Local Exchange and Trading Systems: an evaluation of the economic and social potential

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Abstract

A Local Exchange and Trading System (LETS) is a specific type of local currency system designed to stimulate local economies. Local currency is a broad term for currency systems used in local economies, parallel to the national currency system. A LETS is a community-oriented trading network in which multilateral exchange can take place without the use of the prevailing national currency. The system provides interest-free credit for all its members to enable economic exchange when there’s a shortage of conventional money. The objective of LETS is twofold; on the one hand LETS have an economic objective to facilitate economic exchange. On the other hand, LETS have a social objective to bring communities closer together create a different form of economy based on cooperation and social equity. This thesis evaluates LETS on its economic and social potential by means of experimental research. It does so by comparing a monetary currency system manipulation and a LETS manipulation, accompanied by a control condition. The economic objective is examined by analysing the performance of subjects on a game of reciprocity in small groups. The social objective is measured in terms of subjects Social Value Orientation (SVO) after the currency system manipulation. SVO is the concern one has regarding the welfare of others during decision making. The study fails to find significant proof to establish that LETS provide economic and social benefits. Therefore, from the evaluation of LETS on its economic and social potential we must conclude the system has not succeeded in achieving its objectives. However, the data that is used to perform the evaluation is obtained from an experiment that was not designed for this specific research. Therefore, a research proposal is included that suggests several alterations to the experimental design, to be able to provide a more sound and complete evaluation on the economic and social objectives of LETS.
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1. Introduction

This thesis is concerned with a local currency system named the Local Exchange and Trading System (LETS). More specifically, it focusses on the economic and social potential of LETS as compared to the current monetary system. Over the past decades, a body of literature has accumulated indicating several problems with the use of national money in our contemporary society. These problems stimulated the development of alternative currency systems, including local currency. Local currency, also referred to as community currency, is a broad term to identify currencies that differ from the national currency. These currencies exist in local economies, usually parallel to the national currency, and are accepted as a unit of exchange within that particular community (Bebbington, 2010). In this thesis, we will focus on a specific local currency system called LETS.

A LETS is a community-oriented trading network in which multilateral exchange can take place without the use of the prevailing national currency. The idea is that LETS enable people to trade goods and services within a community when there is a shortage of conventional money or a high unemployment rate, by providing interest-free credit to each. Therefore, LETS strive to stimulate local economic development by enabling individuals, local businesses and voluntary groups to save money and resources in cooperation with each other, as well as to expand their purchasing power (Linton, 1986). In addition to its economic objective, LETS also have a social objective to help build community by allowing the development of wider social networks. Furthermore, it strives to improve the social contact of its members, and to provide a framework for the development of skills and training. The rationale is to create an economy which is based on social equity, cooperation and support, where no members are left behind and economic exchange is driven by reciprocity, defined as the willingness to do something for someone who has done something for you (Williams, 1996a).

The first LETS was created in Canada in January 1983, after which the concept spread all over the world. Especially in the United Kingdom it became very popular during the 1990’s, where the amount of LETS grew exponentially. But the system gained popularity in all Europe, the USA, South-America, New Zealand, Australia, Asia and even Africa (Williams, 1996; Peacock, 2006). Remarkably, there is almost no literature available on LETS after 2008, and it appeared that since then no new LETS established anymore. However, new economic thinkers are
developing other local currency systems which aim to achieve the same goals as the LETS (Eisler, 2008; Lietaer & Dunne; 2013, Shuman, 2013). However, to investigate if these initiatives have actual potential, we need to investigate how a local currency system performs on its stated objectives. Literature on empirical studies in which existing LETS are assessed on the performance on their economic and social objectives is available; however, no experimental studies have been performed to specifically study LETS. This thesis aims to analyse a local currency system like the LETS on its economic goal to stimulate economic exchange and its social goal to stimulate more social and cooperative behaviour, based on data obtained in a laboratorial setting. Social behaviour in this context is measured as the magnitude of concern people have for others. This is called Social Value Orientation (SVO), and provides a framework for underlying motivations in decision making. Individuals who have a prosocial orientation have a high concern for others, individuals who have proself orientation have low concern for others. Therefore the problem statement of this thesis is twofold, and formulated as follows:

Does participating in a LETS, in a laboratorial setting, stimulate reciprocal exchange and induce prosocial behaviour?

To provide an answer to the proposed problem statement we analyse the data obtained from a laboratory experiment. The experiment consists of three parts: the first part contains the currency system manipulation which has three conditions, the control condition, the monetary condition and the non-monetary condition (i.e. the LETS condition). The second part contains a cooling down period, and the third part measures the SVO of individual participants. It must be taken into account that the experiment was not designed explicitly for this particular research. The reason for this is that intentionally the experiment was designed by a group of researchers who were only interested in the economic objective of LETS. The SVO measure was added later on, because this research also focuses on the social objective of LETS. Even so, with the results of this experiment we attempt to provide an answer to the proposed problem statement.

The contribution of this thesis is to test the existing theory on local currency systems, especially on LETS, in a controlled environment. Therewith, we try to identify if there is potential in future local currency initiatives that provide an alternative, or replenishment, to the current monetary system. In addition, we aim with our research to revive the discussion on LETS and its potential, and stimulate future research on this topic.
The structure of the thesis is composed as follows: the following section provides a thorough literature review which starts with a brief history of the conventional money system and the identification of three main problems with this system. It continues with the introduction of LETS and its economic and social objectives and a thorough review of the existing empirical literature on LETS. It ends with conjectures regarding the future of community currency as the basis of our research question. The following section introduces the research model of our investigation and indicates the stated hypotheses. Subsequently, the laboratory experiment which is used to obtain the data is explained in depth. Then the analysis of the obtained data is discussed to test the stated hypotheses; this is elaborated more in the discussion section. The thesis concludes with a research proposal, since the experiment used to obtain our data was not explicitly designed for our investigation. The research proposal suggests several alterations to the experimental design that would improve a subsequent experiment to provide a more complete and sound answer to our problem statement.
2. Literature Review

2.1. A brief history of money and the mechanisms of exchange

A Local Exchange and Trading System (LETS) is a type of community currency which emerged as a new form of Barter economy (Williams, 1996b). Barter is a system of exchange as old as human kind. It is used for the direct exchange of goods and services, without using a medium of exchange. Barter involves reciprocal trade where people can offer a particular good or service and request some other in return. In other words, trade goods and services with each other without money exchanging hands (Jevons, 1983). However, such a system is hardly manageable because supply and demand cannot be matched. It relies on the ‘double coincidence of wants’, which means that to trade, people need to find someone who has the good or service they want, and also wants the good or service that they have to offer (Mishkin, 2013). Such a system leads to high transaction costs, defined as the time spent trying to exchange goods or services, and is therefore inefficient. A medium of exchange which can facilitate trade would promote economic efficiency. Economic efficiency is also promoted by specialization and differentiation of labour. However, specialisation would make it harder to find someone who desires your particular service in a barter system. In addition, in a barter system there is no pricing mechanism to determine the value of goods and services. Therefore, a medium of exchange is vital for a functional and efficient economy (Mishkin, 2013).

A medium of exchange to facilitate trade has shown different forms during the development from a barter economy to the current monetary system. To function as a medium of exchange, an object must be universally accepted as payment for goods and services (Mishkin, 2013). At first people started to use intermediate goods to facilitate trade, because they had a fixed value. Examples of these goods are cattle, shells or salt, and precious metals. These goods were called commodity money and were accepted as payment not because someone wanted that particular good, but because of the knowledge that the commodity could be used in further transactions. Eventually, this resulted in one generally accepted commodity: gold. This first money is called commodity money and exists because it was commonly accepted by the community to use this gold as a medium of exchange. The problem with this payment system was that gold is very heavy and hard to transport. This resulted into the emergence of the first primitive banks. These banks preserved the gold for their customers, and gave them a receipt that could be exchanged
for gold later on. This resulted in people starting to trade with this receipt instead of the gold, because it was more convenient. The reason why people accepted a receipt instead of gold was because of the common knowledge that if they would go to the bank with the receipt, it would be traded for gold. This primitive banking system was built on trust; people in the community trusted that they could go to the bank and trade the receipt for gold if they wanted to. These receipts later evolved in banknotes and where the beginning of paper currency (Jevons, 1983; White, 1999).

Paper currency held the promise that it was convertible into gold. However, few actually made use of this promise. This enabled banks to facilitate more banknotes than there was actual gold in their banks. Money which is not completely covered by the gold stock derives its value by the confidence that it can be used to buy goods and services; this kind of money is called fiat money. Fiat money enabled banks to facilitate loans which made the economy highly more efficient. Furthermore, it boosted the economy because the banks could earn money by providing loans with interest. Interest is the cost of loaning money, thus to reimburse a loan, the initial amount borrowed plus the interest must be paid back to the bank. By having less gold in the bank than the outstanding receipts banks took a risk, because with fractional reserves, there would not be enough gold to refund all loans if they were reimbursed at the same time. The risk became visible when occasionally there would be a lack of confidence in a particular bank and a bank run arose, which happened for example in the United States in 1929 at the end of the great depression. A bank run entails all people trying to convert their banknotes for gold at the same time. However, since the banks had only fractional reserves, there would not be enough gold to refund and the bank would have to close down. This resulted in banks not willing to exchange banknotes for gold anymore and in 1971, Richard Nixon, took several economic measures by which the possibility to exchange money for gold was completely abolished. Paper currency obtained legal tender meaning that paper currency must be accepted as payment, and was not convertible into gold anymore. During the evolution of the payment system from then until now, the payment system became more and more efficient, resulting in the electronic payment environment we have today (Jevons, 1983; White, 1999; Mishkin, 2013).

Besides being a medium of exchange, which facilitates the trade of goods and services more easily than systems of barter, a Dutch economist Jan Pen (1965) identified two other separate
functions of money: its use as a unit of value and as a store of value. Money as a unit of value is a measurement of the market value of a particular good or service, and therefore overcomes the pricing problem which occurs in a barter economy. Money as a unit of value permits comparing different goods and services. The value is reflected in its price, which is determined by the invisible hand of the market, according to classical economic theory of Adam Smith. Money as a store of value is the capability to store, save and retrieve wealth. This function of money is the material of investment and capital. A store of value can be any asset, like stock, art or real estate, however money has an advantage, namely money is the most liquid asset. Liquidity means the ease and speed an asset can be transformed into the medium of exchange. Since money *is* the medium of exchange, and liquidity is highly desirable, people are willing to hold money as a store of value (Mishkin, 2013).

This very brief overview of the emergence of money covers only a small part of the complex subject that money is. However, it serves as a background to understand critique on the monetary system, which is the base of alternative currencies like the LETS. To summarize, money in economics is defined as anything that is generally accepted in payment for goods and services or in the repayment of debts (Mishkin, 2013). Money emerged as a medium of exchange from commodity money to fiat money and has been identified with other functions as a unit of value and as a store of value. In conclusion, money has contributed significantly to the development of the economy.

However, there is also a substantial flow of alternative thinkers who indicate several major drawbacks of the current monetary system. The main critique on which these authors agree is that national currency has defeated its purpose of facilitating exchange and has too much impact on human behaviour (Ekins, 1986; Schumacher, 1993; Greco, 1994; Greco, 2001; Lietaer, 2001; Eisler, 2008; Lietaer, 2013; Shuman, 2013). These authors argue that money has become, inter alia by its function of being a store of value, an object with intrinsic value. Something people want to possess and accumulate, no matter what. That money has become so extremely important to society that it determines human behaviour. These authors state that the fundamental function of money is to facilitate exchange; hence money should be a passive medium of exchange, and nothing more than that. This and other problems of national currency are identified and discussed below.
2.1.1 *The scarcity problem*

Conventional money is kept artificially scarce; it is what gives money its value in the current monetary system (Federal Reserve Bank of Chicago, 1992 p.3). This scarcity, however, is also indicated as one of its fundamental problems. It is argued that there is not enough money in circulation to serve the purposes for which it is created (Linton, 1986; Greco, 1994; Lietaer, 2001). This scarcity is related to the way money is created in today’s economy. Money is created by the banking industry through the process of bank loans. When a loan is requested and approved by the bank, the money is simply created by the bank and put on an account. This money is not tangible; it’s only information of how much credit the bank loaned to you. Thus, the banking system is able to create money and to loan it into the economy. This is the way money enters the economy. Therefore, all money that exists in circulation is debt. The money received in a loan is called ‘principal’. However, as discussed before, to reimburse the loan one does not only have to repay this principal. Bank loans are provided under the condition that one pays back the principal and the interest the bank charges. Interest is the cost of loaning money from a bank. However the problem with interest is that it is not created. Money that is loaned creates a loop. Someone loans money from the bank to be able to buy goods and services necessary for their business. Then, the money shifts from several owners until the initial spender earns it back and can repay it to the bank and the money loop is completed. However, within this loop no interest exists. So to repay the interest, the individual has to retrieve that money from another money loop, leaving that loop without enough money to repay the loan. Therefore, the amount of debt owed is far greater than the amount of money there is to repay it (Galbraith, 1976; Greco, 1994; White, 1999). Thus, there exists an inherent deficiency in the money supply. Therefore it is not possible for all members of an economy to reimburse their bank loans. This creates competition, because one has to compete for an inadequate supply to prevent defaulting on their loans. However, this assures that some will lose the competition, and will not be able to repay their loans. This results in bankruptcy, regardless of how competent they were in doing their business. This is the problem of money being scarce: there will always be less money than necessary. This is thought to have serious effects on human behaviour; it is believed to create fear, competition and individualism, which in turn have negative effects on society (Linton, 1986; Greco, 2001; Lietaer, 2001; Eisler, 2008).
2.1.2 The volatility problem

The second problem of money is its volatility. A particular feature of money is that it moves, and that it can move anywhere. This gives, among others, money its value because it can be spend anywhere. However, it also causes problems because it can diffuse out of local communities. A community relies on the flow of national currency. Money enters the community through the process of exports, visitors and government expenditure and departs through imports, tax, travel etc. (Ekins, 1986). In addition, money as a store of value also exits the community, with persons who have interest elsewhere within the nation. If it would re-enter the community, this would be as externally controlled capital. If more money goes out then comes in, the community loses control of its economy. In addition, national currency is influenced by the fluctuations of international financial markets, which makes it unstable and susceptible to devaluation (Ekins 1986).

In today’s world, globalization has become inextricably linked to economic development, and indispensable of economic growth. However, it is argued by some that globalization has also negative impact on the local level (Pacione, 1997a; Pacione, 1997b; Henderson, 1999; Kelly, 2001; Shuman, 2013). Since money is volatile it can diffuse easily from local communities. Pacione (1997a; 1997b) states that uneven development is a natural characteristic of globalization, since capital has the tendency to drift to the regions which offer the greatest potential return. Wealth tend to flow from where it is originally generated, the local communities, to capital regions (Ekins, 1986). This ensures that local economies become dependent on external demand. However, these local economies suffer when the external parties become redundant to the local goods and services, and cease investing in these local economies, reducing the flow of national currency. Having less national currency implies having less ‘medium of exchange’; therefore locals aren’t able to trade their goods and services between themselves. This results in large-scale local unemployment and wasted local skills and resources. In the meantime, local demand stays unmet as the needs and resources cannot be matched because of this absence of a medium of exchange (Pacione, 1997a; Pacione, 1997b; Shuman, 2013). When national currency flows out local communities, its circulation in communities diminishes, resulting in less local trading. In this way, national currency fails on its purpose to facilitate exchange and inhibits local economic development.
2.1.3 The behavioural problem

According to the classical idea of money, it is a passive medium of exchange which is used to facilitate transactions between people (Lietaer, 2001). This means that money does not influence the kind of transactions being performed nor influences the relationship between the people who are using the money. However, there are serious doubts about this proposition. Nowadays there are a number of studies present that demonstrate that depending on what one uses as a medium of exchange, the relationship between people changes.

In an influential paper by Vohs, Mead and Goode (2006) nine experiments are conducted to test if money induces a self-sufficient orientation, defined as a secluded state wherein individuals strive to attain personal goals and prefer to be apart from others. This was done by activating the concept of money, by making participants in the monetary condition descramble phrases that primed the concept of money (sentences with words like high-salary) or letting them play a board game of monopoly in which they earned relatively a lot of monopoly money. All the nine experiments provide support for the hypothesis that money induces a state of self-sufficiency. A mere reminder of money resulted in independent but socially insensitive behaviour. The authors conclude that this explains why money enhances individualism in contemporary society and diminishes communal motivations (Vohs et al., 2006). The authors strengthen these results by more experimental research in which they find that subtle reminders of money, like looking at a screensaver with contained dollar bills instead of a neutral screensaver, result in large changes in behaviour; participants reminded of money behaved less helpful to others and preferred isolated activities and less physical closeness (Vohs, Mead & Goode, 2008). These results are in line with an experiment by Frank, Gilovich and Regan (1993), who investigated if university students majoring in economics make more self-interested decisions in social dilemma games than students from other specializations. The authors found evidence that economists are more likely to make self-interested choices in social dilemma games than others, a result that corresponds with the theorem that money evokes individualism and competition (Frank et al., 1993). A similar experiment was conducted by Gino and Pierce (2009), who performed three laboratory studies to test if the presence of wealth makes people engage more in unethical behaviour for financial gain. The results showed that participants stimulated by the visible proximity of monetary wealth led to more frequent cheating on an anagram task, which was defined as unethical behaviour (Gino & Pierce, 2009). These studies question the classical idea that money
is just a passive medium of exchange that does not influence the behaviour of people using this money. On the contrary, the studies indicate that using money as a medium of exchange results in more individualistic and selfish behaviour.

The three problems identified above have stimulated the development of alternatives to the present financial system. Over the ages there have been hundreds of monetary and quasi-monetary systems developed around the world, including local currencies. Local currency can remove some of the drawbacks and inequities of the present financial system. The focus of this thesis will be on one particular local currency, namely the Local Exchange and Trading System.

2.2 Local Exchange and Trading Systems

2.2.1 Principle and practice

A Local Exchange and Trading System (LETS) is a concept initiated by the consultancy Landsman Community Services Ltd in the early 1980s in Vancouver Island, Canada. The first LETS was established by Michael Linton, in the Comox Valley, British Columbia in January 1983, in times of severe economic recession (Offe and Heinze, 1992). The idea was introduced by Michael Linton at ‘The Other Economic Summit’ in 1985 in the United Kingdom, which is a forum for speakers seeking to develop and promote a New Economics based on social justice, sustainable use of resources and conservation of the environment (Ekins, 1986). A LETS is a community-oriented trading network in which multilateral exchange can take place without the use of the prevailing national currency within a bounded system. The idea is that LETS enable people to trade goods and services within a community when there is a shortage of conventional money or a high unemployment rate and therefore stimulates local economic development. Instead of national currency a local currency is used, an acknowledged medium of exchange within this local system, usually tied to the national currency in a 1:1 relationship (Williams, 1996a). A LETS is a local non-profit association that have been described as an extended barter system, because LETS use serial reciprocity to overcome the problems of mismatch between supply and demand which are present in a pure barter system (Pacione, 1998).

Everyone within a particular region or community can become a member of the present LETS circle, usually on payment of a small membership fee. Members make use of an information
system or directory to which one can list the goods and services offered, and identify potential individuals to trade with. Transactions are made on agreement by the trading parties and the price is expressed in local currency. The transactions are recorded by the association using cheques written in the local LETS credits. These cheques are sent to the accountant or treasurer every time a transaction is made. The treasurer processes all transactional activity and updates the LETS accounts of its members. On a regular basis, information on the state of these accounts is published so that all members of the system have knowledge of the trading balance (debit or credit) of all members (Lee, 1996; Thorne, 1996).

The main objective of LETS is twofold, first it is to encourage local economic self-reliance and development and second it is to build the experience of a community where members take care of each other (Williams, 1996a). Peacock (2006) states that LETS are the most explicit example of socioeconomic phenomena, since the system has an economic objective to support the poor and unemployed and a social objective, to stimulate community building in which a ‘gentler’ form of economy can be pursued. Both objectives will be discussed in depth below.

2.2.2 Economic objectives

The principal economic objective of LETS is to facilitate trade in economically depressed communities (Linton, 1986; Lang, 1994; Williams, 1996a). Furthermore, the LETS is designed to overcome the problems and limitations of conventional money and therefore to allow its members to manage their own money (Linton, 1986). As a contrast to conventional money, LETS credit is not scarce. The local currency is created by the members of the system via demand for goods and services, instead of by the central bank. Members are in possession of a LETS account which starts at zero and can go positive or negative, furthermore, there is no compulsion to trade. For example, if person X sells a good or service to person Y, person X will have a credit and person Y will have a debit. If person Y then sells a good or service to person Z, person Y will have a credit and person Z will have a debit, if person Z finally sells a good or service to person X, the circle is round, debit and credit is cleared and everybody gained something while the net sum of the accounts is zero; no cash is needed. This is a simplified example, however in reality, the more that join the circle, the more dynamic the process can get.
More participants in a LETS result in a wider range of goods and services available, however the value people contribute should be equal to what they take out (Greco; 1994).

An essential character of the LETS is that no interest is charged or paid on account balances. The system is interest free so creating the currency has no influence on its value. By allowing temporarily imbalances on the accounts, without charging interest, exchange is facilitated. By this the system differs from the conventional money economy, since earning profit is not an objective of LETS (Bebbington, 2000). In addition, charging no interest is thought to stimulate trade, because holding a positive balance has no advantage. Even so, having a high positive balance is negatively perceived, since it means that you are failing to provide potential employment for someone within the system (Bebbington, 2000).

Another contradiction with conventional money is that LETS currency only circulates within the community. Transactions can only be made with members of the system who are locally based, which means that the wealth cannot drift away to regions which offer the greatest potential return outside the community. Therefore, LETS provide local communities with greater control over their financial and economic affairs, since local currency cannot be exported outside the community. It facilitates trade within the local community regardless of national currency deficiencies (Davis & Davis, 1987; Williams, 1996b). Nonetheless, LETS were not intended to replace the national currency completely, they were intended as a parallel economy, which can function as a buffer against external economic forces (Seyfang 1994).

### 2.2.3 Social objectives

Besides the principal economic objective, LETS have a significant social goal to help build an experience of community by developing and strengthening wider social networks. In addition LETS strive to create economies based on cooperation and social equity, where trade is incentivized by reciprocity. Furthermore the system aims to improve social contact, and to take care of the underprivileged within the community, like the poor and unemployed.

Unemployment is a problem faced by virtually all economies. A resulting problem of unemployment is social exclusion and poverty. Unemployment prevents participating in economic activity and the access to credit. This disables the unemployed and poor to use or
develop their skills and makes it more difficult to achieve employment again. This vicious circle results in low self-esteem and deteriorates the perceived quality of life (Bebbington, 2000). In general, there seems to be no shortage of work but a shortage of jobs. The difference between those words is that the word ‘job’, a recent concept, stands for something we do for monetary pay. The word ‘work’, a very old concept, beholds something you do for passion, primarily for its own sake (Lietaer, 2001). Williams (1996b) states that work is abundant, and enough individuals are available who want to do that work. Though, often this demand and supply cannot be matched. For work to classify as a job it needs to be paid with national currency. Since the monetary system is based on money as a scarce good, this indirectly results in paid jobs being scarce. If money would be abundant, it could connect the work with available workers. However, in the current monetary system money derives its value from its scarcity. If money would be abundant in the present system it would lose its value, therefore it wouldn’t solve the problem of unemployment.

LETS do offer an opportunity to escape the downward spiral of unemployment and prevent the poor and unemployed from social exclusion. The system enables them to participate in informal work so as to reduce social inequalities (Offe & Heinze, 1992). For example, the unemployed tend to only interact with other unemployed because lacking employment excludes them from participating in economic activity which then results in social exclusion. By allowing reciprocal exchange without the use of national currency, the social networks can be reconstructed by empowering them to participate in economic activity, demonstrating their worth and therefore rebuilding their self-esteem (Williams, 1996a). Furthermore, participating in a LETS can be an alternative to obtain credit. A lack of credit restrains the poor and unemployed to participate in informal work or develop their skills, since they are unable to purchase the materials and capital goods that are necessary to perform the work. LETS allow temporary imbalances on the accounts, enabling them to go negative at first to acquire the goods they need, and restore this debit by engaging in informal work (Williams, 1996b). By this, LETS overcome the barriers that prevent the poor and unemployed to participate in informal work. LETS thus aim to tackle the problems resulting from unemployment and underemployment and strive for social equity in the economy.
Finally, LETS also have a strong community building objective (Williams, 1996a). It is often assumed that the sense of community is a natural process that emerges when a group of people live together in a certain region. However, experiencing a community life requires more. It requires active creation and reproduction, and participating in reciprocal exchange is the principal mechanism through which social networks can be developed (Williams, 1996c). LETS have a strong community incentive, since every transaction embodies an example of local skills and local resources meeting local needs (Linton, 1986). LETS create a formal structured framework in which social networks can develop through the mechanism of multilateral reciprocal exchange (Greco, 1994; Williams, 1996a; Williams, 1996c). By developing these social networks, communities are strengthened and empowered since the members within the system have stronger interpersonal relationships due to having more exchange relationships with each other (Bebbington, 2000). In addition, because members of a community do not have to compete for LETS credit, since it is abundant, it creates room for other regarding behaviour such as cooperation. When people are aware of the fact that there exist enough credit in circulation and that they don’t have to be scared there won’t be enough, they are able to become less selfish and think more of other members in their community. The system provides a framework wherein members of a community can support individuals, local businesses and enterprises and voluntary groups, out of the social desire to contribute to the community.

In summary, LETS have emerged as a parallel currency and strive to overcome some of the indicated drawbacks of national currency. LETS credit is abundant, remains in the region where it is created and has no intrinsic value. In addition it is argued that the system also contributes to stronger community networks and social, cooperative behaviour. Therefore it should lead to a proliferation of trade and a completely different experience of cooperation and support. It is argued that people become more generous, more comfortable, more giving and willing to receive, and that it provides the security of being part of an exchange group. Therefore it is put forward that LETS can be an example of a complementary currency which leads to a ‘gentler form of economy’ (Greco, 1994; Greco 2001; Lietaer, 2001; Linton, 1994; Eisler, 2008; Lietaer, 2013). In the next section the empirical research on existing LETS is summarized to provide an insight of LETS performance on its economic and social objectives.
2.3 Empirical research on LETS

The first LETS was created in the Comox Valley, British Columbia, in January 1983. Their unit of currency is the green dollar, which is tied to the Canadian dollar. The system contained 650 members and in the first twenty months of operation about 250,000 worth of (green) dollars was traded (Linton, 1986). Since the LETS has been introduced in Canada, the idea has spread all over the Western world, in countries such as Holland, France, Germany (with over 250 LETS), and Great Britain (Peacock, 2006). During the 1990s, LETS became extremely popular in the UK and grew rapidly, from five LETS in 1992 to 350 LETS in 1995. In 1997 there were about 600 LETS with a total membership of 30,000 and a turnover of 2 million (Van Ouytsel & Vanderweyden, 2004). This explains why most of the empirical research on LETS is performed in the UK. Thereafter LETS emerged all over the world, in the USA, South-America, New Zealand, Australia, Asia and even Africa (Williams, 1996; Peacock, 2006). The empirical research can be grouped into two, studies that focus on the potential of LETS, and more critical studies who point out shortcomings of the system. Subsequently, five studies focussing on the potential of LETS are discussed, as well as two more critical studies, respectively.

One of the first empirical studies on LETS was done by Williams (1996a, 1996b, 1996c) in the United Kingdom. Empirical data was obtained by performing national surveys of the United Kingdom and membership surveys of the Totnes LETS in Devon and the LETS in Manchester. The LETS in Totnes contained 250 members of which 63 responded to the survey. In general, the results of the membership survey indicated that LETS provided economic benefits to its members and some access to work and credit for its poor and unemployed (Williams, 1996a). In addition, it showed potential on the community-building aspect; 68.4 per cent of all members indicated that the LETS enabled them develop a broader network of people they can contact for help. For the category unemployed this was 66.7 per cent, therefore, LETS appear to be able to re-integrate the unemployed into community by broadening their network of persons to call for help (Williams, 1996c). However, there were some doubts identified to the economic impact of the LETS. The total value of the exchange between the 63 respondents was the equivalent of £9,964, which represents an average of £153.39 per member and a total value of trade in the past year of £39,539. The average household income in Totnes is £9,722; therefore £153.39 of LETS earnings represents less than 2 percent of total household income. This might give an
insignificant impression, however 32.7 per cent of the respondents still believed that LETS helped to improve their material standard of living (Williams, 1996c).

Similar results were found in the study of the LETS group in Manchester, which contained 500 members of which 109 members responded to the survey. The value of trade by the respondents in the past year was equivalent to £14,251, which represents a turnover of £131.66 per member (Williams, 1996b). Average middle-income in Manchester is £11,800, therefore LETS earnings represent only 1.1 per cent of total household income. This indicates similar problems with the economic significance of LETS; however for those at the lower end of the income scale 48.1 per cent of the low-income household respondents and 44.4 per cent of the unemployed respondents indicated that their participation in the LETS improved their material standard of living (Williams, 1996b). The study concludes with an appeal for LETS to grow in size and scope, since only 51.9 per cent was satisfied with the range of goods and services offered; in the Totnes study this was 59.7 per cent (Williams, 1996a). According to Williams (1996a, 1996b, 1996c) LETS need to grow in size to contribute significantly to the economic objective; however, since the system is based on local and social values, this might be difficult to establish.

Published one year later, Pacione (1997a, 1997b) performed a study on LETS in Scotland, focusing on the development and operation of several LETS groups in Glasgow. These case studies analysed the prospects for further development of the system and consider the potential value the system can provide, with a particular focus on localities who encountered negative effects due to globalisation as a result of capitalism (Pacione, 1997a). The results of the studies indicated that LETS represent a very small proportion of GNP and therefore have little economic impact. However, Pacione (1997a; 1997b) argues that this could not be the right yardstick to measure its success, since LETS also serve social and community goals. The responses to the survey indicated that LETS can have an economic and social benefits by developing a community experience in which self-esteem can be build by valuing skills and by allowing disadvantaged individuals into the circle of exchange through accommodating them with interest-free credit, therefore providing them with an opportunity to enrich themselves (Pacione, 1997a; 1997b). Hence, it would make more sense to measure LETS potential on the basis of improvement of material standards of lower income households. In addition, Pacione (1997a; 1997b) points out LETS potential to relocalize the economy by enabling communities to control
their own economy. As a complement to the formal economic system, LETS strengthens local communities, by improving self-sufficiency of supply. Nevertheless, to achieve this LETS systems need to expand in size of members, raise the trading volume among its members and expand the range of goods and services available in the system (Pacione, 1997a; Pacione, 1997b).

Seyfang (2001) focussed on the evaluation of LETS as an informal employment strategy and as a means to tackle social exclusion by performing a case study on a LETS covering the region of the King’s Lynn and West Norfolk, which is a large area around the fenlands of Cambridge in the United Kingdom. This system consisted of 107 members in which 600 transactions are performed a year, worth around £8,700. This represents a turnover of £17,400, which is nearly three times the typical LETS turnover of £6,000 (Seyfang, 2001). Remarkable about this system is that four-fifths of the members are female. The results of the case study indicate that LETS have some success in providing informal employment opportunities for the poor and unemployed, since the majority of the LETS members were poor and/or unemployed, therefore seeking an alternative way to access income and services which they could otherwise not afford (Seyfang, 2001). The LETS system enabled the jobless, who face several barriers withholding them to perform informal work, to overcome these by providing interest-free credit, making it possible to hire the required goods and equipment, providing a platform for social interaction, and stimulating the development of skills and training (Seyfang, 2001). According to the study, for the majority of the LETS members the alternative to performing informal work in the LETS system is not working at all. Therefore, LETS can play a significant role to empower the socially excluded to participate in economic activity (Seyfang, 2001). However, in accordance with the previous studies, Seyfang (2001) states that the LETS systems are relatively small in size and scope and for it to grow and gain more economic significance, constructive social and economic policy is necessary. On the other hand, this could be contradictory, since the system is based on local and social values which thrive better in small groups, mainstreaming and expanding LETS could risk crowding out those social values, which could ensure the system to fail.

More recently, Gomez (2008) studied local currency systems and their capability to re-claim control over economies and promote endogenous local economic development in Argentina. Often, as was the case in Argentina, a LETS emerges as a response to externally induced
economic shocks. In 1995 de *Club du Trueque* (CT) was founded which contained 25 members and used ‘créditos’ as a unit of account, equivalent to the pesos. During the economic crisis that Argentina encountered in 1999 until 2002 GDP reduced with 25 per cent (North, 2007). As a result, an overarching national network called *Red de Trueque* emerged, which contained 4,700 CT’s at its peak (Gomez, 2008). The rapid growth was partly due to the economic crisis that Argentina encountered in 1999 until 2002 and reduced GDP with 25 per cent. To test the performance of these systems at developing local economies Gomez (2008) examined the effect of local currency on local households, drawing on extensive survey work in Argentina. The results showed that the majority of members were unemployed and that their economic situation improved by entering the *Red de Trueque* by enabling a complementary source of income. The LETS thus enabled income variation which reduces vulnerability. Furthermore, participants earned significantly through the LETS: for 48.5 per cent of the members it established about half of their household expenses (Gomez, 2008). Moreover, the active members appeared to encounter long-lasting effects like woman’s empowerment, acquisition of skills, and micro-enterprise creation. The author concludes that the system promotes social inclusion by enabling the poor and unemployed to establish micro-enterprises and earn extra income for their households and allowing households to develop their skills and competencies and broaden their income sources (Gomez, 2008).

On the more critical side, Peacock (2006) emphasizes on the contradiction first mentioned by Seyfang (2001). Peacock (2006) analysed the moral and economic significance of LETS, as well as the possibility that these two aspects might conflict. LETS claim to have two goals, at first to offer economic opportunities for the poor and unemployed and second to establish a gentler form of economy based on trust and intimacy (Peacock, 2006). However, in this article it is argued that to realize the first claim LETS need to expand their membership and intensify the trading to be of economic significance for those in need, but to realize the second claim and maintain the trust and intimacy, LETS needs to remain small. Peacock (2000; 2006) argues that the ‘social’ side of LETS dominates the ‘economic’ side, since those interested in the community aspect predominate and desire to keep LETS small, to be able to foster relations between members. Furthermore, members are often not dependent on LETS materially, but active in gainful employment and thus not interested in expanding their schemes. According to Peacock (2000; 2006) LETS members are mostly attracted from the ‘alternative scene’, people with ideological
motives for a green and sustainable economy for whom it is a spare-time activity, and not the poor and unemployed whose primary interest is pecuniary gain and for whom the system was initially designed for. Therefore it is forecasted that LETS will remain small and unable to realize their economic goal offering economic opportunities for the less well-off (Peacock, 2000; Peacock, 2006).

Another more critical study was performed by Aldridge and Patterson (2002) on the practical economic role of LETS, by drawing on an intensive case study on Hounslow LETS, an initiative especially created as an anti-poverty strategy in the UK. The system contained 130 members of which 53 per cent did not engage in a single trading activity in the first 30 months. The system makes use of ‘cranes’ as credit which holds a 1:1 relation with the pound sterling. Within the active members only eight per cent had conducted more then ten transactions, and when analysing those in more detail it appeared that only five members were responsible for 43 per cent of the trading. Annually, average turnover was 3,270 cranes which represent a turnover per member of only 25 cranes per year (Aldridge & Patterson, 2002). These activity levels demonstrate a miniscule economic role of LETS in Hounslow, therefore failing its purpose as an anti-poverty strategy. The authors suspect that the LETS was promoted by the central government and supported by local authorities because it ought to be a cheap solution to a problem what would be otherwise very expensive to handle (Aldridge & Patterson, 2002). On the other hand, Aldridge, Patterson and Tooke (2003) analysed another LETS group called Stroud LETS, and compared this to the Hounslow LETS. The Stroud LETS was one of the first LETS in the UK, founded in 1990 by a group of people with strong green ideas. In 1999 the system existed of 320 members of whom most members were female, middle aged and well educated (Aldridge et al., 2003). Credit is called ‘stroud’ and is tied to the pound sterling. In 1998 the amount of transactions performed was estimated to be 2,944, worth of 62,133 strouds. This is an annual turnover of 394 strouds per member. Compared to Hounslow and other UK LETS (turnover of 65-70 units/year) this is a huge economic impact. According to Aldridge et al. (2003), the large difference is related to the social groups within the systems. The stroud LETS seem to be so successful because the system is built on a pre-existing community with shared ‘green’ ideas. The authors conclude with the statement that LETS in their present form and in the current economic context only serve a marginal role in facilitating a more sustainable form of local economic development (Aldridge et al., 2003).
The aforementioned studies show inconsistent results. Practically, all studies described above find some economic and more social potential of the LETS. Economic activity is stimulated through the facilitation of cashless exchange and communities seem to gain more control over their own economies, since wealth stays in the community and is not exported out to the region with the greatest potential return outside the community. The social objective of LETS to build community by creating stronger social networks and therefore create opportunities for the poor and unemployed and prevents social exclusion is also demonstrated in these studies. However, next to the proposed benefits some serious drawbacks are indicated. Nearly all authors point out that especially the economic benefits are hard to assess, since the impact is marginal. The range of goods and services offered is too small, there are not enough members and volume of turnover is too low. Some studies claim that LETS only work with a certain group composition of alternative green thinkers who are mostly woman; others say that LETS will never work since their economic and social objectives are contradictory. Evidence is mixed in the sense that Aldridge and Patterson (2002) state that LETS will never provide an alternative for the poor and unemployed, where Gomez (2008) finds promising results in their potential to stimulate local economic development.

2.4 The future of local currency

Since 2008 empirical research on the topic of LETS has stagnated. It seems like the scientific community has lost its interest in a concept what was at first believed to be so promising. However, new economic thinkers are developing new local currency systems that aim to achieve the same objectives as the LETS. For example the Time Dollars Model, invented by Edgar Cahn during the 1980s, which aimed at stimulating normally unpaid activities as caring for your neighbour, community building and informal support (Cahn and Rowe, 1998). For participating in one hour of service, one time credit is earned. These are registered by a broker, who keeps track of all exchange time credit, similar as in the LETS. Time banks are a form of community currency, which can also be spent on goods and services, with time as their unit of value. Furthermore, time banks try to overcome some of the obstacles faced by LETS by valuing all labour equally and aim to stimulate informal mutual support instead of professional services (Cahn, 2001).
More recently, another community currency called ‘Seedstock’ is brought to life by Jordan Bober, Paola Qualizza and the original founder of LETS, Michal Linton in 2011. Seedstock is a form of community currency that strives to stimulate local economic development and to reconnect communities. It differs in the sense that it involves local businesses and non-profit organizations. Businesses can decide to create the currency by accepting the Seedstock as a partial payment, to subsequently donate an amount of Seedstock to a non-profit organization. This non-profit then reaches out to the community to change their money for Seedstock, in exchange for the services offered by the non-profit. Next, community members can spend this Seedstock, whether or not accompanied with traditional money, on local businesses. Seedstock needs to be evaluated critically, and since no empirical research is performed on the topic yet, future research must point out how it performs on its goals.

Another present-day community currency initiative is introduced by Bernard Lietaer and Jacqui Dunne in their book *Rethinking Money: how new currencies turn scarcity into prosperity* which came out in 2013. Lietaer is an international expert in the design and implementation of currency systems and wrote several books on the topic. Lietaer and Dunne (2013) argue that the monoculture of money, created privately by the banking system, is what creates economic instability, leading to liquidity crisis. Therefore, it is stated in the book that other types of money, like community currencies, are necessary to create economic stability. Furthermore, not one single community currency is promoted, but several currencies that exist parallel to each other (Lietaer & Dunne, 2013).

These initiatives are just a few examples of a great movement of new economic thinkers who have in common that they promote an alternative, or replenishment, to the current monetary system which has been pointed out to be flawed in several ways. These alternatives are believed to stimulate a different kind of human behaviour based on cooperation, local support and social values and are expected to enable a new form of cooperative and sustainable economy. However, no experimental research is done before to asses how these local currency systems, like the LETS, have performed on establishing its economic and social goals. The focus of this thesis is to investigate how LETS perform on its economic and social objectives in a laboratorial setting. This laboratorial setting enables us to compare LETS with a monetary system, and enables us to control for self-selection into LETS, since we are interested to see if LETS can achieve its goals.
regardless of the type of members the system has. The focus lies on the relationship between participating in a LETS and social behaviour.

Social behaviour in this context is measured as the magnitude of concern people have for others. This is called Social Value Orientation (SVO), and provides a framework for underlying motivations in decision making. There are four types of profiles within this framework which indicate different preferences. When a decision-maker prefers to maximize her own payoff the profile is *individualistic*, when the decision-maker prefers to maximize the difference between her own and the other person’s payoff the profile is *competitive*. Does the decision-maker prefer to maximize joint outcomes the profile is *prosocial* and if the decision-maker prefers to maximize the other person’s payoff the profile is *altruistic* (Murphy, Ackermann & Handgraaf, 2011). Since we are interested in evaluating LETS on its economic and social potential in a controlled environment, the investigation of this thesis will focuses on the following question:

*Does participating in a LETS, in a laboratorial setting, stimulate reciprocal exchange and induce prosocial behaviour?*
3. Research Model and Hypotheses

To provide an answer to the proposed research question, we analyse the data from a laboratory experiment on reciprocity in small groups and Social Value Orientation (SVO). This enables us to compare LETS with a monetary system within a controlled environment. In the literature it is argued that LETS often are successful because a certain type of members (woman, elderly, green activists etc.) that participate in LETS. This self-selection factor is controlled for in the experiment, since the endogenous selection of network is prohibited because participants are randomly assigned to a certain condition. The experiment contains three conditions to which participants get randomly assigned, a control condition, a monetary condition and a non-monetary condition (i.e. the LETS condition). Within these systems participants play a particular game of reciprocal gift exchange in groups of four, with different payoff schemes per conditions. After a cooling down period the SVO of individual participants is measured, indicating a prosocial or proself orientation of the participants. The relationship between participating in a certain condition and the measured SVO of participants is the focus of our research. The experiment is explained in depth in the following section.

Based on the theoretical background and previous literature review, three sets of hypotheses are formulated to test how LETS perform on its social and economic objectives. The first two sets of hypotheses concern main effects regarding differences between participants in the different treatment conditions. The last set of hypotheses dig deeper into the underlying group processes by analysing the differences between the small reciprocity groups within the treatment conditions.

The first hypotheses focus on the social objective and concern the relationship between participating in a certain treatment condition and the individual SVO measure. The SVO of participants is measured by the decisions they make on the SVO task and produces a certain SVO ‘angle’. Higher SVO angle scores indicate more prosocial behaviour; lower SVO angle scores indicate more proself behaviour. As discussed in the literature review, participating in a LETS is expected to provide a framework for cooperation and more social, other regarding behaviour, which is measured by their SVO. Therefore the first hypothesis states:

**H1A:** Participating in a LETS induces more prosocial behaviour as indicated by a higher individual SVO angle as compared to the monetary condition and the control condition.
Similarly, as mentioned in the literature, a monetary system is expected to be related to more individual and therefore proself behaviour. Therefore hypothesis 1B states:

**H1B: Participating in a monetary system induces more proself behaviour as indicated by a lower individual SVO angle as compared to the LETS condition and the control condition.**

The second set of hypotheses focus on the economic objective of LETS and concern the differences in earned welfare across treatment conditions. It is argued in the literature that a medium of exchange facilitates exchange and provides efficiency, therefore it is expected that participating in a monetary system as compared to a control system leads to higher earned welfare, because of increased economic exchange. Hence, hypothesis 2A states:

**H2A: Individual payoff, measured in earned points, in the monetary condition is higher compared to the control condition.**

In addition, LETS economic objective is to stimulate economic exchange within the community. It is argued in the literature that the credit used in a LETS system also provides a facilitating function like money, and will similarly stimulate economic exchange. It is argued that by providing credit which is abundant, a proliferation of trade emerges. Therefore, it is expected that in the LETS condition individual payoff will be higher than in the control condition, because of increased economic exchange. Hence hypothesis 2B states:

**H2B: Individual payoff, measured in earned points, in the LETS condition is higher compared to the control condition.**

In addition, we are interested in the groups of four who interact in the first part of the experiment. Within these groups of four economic exchange takes place, therefore it might be more interesting to compare the average group scores than individual scores, within the different treatment conditions. As discussed in the literature, it is argued that LETS stimulate economic exchange. In addition, this economic exchange is driven by social incentives to support members within the community, in contrast to the monetary system, where money itself is the incentive to trade. It is argued that LETS provide a framework for a ‘gentler’ form of economy build on reciprocity; therefore the success of such a system is related to the social orientation of its members. In addition, it is expected that participating in a thriving LETS system enhances other
regarding behaviour. Because being part of a successful LETS group provides the security to be
more willing to give and to receive. Hence we are interested in the relationship between group
earnings and the average SVO of those groups. This leads to the last set of hypotheses which
state:

\textbf{H3A}: \textit{Group earnings in the LETS condition are related to a higher average group SVO angle.}

\textbf{H3B}: \textit{Group earnings in the monetary condition are independent of the average group SVO
angle.}
4. Research Methodology

In this section, the research methodology used to test the hypothesis stated in the previous section, will be discussed. Primary data was gained through a laboratory experiment. It is expected that participation in different currency systems has an impact on the level of economic activity and influences other regarding behaviour of participants.

4.1. Experimental design

To test the hypotheses a 3 (condition: control, monetary and LETS) x 1 (SVO measure) factorial design was used. The data of a laboratory experiment was used as the source of information. In terms of structure, the experiment consisted of three parts. The first part contains the currency system manipulation, in which participants played a game of reciprocity, determined for their condition. The second part consisted of several survey questions and served as a cooling down period. The third part of the experiment enclosed a SVO measure, a game in which participants allocate wealth. All games and questionnaires are conducted on the computer, facilitated by the experimental economic software Z-tree (Fischbacher, 2007). The three parts of the experiment will be discussed individually below. The instructions of the different parts of the experiment are enclosed in the appendix.

4.1.1 Part one: manipulation of currency systems

In the first part of the experiment subjects interact by a decision task. The decision task is a modified favour-exchange game, in which participants can request effort from and send effort to their opponent, to earn experimental credit i.e. money. In each round participants are randomly matched with one opponent out of a group of four, and allocated the role of a ‘receiver’ or the role of a ‘sender’. The game is played over 30 rounds. There are three conditions, the control condition, the monetary condition and the non-monetary condition in which the same task is performed, although with different payoff schemes.

In the control condition, each round requests $r_{ij}$ are made by the receiver for effort and the sender decides after that request how much effort they would like to expend to that player. The actual expended effort $\bar{x}_{ij}$ is decided on as follows: $\bar{x}_{ij} = \min\{r_{ji}, x_{ij}\}$. Pay-offs are dependent
on effort received \((\bar{x}_{ij})\) and effort expended \((\bar{x}_j)\). Thus pay-offs are based on the sum of effort received minus the sum of effort expended:

\[
\pi_i = \alpha \sum_j \bar{x}_{ji} - c \left( \sum_j \bar{x}_{ij} \right)
\]

Where \(\alpha\) is a constant factor by which earnings are multiplied and \(c\) are the cost for extending effort.

In the monetary condition, similar as in the control condition, each round request \(r_{ij}\) are made by the receiver for effort and the sender decides after that request how much effort they would like to expend to that player. The actual expended effort \(\bar{x}_{ij}\) is decided on as follows: \(\bar{x}_{ij} = \min\{r_{ji}, x_{ij}\}\). In addition, all effort received and expended is kept in record in account \(A\) for each player. At the end of the game, a player pays or receives a price \(p\) for the amount in the account. The account payoff is based on the price \(p\) multiplied with the difference of the sum of effort received and the sum of effort expended. Therefore players pay a price for receiving effort, and receive a price for extending effort.

\[
A_i = p\left( \sum_j \bar{x}_{ji} - \sum_j \bar{x}_{ij} \right)
\]

The complete payoff function in the monetary condition is similar as in the control condition, based on the difference between the sum of effort received multiplied by a constant factor \(\alpha\) and the sum of effort extended multiplied by the costs \(c\), but then extended with the account payoff function:

\[
\pi_i = \alpha \sum_j \bar{x}_{ji} - c \left( \sum_j \bar{x}_{ij} \right) + A_i
\]

This payoff function generates a monetary system since players pay a price to receive effort, and receive a price for extending effort.

In the non-monetary condition, similar as in the control condition and the monetary condition, each round request \(r_{ij}\) are made by the receiver for effort and the sender decides after that request
how much effort they would like to expend to that player. The actual expended effort \( \bar{x}_{ij} \) is decided on as follows: \( \bar{x}_{ij} = \min\{r_{ji}, x_{ij}\} \). In addition, all effort received and expended is kept in record for each player, similar as in the monetary condition. However, this is a different account, named account \( B \) and this account balance is not taken into account in the calculation of the final payoff. The account payoff is based on the price \( p \) multiplied by the difference of the sum of effort received and the sum of effort expended. Therefore players pay a price for receiving effort, and receive a price for extending effort, however this is not a monetary price, since the account balance of account \( B \) is not taken into account when final payoffs are calculated. The payoff functions are therefore as follows:

\[
B_i = p\left( \sum_j \bar{x}_{ji} - \sum_j \bar{x}_{ij} \right)
\]

\[
\pi_i = \alpha \sum_j \bar{x}_{ji} - c \left( \sum_j \bar{x}_{ij} \right)
\]

This construction of payoff schemes generates a LETS, because players pay a non-monetary price to receive effort and receive a non-monetary price to expend effort. Thus players spend and receive credit, which they can use to perform later transactions, although this credit has no intrinsic value on its own.

### 4.1.2 Part two: survey questions

After the manipulation of currency systems, the second part of the experiment starts. In this part, participants fill in a survey with questions regarding demographic characteristics (gender, age, nationality, study major and their math grade in high school), general risk attitudes, and positive and negative reciprocity. Thereafter, a Big Five personality survey is submitted to participants, where 50 items on five personality traits are presented with five items at a time. The responses to these questions are not relevant for our investigation, and are therefore not used in the analysis. This part of the experiment therefore serves as a cooling down period, to control for potential carryover effects from the first part of the experiment to the last part.
4.1.3 Part three: the SVO Slider Measure

The final part of the experiment consists of the SVO Slider Measure. The SVO Slider Measure is a relatively new method for measuring other regarding behaviour, developed by Murphy et al. (2011). In comparison to older methods used to measure SVO, the SVO Slider Measure allows for greater explanatory potential by meeting the psychometric criteria of being a high resolution measure that is easy to use, efficient and able to produce data on a continuous scale. In addition, the SVO Slider Measure has increased statistical power (Murphy et al., 2011).

On the SVO Slider Measure task participants need to make a series of decisions regarding the allocation of resources between themselves and an anonymous opponent. Originally, the task consists of six primary items and nine secondary items; however these secondary items are optional and were not used in this experiment. The six primary items are shown in Figure 1. Each item contains an allocation choice of resources between nine different joint payoffs. These payoffs fluctuate individually within a range of 15 and 100. Joint payoffs vary in the sense that some are equally divided, and others are far apart (e.g. an allocation of 85 for yourself and 85 to the other is possible, as well as an allocation of 100 to yourself and 50 to the other). The participant evaluates each item sequentially and indicates the most preferred joint distribution. These allocations are indicated in Figure 2, together with their corresponding social orientations (altruistic, prosocial, individualistic and competitive).

The set of responses can be translated into a single SVO index, which represents the social preferences of the participant. This SVO index is calculated by the formula:

\[ SVO^\circ = \arctan \left( \frac{\bar{A}_o - 50}{\bar{A}_s - 50} \right) \]

The mean allocation for other (\(\bar{A}_o\)) is computed, as is the mean allocation for self (\(\bar{A}_s\)). Then 50 is subtracted from both allocations to place the base of the resulting angle in the centre of the circle (50, 50), instead of the Cartesian origin. Finally, to obtain a single index of a participant’s SVO, the inverse tangent of the ratio between the two means is calculated. The resulting SVO angles can be divided into one of the four social preference categories as follows. Pure altruism corresponds with a SVO angle of 61.39°. A prosocial profile has a wider spectrum and corresponds with a SVO angle between the range of 52.91° and 7.82°. An individualistic profile
corresponds with an angle between $7.82^\circ$ and $-7.82^\circ$ and a pure competitor corresponds with an angle of $-16.26^\circ$.

4.2 Participants and procedures
The experiment was performed in five sessions. For every session, participants were randomly selected from a pool of applicants, and randomly assigned to a session. These applicants were registered via an online recruitment system for economic experiments. The total sample size consisted of 112 participants; all students from different study tracks, with different nationalities and varying in age from 18 to 27. The control condition was implemented in one session, containing sixteen participants. The monetary condition was implemented in two sessions, both containing 24 participants. The non-monetary condition is also implemented in two sessions, both containing 24 participants. The experiment took place in the Behavioural and Experimental Economics Laboratory (BEElab) of the School of Business and Economics of Maastricht University, and proceeds as follows.
Participants enter the BEElab and are assigned to a computer, where participants notify their randomly generated experiment ID, which stays the same throughout the whole experiment. General instructions are provided and the first part of the experiment begins. In all three conditions, participants get randomly assigned to a group of four, which stays the same throughout the first part of the experiment. The composition of these groups is anonymous. Within these groups of four, participants are randomly matched to another subject at the beginning of each round, whom with the decision task is executed. When matched to another agent, participants are able to see each other’s experiment ID. Furthermore, each round the role of ‘receiver’ or the role of ‘sender’ is randomly assigned to each pair within the groups of four.

The decision task is performed 30 times, with each round different matches within the groups of four. At the beginning of each round, participants learn their role as a receiver or as a sender. As a receiver, you send a request of an amount of tokens between zero and sixteen you want to receive from the sender. As a sender, you receive the request and decide the amount of tokens between zero and sixteen you want to send. The lowest amount of the two is created. The earnings and costs for receiving or sending tokens respectively, differ per condition.

In the control condition, points are earned for receiving tokens according to the formula: **Receiver: Earnings = 24 * Tokens Received.** And costs are paid to send tokens according to the formula: **Sender: Costs = Tokens * Tokens.** In the monetary condition, the formula for the receiver is different because participants need to pay a price to receive tokens: **Receiver: Earnings = 24 * Tokens Received – 12 * Tokens Received.** The formula for the sender is also different because the sender receives a price for sending tokens, therefore it does not have to be only costly to send tokens: **Sender: Earnings: 12 * Tokens – Tokens x Tokens.** In the non-monetary condition it gets slightly more complex since in this condition there is also an account B, in which points can be registered, however this account balance is not taken into account regarding the final payoff. The formulas for the non-monetary condition are: Receiver: **Earnings in account A = 24 * Tokens Received.** In addition: **Points transferred to account B of Sender = 12 * Tokens received.** The same holds for the Sender: **Costs from account A = Tokens x Tokens.** In addition: **Points transferred to account B from receiver: 12 * Tokens.** Therefore, participants can use the points in account B to receive tokens. However, their final payoff is based on their account balance of account A. In the instructions several control questions were
included which participants needed to solve before the decision task started, to check if all participants understand the mechanisms.

After the decision tasks is played, the outcome of that round is presented on the screen. Here participants see the amount requested, send and created. Furthermore they see the earnings the sender and receiver made, and their total earnings. After 30 rounds, the first part of the experiment is finished and participants see their total amount of points in their accounts and therewith their preliminary payoffs. The points earned are in Experimental Currency Units (ECU’s) and are converted to euros according to the formula: initial show-up fee + net earnings of the first part of the experiment/125.

After the first part of the experiment, the instructions of the second part of the experiment are presented on the computer screens. Subsequently participants answer the survey questions on demographics, risk attitudes and reciprocity, and thereafter the survey questions on personality traits. When all participants have answered the questions, part two of the experiment is finished.

After the second part of the experiment, the instructions of the third part of the experiment are presented on the computer screens. These explain that participants will make a series of decision about allocating resources between themselves and a randomly selected other, and that additional money can be earned. The amounts in the questions are in ECU’s and will be converted to euros according to the rate: 75 ECU’s equal 1 euro. After the instructions participants are presented with the SVO primary items one by one, and indicate their preferred distributions. After the six allocations decisions are made, participants are randomly paired to a participant whom they have not interacted with in the first part of the experiment. Randomly, one of those participants is assigned the role as sender and the other as receiver. One of the six decisions made by the sender will be chosen at random and implemented for this pair of participants. This allocation of ECU’s translated to euros is the final payoff of the third part of the experiment. The experiment concludes with the final payoffs displayed on the computer screens. This is calculated by summing up the payoffs from part one and part three.
5. Data analyses
The data obtained by the laboratory experiment was analysed by using Stata.

5.1. Variables
In this complex laboratory experiment it is desirable to outline an overview of the different variables. The independent variable is the treatment condition, consisting of the control condition, the monetary condition and the non-monetary condition. In addition there are several dependent variables in the different parts of the experiment. In the first part of the experiment, the amount of points earned by each participant in each round is measured and summed to create the variable Total Points. Furthermore, the variable Payoff is created by dividing the Total Points by 125. This is the amount of money participant earn in the first part of the experiment, and is easier to interpret than Total Points. The data obtained from the second part of the experiment is not used in this study therefore these variables will not be discussed. In the third part of the experiment the SVO angle is measured. This creates the dependent variable SVO angle. Besides, this score places participants in one of the four categories of the SVO measure: altruistic, prosocial, individualistic or competitive. However, to provide more clarity, these four SVO types were divided into two: a prosocial SVO and proself SVO to create the variable SVO. The altruistic and prosocial types belong to the prosocial SVO and the individualistic and competitive types belong to the proself SVO. Therefore the third part of the experiment has two variables: SVO angle and SVO. To analyse the group effects the variable Average Points Groups is created by taking the mean of the Total Points earned by the four members of each group. Furthermore the variable Average SVO angle Groups is created by taking the mean SVO angle of the four group members for each group.

5.2. General results
The first step in the analysis is to provide an overview of the data and the frequency of prosocial and proself individuals across treatment conditions. The frequency of proself and prosocial individuals can be found in Table 1. As indicated in the table, of the 112 participants 50 participants (44.64%) made more social decisions in the SVO task and were categorized to have a prosocial SVO. The other 62 participants (55.36%) made more selfish decisions in the SVO task and were indicated to have a proself SVO. This indicates that in general there are more
participants with a proself SVO. This is also true for the different treatment categories, however in the non-monetary condition this difference is the smallest. Furthermore, there are more participants with a prosocial SVO in the non-monetary condition than there are in the monetary condition. The distribution of prosocial and proself individuals per treatment is illustrated in Figure 3. Figure 3 indicates that in all treatment conditions there are more proself individuals. As stated above, the non-monetary condition has the highest percentage of prosocial individuals and the lowest percentage of proself individuals.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Prosocial</th>
<th>Proself</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>6 (5.36%)</td>
<td>10 (8.93%)</td>
<td>16 (14.29%)</td>
</tr>
<tr>
<td>Non-Monetary</td>
<td>23 (20.54%)</td>
<td>25 (22.32%)</td>
<td>48 (42.86%)</td>
</tr>
<tr>
<td>Monetary</td>
<td>21 (18.75%)</td>
<td>27 (24.11%)</td>
<td>48 (42.86%)</td>
</tr>
<tr>
<td>Total</td>
<td>50 (44.64%)</td>
<td>62 (55.36%)</td>
<td>112 (100%)</td>
</tr>
</tbody>
</table>

Table 1. Frequency of SVO

![Figure 3. Relative Frequency of SVO per treatment condition](image-url)
These results indicate some small differences in the distribution of SVO across treatment conditions. However, statistical test are required to indicate if these differences are significant. Besides the distribution of SVO across treatment, we are interested in the differences in Total Points, and therefore also Payoff, across treatments. Table 2 provides the means of Total Points and Payoff per treatment condition. In addition, it indicates the mean SVO angle per treatment condition.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>SVO angle</th>
<th>Total Points</th>
<th>Payoff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>19.02612</td>
<td>1483.313</td>
<td>€ 11.87</td>
</tr>
<tr>
<td>Non-Monetary</td>
<td>21.41043</td>
<td>1389.764</td>
<td>€ 11.12</td>
</tr>
<tr>
<td>Monetary</td>
<td>20.23046</td>
<td>1719.375</td>
<td>€ 13.76</td>
</tr>
</tbody>
</table>

Table 2. Mean scores across treatments

The results in Table 2 indicate that the mean scores on the different dependent variables differ across treatments. The mean SVO angle is the highest in the non-monetary condition, indicating the most prosocial behaviour. However the difference between treatment conditions is small and statistical test must indicate whether this difference is significant. The mean Total Points is the highest in the monetary condition, indicating that on average in the monetary condition participants earned the most points during the reciprocity task. Similarly, the mean Payoff is the highest in the monetary condition, indicating an average payoff of € 13.76.

5.3. Main effects

To test if there are significant differences in the SVO angle of participants across treatment conditions we perform a linear regression, with treatment as a predictor variable and SVO angle as response variable. To obtain a better understanding of the distribution of the data we first order a boxplot with SVO angle by treatment condition (see Figure 4).
Figure 4 indicates that the distribution of SVO angle across treatment conditions appears to be quite similar. In the non-monetary condition the median is the highest compared to the other two conditions, and so is the highest value. However, in general differences appear to be small.

The regression method used is the VCE cluster robust method, since this method controls for the assumption of independence of errors. Within the treatment conditions, participants interact in groups of four when playing the reciprocity task, therefore their errors are dependent. The VCE cluster method controls for the 28 clusters in the experiment and therefore allow us to perform the regression. The results of this regression are indicated in Table 3.

| SVO Angle | Coef.    | Robust Std. Err. | t     | P>|t| |
|-----------|----------|------------------|-------|-----|
| Treatment |          |                  |       |     |
| Non-Monetary | 2.31119  | 4.038303         | 0.57  | 0.572 |
| Monetary   | 1.320319 | 3.449364         | 0.28  | 0.705 |
| _cons     | 19.02612 | 2.981642         | 6.38  | 0.000 |
Table 3. Linear regression SVO angle by Treatment

| Treatment     | Margin    | Std. Err. | z   | P>|z| |
|---------------|-----------|-----------|-----|-----|
| Control       | 19.02612  | 2.981642  | 6.38| 0.000 |
| Non-Monetary  | 21.33731  | 2.723545  | 7.83| 0.000 |
| Monetary      | 20.34644  | 1.734337  | 11.73| 0.000 |

Table 3. Linear regression SVO angle by Treatment

The control condition is the baseline prediction. The significance levels of the monetary and non-monetary predictor variables indicate if shifting to another treatment condition forecast significant differences in SVO angle. Table 3 indicates a significance level of 0.705 for the monetary condition, and a significance level of 0.572 for the non-monetary condition. These values are both > 0.05 therefore indicating no significant results. Hypothesis 1A states that participating in the non-monetary condition induces more prosocial behaviour as indicated by a higher SVO angle than the control and monetary condition. The margins in Table 3 indicate that the mean SVO angle of the non-monetary condition of 21.34 is indeed higher than the mean SVO angle of the control (19.03) and monetary (20.35) condition. However, as indicated by the p-values, these results are not significant. Therefore there is no statistical evidence to accept hypothesis 1A. Hypothesis 1B states that participating in a non-monetary system induces more selfish behaviour as indicated by a lower SVO angle than the control or non-monetary condition. The margins in Table 3 indicate a lower SVO angle than the non-monetary condition, however a higher SVO angle than the control. In addition, the p-values indicate that these differences are not significant. Therefore we also do not have statistical evidence to accept hypothesis 1B and conclude that there are no significant differences in SVO angle across treatment conditions.

To test if there are significant differences in welfare earned across treatment conditions, we perform a linear regression with treatment as predictor variable and Total Points as response variable. To obtain a better understanding of the distribution of the data we first order a boxplot with Total Points by Treatment condition and SVO (see Figure 5).
Figure 5 indicates rather different distributions of Total Points differs across treatments and SVO. In the control condition a lot of variance appears in the obtained scores, furthermore proself individuals have a higher median than the prosocial individuals. In the non-monetary condition the opposite is present: the median of the prosocial is higher than the median of the proself. In the monetary condition there appears to be less variance present in the obtained points and the median scores in the proself and prosocial category are nearly the same. In general, participants in the monetary condition tend to score the highest Total Points. This corresponds to the means in Table 2. Finally, this plot indicates one outlier in the non-monetary condition. This outlier is removed from the data set in the subsequent linear regression.

To perform the regression the VCE cluster robust method is used to control for the violated assumption of independent errors. The results of this regression are indicated in Table 4.

| Total Points | Coef. | Robust Std. Err. | t    | P>|t| |
|--------------|-------|------------------|------|-----|
| treatment    |       |                  |      |     |
| Non-Monetary | 40.97207 | 245.6533 | -0.17 | 0.869 |
| Monetary     | 241.375  | 228.2512 | 1.06  | 0.300 |
| _cons        | 1483.312 | 227.4244 | 6.52  | 0.000 |
### Adjusted predictions

| Treatment     | Margin   | Std. Err. | z      | P>|z| |
|---------------|----------|-----------|--------|-----|
| Control       | 1483.313 | 227.4244  | 6.52   | 0.000 |
| Non-Monetary  | 1442.34  | 92.86375  | 15.53  | 0.000 |
| Monetary      | 1724.688 | 19.40934  | 88.86  | 0.000 |

Table 4. Linear regression Total Points by Treatment

Again, the control condition equals the baseline prediction. The significance levels of the monetary and non-monetary predictor variables indicate if shifting to another treatment condition forecast significant differences in Total Points. Table 4 indicates a significance level of 0.300 for the monetary condition, and a significance level of 0.869 for the non-monetary condition. These values are both > 0.05 therefore indicating no significant results. Hypothesis 2A stated that individual payoff, measured in total points, in the monetary condition would be higher than the control condition. The margins in table 4 indicate that the mean points in the monetary condition of 1724.69 is indeed higher than the mean points of the control condition (1483.31) and the non-monetary (1442.24) condition. However, as indicated by the p-values, these results are not significant. Therefore there is no statistical evidence to accept hypothesis 2A. Hypothesis 2B stated that individual payoff as measured in total points in the non-monetary condition would be higher than the control condition. The margins in Table 4 indicate that the mean of points in the non-monetary condition of 1442.34 is slightly lower than the mean of points in the control condition of 1483.31. In addition, the p-values indicate that these differences are not significant. Therefore we also do not find statistical evidence to accept hypothesis 2B and conclude that there are no significant differences in individually earned welfare across treatment conditions.

### 5.4. Group effects

In addition to the individual differences between participants across the different treatment conditions, we are also interested in the differences between groups who interact via the reciprocity game. The experiment contains 28 groups of four participants: four groups in the control condition, twelve groups in the non-monetary condition and twelve groups in the
monetary condition. Within these groups of four the economic exchange takes place and as stated in the hypotheses section the relationship between the earned welfare of these groups and their average SVO angle will be analysed. To test if there is a relationship between these variables a linear regression is performed with Average SVO angle Groups as a predictor variable and Average Points Groups as a response variable. The relationship between these variable is displayed in Figure 6.

![Figure 6. Scatterplot Average Points Groups by Average SVO angle groups](image)

This scatterplot indicates a positive relationship between the average points earned by groups and their average SVO angle. The results of the linear regression must indicate if this is a significant relationship (see Table 5).

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>570499.954</td>
<td>1</td>
<td>570499.953</td>
</tr>
<tr>
<td>Residual</td>
<td>1830159.18</td>
<td>26</td>
<td>70390.7376</td>
</tr>
<tr>
<td>Total</td>
<td>2400659.13</td>
<td>27</td>
<td>88913.3012</td>
</tr>
</tbody>
</table>

Number of obs = 28  
F(1, 26) = 8.10  
Prob > F = 0.0085  
R-squared = 0.2376  
Adj R-squared = 0.2083  
Root MSE = 265.31

| Average Points Groups | Coef.   | Std. Err. | t      | P>|t| |
|-----------------------|---------|-----------|--------|-----|
| Average SVO angle Groups | 19.04126 | 6.688487  | 2.85   | 0.009 |
| _cons                 | 1153.912 | 146.5121  | 7.88   | 0.000 |

Table 5. Linear regression Average Points Groups by Average SVO angle groups
The results presented in Table 5 indicate a positive significant relationship between the average SVO angle of groups and the average amount of points earned \((p = 0.009)\). However to test the third set of hypotheses we want to analyse this relationship within different treatment conditions. Since there are only four groups in the control condition, these groups are merged with the non-monetary condition since an analysis of only four groups is not quite meaningful. A linear regression is performed with Average SVO angle groups as predictor variable and Average Points groups as a response variable, on the sixteen groups in the non-monetary condition and on the twelve groups in the monetary condition. The relationship between the average SVO angle of groups and the average amount of points earned in the non-monetary and monetary condition are presented in Figure 7.

These scatterplots indicate quite a different relationship between the average points earned by groups and their average SVO angle. In the non-monetary condition this appears to be a positive relationship, as higher amount of points correspond to higher SVO angle. In the monetary condition there appears to be no relationship between the variables, since all groups appear to have similar earnings, regardless of their SVO angle scores. The results of the linear regression must indicate if these differences between groups are significant, and are presented in Table 7 and Table 8.
Table 7. Treatment = Non-Monetary

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>793493.095</td>
<td>1</td>
<td>793493.095</td>
</tr>
<tr>
<td>Residual</td>
<td>884019.092</td>
<td>14</td>
<td>63144.2209</td>
</tr>
<tr>
<td>Total</td>
<td>1677512.19</td>
<td>15</td>
<td>111834.146</td>
</tr>
</tbody>
</table>

Number of obs = 16  
F(1, 14) = 12.57  
Prob > F = 0.0032  
R-squared = 0.4730  
Adj R-squared = 0.4354  
Root MSE = 251.29

| Average Points Groups | Coef.           | Std. Err. | t     | P>|t|   |
|-----------------------|------------------|-----------|-------|-------|
| Average SVO anlge Groups | 26.12997       | 7.371131  | 3.54  | 0.003 |
| _cons                | 869.2421        | 165.4145  | 5.25  | 0.000 |

Table 8. Treatment = Monetary

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>562.930322</td>
<td>1</td>
<td>562.930322</td>
</tr>
<tr>
<td>Residual</td>
<td>50796.5853</td>
<td>10</td>
<td>5079.65853</td>
</tr>
<tr>
<td>Total</td>
<td>51359.5156</td>
<td>11</td>
<td>4669.04688</td>
</tr>
</tbody>
</table>

Number of obs = 12  
F(1, 10) = 0.11  
Prob > F = 0.7461  
R-squared = 0.0110  
Adj R-squared = -0.0879  
Root MSE = 71.272

| Average Points Groups | Coef.           | Std. Err. | t     | P>|t|   |
|-----------------------|------------------|-----------|-------|-------|
| Average SVO angle Groups | 1.171543       | 3.519233  | 0.33  | 0.746 |
| _cons                | 1700.851        | 74.50112  | 22.83 | 0.000 |

The results of the regression on the non-monetary groups, as presented in Table 7, indicate a strong positive relationship (p = 0.003). Groups that scored on average high on the SVO angle earned on average more points in the first part of the experiment. Therefore we can accept hypothesis 3A. In addition, the results of the regression on the monetary groups, as presented in Table 8, indicate no significant relationship (p = 0.746). As expected, in the monetary condition, average group earnings are independent of the average SVO angle of groups. Therefore, we can also accept hypothesis 3B.
6. Discussion

In the previous section the data was analysed and the three sets of hypotheses were tested. Of the stated hypotheses only the last set, concerning the group effects, were significant. The results will be discussed in more detail in this section.

The first set of hypotheses concerned the social objective of LETS and argues that participating in a certain monetary system influences the other regarding behaviour of participants. It was expected that the manipulation of a LETS system would lead to higher individual SVO scores as compared to the monetary and control system. In addition it was expected that the manipulation of a monetary system would lead to lower individual SVO scores. However, no significant results were found in analysing the data. This is contrary to what most empirical studies finds as discussed in the literature review, namely that LETS perform well at achieving its social objective. A possible explanation for this might be that the treatment manipulation did not create the intention of a ‘real’ LETS system. It might be the case that the manipulation of the currency system was too abstract. Implementing a market setting where participants understand that they can buy or trade goods and services, as well as providing information on local currency to understand that the non-monetary credit can be used to support other community members, might be necessary create an authentically LETS condition.

The second set of hypotheses concerned the economic objective of LETS and investigated the function of money and LETS credit in facilitating exchange. It was expected that the conditions which contained a medium of exchange like money or LETS credit would stimulate trading within the groups of four, therefore leading to higher amounts of earned point in these conditions. In the monetary condition the amount of points earned was indeed higher than the other conditions, although the results were not significant. In the non-monetary condition the earnings were actually lower than the control condition. This indicates that LETS credit does not have the same facilitating function as money does, therefore failing its economic goal to stimulate economic exchange. This is in accordance with most empirical literature discussed, who doubt the economic potential of LETS because of low trading volumes.
The third set of hypothesis concerned the groups of four who interacted via the reciprocity game in the first part of the experiment. The relationship between the success of groups measured in their average earned welfare and their corresponding average SVO angle was analysed. The results indicated that within the non-monetary condition there is a strong positive relationship between group earnings and the average group SVO angle. Within the monetary condition, group earnings are independent of the average group SVO angle of those group members. This points out that a successful non-monetary system, like the LETS, is associated with more prosocial behaviour in contrast to a pure successful monetary system. This suggests evidence for achieving its social objective of LETS to create a ‘gentler’ form of economy based on social values and cooperation because the abundant non-monetary credit can be expended within a secure exchange group, and exchange is driven by reciprocity in which members have high concern for other members.

However, how the data is obtained within this experiment causes a problem of causality. Since the SVO of participants is unknown beforehand of the experiment, we can not be sure if participating in a successful LETS group induces more prosocial behaviour, or that LETS groups are successful because of having more prosocial behaviour of group members. Since the data used to analyse our hypotheses is obtained by an experiment that was not designed to test these hypotheses, it could be the case that the results do not provide an accurate representation of the underlying effects. The reason for this is that intentionally the experiment was designed by a group of researches who were only interested in the economic objective of LETS. The SVO measure was added later on, because this research also focusses on the social objective of LETS. However, this has the problem of causality as a result, since it cannot be determined if participating in a LETS influences more other regarding behaviour as expected, or that other regarding behaviour influences the success of LETS. For this reason, a research proposal is created that applies several alterations to the current experimental design, to test more accurately the relationship between participating in a LETS or monetary system and prosocial or proself behaviour, as well as the facilitating function of LETS credit in economic exchange. The research proposal is discussed in the following section.
7. Research Proposal

As discussed in the previous section, the way the data is acquired to test the hypotheses were obtained by an experiment that was not initially designed to test these hypotheses. Hence, in this section a research proposal is constructed that applies several alterations to the current experimental design to be able to provide a more accurate answer to the proposed research question. We want to investigate how LETS perform on its economic and social objective in a laboratorial setting. This research proposal focusses on two alterations with regard to the manipulation of the treatment conditions, and controlling the SVO variable.

A limitation of the previous experiment is that the manipulation of the currency systems is too abstract. Participants play the reciprocity game over thirty rounds in which they have to understand the complex mechanism of earning and sending tokens in the different accounts. Although it is explained in the instructions it might take participants time to work out the mechanism, especially in the non-monetary condition where participants need to understand that they can use their point earned in account B (which indicates LETS credit) to buy tokens for account A. Furthermore, participants can only use the points to receive tokens, which is a very abstract concept. If participants receive information about a hypothetical market in which they were participating to buy goods and services it would create a better representation of real exchange group. Also, if participants in the non-monetary condition receive information about local currency and its economic and social objective, it would become more clear what is the purpose of the tokens in account B, namely to buy goods and services. In addition, it would become clearer that their opponents are members of a community and points of account B can be used to support other members in that community. In conclusion, it could be the case that the reciprocity game of the previous experiment is too abstract to create an authentically LETS. Therefore the manipulation of treatment condition might fail, causing the non-significant effects in the data analysis.

Another limitation was indicated regarding the problem of causality in the relationship between successful exchange groups and SVO. From the obtained data ambiguity might emerge about if participating in a successful LETS induced more other regarding behavior measured in higher SVO scores, or the contrary, that LETS became successful because their specific group
contained participants with high SVO scores. Since the change in social behavior a LETS ought to induce is the focus of this investigation, the SVO variable needs to be controlled by measuring SVO scores beforehand of the manipulation task.

### 7.1 Experimental design

The proposed experiment contains a 1 (pre SVO measure) x 3 (condition: control, monetary and LETS) x 1 (post SVO measure) mixed factorial design and consists of three parts. The first part consist a pre SVO measure to define the baseline SVO angle of participants and to categorize them as having a prosel or prosocial orientation. The second part of the experiment contains the treatment manipulation. Within the second part there are three treatment conditions: the control condition, the monetary condition, and the LETS condition. After a cooling down period, the last part of the experiment continues with the post SVO measure, to define any changes in SVO angle of participants.

#### 7.1.1 Part one: pre SVO measure

The SVO Slider Measure developed by Murphy et al. (2011) as discussed in the research methodology section will be used to define the baseline SVO angle of all participants. Participants make six decisions on allocating resources between themselves and an anonymous opponent (see Figure 1). On behalf of the responses on these allocation decisions the baseline SVO angle of participants is calculated (see Figure 2). With the baseline SVO angle participants can be categorized as having an altruistic, prosocial, individualist or competitor profile, which is narrowed down to a prosocial or proself profile. According to the baseline SVO, participants get randomly allocated to a treatment condition and exchange group, enabling an equal distribution of proself and prosocial individuals across treatment conditions. This part of the experiment takes place one week before the second part, to control for carry-over effects.

#### 7.1.2 Part two: Manipulation of currency systems

To assure that the manipulation of treatment condition is less abstract, subjects are provided with more information beforehand of the reciprocity game. Agents within the treatment conditions
interact in bigger groups of eight participants, to create more the experience of an ‘exchange group’. Within these groups, each agent gets assigned the role of a profession (plumber, bakery, supermarket, gardener, healthcare, household, administrator or transport), to enable agents to have the representation of a real market in which they can buy goods and services. Agents interact by a similar decision task as in the previous experiment. The task is a modified favour exchange game in which participants can request effort from and send effort to their opponent, this effort represents the different goods or services agents have to offer. By exchanging effort that represents goods and services participants can earn points that equal money. In each round participants are randomly matched with one opponent out of their group of eight, and allocated the role of a ‘receiver’ or the role of a ‘sender’. The game is played over 28 rounds. There are three conditions, the control condition, the monetary condition and the non-monetary condition (i.e. the LETS condition) in which the same task is performed, although with different payoff schemes.

According to the particular treatment condition, additional information is provided. In the control condition agents are informed that they are participating in a market with seven others who offer different goods and services. In addition, they are informed that each round they can request or send effort as a means of exchanging goods and services. It is common knowledge that the available goods and services are all the same price and expressed in effort. Similar as in the previous experiment, each round requests \( r_{ij} \) are made by the receiver for effort and the sender decides after that request how much effort they would like to expend to that player. The actual expended effort \( \bar{x}_{ij} \) is decided on as follows: \( \bar{x}_{ij} = \min\{r_{ji}, x_{ij}\} \). Pay-offs are in the first instance dependent on effort received \( (\bar{x}_{ij}) \) and effort expended \( (\bar{x}_{ji}) \). Thus pay-offs are based on the sum of effort received minus the sum of effort expended:

\[
\pi_i = \alpha \sum_j \bar{x}_{ji} - c \left( \sum_j \bar{x}_{ij} \right)
\]

Where \( \alpha \) is a constant factor by which earnings are multiplied and \( c \) are the cost for extending effort. In the control condition \( \alpha = 24 \) and \( c = x^2 \) therefore points are calculated as follows: Receiver: Earnings = 24 * Tokens Received. Sender: Costs = Tokens * Tokens.
In the monetary condition agents are informed that they are participating in a monetary market with seven others who offer different goods and services that agents can buy. Furthermore, they are informed that each round they can request or send effort as a means of exchanging goods and services. It is common knowledge that the available goods and services are all the same price and expressed in effort. In addition, agents are informed that to receive goods and services agents pay a monetary price $p$, as well as to send goods and services they receive a monetary price $p$. All effort received and expended is kept into record in an account $A$ and participants are explicitly reminded that the points earned in this account function as money to spend on effort to buy goods and services. The account payoff is calculated as follows:

$$A_i = p\left(\sum_j \bar{x}_{ji} - \sum_j \bar{x}_{ij}\right)$$

This account payoff is taken into account in the final payoff, therefore the complete payoff function of the monetary condition is:

$$\pi_i = \alpha \sum_j \bar{x}_{ji} - c \left(\sum_j \bar{x}_{ij}\right) + A_i$$

In the monetary condition $\alpha = 24$, $c = x^2$ and $p = 12$. Therefore points are earned according to the formula Receiver: Earnings = 24 * Tokens Received – 12 * Tokens Received. Sender: Earnings: 12 * Tokens – Tokens x Tokens.

In the non-monetary condition agents are informed that they are a member within a community with seven others who offer different goods and services. Furthermore, they are informed that each round they can request or send effort as a means of exchanging goods and services. It is common knowledge that the available goods and services are all the same price and expressed in effort. In addition, participants are explained the concept of local currency. It is explained that they have an account $B$ that can go negative or positive, from which they can use the non-monetary credit to spend on effort for goods and services, and therefore support the other members in the community. However the points in account $B$ will not be taken into account when calculating the final payoff. All effort received and expended is kept into record in this account. For spending effort agents receive a non-monetary price $p$ and for requesting effort agents ‘pay’ the non-monetary price $p$. Participants are explicitly reminded that the points in
account B serve as non-monetary credit like local currency. The account payoff is calculated as follows:

\[ B_i = p \left( \sum_j \bar{x}_{ji} - \sum_j \bar{x}_{ij} \right) \]

However, since this is the non-monetary condition, the account payoff is not taken into account in the calculation of the final payoff. However it does provide points that can be used to request goods and services that eventually results in a higher total payoff. The payoff function in the non-monetary condition is as follows:

\[ \pi_i = \alpha \sum_j \bar{x}_{ji} - c \left( \sum_j \bar{x}_{ij} \right) \]

In the monetary condition \( \alpha = 24 \), \( c = x^2 \) and \( p = 12 \). Therefore points are earned according to the formula. Receiver: Earnings in account A = 24 * Tokens Received. In addition: Points transferred to account B of Sender = 12 * Tokens received. The same holds for the Sender: Costs from account A = Tokens x Tokens. In addition: Points transferred to account B from receiver: 12 * Tokens. Therefore, participants can use the points in account B to receive effort and therefore points. However, their final payoff is based on their account balance of account A.

### 7.1.3 Post SVO measure

After the manipulation of currency systems, participants fill in a survey with questions regarding demographic characteristics. This questionnaire is implemented to attenuate the link between the manipulation of currency systems and the performance on the post SVO task, and therefore serves as a cooling down period. Hereafter, the SVO Slider Measure is used again to measure the post SVO angle of agents. Similarly as in the pre SVO measure, agents make six decisions on allocating resources between themselves and an anonymous opponent during an online task. By this, their individual SVO angle is measured. Via a turnpike matching protocol it is ensured that none of the participants interacts during part three with a participant with whom has been interacted during part two.
7.2 Variables

The first part of the experiment contains the variable individual pre SVO angle, which is used to categorize participants in the proself or prosocial category. This categorization is used to allocate participants equally to the different treatment conditions, as well as to the different groups within the treatment conditions. In addition, the pre SVO angle is compared to the post SVO angle, to test if the currency system manipulation has an effect on SVO behavior. The second part of the experiment contains the variable Total Points, and is constructed by the sum of the amount of points earned each round. This variable is a measure of economic exchange, since higher earnings are related to more effort expended between participants, and therefore more goods and services exchanged. In addition, we are also interested in group effects; therefore the variable group payoff is created by summing the earned points of all group members. Furthermore, the post SVO angle is measured, to examine changes in individual SVO behavior. Finally, the variable group average of post SVO angle is created to be able to test the relationship between the market success of groups and the social behavior of its members.

7.3 Procedure and Participants

The experiment takes place during two testing moments. The first testing moment contains part one of the experiment and takes fifteen minutes, the second testing moment contains part two and three and takes 60 minutes. Participants are selected from a pool of applicants who registered via an online recruitment system for economic experiments. The experiment requires 72 participants to form three groups of eight within each treatment condition. All participants are students from Maastricht University. The experiment takes place in the Behavioural and Experimental Economics Laboratory (BEElab) of the School of Business and Economics of Maastricht University, and proceeds as follows.

Part one contains the pre SVO measure and is conducted in three sessions of 24. Participants enter the BEElab and are assigned to a computer, which contain the instructions on the computer screen. These explain that participants will make a series of decision about allocating resources between themselves and a randomly selected anonymous other, and that money can be earned. The amounts in the questions are in ECU’s and will be converted to euros according to the rate: 75 ECU’s equal 1 euro. After the instructions participants are presented with the SVO primary
items one by one, and indicate their preferred distributions. After the six allocations decisions are made, participants are randomly paired to another anonymous participant. One of those participants is assigned the role as sender and the other as receiver. One of the six decisions made by the sender will be chosen at random and implemented for this pair of participants. This allocation of ECU’s translated to euros and this equals the payoff of the first part of the experiment. Participants receive their payments and are informed that they will receive a notification when they have to return for the second testing moment. When participants assigned for the experiment they were informed that there would be a second testing moment at a certain day, and were requested to keep that date free, since they would be informed about the time-slots later on. Why they would receive this information later on is left open to the participants.

After the first part of the experiment, the individual SVO angle of participants is calculated. Accordingly, participants are categorized as to have a prosocial or proself orientation. Based on the pre SVO score participants are assigned randomly to the three different treatment conditions, enabling a, randomly generated, equal distribution of proself and prosocial individuals. Subsequently, participants are notified which time slot there are assigned to for the second testing moment.

Part two and three are also tested in three sessions in which 24 subjects participate, each session equals a treatment condition. Beforehand the groups of eight are determined according to an equal distribution of prosocial and proself individuals, by this each participant is assigned an experiment ID. Accordingly, when participants enter the BEElab they are assigned by the experimenter to the computer which is linked to this predefined experiment ID. General instructions are provided and the first part of the experiment begins. The instructions of part two of the experiment are presented on the screen; these explain the decision task and provide the information on the particular market setting that differs per treatment condition. In addition participants notify their profession. Furthermore, to participants the composition of groups is anonymous.

The decision task is performed 28 times, with each round different matches within the groups of eight, so that each participants meets every opponent three times. At the beginning of each
round, participants learn their role as a *receiver* or as a *sender*. As a receiver, you send a request of an amount of tokens between zero and sixteen you want to receive from the sender. As a sender, you receive the request and decide the amount of tokens between zero and sixteen you want to send. The lowest amount of the two is created. The earnings and costs for receiving or sending tokens respectively, differ per condition as explained before. After the decision tasks is played, the outcome of that round is presented on the screen. Here participants see the amount requested, send and created as well as the Experiment ID of the opponent and his/her profession. Furthermore they see the earnings the sender and receiver made, and their total earnings. After 28 rounds, part two is finished and participants see their total amount of points in their accounts and therewith their preliminary payoffs. The points earned are in Experimental Currency Units (ECU’s) and are converted to euros according to the formula: initial show-up fee + net earnings/125.

Hereafter, the third part of the experiment continues and participants are presented with the survey questions. When these are completed, the instructions of the SVO task are presented on the screen, which explain that participants make a series of decision about allocating resources between themselves and a randomly selected other, and additional money can be earned. After performing the post SVO task, which is the same as the pre SVO task, the experiment concludes with the final payoff displayed on the screens. This is calculated by summing the earnings of part two and three of the experiment. Subsequently, participants are paid discretely and thanked for their participation.

### 7.4 Hypotheses

By performing this experiment it is investigated how a local currency system like the LETS performs on its economic and social objectives. The focus lies on the social objective; however we are also interested in the economic objective. It is expected that within the monetary system and the LETS condition, trade is facilitated by having a medium of exchange as argued in the literature. Therefore we expect that individual payoff in the monetary condition will be higher than in the control condition where a pure barter system is implemented. The same expectations hold for the LETS condition, as compared to the control condition we expect higher individual payoff, because it is argued that the non-monetary medium of exchange also facilitates trade.
With regard to the social objective, we are now able to look at causality since we measured the SVO of participants before and after the currency manipulation. Based on the discussed literature, we expect that participating in the monetary condition and being explicitly reminded of the concept of money, a more prosel self orientation will be induced. Therefore we expect a decrease in average SVO angle when we compare the predefined SVO angle with the measured post SVO angle. Furthermore, we expect that participating in the LETS condition, and being explicitly reminded of the concept of local currency, induces a more prosocial orientation, since the incentive to trade is based on reciprocity and to support the members with the community. Therefore we expect an increase in average SVO angle when we compared the predefined SVO angle with the measured post SVO angle. With regard to the control condition we expect the average SVO angle to be about the same before and after the currency manipulation. With respect to the group earnings, in the monetary condition it is expected that group success is independent of the post SVO measure of their participants since monetary gain is the only incentive in that condition. However, in the non-monetary condition, it is expected that successful groups are related with higher post SVO angles, since it is argued that LETS provide a framework in which trade is facilitated by reciprocity and the social incentive to do something for someone in your community.
8. Conclusion

The objective of this thesis is to evaluate LETS on its economic and social potential in a laboratorial setting. The relationship between participating in a certain currency system and the level of economic exchange, as well as the relationship between participating in a certain currency system and the concern for others are analysed. With regard to the economic potential of LETS, in this particular experiment, LETS do not achieve their economic goal to stimulate economic exchange. This is in correspondence with most empirical literature discussed in the literature review that doubts the economic potential of LETS because of the low values and volumes of trading. The social potential of LETS in this research is analysed as the preferences individuals hold during decision making with regard to others. Since LETS claim to provide a framework in which its members take care of each other, by being part of a secure exchange group, and strive to enable a gentler form of economy which is based on reciprocity and social equity, it is expected that participating in a LETS would induce more concern for others within their community, as measured by having a more prosocial SVO. However, this research finds no evidence to confirm this hypothesis. This is contrary to what most empirical research suggests, as discussed in the literature review, namely that LETS perform well on its social objective. On the other hand, there is a positive relationship established between the success of a LETS group and more prosocial behaviour of its members. When compared to the monetary condition, no relationship is found between the success of monetary groups and the SVO of its members. This is an interesting implication which should be elaborated more in future research as proposed in the research proposal, as this research is in terms of structure not capable of demonstrating a causal relationship between these variables.

With this research a contribution to the debate on the effectiveness of local currency is made. The existing theory on LETS and its economic and social potential is tested in a controlled environment. By this, it is intended to stimulate more initiatives to evaluate local currency on its potential in a laboratorial setting, to be able to identify if there is potential in future local currency initiatives that provide an alternative, or replenishment, to the current monetary system.
9. References


10. Appendix

10.1. Instructions part one

10.1.1 Control condition

Instructions
Welcome to this experiment on decision-making! In this experiment you can earn money. The amount you earn depends on the decisions you and other participants make. Therefore please read these instructions carefully.

In the experiment you will earn points. At the end of the experiment we will convert the points you have earned into euros according to the rate: 125 points equal €1,-. You will be paid your earnings privately and confidentially after the experiment.

Throughout the experiment you are not allowed to communicate with other participants in any way. If you have a question please raise your hand. An experimenter will come to your desk to answer it.

Your group
At the beginning of the experiment the computer will randomly assign you (and all other participants) to a group of 4 participants. Group compositions do not change during the experiment. Hence, you will be in the same group with the same people throughout the experiment. The composition of the groups is anonymous. Neither during nor after the experiment will you get to know the identities of the other people in your group. The other people in the group will also not get to know your identity. On your computer screen, you will see your randomly generated experiment ID, which stays the same throughout the experiment. When matched with another group member, you will see his or her experiment ID as well.

Number of rounds
The experiment consists of 30 rounds. You will receive a show-up fee of €5,-. In each round you can earn additional points. Your total earnings will be the sum of the show-up fee and your earnings converted from points in each of the 30 rounds.

The decision task
At the beginning of each round, you will get randomly paired with one of your three other group members. You will be able to see the experiment ID of your partner and he/she will get to see your experiment ID. One of you will be assigned the role of ‘receiver’; the other will be
assigned the role of ‘**sender**’. Please note that your role and paired group member can change each round.

Every round, the receiver makes a request on how many tokens he or she would like to receive from the sender. The sender makes a decision on how many tokens to send to the receiver. The precise details are provided below:

As a receiver, you can choose a number between 0 and 16, which denotes the amount of tokens you would like to receive from the sender. When the sender receives your request, he or she can decide on the amount of tokens to send to you, by choosing a number between 0 and 16. The **lower** of the two numbers will determine the number of tokens created. For example, if you request 5 tokens but the sender chooses 3, then the number of tokens created will be 3. Likewise, if you request 5 tokens and the sender chooses 8, then the number of tokens created will be 5.

You will earn points for the tokens that you receive according to the following formula.

**Earnings = 24 * Tokens Received.**

As a sender, you will decide on how many tokens to send to the receiver, based on the request you receive. This request is a number between 0 and 16. The amount of tokens that will be created is a number between 0 and 16 as well. The **lower** of the two numbers will determine how many tokens will be created. You will pay costs for the tokens created according to the following formula.

**Costs = Tokens x Tokens.**

At the end of the experiment, you will be paid out the following: **initial show-up fee + points of Earnings – points of Costs**. Minimum earnings will be 0 and therefore you cannot earn a negative amount.

**Information**

During the experiment, when making your decision, you will see the following information on your screen (see also the screenshot):

- Your role this round
- Your experiment ID
- The experiment ID of the group member you are paired with
- If a sender, the request of the group member you are paired with
During the experiment, when receiving the outcome of the round, you will see the following information on your screen (see also the screenshot):

- Your experiment ID
- Your role this round
- The experiment ID of the group member you were paired with
- Tokens requested/chosen to send
- The tokens requested/chosen to send of the group member you were paired with
- Amount of tokens created
- Your earnings/costs this round
- Your total earnings
Examples

Here are two examples of hypothetical play to make the instructions clear. Note that all numbers mentioned are points.

Example 1: Participant A is a receiver this round and requests 10 from the sender. Participant B is the sender who receives a request of 10 and decides to send 4 tokens. The number of tokens created will be 4. Participant A earns 24 * 4 = 96 and participant B pays 4^2 = 16.

Example 2: Participant A is a receiver this round and requests 6 from the sender. Participant B is the sender who receives a request of 6 and decides to send 14 tokens. The number of tokens created will be 6. Participant A earns 24 * 6 = 144 and participant B pays 6^2 = 36.

Control questions

To ensure that you understood the instructions we ask you to answer a few control questions. Please take the page with control questions in front of you. After all participants have correctly answered these questions, the experiment will continue. Raise your hand when you have completed the control questions and an experimenter will come to your desk and check your answers.
Concluding remarks
You have reached the end of the instructions. If anything remains unclear to you or if you have any questions, please raise your hand.

10.1.2 Monetary condition

Instructions
Welcome to this experiment on decision-making! In this experiment you can earn money. The amount you earn depends on the decisions you and other participants make. Therefore please read these instructions carefully.

In the experiment you will earn points. At the end of the experiment we will convert the points you have earned into euros according to the rate: 125 points equal €1,-. You will be paid your earnings privately and confidentially after the experiment.

Throughout the experiment you are not allowed to communicate with other participants in any way. If you have a question please raise your hand. An experimenter will come to your desk to answer it.

Your group
At the beginning of the experiment the computer will randomly assign you (and all other participants) to a group of 4 participants. Group compositions do not change during the experiment. Hence, you will be in the same group with the same people throughout the experiment. The composition of the groups is anonymous. Neither during nor after the experiment will you get to know the identities of the other people in your group. The other people in the group will also not get to know your identity. On your computer screen, you will see your randomly generated experiment ID, which stays the same throughout the experiment. When matched with another group member, you will see his or her experiment ID as well.

Number of rounds
The experiment consists of 30 rounds. You will receive a show-up fee of €5,-. In each round you can earn additional points. Your total earnings will be the sum of the show-up fee and your earnings converted from points in each of the 30 rounds.

The decision task
At the beginning of each round, you will get randomly paired with one of your three other group members. You will be able to see the experiment ID of your partner and he/she will get to see
your experiment ID. One of you will be assigned the role of ‘receiver’; the other will be assigned the role of ‘sender’. Please note that your role and paired group member can change each round.

Every round, the receiver makes a request on how many tokens he or she would like to receive from the sender. The sender makes a decision on how many tokens to send to the receiver. The precise details are provided below:

As a receiver, you can choose a number between 0 and 16, which denotes the amount of tokens you would like to receive from the sender. When the sender receives your request, he or she can decide on the amount of tokens to send to you, by choosing a number between 0 and 16. The lower of the two numbers will determine the number of tokens created. For example, if you request 5 tokens but the sender chooses 3, then the number of tokens created will be 3. Likewise, if you request 5 tokens and the sender chooses 8, then the number of tokens created will be 5. You will earn points for the tokens that you receive according to the following formula.

**Gross Earnings = 24 * Tokens Received.**

You must pay the sender for each token that you receive. The cost per token is 12. Therefore, your net earnings are given by:

**Net Earnings = 24 * Tokens Received − 12 * Tokens Received**

\[ = 12 * \text{Tokens Received}. \]

As a sender, you will decide on how many tokens to send to the receiver, based on the request you receive. This request is a number between 0 and 16. The amount of tokens that will be created is a number between 0 and 16 as well. The lower of the two numbers will determine how many tokens will be created. You will pay costs for the tokens created according to the following formula:

**Costs = Tokens x Tokens.**

In addition, you will receive a payment of 12 per token from the receiver. Therefore, your net earnings are given by:

**Net Earnings = 12 * Tokens − Tokens x Tokens.**

At the end of the experiment, you will be paid out the following: initial show-up fee + (net earnings)/125. Minimum earnings will be 0 and therefore you cannot earn a negative amount.

*Information*
During the experiment, when making your decision, you will see the following information on your screen (see also the screenshot):

- Your role this round
- Your experiment ID
- The experiment ID of the group member you are paired with
- If a sender, the request of the group member you are paired with

During the experiment, when receiving the outcome of the round, you will see the following information on your screen (see also the screenshot):

- Your experiment ID
- Your role this round
- The experiment ID of the group member you were paired with
- Tokens requested/chosen to send
- The tokens requested/chosen to send of the group member you were paired with
- Amount of tokens created
- Your gross earnings/costs this round
- The payment made/received for tokens this round
- Your net earnings for the round
• Your total earnings

Examples

Here are two examples of hypothetical play to make the instructions clear. Note that all numbers mentioned are points.

Example 1: Participant A is a receiver this round and requests 10 from the sender. Participant B is the sender who receives a request of 10 and decides to send 4 tokens. The number of tokens created will be 4. Participant A earns $24 \times 4 - 12 \times 4 = 96 - 48 = 48$ and participant B receives a net payment of $12 \times 4 - 4^2 = 48 - 16 = 32$.

Example 2: Participant A is a receiver this round and requests 6 from the sender.Participant B is the sender who receives a request of 6 and decides to send 14 tokens. The number of tokens created will be 6. Participant A earns $24 \times 6 - 12 \times 6 = 144 - 72 = 72$ and participant B receives a net payment of $12 \times 6 - 6^2 = 72 - 36 = 36$.

Control questions

To ensure that you understood the instructions we ask you to answer a few control questions. Please take the page with control questions in front of you. After all participants have correctly answered these questions, the experiment will continue. Raise your hand when you have
completed the control questions and an experimenter will come to your desk and check your answers.

**Concluding remarks**
You have reached the end of the instructions. If anything remains unclear to you or if you have any questions, please raise your hand.

10.1.3 Non-monetary condition

**Instructions**
Welcome to this experiment on decision-making! In this experiment you can earn money. The amount you earn depends on the decisions you and other participants make. Therefore please read these instructions carefully.

In the experiment you will earn points. At the end of the experiment we will convert the points you have earned into euros according to the rate: 125 points equal €1,-. You will be paid your earnings privately and confidentially after the experiment. Throughout the experiment you are not allowed to communicate with other participants in any way. If you have a question please raise your hand. An experimenter will come to your desk to answer it.

**Your group**
At the beginning of the experiment the computer will randomly assign you (and all other participants) to a group of 4 participants. Group compositions do not change during the experiment. Hence, you will be in the same group with the same people throughout the experiment. The composition of the groups is anonymous. Neither during nor after the experiment will you get to know the identities of the other people in your group. The other people in the group will also not get to know your identity. On your computer screen, you will see your randomly generated experiment ID, which stays the same throughout the experiment. When matched with another group member, you will see his or her experiment ID as well.

**Number of rounds**
The experiment consists of 30 rounds. You will receive a show-up fee of €5,-. In each round you can earn additional points. Your total earnings will be the sum of the show-up fee and your earnings converted from points in each of the 30 rounds.

**The decision task**
At the beginning of each round, you will get randomly paired with one of your three other group members. You will be able to see the experiment ID of your partner and he/she will get to see your experiment ID. One of you will be assigned the role of ‘receiver’; the other will be assigned the role of ‘sender’. Please note that your role and paired group member can change each round.

Every round, the receiver makes a request on how many tokens he or she would like to receive from the sender. The sender makes a decision on how many tokens to send to the receiver. The precise details are provided below:

As a receiver, you can choose a number between 0 and 16, which denotes the amount of tokens you would like to receive from the sender. When the sender receives your request, he or she can decide on the amount of tokens to send to you, by choosing a number between 0 and 16. The lower of the two numbers will determine the number of tokens created. For example, if you request 5 tokens but the sender chooses 3, then the number of tokens created will be 3. Likewise, if you request 5 tokens and the sender chooses 8, then the number of tokens created will be 5.

There will be two accounts in this experiment: Account A and Account B. You will earn points, which will be deposited in Account A for the tokens that you receive according to the following formula:

\[ \text{Earnings in Account A} = 24 \times \text{Tokens Received}. \]

In addition, whenever you receive tokens from the sender, you will transfer points from your Account B to the sender’s Account B according to the formula:

\[ \text{Points transferred to Account B of Sender} = 12 \times \text{Tokens Received}. \]

As a sender, you will decide on how many tokens to send to the receiver, based on the request you receive. This request is a number between 0 and 16. The amount of tokens that will be created is a number between 0 and 16 as well. The lower of the two numbers will determine how many tokens will be created. You will pay costs, which will be deducted from Account A, for the tokens created according to the following formula:

\[ \text{Costs from Account A} = \text{Tokens} \times \text{Tokens}. \]

In addition, as noted above, you will receive points from the sender, which will be deposited in your Account B according to the formula:

\[ \text{Points transferred to Account B from Receiver} = 12 \times \text{Tokens}. \]
At the end of the experiment, you will be paid out the following: initial show-up fee + (Final Account A Balance)/125. That is, your final balance in Account B will not influence your payment at the end of the experiment. Minimum earnings will be 0 and therefore you cannot earn a negative amount.

Information
During the experiment, when making your decision, you will see the following information on your screen (see also the screenshot):

- Your role this round
- Your experiment ID
- The experiment ID of the group member you are paired with
- Your own Account B balance
- The Account B balance of the group member you are paired with
- If a sender, the request of the group member you are paired with

During the experiment, when receiving the outcome of the round, you will see the following information on your screen (see also the screenshot):

- Your experiment ID
- Your role this round
- The experiment ID of the group member you were paired with
- Tokens requested/chosen to send
- The tokens requested/chosen to send of the group member you were paired with
- Amount of tokens created
- Your earnings/costs this round in both Accounts A and B
- Your total earnings in both Accounts A and B

Examples
Here are two examples of hypothetical play to make the instructions clear. Note that all numbers mentioned are points.

Example 1: Participant A is a receiver this round and requests 10 from the sender. Participant B is the sender who receives a request of 10 and decides to send 4 tokens. The number of tokens created will be 4. Participant A earns $24 \times 4 = 96$ to be credited in his/her Account A and participant B pays $4^2 = 16$ to be deducted from his/her Account A. In addition, Participant A will have $12 \times 4 = 48$ points deducted from his/her Account B, which will be transferred into Account B of Participant B.

Example 2: Participant A is a receiver this round and requests 6 from the sender. Participant B is the sender who receives a request of 6 and decides to send 14 tokens. The number of tokens created will be 14. Participant A earns $24 \times 14 = 336$ to be credited in his/her Account A and participant B pays $14^2 = 196$ to be deducted from his/her Account A. Participant A will have $12 \times 14 = 168$ points deducted from his/her Account B, which will be transferred into Account B of Participant B.
created will be 6. Participant A earns $24 \times 6 = 144$ in **Account A** and participant B pays $6^2 = 36$, which will be deducted from his/her **Account A**. In addition, $12 \times 6 = 72$ points will be transferred from **Account B** of Participant A to **Account B** of Participant B.

**Control questions**

To ensure that you understood the instructions we ask you to answer a few control questions. Please take the page with control questions in front of you. After all participants have correctly answered these questions, the experiment will continue. Raise your hand when you have completed the control questions and an experimenter will come to your desk and check your answers.

**Concluding remarks**

You have reached the end of the instructions. If anything remains unclear to you, or if you have any questions, please raise your hand.
10.2 Instructions part two

Instructions for Part 2.

This part of the experiment consists of a questionnaire.
In the following you will be asked to evaluate several statements and to answer questions.
In each section we will explain how to answer the question. For instance how you can give your answer on a scale.
If you have questions please raise your hand. One of the experimenters will come to you and answer your question.
Please answer the questions thoroughly. This is important for the scientific purpose of this study.

Please click START if you are ready to start with the questionnaire.
10.3 Instructions part three

Instructions for Part 3.

In what follows, you will be making a series of decisions about allocating resources between you and another person. For each of the following questions, please indicate the distribution you prefer most by marking the respective position along the midline. You can only make one mark for each question. Your decisions will yield money for both yourself and the other person. The amounts in the questions are in ECUs. For this part, ECUs will be converted into Euros according to the rate 75 ECUs equals 1 Euro. There are no right or wrong answers, this is all a game. At the end of this task you will be randomly paired with another participant with whom you did not interact during Part 1. This other participant will remain mutually anonymous, and all of your choices are completely confidential. One of your decisions will be chosen for you and this other participant. You will also be the other person for another, different, participant. Again this will be another participant with whom you did not interact during Part 1.