, especially in cases of payment delays. Therefore, in cases of a long time taken in the execution of any transaction, this causes the raise of the opportunity cost for the payee. The cost bore by the payee is represented in the late arrival of a payment, so here he receives a payment that might be less than the market prevailing price due to the time difference between the transaction agreement and its payment to be effective and so the difference in inflation rates between the two dates.

Consequently, this might contribute later to slowing down the payment pace and circulation within an economy due to the decrease in the number of transactions performed especially the ones related to production activities which might also affect slowing down economic growth (Biden 2012, 2018-2020). Another issue related to inflation is the float in an economy. Given a percentage of inflation prevailing in an economy the float which is the result of the time difference in the process of debiting the payer and crediting the payee must be as minimum as possible so that opportunity costs or losses due to inflation are not incurred by any side of the transaction (Biden 2012).

Not only does inflation affect the demand for money needed to execute transactions but it also hurts the other banking products and services[3] as well, such as the investment in bills and bonds as these government debt products become less attractive except if it offers high interest to compensate the high level of inflation which will consequently add pressure to the economy.

Consequently, central banks pay great attention while performing their monetary policy role to make inflation within its acceptable limits, to maintain the same levels of money demand, and not to affect the transactions negatively (Johnson 1998). Also clearing and settlement time is a top priority for barks to be at their minimum range. Accordingly, central banks for these reasons develop their payment systems to decrease settlement time so that payments are settled once processed (Johnson 1998, 15-19).

2) The Issues Related to The Role of the Central Bank

The central bank has the objectives of price stability and smooth functioning of interbank payments and in a broad definition it takes a special interest in pursuing monetary stability, all this to make sure that money can perform its functions efficiently. Consequently, achieving financial stability is included in the concerns of the monetary policy to achieve its targets. Financial stability assures prevention of the cases of contagious losses among banks or disruptions to payments and any other components of the financial infrastructure (like clearing houses).

In cases of stress, the central bank is prepared to face such cases by having the capacity to increase the supply of its liabilities to banks (which means extending credit to banks in various forms) to ensure payment execution and continuity of the settlement process. In addition to this in certain severe conditions, it might exercise its role as the lender of last resort to save banks from failure and consequently prevent any abrupt distribution of systematic risk across banks (ECB: Payments Systems Glossary, accessed date 30 November 2022). Besides these policy roles, central banks are fully responsible for monitoring the market movements and participants (banks') interaction and providing all means and systems that help in the payments processing and operation.

The central bank is majorly responsible for assuring public confidence in the banking sector and its payment services and systems. Money circulation in the banking sector must be done safely, rapidly, and without excessive cost through effective payment, clearing, and settlement systems. Through these systems, central banks intend to avoid systemic risk, for financial stability purposes. In addition to guaranteeing the security of the payments processed, the public trust in the currency as the settlement asset; and preserving the transmission channel for monetary policy (ECB: Payment Systems Glossary, accessed date 30 November 2022).

ii. Microeconomic Aspects of Banking Transactions

Some microeconomic aspects have a coincided importance in the cases of banking transactions, its payments, and their expansion such as:

1) Network Effects

Payments to be processed must be done through systems that depend on networks to connect banks and thus facilitate the transfer of funds and payment settlements. In addition, "the network economies focus on strategic interaction between firms and its impact on consumers' choices as regards products and services" (ECB: Payments Systems, accessed date 30 November 2022). In any network, adding new participants increases the value of the network

[3] Other investment options that bank offer rather than holding accounts and deposits, such as bills, bonds, foreign exchange, card issuance, mutual fund, etc.

for all of them; consequently, adding more participants means that they are ready to pay for the network services and accept them. This is called the network effect. One of the implications of this is that the use of the service by one participant benefits the other participants indirectly whether they own or use the network.

This type of side effect is known as a network externality which can be either positive or negative. As the number of participants (banks) in the process of exchange increases, market liquidity increases (Kokkola 2010). There will be a positive effect on the payment order flows and its increase in volumes, which will lead to a decrease in the marginal cost of transactions (Kokkola 2010, 131).

Given these benefits, networks can create difficulty in innovation, competition, and market entry. On the supply side that is presented by the service provider (usually the central bank), network effects make high entry barriers and difficulty in gaining market shares as this is a centralized service. On the other hand, on the demand side (that is presented by system participants, there is somehow a percentage of rigidities and reliance on the central provider that may occur (ECB: Payment Systems, accessed date 30 November 2022). In these cases, there are no available options for going to another system or another service provider. There is some advice in this aspect that prefer the idea of separating the provision of services from the provision of physical infrastructures and allowing for the private sector to operate with central banks in the stages of service providing that do not bear high risks. (ECB: Payment Systems, accessed date 30 November 2022).

2) Economies of Scale Scope in the Payment Process and its Cost Effects

Transactions and payments and their services are growing to be more of an industry of their own within the existing banking industry. Consequently, as available industries it experiences both economies of scale and scope:

a. Economies of Scale:

Theoretically, they exist where the average unit cost declines as output rises. It is often measured in terms of cost-output elasticity, which indicates the percentage change in the cost of production that causes from a 1% growth in output[4] (ECB: Payment Systems, accessed date 30 November 2022). In cases of the availability of economies of scale, the marginal cost is less than the average cost and cost-output elasticity is fewer than one. In the case of diseconomies of scale, the marginal cost is larger than the average cost and cost-output elasticity is more than one (ECB: Payment Systems, accessed date 30 November 2022).

Cases of diseconomies of scale occur when doubling output will cost more than double. The process of banking transactions, payments, and their execution and settlement show substantial economies of scale. (ECB: Payment Systems, accessed date 30 November 2022). Costs of participating in payment services or systems decrease with the entrance of more participants. Another thing is that provision of payment services -whatever it is- needs elevated levels of initial investment and sizeable fixed costs are being born in the operation. Although it has positive implications it may also have negative aspects such as:

- The blend of major economies of scale and network dynamics can lead to an improved level of market concentration and significant establishment of payment systems within a country (or a larger geographical area). While concentration might be beneficial for the overall efficiency of the market, there is the risk of the misuse of such concentration as this could lead to a natural monopoly. This can have negative effects such as reducing the incentive for cost control or technological or organizational innovation. These cases

[4] Where the cost-output elasticity equals one when marginal and average costs are equal.

of inefficiencies take place usually in markets with no competition, where there are barriers to entry (ECB: Payment Systems, accessed date 30 November 2022).

- Barriers to entry can be explained under some reasons one of them is that payment services that serve the banking transactions and payments execution need large set-up costs. Another reason is that any market entrant; as a service provider other than the central provider, needs to attract a specified number of participants and a particular volume of business before becoming a viable alternative for conducting payments. This is difficult in such a centralized service and can be done in very advanced economies and cannot be taken as a general case (ECB: Payment Systems, accessed date 30 November 2022).

b. Economies of Scope:

Another associated issue is the economies of scope, based on its concept it has resemblances with the economies of scale but both perceptions are not related to each other. Furthermore, "economies of scope refer to efficacies related to demand-side changes for diverse types of products. Thus, the efficiency of production may improve as the number of products produced increases" (Kokkola 2010). This concept arises when the total output of a single production unit that produces two distinct products is greater than the total output that could be achieved by two production units producing those two products separately. Kokkola further states, "If the single unit's total output is less than that of the two individual production processes, diseconomies of scope are present" (Kokkola 2010, 133-135).

This concept is also related to costs, so if at a given level of inputs, a unit producing two diverse products generates more output than two autonomous units producing those two products distinctly, the single unit will be able to produce both products at a lower cost than the two independent units combined (Kokkola 2010). In payment clearing and settlement services, this can be applied as the single unit that provides these services, which is typically the central bank, is cost-effective as it provides all these services at a lesser price as it has already invested the prominent level of fixed cost. Therefore, a specific provider may be able to provide a package of interrelated services at a smaller cost than a group of service providers.

3) Natural and Quasi-Monopolies

Economies of scale and scope do not only affect the cost, but it also has an important implication over market structures and economic welfare (Kokkola 2010). Theoretically, a given market that enjoys strong network effects and given economies of scale, creates a case of natural monopoly and this is true for payments, clearing, and settlement services, and their systems as they have the propensity to create natural monopolies or quasi-monopolies in the market through the central bank.

A natural monopoly occurs when one unit can produce what can cover the entire market's demand at a lower total cost than other producing units (Kokkola 2010). This means by default that the market is imperfect since the basic characteristics of market competition and incentives to innovate are not present (Kokkola 2010). This can turn in a negative direction in case the monopolist provider uses its market position to practice its terms and welfare.

In the case of central banks providing payment, services this is clear when there are no pricing options or limited liquidity choices that suit the various participating banks in the banking sector. Thus, the balance between providing the service and controlling the market must be clear in front of the policymakers at the central bank (Kokkola, Tom. op, cit. 136).

4) Moral Hazard

Moral hazard is a behavioral phenomenon; it is the case that can happen when an action is taken by economic agents who maximize their utility causing a disadvantage to other agents and they bear nothing of the loss that results from their choice. Agents who perform such a phenomenon, behave less cautiously and are partly or fully insulated from risks that encourage them to repeat it more than once in the future. Moral hazard may prevail in the process of payments and their execution processing (Millard 2008). Some banks deal with their available liquidity to achieve the ultimate benefits regardless of delaying important payments to be executed to other banks, which would lead that one bank is maximizing its interests without considering the other participant banks.

The latest payment, clearing, and settlement infrastructures enable economic agents to initiate and process substantial amounts of payments. The development of such infrastructures has helped in raising the efficiency of the financial markets (Millard 2008, 67). These systems should help the central bank to monitor the behavior of the banks and all types of risks. Moreover, this infrastructure itself must not create a source of risk, and participants in a system that are suspicious of moral hazard should not harm the smooth functioning of that system (Millard 2008, 70). In case the bank that performs this phenomenon is big enough and with considerable volume and value of transactions, it could hurt the system, with domino effects for other participants (Millard 2008, 70).

In worst cases, this behavior could threaten the most dangerous type of risk; systemic risk which might even get worsen into a financial crisis (Millard 2008, 75). Financial turmoil and its potential economic effects might then attract rapid policy responses under severe pressure. In these cases, the central bank has a crucial role to save the banking sector and consequently the economy (Millard 2008, 65). This can take many forms like providing emergency liquidity to address the destabilizing effects of shocks or a public bail-out.

In that regard, the probable dimension and effects of systemic risk in payment, clearing, and settlement systems depend on the effectiveness of the measures taken to limit moral hazard (Millard 2008, 73) and how the balance is maintained between efficiency and safety in day-to-day operations.

5) Transaction Costs

Transaction costs are one of the microeconomic issues that accompany the analysis of the expansion in the transactions and payments landscape. According to the neo-classical approach exchange of money needs facilitation which consequently needs to be small in value compared to the returns for each side of the transaction to encourage more transactions to be executed and prevent holding money in its highest liquid form.

Transaction costs can take either one of two main forms or both. The first is due to the factor of time where the cost increase with increasing the time elapsed to execute the exchange. The second one is the spread between the prices of buying and selling in the market where the difference between the two prices must not be large (Williamson, 1981, 560). Costs can be caused also by a lack of exchange partners, fraud, risks, communication problems, and Information unavailability. This also applies to the cost of obtaining liquidity. Where banks should have equal and low-cost access to different liquidity extension alternatives, choices, and sources so that the cost of obtaining liquidity and the opportunity cost of liquidity options is at its minimum[5] (Williamson, 1981, 549).

[5] See also for further detail: Williamson, Oliver E., Transaction Cost Economics and Organization Theory. American Journal of Sociology Vol. 87, No. 3 (Nov., 1981), 548-577.

As a result, transaction costs must be minimized as much as possible to encourage the use of banking transactions and their payment rather than performing payments in cash directly. Payment systems may help tremendously in decreasing such costs and thus encourage the expansion of the banking transaction landscape.

iii. Other Economic Issues

There are other micro and macroeconomic issues related to banking transactions, payment processing, and their serving systems that have indirect effects on them. And these can be as follows:

- One of the considered issues is the **fiscal policy harmonization** with monetary policy. The fiscal policy is not under the control of the central bank but as the central bank is the government's bank, it gets involved in issues that are related to the central depository of the government debt instruments, issuing the instrument, selling, and repayment (Williamson, 1981). All this creates banking transactions that affect the composition of the money supply and liquidity in the economy. Consequently, it must work by the monetary policy targets, therefore the balance between the two policies is of high importance to prevent contradicting targets (as in the open market operations) (Williamson, 1981).
- **Banking transaction expansion** tackles another issue which is institutional changes. This requires changes in the infrastructure of payments services and instruments at the central bank side besides creating specialized units in this field (as in the transaction banking units).
- **Foreign Exchange**: cross border payments are denominated in many currencies which is why to serve a good plan for the transaction landscape widening this will need payment services and systems that deal with national as well foreign currencies. This will have a positive effect on reducing risks related to payments executed in foreign currencies which have an embedded time lag problem due to the differences in time zones, so this requires its settlement to be with the least delay possible.

Given that transactions and payments reflect real economic activity, so it needs to expand, good payment services and systems to ease the execution of the transactions reduce delays, and win the confidence of the payer and the payee (Williamson, 1981). These factors have influenced lot raising the volume and pace of trade among countries and helped a lot in attracting investments. And since having efficient payment services and systems is the main requirement for allowing the expansion of banking transactions and its landscape it will be dealt with in section four in more detail (Williamson, 1981).

III. Economic Aspects of Payment Systems

This part will discuss payment systems from their economic perspectives rather than their technical ones. This includes payment systems, their definition, their types, and issues related to payments processing, settlement, and finality that have an impact on the economy. There will be clarification in this part for the role of central banks as payment systems operators and sources of policy planning and development for banking transactions and payment landscape expansion.

i. Overview of Payment Systems

Banking transactions and payments need systems to allow for their processing these systems are called payment systems. The payment systems have more than one definition a primitive definition for it can be: *"The way to transfer amount of money from the buyer to the seller in a*

given transaction. Accordingly, goods and services are exchanged upon payment finality. Another definition according to Borio et al. (1992) is as follows: *"That set of arrangements for the discharge of the obligations assumed by economic agents whenever they acquire control over real or financial resources"* (Bank of England, Conference, 2007, 5).

A payment system is defined according to the bank of international settlements as: *"a system that consists of a set of instruments, banking procedures and, typically, interbank funds transfer systems that ensure the circulation of money. This includes payment instruments, processing, transactions, and settlements, which cannot be done except under certain market arrangements within sets of international standards" (*A glossary of terms used in payments and settlement systems 2003, 38).

These arrangements mentioned in the definitions are provided by one of the central banks or any affiliated units that offer settlement assets accepted by all banks. These assets are considered central bank liabilities and it is called the "central bank money" upon which the settlement is then done across it. After all the money of customers deposited in banks is then considered as a lump sum the commercial bank money is then deposited as accounts in the central bank for settlement purposes.

The payment system's efficiency in operation (processing of the payments and it is settlement) raise high concerns especially for policymakers due to its interdependence with many units inside the central bank or outside it (i.e.: banks) and that it affects the flow of money in the economy. Payment systems are characterized by some features:

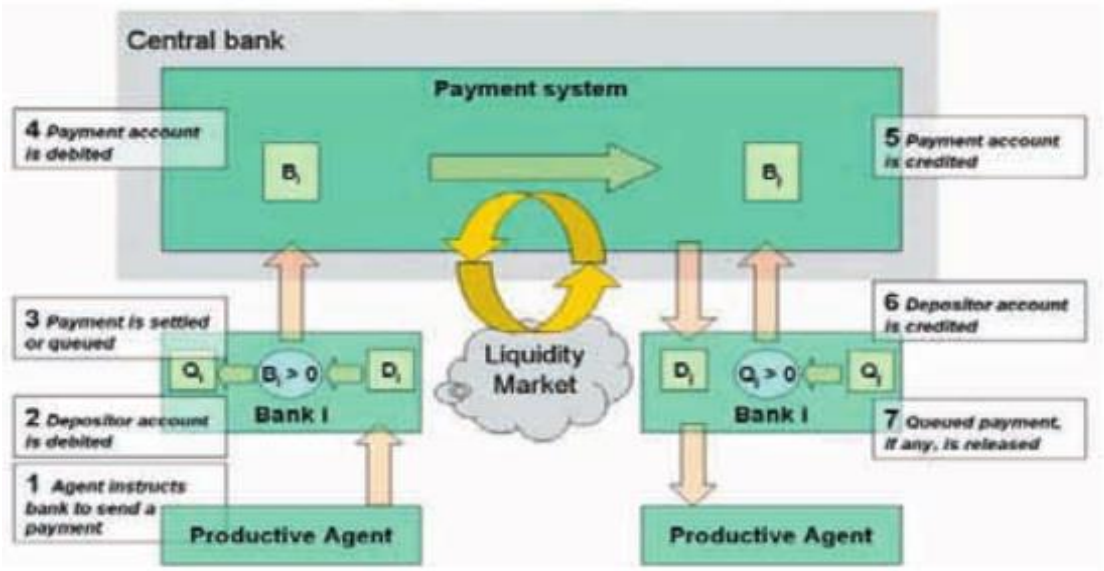
- Payment systems include the main system that is called "Interbank funds transfer systems" which offer the service of transferring funds between banks. These systems come in two main forms: large-value transfer systems (usual transactions in large values and time-critical) and retail systems (collection of the high volume of payments with small values).
- Payment systems rely heavily on detailed information in their processing. The processing of funds transfers requires the transfer of information between the payer and payee banks, where a payment order is initiated for that purpose. The payment orders usually credit one side and debit the other side of the banking transaction. This procedure includes identification, reconciliation, and confirmation of payment orders.
- Processing of payment is concluded then with the actual transfer of funds between the payer's bank and the payee's bank which is the settlement. The rules, the operating procedures, and the legal environment may differ in defining the concept of payment's finality, it is known according to the bank of international settlement, where settlement is made by the transfer of central bank money, and final settlement occurs when the final (i.e., irrevocable, and unconditional) transfer of value has been recorded on the books of the central bank[6] (Real-time gross settlement systems", report, March 1997, 3-6).
- A payment system assures complete payment execution. Whatever the means of payment used payment systems finally settle the payments in money terms. Based on this these systems enjoy the function of clearing and settlement. But in cases of electronic payments, checks, cards, securities …etc., the clearing function is needed to assure the availability of money from the payer side to the payee and then the transfer occurs and thus the settlement. It is like changing the form of the obligation into the money form. It is usually cleared on a *T+1* basis but settled on a *T+0* basis. These types of payments are related to retail payment systems so each participant bank in the system

[6] The payment order is processed according to predefined rules and operating procedures.

is debited and credited by more than one payment, so the payments are collected and then cleared between banks on a netting basis (Real-time gross settlement systems", report, March 1997, 3-6).

- Payment systems are a market change-driving tool. Progress of payment systems helped a lot in expanding markets due to the ease by which payments are processed and thus the ease of exchange reflected in the increase of trade. Payment system help participant banks to daily monitor money movement across their accounts. The previous aspects can be clarified in the following figure (Real-time gross settlement systems", report, March 1997, 3-6).

Figure 1



Source: *Beyeler et. al, 2007*

In this figure the linkage between market transacting agents and their banks through how the account of one side is debited and the other side is credited; besides this has a direct effect on circulating the liquidity of the market as shown with cyclic arrows in the middle of the figure (Soramäki 2012, 26). A conclusion can thus be drawn that the big banks with high balances, in this case, contribute directly to the market by providing it with the needed liquidity unlike small banks with low balances which tend to draw liquidity from the market. Also, when a market is liquid, this allows banks to operate through the payments independently otherwise if the liquidity started to decrease there will be more dependence on the banks to finance each other through the incoming payments rather than depending on the illiquid market. This may pose threats of queuing unsettled payments in case of liquidity shortages or mismatching.

In that respect, payment systems differ from one country to another in the stages of development after all the ultimatum is the guidelines and best practices laid down by the leading countries in this field. Payment systems in the USA and Europe are considered countries somehow instructive as these countries were leading in this field and they passed many stages of development before reaching these advanced forms of payment systems.

1) Types of Payment Systems

Payment systems have the main backbone which is the interbank fund transfer and settlement systems and other systems that complete the payment execution process, and they are considered ancillary systems.

a. Interbank Fund Transfer and Settlement Systems:

These systems can be classified into two types, designated time (or deferred) settlement systems (DNS) and real-time gross settlement systems (RTGS), depending on how settlement is conducted. In the deferred settlement system, in which the final settlement occurs at the end of the business day, these systems settle payments on a netting basis. These types of systems do not have the certainty feature of payment settlement except at the end of the day. In a real-time, gross settlement system, on the other hand, the settlement of funds occurs on a transaction-by-transaction basis. An RTGS system is defined according to the bank of international settlement as *"a gross settlement system in which both processing and final settlement of funds transfer instructions can take place continuously (i.e., in real-time). This system provides continuous intraday finality for individual transfers"* (Real-time Gross Settlement Systems, 10).

The payments can be processed once there are available funds or if there are no sufficient funds then the payment might be rejected (can be re-sent later when funds are available). Payments can stay also in queues according to the queuing rules where payments due are visible to the payer and the payee bank up till there are available funds. This is done based on predefined rules, agreed upon between the system and the participating banks. The payment in some cases can pass by more than one of the previous processing stages (Real-time Gross Settlement Systems, 10). These systems put high stress on liquidity which is why central banks must provide the service of extending credit, for a period of less than one business day this is called intraday credit to face liquidity shortages.

Intraday liquidity requirements raise principal issues for both the central bank and banks. As for the central banks, they must choose the ultimate way to provide such credit with less risk (ex: credit risk). Banks are more concerned with the costs that they will incur given the credit extended by the central bank. Liquidity costs here that banks are concerned with are not just the direct funding costs[7] but also the opportunity costs as the interests forgone or tying up collateral or securities and being unable to re-sell them in the secondary market. In addition to this, banks must be very actively concerned with managing their payment flows in a timely way.

b. Ancillary (Supporting) Systems:

Ancillary systems are systems that are linked with settlement systems at one or more assigned times. It is a system in which payments (retail payments or securities) are handled, while the execution of the monetary obligations is settled in the settlement system, typically a Real-Time Gross Settlement System. These systems are supporting systems and are responsible for the clearing of a group of transactions that are related together and are not directly denominated in money terms. The types of transactions executed through these systems are cards payment, checks, securities, other bills bonds, stocks, and so on. These systems are needed to check the papers and obligations, revise them, make the netting between the payer and the payee, and send the result of this for settlement to the fund settlement systems mentioned above. Well-known examples of such systems are:

[7] Cost incurred to gain liquidity sources.

- **The central security depository (CSD):** is defined as "*a facility (or an institution) for holding securities, which enables securities transactions to be processed by book entry. Physical securities may be immobilized by the depository or securities may be dematerialized (i.e., so that they exist only as electronic records). In addition to safekeeping, a central securities depository may incorporate comparison, clearing, and settlement functions. This is accompanied by securities settlement systems (SSS) to facilitate the delivery versus payment option."* (Glossary v.0.3,Target 2 Securities, European Central Bank Report).
- **Retail payment system:** this is defined as a funds transfer system that manages a large volume of payments of low value in such forms as cheques, credit transfers, direct debits, and ATM transactions (Revised Oversight Framework for Retail Payment Systems, European Central Bank, 2)
- **Systems serving the Clearing Houses:** A clearing system is defined as a set of practices whereby financial institutions present and exchange data and/or documents concerning funds or securities transfers to other financial institutions at a unique location (clearing house)[8]. The procedures often also include a mechanism for the calculation of participants' bilateral and/or multilateral net positions to facilitate the settlement of their obligations on a net or net basis (A glossary of terms used in payments and settlement systems, 14).

IV Economic Implications and outcomes of Payment Systems

This part discusses the economic application that is the motive for developing the payment systems and is at the same time an outcome of developing such systems to follow international standards. This is like risk management, liquidity management and monetary policy, and financial stability.

i. Risk Management within Payment Systems

Payment systems in general are subject to many risks such as **credit risk** in the case that one party within the system is unable completely to cover its financial obligations due to initiated payments either currently or at any time in the future. Another related risk is the **liquidity risk** which is the risk that a party within the system will have insufficient funds to meet financial obligations when due totally or partially for some time through the business day, although it may be able to do so at some time in the future.

There is the **legal risk** too, that is the risk that a poor legal framework or legal uncertainties will cause or enlarge credit or liquidity risks. Besides, there is the **operational risk** which is the risk that operational factors such as technical malfunctions or operational mistakes will cause also or endanger the payment systems with credit or liquidity risks.

All these previous types of risk either separate or in conjunction with each other, can have systemic consequences creating what is called **systemic risk**. This can happen in cases like the inability of one of the participants to meet its obligations, or a disruption in the system itself could result in the inability of other system participants or of financial institutions in other parts of the financial system to meet their obligations too. Such a failure could cause

[8] Clearing houses are defined as a central location or central processing mechanism through which financial institutions agree to exchange payment instructions or other financial obligations (e.g., cheques). The institutions settle for items exchanged at a designated time based on the rules and procedures of the clearing house. In some cases, the clearing house may assume significant counterparty, financial, or risk management responsibilities for the clearing system.

widespread liquidity or credit problems and, as a result, could threaten the stability of the system or financial markets. For banks and especially central banks, there are points mentioned by Lamfalussy[9] which are the main principles that must be available in any systemically important payment system.

These principles are as follows, based on the Core Principles for Systemically Important Payment Systems report (Core Principles for Systemically Important Payment Systems report 2001, 16-29):

1) **The system should have a well-founded legal basis under all relevant jurisdictions.**

Systems that are very much connected with money and its transfers must have a strong legal backbone majorly represented through laws, rules, and procedure that organizes the operation of the system and the interactions among the various participants, and the solutions to any conflicts or disputes that may arise. Such a legal foundation is a very core basic element for the smooth functioning of any system and a requirement for any future further expansion.

2) **The system's rules and procedures should enable participants to have a clear understanding of the system's impact on each of the financial risks they incur through participation in it.**

When the rules are set and the legal basis is laid for the system, the system operator (the central bank and its affiliates) must explain and publish the reasons behind the system establishment and how it works, and their role in such system. In addition to this, it must be clear in front of the participants the risks that the system has been created to mitigate so that their daily operation or the setting of their strategies do not conflict with the overall system operation.

3) **The system should have clearly defined procedures for the management of credit risks and liquidity risks, which specify the respective responsibilities of the system operator and the participants and provide appropriate incentives to manage and contain those risks.**

Among the major risks that the payments systems are designed to face are the credit and liquidity risks as they are directly connected with the day-to-day payments procedures. That is why it must be set from the system operator side the facilities and available options in front of the interacting participants to extend their abilities of liquidity management to prevent any congestion due to lack of available liquidity at any point of the business day (ex: extending intraday credit).

4) **The system should provide prompt and final settlement on the day of value, preferably during the day and at a minimum at the end of the day.**

Any payment executed through the system must be final by the settlement that stands for the actual transfer of the money to the payee side. This must be assured by the system either instantly or maximum by the end of the business day. Extended settlements could create enormous and complex risks due to the delay of the actual transfer of the money values.

5) **A system in which multilateral netting takes place should, at a minimum, be capable of ensuring the timely completion of daily settlements in the event of an inability to settle by the participant with the largest single settlement obligation.**

Such large interlaced systems usually include a lot of participants which creates by default a high rate of multilateral payments across the system which requires netting and settlement. This process though the high rate of execution available must be done in an extremely brief

[9] Baron Alexandre Lamfalussy (Hungarian born 1929) is a European economist and central banker. The creator of lamfalussy standards, processing, and core principles for systemically important payment systems.

time to assure the final settlement in addition to the guarantee that all participants can meet their obligations.

6) **Assets used for settlement should preferably be a claim on the central bank; where other assets are used, they should carry little or no credit risk.**

The settlement must be executed over the bank's accounts held at the central bank, at this point the central bank guarantee the availability of funds and assures the control and the monitoring of any events of credit risk exposure to be solved before spreading.

7) **The system should ensure a high degree of security and operational reliability and should have contingency arrangements for the timely completion of daily processing.**

The central bank when it offers such systems and provides banks with them must provide a high rate of security and safety in daily operations. Such arrangements include contingency plans (ex; disaster recovery site) to provide continuous system operations even in cases of any sudden problems or crises.

8) **The system should provide a means of making payments that are practical for its users and efficient for the economy.**

The systems have to offer the participants and their users a way to execute their payments in an affordable straightforward way to serve the flow of money in the economy smoothly. These payment options that the systems facilitate assure continuous operation through the business day even in cases of stress.

9) **The system should have objective and publicly disclosed criteria for participation, which permit fair and open access.**

All participants regardless of their type (any institution playing a role in the process of payment) must have a clear objective of the system and how to operate efficiently according to the institution type and its role in the payment process. The participants could be a central bank, clearing houses, banks, and payment tools providers in retail payments. Criteria for participating in the system must be declared and no deprivation from access because that would create natural monopolies in some cases and a lack of competition.

10) **The system's governance arrangements should be effective, accountable, and transparent.**

The system operator- usually the central bank -has to offer the arrangements to control the system operation that are efficient, clear, and easy to apply. These arrangements must be simple to allow for smooth operation, decreasing problems and disputes to assure the system's continuous operation in the business days.

The duties of the central bank in applying the core principles are seen as follows:

The central bank should clearly define its payment system purposes and should reveal publicly its role and major policies concerning systemically important payment systems. The central bank should ensure that the systems it operates to fulfil the core principles. The central bank should manage compliance with the core principles by systems it does not operate, and it should have the ability to conduct its oversight. The central bank, in encouraging payment system safety and efficiency through the core principles, should cooperate with other central banks and with any other relevant domestic or foreign authorities.

Many countries have moved from using DNS systems to RTGS systems had many risks involved due to long settlement times and uncertainty of processing. On the other hand, RTGS

systems helped a lot in limiting payment system risks because of its continuous intraday final transfer capability, which also added to the ability to minimize the basic interbank risks in the settlement process to negligible percent.

RTGS reduces the length of credit and liquidity exposures because it assures that sufficient covering funds are available at the designated time of processing and settlement lags can nearly disappear. Consequently, the main sources of risks in interbank fund transfer systems are diminished. Once a settlement is done banks can use the receivable funds in their daily investments and obligations, without facing the risk of payments being revoked. Based on this credit risk is decreased tremendously as RTGS permits the final transfer of funds at any time during the day (subject to the availability of covered funds).

This also helped in the contribution to the reduction of settlement risk in securities and foreign exchange transactions. Above all RTGS system provide a powerful mechanism for reducing systemic risk. Usually, central banks have a high interest in limiting systemic risk, and this has been one of the major motives for many central banks to migrate to RTGS in large-value transfer systems.

Decreasing systemic risk is reflected in the reduction of intraday interbank exposures which by its role lowers the possibility that a bank may become unable to cope with cases of liquidity deficit caused by the inability of any participant bank in the system to meet its obligations when due. In addition to this, it prevents the possibility of revoking payments, which can be a significant source of systemic risk.

ii. Payment Systems and Monetary Policy

Monetary policies set within the central bank in any country are assumed to be followed by banks aiming at working in the same context to achieve a certain macroeconomic aim. This means that there must be available tools within banks that can make their day-to-day work aligned with the policies set.

Within the monetary policies being in action, some conditions must be avoided to allow for a good banking environment and to make the policies more effective. Among these conditions are liquidity shocks, shortages, panics, and operational problems. The banking sector should allow for smooth operations and availability of liquidity to achieve financial market stability and soundness.

Transactions and payments are very much related to monetary policy, as it is concerned with money and its circulation in the market, and this is done through the process of transactions and the execution of the payment which affect the demand and supply of money. Monetary policy no longer works in a separate unit just for policy making this is due to the continuous widening of the globalized circle of financial interactions and the ongoing increasing complexity of both financial markets and their instruments. The need for efficient operations and integration among markets added up a lot to this.

Long-term monetary policy targets need shorter-term ones to accomplish them. These short-term targets are overseen monthly, weekly, or daily. Daily monitoring to check compliance with the monetary policy targets is particularly important. Consequently, there are short-term parameters that can give indications to monetary policy units about daily market movements and changes (such as the average volumes and values of transactions (Real-time gross settlement systems 2003). Payment systems serve the monetary policy in many ways:

- Payment systems reflect all daily bank-to-bank transactions, as a result, it forms an insight for monetary policy on money movement and flows within the market, this helps in monitoring the accomplishment of monetary policy objectives. Any disturbance in

the day-to-day process which could lead to the incompletion of the transaction (by the settlement) could lead to systemic risk which raises concerns about monetary policy. Decreasing these cases is not important for a stable and sound financial market but it puts fewer burdens on the central bank to intervene.

- Payment systems are dynamic so updates and development in it affect their speed of operation, the ability to face risks, and the ongoing process of banking innovation. Monetary policy uses payment systems to see how all these factors are reflected in daily payments and how it affects money demand and supply (Maxwell Report, Bank of England)
- Payment systems need a monetary policy to keep pace with their changes, requirements, and development needs. After all these systems need an updatable policy in the short run, in order not to hinder daily operations, as this might restrict some banking transactions and impede market enlargement. It is eventually a mutual relationship between the two units.

Accordingly, payments processed should not affect or even create any limitations to the monetary policy targets either in the long run or the short run objectives. This could happen in cases like money supply being affected through changes in the monetary base as a part of the market liquidity management. This will require seeing the effect of the money multiplier and money demand (Maxwell Report, Bank of England, 96-97).

Types of payment systems add stress over monetary policy, in deferred net settlement systems the settlement is done at the end of the business day or in some cases after a few hours within the business day which does not put any pressure on liquidity needs through the day unlike the real-time gross settlement systems were settlement is done after each payment is processed. In the latter form, liquidity is affected by each payment performed which is why central banks pay great attention to liquidity levels within banks to assure the continuity of the "credit push principle." (Payment, clearing, and settlement systems in South Africa 2012, 388).

In this case, the monetary policy unit must put credit extension options for banks to provide them with liquidity in times of stress up till can have funds to pay their due obligations. Clustering of payment would cause gridlocks and the flow of payments would stop which would cause system risk and affect the short-term goals of monetary policy. Through the process of controlling inflation, the monetary policy is concerned with the average length of the execution of payments and consequently its settlement (being final) the structure of accounts that hold the bank's reserves, and the access to information about payments executed which give a view for the demand of bank reserves.

As for the central bank credit provided through payment systems and regulated by monetary policy, different options can be considered. The Refinance policies are taking the lead, especially in the stressful conditions of the market. Credit options given by the monetary policy not only preserve the targeted short-term objectives but also facilitates at the same time the operational efficiency of the payment systems. All the countries have recently switched to real the gross settlement system, so the interest has been shifted towards intraday credit rather than overnight credit. Intraday credit is granted to banks to supply them with needed liquidity in times of liquidity stress to provide timely settlement for payment. Banks are required to repay their credit before the end of day and here the banks are provided with another option than overnight credit which by default has higher rates of interest.

The central bank could adopt different options to provide intraday credit like extending the amount of credit either in the form of overdraft or repo and with different terms. These terms could be either extending the credit for free or for a fee or a collateralized credit

extension. This plays a significant role in decreasing the costs of obtaining liquidity and transaction costs in general.

From the above mentioned a conclusion can be reached that the payment systems are a tool that the monetary policy used to affect the market. This means that the payment systems are an independent variable that is affected by the monetary policy decisions and their updates. It also acts as an indicator that policymakers can absorb conclusions from it of how the policies affect the banking sector and the system Participants.

iii. Liquidity Practices Considering Payment Systems

Over the last twenty years, there have been structural developments in the financial industry that caused in the recent years central banks to have great interest in shortening the time of the settlements to achieve low liquidity risk and high liquidity management. The time horizon for payments has even changed, the short term now refers to intraday activities and the medium term refers to overnight extensions or overdrafts and the long term is now a week. This reflects the high vitality of liquidity, its management, and the payment systems that serve it. This progress has been motivated by the modifications in the use and the patterns of payment and settlement systems.

Liquidity risk is usually defined as the risk of not being able to meet payment obligations when due. However, the increasing use of payment and settlement systems and the evolution of these systems towards real-time settlement practices have created a new situation, with payment obligations falling due much quicker than in the past. Consequently, the payment systems especially the interbank fund's transfer system offer innovative liquidity practices to decrease the cases of liquidity stress (Real-time gross settlement systems, 18-19). Among these practices are the following elements:

1) The intra-day liquidity management

Liquidity and its changes are monitored all over the business day either from the bank's side or the system operator's side. Any changes or shortages in liquidity are quickly solved before the end of the day. Sub-accounts for several types of payments to distribute the bank's obligations among. In addition to queuing rules and facilities that allow payments to stay in visible queues for both payer and receivers up till available funds are provided.

Liquidity management can be presented mathematically as follows: The behavior of banks is dynamic because banks change their behavior based on market updates in prevailing conditions.

Banks and liquidity choices, At the beginning of each day the available banks in the market ***(N)***. Where ***i=1, 2, 3…N***.

With reserves *Li* ***(0),*** this includes both external liquidity and acquired ones. It is also considered an action as it can be used to face day-to-day liquidity needs. Therefore, it consists of a vector of the various actions available in front of the bank where ***L= (L1 (0), L2 (0) …...LN (0)*** (Galbiati 2008, 7-8).

The business day is presented by a continuous time interval ***(0, T)*** within the operating hours of the business day. The payment orders are received by a Poisson process with parameter ***μ=1*** and the systems receive *T* orders per day (Galbiati 2008, 7-8).

In case we have a payer and receiver banks i and j and they perform their payment on a uniform random draw then we get probability parameters for a payer of **1/N** and the payee **1/N-1** and each bank receives a payment of **μ=1/N** (Galbiati 2008, 7-8).

The payment orders received are usually treated as exogenous for the bank which chooses its liquidity from ***Li (0)***. Each bank receives several payment orders which can be denoted by ***Zi(t)*** and execute several payments denoted by ***Xi(t)***. When payables are more than receivables queued, payments are found in the liquidity management queues in the system denoted by ***Qi(t).*** Where the value of the queue is derived from ***Qi(t)=Zi(t)-Xi(t). Zi(t)*** can be used to reflect the available liquid assets in general available in the bank's account for settlement purposes (Galbiati 2008).

Based on this the liquidity of the bank at any time ***(t)*** throughout the business day is presented by the equation ***Li(t)=Li(0)-Xi(t)+Yi(t)*** where ***Li (0)*** is the opening bank's balance at the beginning of the business day.

Payments therefore to be settled or queued ***Li(t)*** must always be a positive number while it can be queued only in case of lack of sufficient funds and ***Li(t)*** is zero therefore in any case of a payment initiation the amount of ***Li(t)*** will be a negative value. All the above mentioned is a mathematical representation of the intraday settlement process. Based on the previous analysis a conclusion can be drawn that decreasing overall liquidity within banks will consequently decrease the liquidity within the system thus queues will increase. Gridlocks could be more often but due to the diverse sizes of the banks and their obligations, this increase can take a non-linear form. This might also create dead losses and increase opportunity costs due to the congestion in payments and the chain of delays that results which is like the domino effect (Galbiati 2008).

Each bank of course when it interacts in the system is supposed to gain payoffs of any choice it makes through the business day. The payoffs majorly depend on the start of the day liquidity and the delays due to liquidity shortages. Costs can be created in acquiring liquidity itself where the cost, in this case, is denoted by ***C(Li(0)) =μLi(0)*** where μ must be greater than zero. And since previously initial time was denoted ***t*** therefore the delay will be denoted ***t'***. The cost of the delay comes in more than one form like the opportunity cost of the amount itself for the receiver and penalty for the payer in addition to a system overall unsmooth flow of credit among the participants. The cost of the delay is ***C(t,' t) = K(t'-t)*** where ***K>0*** (Galbiati, 9). Consequently, the bank's stochastic payoff is equal to the cost **(liquidity +delay**). The central banks through payment systems, therefore, monitor the above-mentioned process to allow for smooth functioning of the system and fast interference in case of multiple payment queues or delays (Chapter 2 New approaches for payment system simulation research).

2) The Intra-Day Credit Extension and Collateralization

Liquidity management and payments have coincided with developments in the collateralization process as a form of risk mitigation technique, especially in payment and settlement systems. Addressing intraday liquidity-related issues requires considering at the same time issues related to collateral management and collateral options that must be diverse to decrease the cost of liquidity.

Since most central banks extend credit only against collateral, the type of collateral that the participants of the payment systems can use is a key factor in determining the opportunity costs of holding collateral. In general, in the past decade, most central banks have broadened the range of collateral they accept in their provision of intraday liquidity.

3) Enhancing the Linkage between the Settlement Systems and the Securities System

A Comparable evolution has taken place in the securities and its settlement as a second line of defense liquidity with the option of delivery versus payment (DVP). This implies that the delivery of the securities leg is done based on the previously processed transaction on a gross basis once the settlement of the related cash obligation is concluded. This place improved the

final settlement of securities and accelerated both the re-delivery of securities and the re-use of the cash settlement proceeds (Real-time gross settlement systems Report).

4) Automated System Offsetting Facilities:

There are also the opposite offsetting factors and arrangements that are used to save liquidity and collateral associated with the widespread design of risk control measures in payment and settlement systems. Grid locking tool for easing clustering payments in cases of insufficient funds (that is done by complicated system algorithms to make netting between obligations without making new fund transfers between banks) has helped a lot to economize on liquidity needs. These are considered liquidity-saving features (Bech and Soramaki 2001).

Mathematically the grid locking problem can be represented as explained by Bech and Soramaki's analysis in 2001 as follows:

If the market has n number of banks which are dented by *i* where *i=1,2,3..n* all are members in the RTGS system with a certain level of liquidity denoted by Si and the system for sure is assumed to allow for queuing facility where payments that have insufficient funds are held in the queue until funds are provided for the queued payments.

Payments are denoted by Kn $a_{i,k}\ r_{i,k} \in \{1,2,\ldots,n\} \setminus \{i\}\ \ x_{i,k} \in \{0,1\}\ (x_{i,k})_{\substack{i=1\ldots n \\ k=1\ldots m_i}}$

$$V = \sum_{i=1}^{n}\sum_{k=1}^{m_i} a_{i,k}x_{i,k}, \quad \begin{cases} \forall i \in \{1\ldots n\}, \quad S_i - \sum_{k=1}^{m_i} a_{i,k}x_{i,k} + \sum_{\substack{j=1 \\ j\neq i}}^{n}\sum_{k=1}^{m_j} a_{j,k}x_{j,k}\delta_{r_{j,k}=i} \geq 0 \\ \forall i \in \{1\ldots n\}, \quad \forall k \in \{1\ldots m_i - 1\}, x_{i,k+1} \leq x_{i,k} \end{cases}$$

where $\delta_{r_{j,k}} = i$ is equal to 1 if $r_{j,k} = i$ and zero otherwise.

iv. Payment Systems and Financial Stability

Central banks are very much concerned with supplying banks and the economy with continuous nonstop payment services and settlements. Besides, they also provide accounts for holding bank settlement accounts for interbank money transfers.

Once established, banks depend heavily on such systems to support their transactions, considering that their transfers will be settled as expected. Payment systems are created to make banks confident and have a high level of dependence on their smooth functioning. The central bank is a provider of the settlement assets in the interbank payment arrangements that can facilitate a higher quantity of transactions within the economy. In a world with imperfect information and limited enforcement, inside money transfers reveal potentially valuable information about the identity of the transacting parties and provide evidence that a trade has taken place.

The loss of confidence in the payment systems; where banks rely on the transfer of bank deposits, could therefore have negative severe effects, such as depending on cash rather than transfer accounts which of course will raise the costs that banks bear and decrease the efficiency of the banking sector. This is regardless of the negative international impact which can affect other aspects of the economy away from banking such as foreign investments. Payment systems play an indirect role in support of trade, financial intermediation, and overall economic activity.

Financial stability is an independent variable, in this case, it is a true result of a stable smooth operating payment system. Risk evasion and market control achieved by the payment systems are direct contributors to financial stability.

V. Conclusion

Banking transactions are technically important for the well-functioning of the financial market. The execution of payments of the banking transactions is very essential to assure the finalization of the Banking transaction and the actual transfer of money from one side of the transaction to the other.

Payment Systems are used to assure the execution of such a process in a final and timely manner and to achieve the concepts of smooth functioning of the financial system and its soundness. It works also with the concept of credit push which guarantees that there are no delays, congestion, or unpaid payments among banks. Any payments that are unpaid or unsettled cause gridlock situations which may cause risks to arise like liquidity risk which in extreme cases could be transformed into systemic risk.

Payments also affect the money supply as it is responsible for the circulation of money within the economy that is why payment systems gains such importance to ease the availability of liquidity when in need and to facilitate the circulation of money within any economy. Consequently, payment systems provide liquidity practices that ease the management of liquidity and especially intraday liquidity which is of high concern for both banks and the central bank as well. Among these services, are the automated clearing of gridlocks the availability of real-time monitoring of accounts, and the daily credit extension.

From the paper's discussion, it can be concluded that Payment systems development is driven by the economic needs of the financial market the need to overcome risks to control monetary policy and consequently inflation, to provide dynamic liquidity management, and oversee the market instantly. All this contributes to the financial stability of the financial market. These motives are also the outcome of developing payment systems given the nonstop technological advancement. Technological progress is one of the means to achieve the market needs and consequently it is not an automatic process regardless of the economic aspects of each financial market.

References

Baiden John E. (2012). *Inflation Targeting Why the Value of Money Matters to You*. USA. Available at: http://books.google.com.eg/books?id=6SRSAAAAQBAJ&pg=PA2018&dq=inflation+and+transactions&hl=en&sa=X&ei=UYRXVKjXMvTLsATsp4CYDQ&ved=0CDcQ6AEwBQ#v=onepage&q=inflation%20and%20transactions&f=false.

Bank for International Settlements. (2003). *A Glossary Of Terms Used In Payments And Settlement Systems. Committee on Payment and Settlement Systems, Basel*. Switzerland. Available at http://www.bis.org/cpmi/glossary_030301.pdf.

Bank for International Settlements. (January 2001*) Core Principles for Systemically Important Payment Systems*. CPSS Publications (43). Basel, Switzerland. Available at: http://www.bis.org/publ/cpss43.htm.

Bank for International Settlements. (2012) *Payment, Clearing and Settlement Systems in South Africa*. CPSS, Red Book, Basel, Switzerland. Available at:https://www.bis.org/cpmi/publ/d105_za.pdf.

Bank for International settlements. (March 1997). *Real-time gross settlement systems*. CPSS Publications. (22). Basle, Switzerland. Available at: http://www.bis.org/cpmi/publ/d22.pdf.

Boundless Economics. *Introduction to Monetary Policy*. Available at: https://www.boundless.com/economics/textbooks/boundless-economics-textbook/monetary-policy-28/introduction-to-monetary-policy-117/the-demand-for-money-459-12556/**.**

Dwivedi D. N. *(*2007). Inflation: meaning, measure and effect, second edition in *Macroeconomics: Theory and Policy*. McGraw Hill. Available at: http://books.google.com.eg/books?id=P1eFyp9Iku8C&pg=PA389&dq=inflation+definition&hl=en&sa=X&ei=N3ZXVOzrGYK_sQT9wIGwBg&ved=0CCcQ6AEwAg#v=onepage&q=inflation%20definition&f=false.

European Central Bank. "*ECB: Payments and Market Glossary"*. European Central Bank. Available at: https://www.ecb.europa.eu/home/glossary/html/act6p.en.html#368

European Central Bank. (2007). "*Payments and Monetary and Financial Stability"*. ECB-Bank of England Conference, 12-13. Available at: http://www.ecb.europa.eu/pub/pdf/other/paymentsmonetaryfinancialstability200801en.pdf.

European Central Bank. (2014). *Glossary v.0.3: Target2 Securities.* Available at: https://www.ecb.europa.eu/paym/t2s/pdf/T2S_AG_meet3_glossary.pdf

European Central Bank. (2021). *Revised Oversight Framework for Retail Payment Systems*. Available at: https://www.ecb.europa.eu/pub/pdf/other/Revised_oversight_framework_for_retail_payment_systems.pdf?983906a191ce946301c0803fa2e6d422.

Fry, M.J., Kilato, I., Roger, S., Senderowicz, K., Sheppard, D., Solis, F. and Trundle, J. (1999). *Payment systems in global perspective*. London: Routledge. Available at: http://www.bankofengland.co.uk/education/Pages/ccbs/publications/psigp.aspx.

Haldane, A. G., & Saporta, V. (Eds.). (2008). The future of payment systems. *Routledge*. Available at:

https://books.google.com.eg/books?id=xj58AgAAQBAJ&pg=PA70&dq=payment+systems+and+moral+hazard&hl=en&sa=X&ved=0ahUKEwjQkNbpo-bJAhVGpQ4KHft7AqIQ6AEIMzAF#v=onepage&q=payment%20systems%20and%20moral%20hazard&f=false.

Hong Kong Monetary Authority. (2002). Definition of Money Supply. *Quarterly Bulletin.* 6-23. Available at: http://www.hkma.gov.hk/media/eng/publication-and-research/quarterly-bulletin/qb200205/fa02.pdf.

Humphrey, D. B. (1995). *Payment systems: principles, practice, and improvements*. World Bank Publications. *23*(260). Available at: http://books.google.com.eg/books?id=tJyKSyv1gM0C&printsec=frontcover&dq=types+of+payment+systems&hl=en&sa=X&ei=wi0mUoTDDJTM0AXXICwBg&redir_esc=y#v=onepage&q=types%20of%20payment%20systems&f=false

Johnson, M. O. E. (1998). *The payment system and monetary policy*. International Monetary Fund. Available at: https://www.imf.org/external/pubs/ft/ppaa/ppaa9804.pdf.

Kokkola, T. (Ed.). (2010). *The payment system: Payments, securities and derivatives, and the role of the Eurosystem*. European Central Bank. Available at: http://www.ecb.europa.eu/pub/pdf/other/paymentsystem201009en.pdf.

Meigs, A. J., & Wolman, W. (1971). *Central Banks and the money supply*. Research Department, Federal Reserve Bank of St. Louis. Available at: http://core.ac.uk/download/pdf/6958328.pdf.

Sheppard, D. (1999). *Payment Systems in global: Some Views from the Central Bank*. Routledge.

Soramäki, K., Bech, M. L., Arnold, J., Glass, R. J., & Beyeler, W. E. (2007). *New approaches for payment system simulation research*. ch2. Available at: http://www.sandia.gov/nisac/wp/wp-content/uploads/downloads/2012/03/New-Approaches-for-Payment-System-Simulation-Research.pdf.

Tumpel-Gugerell, G. (2007). Payments and monetary and financial stability. In Payments and Monetary and Financial Stability. ECB-Bank of England Conference. 31-37. Available at: https://www.ecb.europa.eu/press/key/date/2007/html/sp071112.en.html.

Williamson, O. E. (1981). Transaction Cost Economics and Organization Theory. *American Journal of Sociology.* *87*(3). https://www.jstor.org/stable/2778934#metadata_info_tab_contents.