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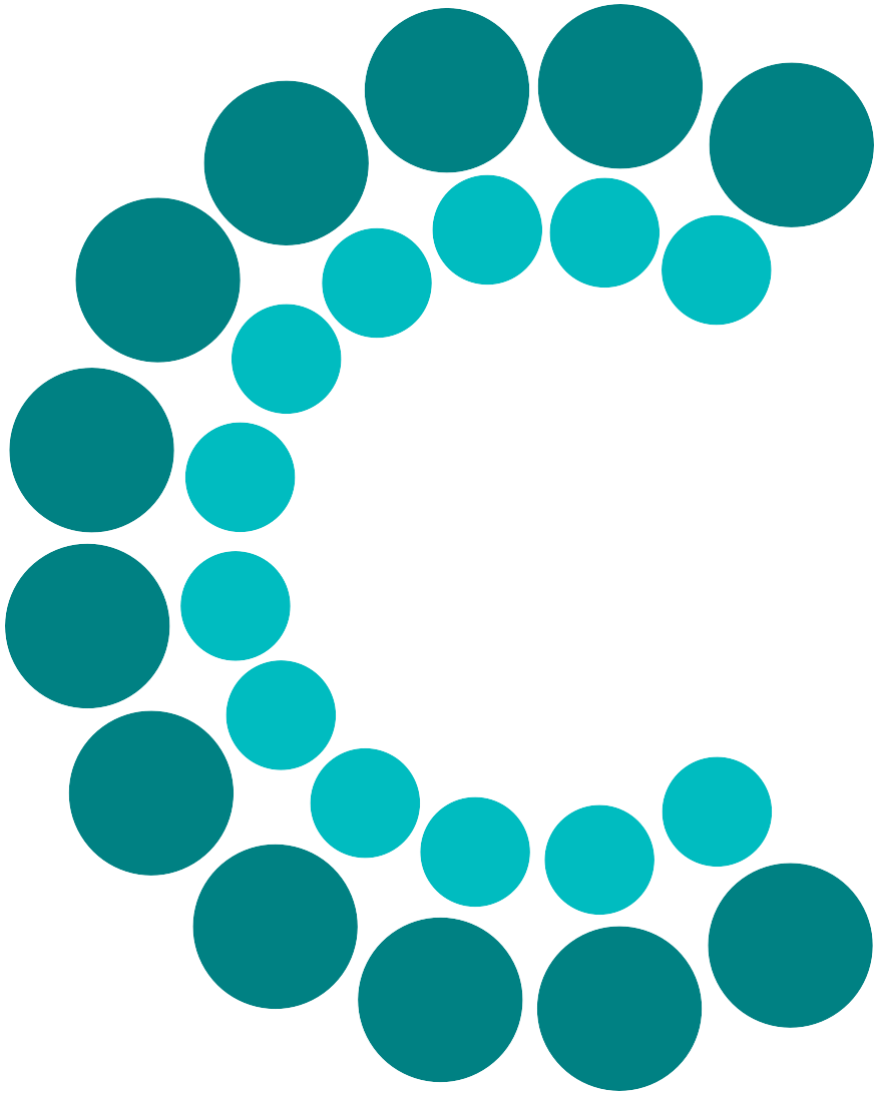

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EDITORIAL

Georgina M. Gómez

Chief Editor

The International Journal of Community Currency Research renews itself. In this Summer Issue of Volume 20 it introduces a number of changes, including a lighter design and easier to navigate features for those that prefer to read articles on the screen. IJCCR welcomes suggestions to make the template more user-friendly and volunteers to take responsibility for the formatting stage of the publication process.

Furthermore, in collaboration with the libraries of the Universities of Delft and Rotterdam in the Netherlands IJCCR articles will now have a Digital Object Identifier (DOI). The metadata of each article will be stored in association with a DOI name and a location, in this case the URL at IJCCR.net, where it can be found. A DOI allows researchers to uniquely identify databases, electronic documents, and so on, facilitating their dissemination and identifications in academic hubs such as Researchgate, Academia.edu and Google Scholar. The DOI for a document is permanent, whereas its location and other metadata may change. In other words, referring to an online document by its DOI provides more stable linking than simply referring to it by its URL, because if its URL changes, the publisher needs only to update the metadata for the DOI to link to the new URL. Articles in past IJCCR volumes will gradually be given a DOI. The Editorial Board of IJCCR regards this new coding as a step forward in making the journal more visible and professional. We are working towards including the IJCCR in indexed academic databases in the near future. Please continue submitting your research for publication in the IJCCR, as the number of articles and their regularity are two criteria that will be considered.

These changes follow the milestone announced in June, 2016, when the IJCCR became the official publication of the newly created Research Association on Monetary Innovation and Complementary and Community Currencies (https://ramics.org/). A group of social scientists from around the world believed that it was time to form an organization that would enhance research on the myriad of monetary innovations and non-monetary exchange modalities that have been emerging globally in the last decades. They were convinced that systematic academic research was of crucial importance to acknowledge the ingenuity and enthusiasm of the practitioners and the grassroots organisations that launched most of these initiatives. IJCCR is a critical resource for newcomers and potential researchers on complementary currencies and other alternative exchange modalities, defined in a broad manner. Apart from present-day community and complementary currencies, RAMICS defines its field of studies broadly and includes historic currencies, monetary plurality and other monetary innovations such as cryptographic currencies. RAMICS focuses in particular on socio-economic innovations on the monetary system which contribute to economic diversity, social cohesion, democratic participation and environmental sustainability. The association already welcomes new members who want to join and support the initiative.

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PSYCHOLOGICAL FACTORS INFLUENCING THE USE AND DEVELOPMENT OF COMPLEMENTARY CURRENCIES

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ABSTRACT

This paper presents a novel socio-psychological analysis of the motivations and experiences of mutual credit members in the United Kingdom and in the United States. Primary data comprised of interviews and participant observation, supplemented with secondary data analysis of organisation documents, and a review of the literature in psychology, sociology and economics. Group members were motivated to secure personal resilience against hardship, and the personal agency that results from this, along with the experiences of community and cultural identity positioning, motivates engagement. Consequently these groups are defined as cultural communities offering personal resilience to members through informal reciprocity. This approach, which prioritises the social aspects of exchange, has implications for the design of complementary currencies, particularly mutual credit initiatives, and demonstrates the value of engaging with the fields of psychology and sociology in developing interdisciplinary understandings of alternative economic practice.

KEYWORDS

Complementary currency, mutual credit, sustainability, reciprocity, resilience, community

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1. INTRODUCTION

This paper presents a topic of analysis that has not been widely addressed within complementary currency research: the psychological experience of complementary currency use among group members. Various types of complementary currencies include digital currencies such as Bitcoin, local currencies such as the Bristol Pound and Brixton Pound, business barter networks and mutual credit systems, which are currency systems designed for specific community groups to support sustainability, equality and greater connection between individuals (Blanc, 2011). While it is clear that mutual credit offers a sustainable alternative to mainstream economic practices in the developed West, these organisations remain on the fringe. Perhaps, through understanding the motivations and experiences of those who engage with mutual credit initiatives, the conditions for a more widespread uptake of these practices may be nurtured. As such, the contribution of this paper is to explore inductively the psychological factors determining the use of mutual credit. These include the motivation for members to join such groups, the ways they experience group membership and what their preferences are. Psychological insights are then used to inform the design of mutual credit systems, offering a valuable supplement to the range of quantitative and macro-economic assessments within the field of complementary currency research. Given the growing understanding that mainstream and alternative economic relations engage individuals in differing ways, an investigation into the psychology of complementary currency use is timely.

Two groups were selected for this case-study research: Dane County Timebank (DCTB) in the United States and Bristol Local Exchange Trading Scheme (LETS) in the United Kingdom. Without aiming to be representative of whole populations, this cross-cultural group sample means that these findings have theoretical transferability, not only to similar initiatives in the UK but also to ones in the United States. The following sections will briefly introduce the chosen organisations and present the theoretical framework for the study, before outlining the methods of data collection used.

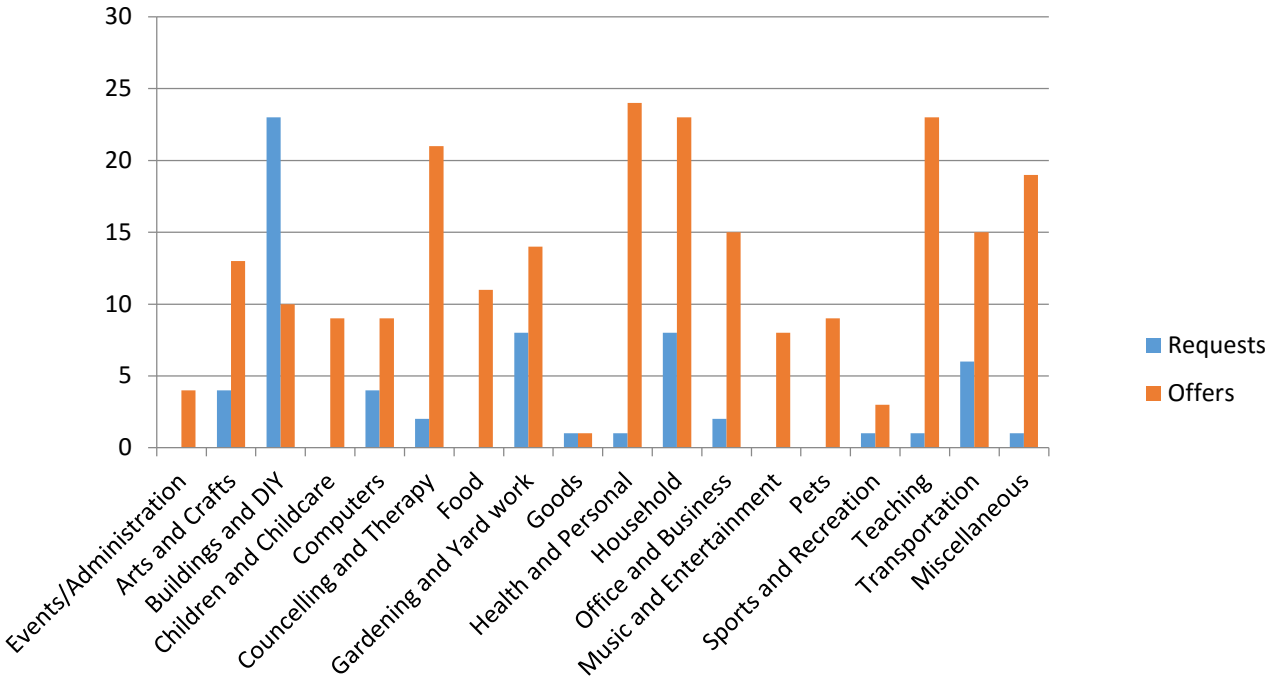
2. INTRODUCING THE GROUPS

2.1 Bristol LETS

LETS involves the use of a complementary local currency alongside cash, and produces a directory of goods and services offered by its members. The virtual currency is then used to record the transactions that take place between them. As such, LETS makes local economies more resilient by addressing two failures of the global economy: they provide an abundant medium of exchange and create a currency that cannot leave the area (Seyfang, 2004). LETS have been implemented in 39 countries across the globe, each with a unique socio-economic landscape. According to Greco (2001), in 2001 there were approximately 1800-2000 groups worldwide and in the UK the number expanded from only five in 1992 to an estimated 450 in 1998 (Lee 1996; Williams 1996). However, evidence suggests that following their rapid introduction, the replication of LETS has plateaued. For example, Williams (2001) reports 303 groups operating in the UK, with an estimated total membership of 21,800 and an average of only 72 members per group.

Compared to the average, Bristol LETS with 146 accounts, of which only 26 are inactive, demonstrates a healthy trading community in the South West of England. The group is managed by a "core-team" of ten members who maintain the record of transactions and follow up membership. Other activities include doing transactions with other members, planning and initiating a vegetable co-op, organising social events and some campaigning. Figure One depicts the online 'requests' and 'offers' made by LETS members. While the number of offers is large and varied, particularly in creative and therapeutic activities; the range of requests are more practical, including requests for help with DIY, Gardening, Household and Transportation. This indicates the differing ways in which LETS members are willing to, and would like to, use their time.

Graph 1. Online 'requests' and 'offers' made by members of Bristol LETS



The Bristol LETS core-group is primarily focussed on maintaining its organisational structure and membership numbers by regularly contacting members with inactive accounts. Minimal external engagement with the wider public was also expressed by Dave, the chairman, who admits that: 'There hasn't been anything terribly organised in terms of recruitment.' Instead, he is 'prepared to wait' for membership numbers to rise.

The focus of Bristol LETS is not therefore to engage with mainstream audiences in order to affect immediate social change, but rather to provide a space for likeminded individuals to experience community and enact ideological values based on economic sustainability. However, this focus on protectionism and continuation, whilst appealing to a more elderly demographic, contradicts the professionalism and technological development occurring within the complementary currencies movement, and as a result, innovative "second generation" mutual-exchange models have begun to attract wider sections of the population (Schroeder, 2011). Nevertheless, LETS continues to remain functionally distinct from other mutual credit initiatives in the social service sector and as such, Bristol LETS continues to flourish as a grassroots "niche" (Seyfang, 2014).

2.2 Dane County Timebank

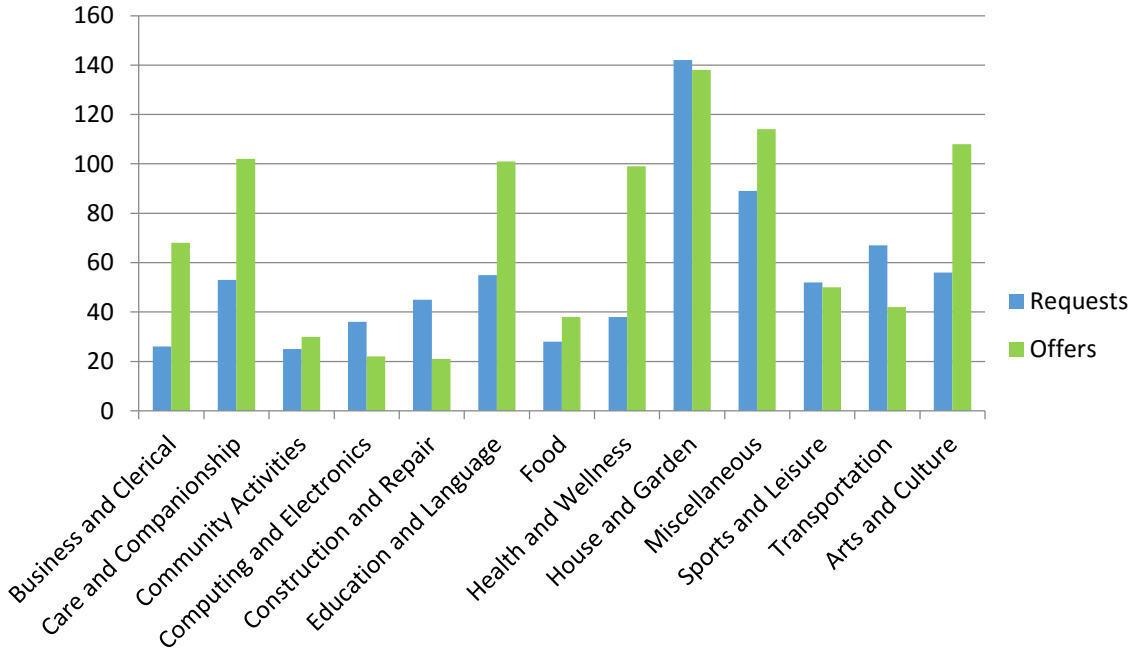
Timebanking operates on the similar concept of one hour of service given to another member earns one time-credit, exchangeable for an hour of service in return. There is no legal guarantee or monetary equivalent to the value of hours, and goods are priced based on the time taken to produce or obtain them. The concept was popularized by Edgar Cahn who applied the principle of "Time Dollars" to social projects in Washington D.C. in order to address inadequacies in national social service delivery (Greco, 2001). As a result, Timebanking focuses more on social service provision than LETS, and this has had global appeal. Groups have been established in 34 countries (Martin, 2010; Madaleno, 2012). There are 300 Timebanks in the United States and over 300 in the UK involving 25,000 participants who have given and received over one million hours of mutual support (Cahn, 2000).

In 1995, the "Madison Hours" complementary currency was established to promote economic self-reliance in Madison. Then, in October 2013 management and assets were transferred to the Dane County Timebank, which was established in 2005. The DCTB is currently managed by a board of nine directors (elected every January) who oversee three paid staff members. Its rapid expansion into neighbourhoods throughout Dane County is managed through hubs where residents in a given neighbourhood elect their own "Kitchen Cabinet" (Steering Team), who

make day-to-day policy decisions for their local area, host regular social events and organise local projects. These include "Maxine's Timebank Store", green carts selling fresh vegetables, an energy project and medical transportation throughout the Madison metropolitan and surrounding areas.

For many, the Timebank provides an essential means by which the necessities of daily life can be met at no financial cost. In contrast to Graph 1, synergy is evident between the offers and requests of Timebank members in Graph 2. The range of requests is greater in number and more varied than those at Bristol LETS, and these are met by a balanced distribution of offers. The size and activity of the Dane County Timebank indicates that it is much more, as its founder, Stephanie envisages: 'Integrated, and part and parcel of the fabric of people's lives and not even a question'.

Graph 2. Online 'requests' and 'offers' made by members of DCTB



The Timebank provides an open online space in which admitting the need for help with daily chores, household maintenance or companionship is both acceptable and encouraged. Furthermore, the range and creativity of the services offered by members indicates a compassionate understanding of the needs faced by others, along with a willingness to provide personal services that meet those needs.

However, in terms of member engagement, regular activity is low. In 2015, of the 2,250 registered members, only 200 accounts were active, that is, have done transactions in the past year. These members have, however, completed 1,431 transactions, totalling 6,455 hours. This is an average of 7 transactions per year for active members and it may be assumed that this activity is supported by the development of a natural community. Indeed, this is a phenomenon that is common among LETS and Timebank groups, where regular trading communities rarely grow beyond 150 members (Wellman, 2012; Bendell and Slater, 2015).

3. THEORETICAL FRAMEWORK

This interdisciplinary study of mutual credit membership is situated at the intersection of literature in sociology, psychology and economics. In the field of environmental psychology, various models and approaches have been developed over the past 50 years to better understand the motivation to engage in more sustainable behaviour. However these models, which draw on a range of cognitive variables, are found to be inadequate for modelling

complex behavioural patterns (Barr, 2011). In particular, these "rational choice models" assume that behavioural patterns themselves are universal, and in failing to consider the deeper motivations for behaviour change, to date they have had low predictive ability.

Rather, this study draws on Social Cognitive Theory to offer an agentic perspective on the motivation of individuals to partake in Bristol LETS and the Dane County Timebank. In Social Cognitive Theory, individuals are not seen as being reactive, shaped by environmental forces, as was conceived by behaviourist psychologists during the 19th century (Gazzaniga, 2010). Instead, "agency" refers to the capacity of an agent to act in the world, and according to Bandura (2001) this is the essence of humanness. To be an agent is to influence intentionally one's functioning and life circumstances, and in turn this influences personal development, adaptation, and change (Bandura, 1989, 2001). The degree of personal agency experienced by each individual is contingent, however, on individual differences in personality development, emotions, and biological factors as well as situational and socio-structural factors (Rootman, 2013). To understand the motivations and experiences of mutual credit members, the role of personal agency, and its relationship to other factors, is investigated as a topic of this paper.

A factor that is particularly important to this investigation is the nature of sustainable economic behaviour. So far, research in environmental psychology has failed to account for the way in which economic practices are socially embedded, and the role of this embeddedness in environmental sustainability. Some small consideration has been given to income and wealth as factors determining pro-environmental behaviour (Huddart Kennedy et al, 2015), but on the whole a more in-depth consideration of economic factors is a striking omission within the socio-psychological literature on behaviour change. From an economic perspective, progress has been made in the emerging sub-disciplines of neuroeconomics and economic psychology to bridge this gap and in this line, Guagnano, Stern, and Dietz (1995) criticise the reluctance of applied researchers to merge insights from economics and psychology. These insights are required, not only to manage the negative social and environmental consequences of current economic practices, but to develop new, collaborative economic models.

Indeed, one psychological element that is common to the economic models investigated here is the practice of reciprocity. Cosmides and Tooby (2004) argue that our cognitive propensity for reciprocity exists in humans in the same way as we have the innate propensity to learn language. Specific behavioural responses to exchange are learned, however, and this depends on the environment, individual differences, family and societal exchange processes. Consequently, cognitive functions work in tandem with the historic institutions that dictate the "rules of the game" (North, 1990), and as the market economy has developed so our cognitive mechanisms adapt, and neither can be investigated in isolation.

But what are the cognitive elements of reciprocity? First, reasoning procedures that detect cheaters or "free-riders" are required to avoid exploitation (Cosmides and Tooby, 2004). Negative sentiments toward-free riders are triggered by a 'willingness to participate towards a group goal': the more willing one is to participate, the more negatively one feels towards free riders (Cosmides and Tooby, 2004). Sentiments that reward contributors to the group, on the other hand, are triggered by 'self-interest in the group goal' (Price, Cosmides and Tooby, 2002). The interpersonal nature of community reciprocity therefore allows individuals to exercise their agency to influence others, for example by rewarding contributions or immediately inflicting social punishments, which consequently lifts cooperation levels towards a welfare-maximizing 100 percent contribution to the common pool (Price, 2002). These findings, which highlight the emotions associated with reciprocity, point to its role in maintaining a stable group dynamic.

Group experiments in economics show that people continuously monitor the state of play, assessing for the presence of free-riders and adjusting their behaviour accordingly (Fehr and Gächter, 2000; Kurzban et al., 2001). However, in situations when immediately punishing free-riders is not possible, participants strategically reduce their contributions to the expectations of rational choice theory (Kurzban et al., 2001). In a new exchange situation, however, instinctive voluntary cooperation returns. Hoffman et al. (1998) therefore conclude that:

> 'We should expect subjects to rely upon reciprocity norms in experimental settings, unless they discover in the process of participating in a particular experiment that reciprocity is punished and other behaviours are rewarded. In such cases they abandon their natural instincts, and attempt other strategies that better serve their interests.'(p.350)

Rather than considering the expectations of rational choice theory to be a natural state, these studies suggest that such strategies emerge as instincts to act in the service of a group are thwarted and turn to self-serving interests (Kurzban et al., 2001). In studying the psychology of economic behaviour, it may then be suggested that rational choice behaviour is promoted in the global economy through widespread free-riding and anonymity, while in mutual credit initiatives, individuals are able to exercise their agency to promote healthy group exchange norms, thus incentivising membership.

However, each individual participates in multiple and varied social groupings, and therefore embodies multiple identity constructions simultaneously, each one becoming salient in relation to the demands of the given situation (Burr, 2002). Membership within such groupings requires individuals to consider the group or culture as their "generalized other" or "frame of reference" to which they aspire or wish to incorporate into their self-identity (Mead, 1934). It must be seen as attractive, or in the interests of the individual, to belong to that group. In light of growing economic insecurity, unemployment and the existential threat of climate change among other environmental threats, it could be argued that membership within mutual credit initiatives may be seen to confer a survival advantage against the potential shocks of peak oil, climate destruction, and economic instability (Scott-Cato and Hillier, 2011).

Indeed, the ability for individuals and communities to recover from devastating events such as such as floods or droughts is crucial to their ability to thrive. Research funded by UNESCAP found that the ability of communities to pool social, natural, and economic resources allowed them to overcome disaster much faster than communities with an individualistic mind-set (UNESCAP, 2013). However, even when the risk of a natural disaster is not immediately perceptible, certain individuals prepare for disruptions in social or political order. This "survivalism" movement has, since the 1960's, focussed on emergency and self-defence training, stockpiling food and water and preparing to become self-sufficient. Many of these interests in self-sufficiency and preparedness are shared by adherents of the "back-to-the-land" movement. Importantly, these "survivalist" strategies have also been suggested as strategies that aim to enhance personal and psychological resilience, allowing individuals to better adapt to stress and adversity (APA, 2014).

In this respect, the distinction between personal and community resilience may be blurred. On an individual level, resilience is defined as the ability to adapt to stress and adversity as a result of family, health or financial problems, for example (APA, 2014). Rather than being a trait of the individual, it is a process of developing and practicing coping techniques (Rutter, 2008; Klohnen, 1996). These may be individual coping strategies, or may be supported by families, schools, communities, and social policies that make resilience more likely to occur (Leadbeater et al., 2005). Through these factors, psychologically resilient people develop an optimistic attitude that enables them to balance negative emotions with positive ones, allowing them to more easily overcome crises (APA, 2014). Given the social support aspect of individual resilience practices, clear links may be inferred between the sociological literature on community resilience practices and psychological theories of personal resilience. Adger (2000) also notes the similarities between resilience in the social and natural world. Social resilience is defined as the "ability of a system, from individual people to whole communities, to hold together and maintain their ability to function in the face of change and shocks from outside" (Hopkins 2008, p. 12). Discourses about resilience within the field of environmental sustainability also define social resilience in terms of self-reliance through a reducing dependency on global and national economic ties; what Bailey et al. (2011) have termed the 'relocalisation agenda'.

But what is the motivation for individuals to develop the skills, competencies and values that promote personal and social resilience? These motivations are investigated by looking at the meaningful social context of LETS and Timebank initiatives. Situating this investigation within the socio-psychological and socio-economic literature demonstrates the value of further engaging with the fields of psychology and sociology in the development of alternative economic forms. In particular, Social Cognitive Theory considers behaviours as being "agentic", as well as taking a multi-level approach that includes proxy, and collective agency at the level of society (Bandura, 2001). Another important theoretical contribution from psychology is Social Identity Theory in understanding the multiple individual, group and cultural identities of members (Turner et al., 1987; Sleebos et al., 2006; Kennedy, 2011). Furthermore, this approach extends the traditional socio-psychological study of behaviour change to present an analysis economic behaviour.

Engaging with Cosmides and Tooby's (2004) theory of reciprocity, it is argued that community groups who actively conduct reciprocal practices provide a valuable topic for research. The suggestion that our cognitive mechanisms for reciprocity solve immediate social exchange problems rather than those based on uncertain and abstract information, reinforces the potential role of the small social group, and highlights the importance of interpersonal, reciprocal interaction within communities (Hoffman et al 1998; Cosmides and Tooby, 2004; Wilson and Ostrom, 2013). To date, much research in this area has relied on public goods games in experimental economics (Fehr and Gächter, 2000, Yamagishi, 1986), and so a qualitative account of members' experiences provides ecologically valid findings that supplement those of experimental research.

This multi-level study therefore includes both an individual socio-psychological perspective and a group level socio-economic perspective. It occupies an interdisciplinary space, bringing together the fields of psychology, sociology and economics in understanding the motivations and experiences of participants in mutual credit intiatives. The following section addresses the research methodology, followed by a presentation of the findings and their implications, both for the literature discussed and for the design of mutual credit systems.

4. RESEARCH METHODOLOGY

A mixed methods approach was taken in this study. The methods used were semi-structured interviews, analysis of group materials, conference proceedings and online data repositories, as well as observation of group events and meetings. Data was collected over a period of five months, from January-May 2014. A sample of five members from each group was selected on the criteria of age, gender and duration of membership. This distribution, along with educational attainment and occupational data, is shown in Table One.

Table 1. Participant Information

Name/ Pseudonym	Group	Gender	Age	Duration of membership	Educational attainment	Occupation
Hilary	LETS	Female	45-50	7 years	Diploma in Clinical Hypnotherapy, NLP and Life Coaching	Hypnotherapist and Life Coach
Karaline	LETS	Female	55-60	10 years	BSc in Information Technology	Retired IT consultant
Annette	LETS	Female	50-55	10 years	BA: Drama and English Lit, Diploma in Clinical Hypnotherapy	Hypnotherapist, Aromatherapist
Mike	LETS	Male	60-70	3 years	BSc in Information Technology	Retired IT professional, volunteer
Dave	LETS	Male	55-60	2 years	PhD	Retired teacher, Languages tutor
Katie	DCTB	Female	25-30	1 year 9 months	BSc Degree in Psychology	Support worker
Stephanie	DCTB	Female	40-45	11 years	BSc Degree in Media studies	Director: DCTB and Mutual Aid Networks

Joe	DCTB	Male	60-65	2 years	-	Retired
Irene	DCTB	Female	25-30	7 years	PG degree: History of Science and Medicine	Graduate student and volunteer
Natalie	DCTB	Female	30-35	2 weeks	PhD in Early Modern History	Doctoral Student

The sample was selected to cover both recently-joined and long-standing members in order to capture the dynamic nature of group membership: why individuals choose to join, why they decide to stay for many years, and how their perceptions change over time. Although the sample does not aim to be representative of the Western population in general (e.g. all participants are white British or American), it does aim to provide a fair distribution of perspectives within the organisations studied. The sample includes members with leadership positions within the group (Stephanie and Dave), and those without. Participants also cover a relatively balanced distribution in terms of their age and gender. The sample comprised a ratio of 70 percent women to 30 percent men across both groups, reflecting the gender distribution within these organisations. Bristol LETS attracts a more elderly demographic than the DCTB and so finding an interviewee aged 25-30 at Bristol LETS was not possible within the time frame. Consequently ages ranged from 45-70 years in Bristol LETS, while in the DCTB they ranged more broadly from 25-65 years.

Although participant selection was based on the above criteria, data regarding participants' educational attainment and occupation was also collected to aid interpretation of the findings. The majority of interviewees have undertaken further education, however only 40 percent are engaged in full-time employment. Although income was not disclosed, it may be determined that these participants tend to fall into the middle to lower socio-economic groups. The impact of these demographic factors on members' participation is discussed in section 7.

During 45-60 minute interviews, participants described their reasons for joining the group, their experiences and relationships within the group, within their local neighbourhood and their family life. Interviews were conducted on location, recorded and transcribed according to the theory and methods of Interpretive Phenomenological Analysis (Smith, 1996; Pietkiewicz and Smith, 2014). Because IPA is concerned with understanding lived experience, interview questions were designed to glean information about participants' sensory and perceptual experiences as well as thoughts, memories, associations (Smith et al. 1996). Interviewees also commented on the wider contexts and issues relating to their group membership, as well as on the organisation and rules of the group. Along with verbatim transcriptions, other meaningful information was recorded in a research diary soon after the interview (Hollway and Jefferson, 2005).

Observations of group meetings served to contextualise the interview data, and secondary data from group websites, blogs, and other media provided a comprehensive overview of the groups, the wider social movements and socio-political contexts. Secondary data sources were selected based on their appropriateness to the groups and to the research question. Sources were also cross-referenced to ensure the quality and accuracy of the data (Yardley, 2000). This study adheres to ESRC's Research Ethics Framework and full ethical approval was granted by the University of Bath. To protect participant anonymity, pseudonyms are used in this study upon request and informed written consent was given by all interviewees (Grinyer, 2002).

The following section outlines the main findings of the research study. These come under three themes: personal resilience, informal reciprocity and alternative cultural identity. Group members' personal and psychological experiences of these phenomena are documented using verbatim extracts. This is followed by a discussion on how these insights might inform the design of mutual credit systems, before concluding with a final discussion.

5. FINDINGS

5.1 Personal Resilience

'Resilience' was unanimously expressed in multiple forms by interviewees across both organisations. This represents the clearest example of personal agency being exercised among group members, leading to the experience of empowerment associated with the activities they undertake. For example, at a LETS meeting, which was held in a bustling local café, Annette, a 47 year old part-time therapist told the story of how she recently was unable to thread a bobbin on her sewing machine. She had lost the manual and so called upon the assistance of another LETS member, who came over and helped her so that she could finish making her lodgers' curtains. She exclaimed that the experience made her:

> 'Feel powerful as opposed to powerless. It's just reassuring to know that somebody would want to do that, I mean ok I've done other things for people at LETS but it still feels quite nice to receive'.

She emphasised the reciprocal nature of the transaction, describing it as,

> 'Like a web... that leads onto all sorts of other conversations...unexpected useful things.'

Annette's primary reason for joining LETS is to maximise her own resilience through such opportunities. Her opportunistic attitude demonstrates that she is aware of the possible benefits of reciprocal interaction and that she is pragmatically driven to reap those benefits for personal betterment. Here, in light of economic necessity, her personal agency is exercised in self-interest, that is, through giving to others she is able to receive, and it is the reassurance of receiving kindness and compassion during times of need that provides her with satisfaction.

Over coffee at the meeting, Karaline, another member of LETS, explained that she prefers giving rather than receiving. She emphasised her personal desire to provide for others' needs, stating that:

> 'To be in LETS and enjoy it you must get satisfaction out of doing a service for somebody… I need a ladder that can get up to peoples' roofs because there's a real need for that'.

This statement indicates that although her actions are altruistic, in giving she also satisfies her own desire to contribute, thereby assuring herself personal security in the future and establishing belonging within the group. Despite their differences in emphasis, Karaline and Annette both make the decision to engage in reciprocal interaction through LETS to ensure their own personal resilience against times of isolation and vulnerability. This reassurance is particularly pertinent based on the high number of LETS members that suffer from illness or isolation. As Karaline, who has multiple sclerosis, comments:

> 'LETS works where people have been taken out of the conventional commercial world of "OK GET MY JOB and then 80% of my life IS MY JOB and then I've got this little bit left over, it works where people have been taken out of that functioning.'

This, combined with the limited physical capability of members to become fully self-sufficient, is associated with feelings of helplessness and frustration. LETS members express a concerned and often pessimistic outlook for the future and their shared understanding is that LETS currently occupies a "niche" that in itself cannot fully address issues of global sustainability. The limitations of the LETS system are also noted by Dave, the chairman, who states that:

> 'We're not functioning as an alternative economy- we're providing a sort of layer of things on top'.

With regard to the challenges facing society, Dave states that 'I wish I could do more', while Karaline elaborates,

> 'I'm very frustrated that I can't do very much, there's huge, huge issues happening out there and we're all so helpless.'

Nevertheless, conducting reciprocal practices allows members to exercise their agency in order to live in a manner that they consider to be morally upright. From these quotes it is clear that LETS is not a protest movement,

but through the practice of reciprocity, members gain satisfaction from upholding an ideology about the resilience of humanity on a global scale. As Dave states, LETS offers:

> 'The feeling that something is being done, and you're involved in something that MIGHT turn into something bigger if things happen to our economy you know (haha) we're developing something that is a bit more resilient.'

Here Dave uses the term "resilient" to describe the practice of LETS members who aim to prepare for social, economic and environmental crises (APA, 2014; UNESCAP, 2013). Indeed, his use of the word "resilient" suggests an overlap in meaning between the "survivalist" practices of mutual credit initiatives at the level of communities and societies, and the personal psychological resilience experienced by group members.

However, age is another factor to take into consideration when analysing these findings. As noted previously, interviewees at Bristol LETS fall into a higher age bracket on average than those at the DCTB. Their more advanced age may indeed influence their motivations and experiences as well as their ideological perspectives. For example, LETS members express the notion of adaptation by necessity in which they do not initiate but instead wait for social change to occur, as Karaline states:

> 'If we can keep LETS going, if society is having to change then we're already there with a basic philosophy if we can keep it going, to go 'ok we're here to be used', that's MY feeling but hey, I'll be dead long before we get to that point (laughs)'.

While her motivation here is not to meet her own personal needs, she also experiences satisfaction as a result of contributing towards the resilience of future generations. But because the importance of LETS is seen to depend on its future rather than immediate economic necessity, personal agency is limited by the ideological nature of participation, as noted by Dave's repetition of 'idea' in the following statement:

> 'My main reason for joining was an ecological-ideological one. It's an idea which could be part of a much bigger idea and that's probably the biggest reason for me joining.'

In contrast, the younger DCTB members are motivated by economic necessity to take responsibility for their own and each other's welfare. This sense of responsibility results in the coordination of voluntary welfare provision and an engaged awareness of the ways in which social needs can be met collectively. This sense of urgency is distinct from the more ideological approach taken by members of Bristol LETS.

In the context of private ownership and minimal state provision, Stephanie's strong belief in the choice, agency and responsibility of each individual plays an important role in empowering others through the DCTB. The Timebank contributes towards personal betterment through skills-swaps such as talks, classes and private tuition. For example a young woman doing care work for the Medical Transport project (Katie) comments that:

> 'A couple of things that I'd really like to learn to do are, I don't really know how to use the sewing machine and it's like well; I want to go and earn these hours gardening so that I can go out and, you know, even just better my OWN LIFE SKILLS (emphasis)'.

According to Katie, the potential to better oneself through learning new skills provides the incentive for members of any age and ability to engage in community work, as Joe, a retired member of the DCTB emphasises:

> 'It doesn't matter who you are, you can offer something.'

The experience of collective agency and the pragmatic, progressive thinking demonstrated by DCTB members in this study is further exemplified by Stephanie (the director) who aims to "redesign work" through the Timebank, as she states:

> 'I feel like it is really straightforward, the things keeping us from doing something more sensible are ONLY, are only engrained false notions of what the world is and what the world can be, and as soon as people are able to take off the blinders and are able to understand how imaginary it is, I mean especially like the financial system and the way that we're controlled by it as individuals, for example staying in a job we

> hate because we are afraid of financial insecurity...I get that! And I want to provide security so people don't have to do that.'

This excerpt suggests liberation from constraints on reasoning. Instead of subscribing to economic conventions such as 'staying in a job we hate because we are afraid of financial insecurity', Stephanie chooses to subscribe to existential indicators for success. This empowers her sense of self-efficacy (Bandura, 1997), leading her to see 'taking off the blinders' as a conscious choice that one makes when they are 'able'. Importantly, this deep sense of personal agency, whilst being seen as incompatible with mainstream work and consumer practices, is rather expressed as part of a more unconstrained, ecological understanding of 'what the world is and what the world can be' and it is from this perspective that group members experience a sense of personal resilience.

5.2 Informal reciprocity

A common finding within Bristol LETS and the DCTB is that members sometimes forget to record their transactions online and might then only do so in order to maintain the online system, as Annette from LETS describes:

> 'I think we did do Ideals (the local currency) just to keep the record system, so it's seen you paid somebody in ideals, just to inspire other people, to make it look active, which reminds me I must put some ideals for Lara on.'

This tendency towards informalising transactions highlights a preference among members for a direct and personal "gift mechanism" between individuals over a more formal community-based system, despite both processes being a means of building and strengthening relationships within communities (Lietaer, 2014). For example, Annette expresses her preference that:

> 'I do really like it when it's a straight swap if that's possible, like I had all my family's bikes serviced and I did an aromatherapy massage for each service and that was just, you know the bike mechanic had a bad back and it was just like "this is nice and simple"'.

Lietaer (2001) states that, when giving somebody a gift there is a "counter-gift" that is not manifested, which creates an imbalance. This acts as an investment leading the receiver to be more positively oriented towards the giver in future relations. This "gift economy" based on informal reciprocity is instrumental in building trust between group members. In a mutual credit system, however, the receiver is not personally indebted to the giver. Rather than being an individual process, the gift process occurs in relation to the community of individuals that use the currency, that is, it is a collective process in which, as the giver is reimbursed with credits, a relationship is formed with the entire community of currency users or potential reciprocators. Reports from group members, however, show a preference for informal gift exchanges that confer the emotional experience of "reciprocal interdependence" between members (Gregory, 1982).

Nostalgia was also expressed among group members for a type of community connection that they no longer feel is present in modern Western society. For example, Mike states that:

> 'I think extended groups of friends is the closest thing we have to community these days, maybe it has been like that for a very long time since villages have got over a certain size you didn't know everybody, your community is your extended friends and family or your network of sharing eggs and bread and stuff but it wasn't the whole village'.

Indeed, this social aspect - the desire for, and realization of community connection - was for many interviewees the primary motivation for initiating and continuing membership. This sentiment is demonstrated in the following conversation at a Bristol LETS meeting:

> A: Maybe we just miss this idea of living in a village, you know where they can be part of a small community and swap things and do favours
>
> K: I think that's what LETS is trying to do, it's trying to, it's trying to replace the community, because the community atmosphere has been whisked away by our focus on large scale business blah blah blah, and LETS is trying to replace that. It's almost like trying to give people an excuse to do the things they would

have done in a small community, it's like trying to make it OK in the eyes of the "I'm not being a mug doing this because I'm doing this for some money, I'm doing this for some Ideals" (sarcastic, passionate tone). That's what I think LETS is, it's trying to say in the eyes of the commercial world "I'm not being a mug because I'm doing this for a profit! Look at my ideals bank balance, hey!" (laughs)

C: So is that not the most important part?

K: No, that's not what it's about, it's about the fact that REALLY you're doing it for the community; you're doing it for helping each other

C: But then does the currency make it easier?

K: It makes it EASIER in some way yeah

A: See in a small community you'd have an on-going tally in everybody's heads, you wouldn't need Ideals you know, for example, my ex, he lives in the countryside now in Somerset and he did a favour for a local farmer and then you know the farmer drove by and put a whole load of logs in his barn and that's how they work and you know they remember all that.

C: But then the idea is to apply to society as a whole?

A: To a big society, yes.

Within this excerpt is the notion that reciprocal exchange, to 'swap things and do favours', naturally forms the basis of community life. Indeed, several scholars have found that, due to its advantages to survival through providing unity and identity, reciprocal exchange formed the basis of tribal community (Fromm, 1970; Lietaer, 2001; Dunbar, 2010). However, Karaline states that capitalist economic practice erodes or 'whisks away' the community connections that form around these reciprocal, non-profit exchanges. Although the mechanical aspect of mutual credit is economic, on an experiential level Bristol LETS and DCTB provide members with a means of experiencing reciprocal exchange as a form of community connection, as Karaline confirms, 'that's not what it's about, it's about the fact that really you're doing it for the community, you're doing it for helping each other'. The phenomenological experience of this exchange is described by LETS and DCTB members as being 'heartfelt and 'joyful', bringing 'meaningfulness' to their lives.

5.3 Alternative Cultural Identity

Cultural factors play an important part in the formation of these specific communities of practice (Wenger, 2006). For example, the political and social history of both Bristol and Madison provide the conditions that support a liberal alternative culture. Those that are interested in social justice issues are then drawn to live in the cultural metropolises of Bristol or Madison, and communities based on an alternative culture tend to form around these areas.

For example, Bristol was England's second largest city and trading port in the 18th century and has been a multicultural city since the 1950s and 1960s, when the first waves of immigration made it one of the most diverse in the UK. An underground scene steeped in punk, reggae and hip-hop influences and street art that tends to separate from the 'mainstream' has meant that alternative cultural communities now continually form in Bristol around subversive political protest, the consumption of healthy and organic local produce, alternative economy, community activities and health and wellbeing. It is within this cultural scene that the members of Bristol LETS participate. It is supportive of the alternative values and practices that are promoted in Bristol LETS and is reflected in members' experiences.

In Madison, social and political awareness also characterise the population. Residents work to maintain a tradition of subversive political action which began with "Fighting Bob" La Follette and the Progressive movement. La Follette's magazine, The Progressive, has been published in Madison since 1909. Regular protests occur outside the State Capitol building and a strong cooperative tradition, which is felt to be stronger there than in neighbouring cities such as Chicago, forms part of a thriving alternative and bohemian culture within the city.

Those who trade hours within the Dane County Timebank find themselves within a specific cultural community, among people whose interests already lie in activism, political liberalism and alternative lifestyle choices. On an individual level, this is a natural meeting of likeminded people that occurs because all parties are interested, feel welcome, understood, and because they want to be involved. Community such as this cannot be forced or manufactured externally but must emerge naturally from within, as members successfully interact over time. While the conditions for community may be put in place, the connections that build a community must form naturally and organically, echoing Stephanie's statement that:

> 'A lot of this stuff isn't going to be filled by how your currency circulates or how you design your currency, it's going to be filled by how you interact with each other and how deliberate we are about that and how thoughtful, and that's what I like about how Michael said in one of the bylaws, to put people above any of the tools or any of the mechanics.'

Among interviewees, the use of a mutual credit system was found to be just one part of their wider alternative cultural identity. Alternative culture is very much a part of who they are: identities and lifestyles represent a culmination of the cultural selections made throughout their life-course, such as where to work and live, what food to buy, how to dress and who to socialise with. These selections are based on ethical beliefs, which are determined by socio-structural influences. Some examples of these include Natalie's upbringing in a small American town where 'everybody looked the same' which lead to her strong beliefs about female equality, Hilary's negative workplace experiences of 'the competitive nature of one employee on another' which lead to the desire to work collectively with people, Karaline's alternative upbringing which lead her to reject the desire for material possessions and Stephanie's experience of social injustice as an employer which lead her to explore alternative economies and to set up the Dane County Timebank.

Ethical beliefs resulting from these transformative moments (Hards, 2011), then influence and shape members' selection of an alternative lifestyle and culture. The crucial element of choice, as an exercise of personal agency, is elaborated upon by Hilary:

> 'I mean I personally believe that choice is the most powerful and influential thing there is and it has effects. You know we create our future through what we think, so let's look at the evidence, let's look at the world, what's fed to us, recognising that we're choosing the evidence that we look for, so we can choose to look for evidence of how awful everything is or of how positive and exciting everything is.'

An important aspect of group members' alternative cultural identity and lifestyle is their occupation. Indeed, 40 percent of the sample is engaged in social support work, care work or Timebanking, while another 40 percent are involved in education, either as a retired teacher or student. Notably 40 percent of participants are either retired or in education instead of full time work, as Karaline states:

> 'LETS works where people have been taken out of the conventional commercial world of "OK GET MY JOB and then 80% of my life IS MY JOB and then I've got this little bit left over, it works where people have been taken out of that functioning.'

As a result of factors including personal choice, upbringing, life-circumstances such as family and health-related issues, as well as socio-structural factors such as those highlighted above, group members express alternative professional identities. While these are solution-focussed in everyday conversation, they are often expressed as a reaction against mainstream capitalist culture and the money economy. Instead, group members pursue professions and lifestyles that do not rely on the accumulation of wealth. For example, Karaline (LETS) describes her reaction against:

> 'Financial service people who rang me up…and I was thinking I DON'T LIKE YOU I REALLY DON'T LIKE YOU (gritted teeth), I wrote myself out of being able to work for them because I didn't like the idea of them.'

This ethical distaste for, or reaction against, capitalist culture in the workplace led her to be, as she states:

> 'Happier working as a computer programmer for the council than I would have been for Microsoft'.

As demonstrated here, group culture is also based on distaste for mainstream capitalist culture, and consequently members look to create new economic solutions. They actively construct professional or work identities by re-signifying mainstream values and expectations about living meaningfully and productively in society. Meaningfulness, for group members, involves rejecting societal standards of success in favour of existential understandings of what it means to lead a 'good' and 'successful' life, as demonstrated in the following excerpt from Bristol LETS.

> K: I'm not attracted to people who are real money-heads going to study business and this and that because they want to make a killing, so it's political and social as well for me, it's where they overlap. I think well oh yeah I meet nice people now! (laughs)
>
> C: So everyone has this idea of what life's about, what's that?
>
> K: Life is about (…) learning, expressing yourself as much as you can, doing things with and for people (..) anything I do I want to do because of the love of doing it, not because I'm going to get paid for it (passionate, indignant tone)

For group members, meaning is found, not through the accumulation of material possessions, but through the immaterial values of 'learning, expressing yourself as much as you can, and doing things with and for people'. These practical everyday acts are imbued with meaning and significance, that is, acts of giving and receiving uphold a moral standpoint that rejects materialism and personal wealth accumulation in favour of values such as 'caring for humanity'. However, it must be noted that there is no single definitive way in which someone can establish meaning in life, as meaningfulness is the subjective evaluation of how successfully one has managed to achieve a sense of purpose, efficacy, value and a positive self-worth in their life (Baumeister, 1996).

It could also be argued that moral values such as thrift, anti-consumerism, simplicity and reciprocity may be employed by those 'on the fringes of the conventional, commercial world' in order to either justify their social positioning or enhance their self-esteem. For somebody who is retired or with a low monthly income, the expression of anti-consumer values as part of their identity might work to enhance self-esteem or minimise anxiety (Greenburg et al. 1986). However, in relation to anti-consumer values, Karaline states that:

> 'I have always had that ethos…I was happier working as a computer programmer for the council than for Microsoft.'

This indicates that, for her, meaningfulness has 'always' been found in her existential values regardless of her position within society.

Finally, group members reproduce alternative cultural networks at a community level, through co-ordinating or participating in small local events and activities. By selecting these alternative cultural spaces and media sources on a daily basis, they become immersed within alternative cultural communities in which identities are positively reinforced. For example, Dave at LETS states that:

> 'We're developing something that is a bit more resilient and I know that's what people are talking about in the Transition Movement and I read about this stuff every day, I do, I read blogs like The Automatic Earth and Mike Shedlock's Global Trends and James Hansen, and all these people I read them every day and I have done for about six or seven years since the oil price went up in 2007'.

In associating himself with these media sources, Dave positions himself within a culture that promotes "resilience". His repetition of 'I read this stuff every day, I do', suggests an eagerness to prove his knowledge and therefore his place in this ideological community. Conformity is driven by the need to belong (Sleebos et al., 2006), while rejection leads to depression and withdrawal of efforts towards the group goal (Tyler and Blader, 2003; Smith et al., 2007). Outwardly expressing moral virtues or knowledge and expertise allows Dave to mutually verify his moral identity, not only as a moral citizen, but one that is appreciated or respected within the group, and this identity affirmation leads to feelings of pride, increased self-esteem and feelings of belonging (Turner et al., 1987; Kennedy, 2011).

6. HOW DO THESE INSIGHTS INFORM THE DESIGN OF MUTUAL CREDIT SYSTEMS?

6.1 Personal resilience within needy communities

First, evidence from the DCTB and Bristol LETS indicates that economic necessity motivates members with a sense of collective responsibility for each other's welfare, resulting in an active and purposeful coordination of voluntary welfare provision within communities. Although income data was not disclosed, the educational attainment and occupational data of group members indicate that in both cases they tend to fall into the middle to lower socio-economic groups. From this evidence, along with participants' interview transcripts and group observation, it may be suggested that a relationship exists between socio-economic conditions and the experience of personal agency among group members.

This finding has important implications for the development of sustainable social models. Rather than being implemented from above, they emerge from the communities that they serve, and so the experience of personal agency among members is an essential element in the continued and effortful maintenance of these networks.

While marginalised communities may be limited in their capacity to affect large-scale social change, their propensity for community connection is more attuned to the ideals of eco-communalism- simplicity, self-sufficiency and local sustainability, than more wealthy communities (Raskin et al. 2002). Indeed, the agency and heightened receptivity of marginalised communities to eco-communalism has consequences for developing mutual credit initiatives. For example, at the Climate Change Convergence talk held in Madison on 23rd April, it was stated by a guest speaker that:

> 'People who have less money have always had to be creative about how their needs are met, and we can learn from them.'

Indeed within the disadvantaged Allied Drive community and in Detroit, Michigan which is a Mutual Aid Network pilot site, Stephanie states that 'the Timebank is helping to create it (wealth) where it's needed'. However, she also observes a need for Timebanking within middle class communities in the United States:

> 'We have really found in our Timebank there's plenty of need for this whether you're economically well off or not, because often if you're economically well off you're strapped for time or strapped for community connection, so again this is the desire to integrate this stuff and integrate these people, and I see that desire is there in many circumstances, so we start with the people who want it and the people who need it and then we'll demonstrate that it's really fun and really rewarding and really enjoyable and then more people will jump on'.

These findings suggest that the drive for resilience in response to immediate social and economic need motivates members with a sense of agency and this in turn suggests that mutual credit initiatives may be most effective when maintained by those who are motivated to make sustainable and healthy lifestyle choices that enhance their own resilience against hardship. For example, through the DCTB Front Yard Gardens Program members use their front gardens to collectively grow fresh, healthy food, through Maxine's Timebank Store members are able to exchange used clothes and household goods for Timeank Hours, and through the Allied Drive Energy Project members support each other in saving energy as well as money on their electricity bills.

This finding accounts for the socio-structural conditions that influence the experience of agency among members of mutual credit initiatives. In the absence of a profit motive and the experience of agency associated with wealth accumulation, it is suggested that this non-growth thinking and working model is most easily translated in areas where economic conditions support a strong grassroots movement for personal and collective resilience.

6.2 Avenues for scaling up through formal and informal reciprocity

A preference for informal reciprocity was expressed by members of both Bristol LETS and the DCTB. This 'joyful' and 'heartfelt' experience points to the social function of reciprocity within communities as it creates the emotional experience of reciprocal interdependence between group members (Gregory, 1982). As noted previously, public goods games conducted in experimental economics also demonstrate that our cognitive mechanisms for

reciprocity work to maintain stable group dynamics by triggering punitive and pro-reward sentiments towards others in the group (Cosmides and Tooby, 2004; Fehr and Gächter, 2000; Yamagishi, 1986).

The social function of reciprocity in maintaining a regular trading community is also evident in that mutual credit groups rarely grow beyond 150 members (Wellman, 2012). For example, although the DCTB has 2,250 registered members, 266 active accounts suggest the formation of a natural community of individuals who trade with each other; and similarly, the trading community in Bristol LETS comprises 120 members. While informal reciprocity allows bonds of trust to form between members, more formal gift mechanisms, by reimbursing members with credit, may deprive individuals of the phenomenological and emotional experience of informal reciprocity and the satisfaction of 'reciprocal interdependence' that this provides.

These experiential differences between formal and informal reciprocity may explain the lack of scalability among LETS and Timebank initiatives, despite efforts to increase membership numbers. For example, to increase membership and the exchange of services the DCTB adopts flexible regulations, for example by allowing members to donate time credits to organisations or by allowing members to "go into the red". However, informalising exchange processes further so that transactions are not recorded would be detrimental. This is because the formal use of a currency is essential in supporting the continued existence of the groups as it satisfies three of Elinor Ostrom's Core Design Principles for groups that manage common-pool resources: it provides a clearly defined boundary, a means of recording costs and rewarding members, and a cost-effective means of monitoring the commons to avoid free riding (Wilson et al, 2013).

Here, the needs of a stable group design are in conflict with the preferences of individual members. It is therefore suggested that currency designers do not rely only on Ostrom's Principles as these focus primarily on social control mechanisms such as recording, measuring, rewarding and cost-effective monitoring. In order to build bonds of trust and a community identity, group members might develop additional mechanisms. For example, the use of a virtual system to map the frequency of exchanges between members might enhance the social aspects of community exchange. Mapping, not only credit balances, but also the relationships that are formed through direct reciprocity, may work to establish trust-based relationships and enhance legitimate participation within LETS and the DCTB. Such a measure may not help to scale-up the group, however. Scaling-up of mutual credit is demonstrated, not through enhancing aspects of informal reciprocity, but through the use of formal systems of reciprocity. For example, Spice Time Credits, a Welsh mutual credit initiative that engages with UK social service organisations, connects 1,500 individuals and 500 organisation members who trade in time. This formal system of volunteering within organisations in exchange for time credits successfully engages more individuals but minimises opportunities for informal reciprocity. This suggests that initiatives that wish to promote informal reciprocity may be limited in their attempts to scale up beyond the size of a natural community.

6.3 Options for engaging with mainstream and alternative cultures

Finally, membership within Bristol LETS and the DCTB forms part of a wider cultural identity to which group members subscribe. This cultural understanding of group membership has implications for the initiation of mutual credit initiatives within more mainstream Western contexts. In particular, the LETS and Timebank groups studied here were found to exist within the context of a strong grassroots network and cooperative urban culture. Not only do these groups provide members with personal resilience, but they are also a means of expressing cultural identities based on the ethical values of anti-consumerism and social justice.

Mutual credit initiatives such as Bristol LETS and the DCTB might therefore look to engage further with the professions, markets, media, and spaces that constitute alternative cultural networks. For example, Bristol LETS remains appealing to a mature and culturally alternative demographic while other Bristol-based initiatives such as 'Just for the Love of It' attract a younger membership. The social benefits enjoyed by Bristol LETS members may be enhanced, not through aiming to capture a wider membership, but through better tailoring the Bristol LETS platform towards a specific alternative cultural demographic.

In this regard, Bernard Lietaer points to the benefits of "bespoke" currencies applying to specific niches in society, at a neighbourhood, town and city level (Lietaer, 2001). His concept of a "monetary ecosystem" is supported by the suggestion made here that alternative cultural networks are selected and reproduced by members who aim to

gain recognition within a specific cultural community (Sleebos et al., 2006). Within these alternative cultures, mutual credit groups are established and maintained by individuals who, as Annette states, look to 'organise and have an effect', and thereby become recognised within a community that furthers their ethical agenda. This natural process of personal and group identity formation works to promote the attitudes, values and beliefs that support the use of complementary currencies (Turner et al., 1987; Kennedy, 2011). As communities are formed from within, translating and replicating these models in different cultural contexts would need to account for these identity processes. For example, developing mutual credit initiatives within 'mainstream' Western contexts would need to engage with the styles and values of 'mainstream' identities. As alternative cultural groups, Bristol LETS and the DCTB rather contribute towards the fabric of a diverse monetary ecosystem and alternative culture.

7. CONCLUSION

This paper has investigated the psychological motivations and experiences of mutual credit use among members of Bristol LETS and the DCTB. The main findings of this study addressed three main themes: personal resilience, informal reciprocity and alternative cultural identity.

First, group members use both the act of giving and of receiving in order to secure personal resilience against social isolation and economic hardship. This finding suggests that in order for mutual credit initiatives to thrive, group members must feel empowered in the service of achieving resilience against social and economic risk. Enhanced personal agency results from activities conducted in Bristol LETS and the DCTB, along with the expression of anti-consumer identities. These enhance personal agency by determining a moral precedent that gives meaningfulness to life, such as to live 'without expecting to make a profit' (Karaline) (Allan and Shearer, 2012).

Much of the literature on social resilience has looked at the ways in which communities might become more resilient to the effects of climate change and resource depletion (Barr and Devine-Wright, 2012). However, this inductive study of the motivations and experiences of mutual credit members shows that socially resilient networks are often maintained by individuals wishing to secure their own personal resilience against times of hardship. The implication of this psychological approach is to understand that the motivation for individuals to actively engage in socially resilient practices such as mutual credit is often deeply personal rather than being ideological. In a recent investigation into the diffusion of grassroots innovations, Seyfang and Longhurst (2014) determine which activities, contexts and socio-technological characteristics confer successful diffusion among twelve community currency niches. In addition to these variables, this study points to the experience of agency and personal resilience among members as factors to consider in future research on the diffusion of social and complementary currencies.

The cross-cutting factors of age, gender and duration of membership were also found to have an impact on the conclusions stated. The age of participants influenced their experiences and motivations for participation, as noted by the more ideological perspectives and reduced agency of Bristol LETS members compared to the younger DCTB sample. While young members are more often motivated by skills development, elderly members highlight the benefits of receiving social support, nevertheless both groups value contributing to their community in order to receive the experience of belonging and enhanced personal resilience. Gender did not however, significantly influence members' discourses as both men and women unanimously expressed a drive for personal resilience, alternative cultural identities and the desire for community connection through informal reciprocity. The higher percentage of women in the sample is reflected in a similar ratio of 70 percent women to 30 percent men in attendance at meetings and events for both groups. This points to benefits provided to women by such groups in terms of enhancing resilience and a sense of belonging within a likeminded community, supporting a growing number of studies that highlight the role of the "Social and Solidarity Economy" in the empowerment of women (Smith et al., forthcoming). Notably, these social aspects were cited by long standing members as being the reason for continuing their membership over many years, that is, forming close friendships with other members of the community became an important factor over time, while the motivation for recently joined members focussed more on the benefits of networking, skills development and sustainable practices. This underlines the importance of friendship between group members in maintaining active participation over time, further reinforcing the second major finding of this study.

The second major finding is that the mechanical aspects of mutual credit, that is the transaction of time credits in exchange for services, is expressed as being of secondary importance to members compared to the emotional experience of community connection afforded by those transactions. This sentiment is expressed in Stephanie's comment that currency design is about 'how you interact with each other and how deliberate we are about that and how thoughtful'. Conceptualising these initiatives as "social groups" rather than as "currencies" would focus research and best practice, not only on 'the tools and the mechanics' but also on the social processes that build trust within LETS and Timebank communities. This has implications for the better management of community currencies, not only through virtual systems that enhance the social aspects of exchange, but also through games and social events that work with group members' tendency towards informal reciprocity, for example, the DCTB's 'Timebanking Yarn Game' connects players' needs and assets to identify community goals and build connections based on empathy.

The significance of informal reciprocity also has implications for scaling-up these initiatives. However, the majority of research into the psychology of reciprocity relies on public goods games played in experimental conditions (Fehr and Gächter, 2000, Yamagishi, 1986). By suggesting that group members prefer to engage in direct or "informal" reciprocity over more formal exchange mechanisms (Lietaer, 2001) these phenomenological insights support experimental evidence for the social function of reciprocity (Cosmides and Tooby, 2004; Fehr and Gächter, 2000, Yamagishi, 1986). Such evidence points to the role of punitive and pro-reward sentiments in maintaining stable group dynamics through reciprocity (Cosmides and Tooby, 2004), however further research could explore in more depth the psychological processes by which informal reciprocity affects group dynamics within LETS and Timebanks in comparison to more formal community-based exchange processes. For example, cognitive aspects such as members' sentiments towards others, their rate of participation and their self-interest in the group goal may impact upon group success differently in formal and informal exchange contexts (Wilson, 2013; Cosmides and Tooby, 2004).

Finally, this study highlights the culturally specific nature of Bristol LETS in the UK and the Dane County Timebank in the United States, and points to the way in which group members become immersed within these alternative cultural networks through identity positioning and mutual identity affirmation (Turner et al., 1987; Sleebos et al., 2006; Kennedy, 2011). Analysis of interview transcripts identified factors leading members to choose alternative professions and cultural identities that support membership within Bristol LETS and the DCTB. These include upbringing, life circumstances such as family and health issues, and socio-economic factors within their local area. These factors differ across groups and regions, depending on their specific goals and the socio-political context. For example, in Europe and North America, initiatives tend to focus on promoting a sustainable economy and enhancing social cohesion as in the Bristol LETS and DCTB examples, while in Latin America they are mainly seen as tools for income generation and improving welfare (Gomez, 2015).

Nevertheless the psychological processes noted here have theoretical transferability in the sense that "community" is a universal notion by which individuals organise their lives and understand their relationships (Smaling, 2003; De Anca, 2012). In modern society, most individuals identify with multiple communities of interest and of practice (Wenger, 2006; Henri and Pudelko, 2003). While some community identities are selected, others are imposed, and while some individuals identify with their community of origin, others identify with a "community of aspiration" such as one that is escalating in socioeconomic status, or one that is value-based. In making a selection about which communities to identify with, individuals contribute to the production and reproduction of those collectivities (De Anca, 2012). In an increasingly value-driven society, participation within these mutual credit groups is meaningful to individuals because it confers social identity and permits self-evaluation through the interplay of personal and group identity (Jenkins, 1998).

Prioritising identity processes in the initiation and maintenance of complementary currency systems informs inquiries into the replication and translation of these models (Seyfang and Longhurst, 2014). For example, this understanding of members' experiences points to the contextualised and emergent nature of cultural communities such as Bristol LETS and the Dane County Timebank as members collectively resignify mainstream values. The bottom-up socio-psychological approach of IPA therefore adds valuable insights to the field of complementary currency research by prioritising the phenomenological experience of LETS and Timebank members over and above the tools that constitute these systems. In doing so, it connects the fields of psychology, sociology and eco-

nomics in the study of these alternative economic practices, as they are seen, first and foremost as cultural communities offering personal resilience to members through informal reciprocity, and from this definition, new approaches to the management and expansion of social and complementary currencies might emerge.

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CLASSIFYING NON-BANK CURRENCY SYSTEMS USING WEB DATA

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ABSTRACT

This paper develops a new classification of non-bank currency systems based on a lexical analysis from French-language web data in order to derive an endogenous typology of monetary projects, based on how these currencies are depicted on the internet. The advantage of this method is that it by-passes problematic issues currently found in the literature to uncover a clear classification of non-bank currency systems from exogenous elements. Our textual corpus consists of 320 web pages, corresponding to 1,210 text pages. We first apply a downward hierarchical clustering method to our data, which enables us to endogenously derive five different classes and make distinctions among non-bank currency system and between these and the standard monetary system. Next, we perform a similarity analysis. Our results show that all non-bank currency systems define themselves in relation to the standard monetary system, with the exception of Local Exchange Trading Systems.

KEYWORDS

non-bank money, text mining, web data, downward hierarchical clustering, similarity analysis.

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1. INTRODUCTION

What is money? It is particularly difficult to give a clear answer to this question today, as the current surge in various non-bank monetary forms or complementary currencies around the world calls for a re-conceptualization of this economic and social tool. In the literature, money is traditionally defined by its three functions as: (i) a medium of exchange, (ii) a store of value and (iii) a unit of accounting. However, what is exceptional now is the fact that these three functions are combined in one unique national (our supranational) official currency. Indeed, in most previous periods of history, several currencies were used to serve these three functions separately (Douthwaite, 1996; Greco, 2001; Lietaer, 2001, 2013). Hence, complementary currencies are not a new phenomenon. However, since the 1990s, we have seen a massive surge worldwide in the implementation of complementary currencies.

Given the increasing number and complexity of complementary currencies, their puzzling diversity, and their ever-increasing specific features, understanding them is becoming increasingly complex. To understand and better analyze their impact and to better manage and support their development, it is necessary to establish a clear classification of them. In particular, Place & Bindewald (2015) argue that typologies are needed in order to "appropriately evaluate CCS against their own and diverse targets and not against implicit notions of success or ambition" (p.155). In this regard, the literature on complementary currency classification, initiated by Kennedy & Lietaer (2004) and Bode (2004), currently represents a rapidly-growing research field (see, Blanc, 2011, 2013; Schroeder, 2011; Slay 2011; Martignoni, 2012; Bindewald et al., 2013; Seyfang & Longhurst, 2013). Overall, authors deal mainly with questions such as, what kinds of exchange do CCS aim at promoting? Between whom? For what purposes?

Bode (2004) suggests a classification of complementary currencies according to the following two criteria: (i) their compensation schemes and (ii) the type of co-contracting parties involved. Within this typology, he further distinguishes between "services-based complementary currencies" and "monetary-based complementary currencies". Here, we notice a clear dividing line between barter clubs and other Local Exchange and Trading systems (LETS), independent from standard moneys, and citizens' currencies, anchored to national or supranational currencies. Kennedy & Lietaer (2004) propose a more detailed and complex typology, including technical features of complementary currencies and define five main classification factors: (i) the objectives they serve, (ii) their functions, (iii) their medium of exchange, (iv) their underlying process of monetary creation and (v) their cost recovery schemes. Starting from this basis, the current evolution of this literature aims at clarifying and deepening these initial classifications by accounting for a larger set of characteristics (see Blanc, 2011; Martignoni, 2012; Seyfang & Longhurst, 2013; Bindewald et al., 2013; Place & Bindewald, 2015).This has resulted in ever more complex and varying classifications, making standard comparisons more difficult.

Indeed, Derruder & Lepesant (2011) and Dittmer (2013), mainly divide complementary currencies according to their objectives (characterized from a microeconomic point of view and a meso/macroeconomic point of view, respectively), Bindewald et al. (2013) put forward a typology of complementary currency systems based on four categories, namely (i) political, (ii) economic, (iii) social and (iv) environmental, which are then subdivided according to their respective scope (meta, macro, meso and micro). Place & Bindewald (2015), also subdivide the « political » category into two further distinct categories, namely "culture" and "governance".

Seyfang & Longhurst (2013) define a classification of 3,428 monetary projects from 23 countries located across 6 continents. Their sources come from the compilation of existing database and field information. In order to classify these projects, they assume that three distinct types of monetary projects appear in the literature: (i) credit services, (ii) mutual exchange systems and (iii) local currencies. They then add a fourth category, namely (iv) barter clubs. According to the authors, the first two classes, credit services and mutual exchange systems, make up 91.5% of all recorded initiatives, whereas barter clubs only account for 1.4% of monetary projects in their database. Therefore, local currencies and barter clubs seem to account for a very limited number of complementary currency systems around the world, unless this observation comes from a bias arising from the database itself or from the classification method used by the authors. Indeed, we believe that the authors' choice to differentiate between barter clubs and mutual exchange systems is questionable. When we look at the definitions the authors provide for these two categories, they seem to be nearly equivalent, the authors' decision to separate them ap-

pears to be based only on the fact that the projects call themselves "barter clubs" or "mutual exchange systems", and not based on significant difference between the two in terms of functioning, structure and goals.

This demonstrates an example of the current trend in the literature, which seems to be in search of an increasing number of complementary currency features, with ever more complex division into sub-fields. We believe that these developments make the understanding of complementary currencies projects trickier, and that such complex classifications gradually lose sight of their goal of simplification and clarification of a given phenomenon.

On this point, Blanc (2013), acknowledges the relative failure of the literature to define a clear-cut typology of complementary currencies, and we believe that following the current trend of increasing classification criteria will only worsen this failure to find a useful classification system.

First, the problem lies in the fact that authors do not seek to classify the same currency systems. Some authors want to account for all existing currencies, whereas others want to account for only a limited set, depending on the authors' interests. According to Blanc (2011), the current heterogeneity of complementary currencies is so great that resorting to at least several classifications becomes unavoidable. Moreover, Blanc (2011) argues that? the literature's difficulty in defining a clear and efficient typology of complementary currencies may come from an exclusive focus on moneys, when the emphasis should instead be placed on systems.

As a result, Blanc (2011) suggests a classification based on systems rather than on objects and determines three main classes of systems: (i) local currencies (territorial/geographical-based projects), (ii) community currencies (originating from preexisting communities) and (iii) complementary currencies (economic-based projects focused on production and exchange activities into markets). Going one step further by broadening his previous analysis, Blanc (2013), drawing upon Polanyi's works, proposes a typology of monetary projects according to three "ideal types": (i) public currency, (ii) profit-making currency and (iii) citizens' currency, and six subcategories (state, sub-state, market, captative, community and trade). This taxonomy has the clear advantage of enabling the classification of all types of currencies, with the only exception being that of crypto-currencies. In our view, this typology is the most successful to date.

As evidenced in the brief literature review above, classification of complementary currencies is clearly a thorny issue and a clear-cut typology has not yet been found. We believe that the issue of classification seems to resist resolution because the purpose of classification is not clear enough. We believe that clarity can be found in answering the following questions: (i) Which elements do authors need to focus on and why?; (ii) How do databases on complementary currencies get compiled? On the one hand, authors have focused on different aspects of monetary objects or projects such as their functioning, the actors they involve, the types of goods and services exchanged their conditions, their medium of exchange and the goals they serve. Although these various elements are strongly interrelated, each author inevitably favors some particular features of monetary projects he believes more significant and representative and subdivides each element accordingly, which makes the existing classifications very hard to compare. Furthermore, databases on complementary currencies are still poorly organized and their availability is limited. As a result, it proves very challenging to form an exhaustive and representative database, which further complicates the classification of complementary currencies according to their characteristics. Since authors resort to different and partial databases, they obviously find different results.

In order to circumvent these problems, we believe that a relevant way to classify complementary currencies may be to resort to a classification based neither on recorded objective data nor according to a priori factors, but instead to endogenously categorize the largest possible set of monetary projects using web data. Indeed, the internet abounds in articles, blogs and other web content dedicated to complementary currencies. This combined web content represents an invaluable source of information on complementary currencies despite the fact that it is in textual form rather than statistical. Yet, for more than two decades, there has been an important development in statistical methods for text analysis, especially regarding endogenous classification of textual corpora according to their content. A clear benefit of this methodology is that it neither resorts to a priori hypotheses about factors driving the typology, nor focuses on specific subsets of monetary projects. In our case, a larger sample size of data related to complementary currencies would especially mitigate the issue of data-bias author preferences and lead to a more objective classification. Furthermore, even if there is possible ideological bias in sources that discuss complementary currencies, by gathering many different sources dealing with this topic, our methodology offers a

way to derive a more representative discourse on complementary currencies. Hence, we use the term "non-bank" to qualify most of the existing currency systems. We acknowledge that the choice to base our study on French lexical data reduces the scope of our study and thus the external validity of our classification. However, we believe that focusing on lexical data available in French provides a first test to gauge the relevance of our methodology in deriving a new classification of complementary currencies. Obviously, further research needs to be done to extend our work to other languages, such as English, Spanish, Portuguese or German, in order to allow lexical comparisons between monetary projects according to their geographic origins or the language used to depict them.

The rest of this paper is organized as follows. Section 2 presents our lexical corpus data, as well as our statistical methodology. Section 3 displays the main results regarding the endogenous classification of non-bank currencies using a top-down hierarchical clustering. Section 4 explores the relationships between the various estimated classes in Section 3 using a similarity analysis, and Section 5 concludes.

2. METHODOLOGY

According to Gerin-Pace (1997), statistical methods for text analysis were born in the 1980s and since that time they have followed two main development paths: a first set of methods aims at analyzing writing style (text comparison and evolution), while a second set deals with the analysis of the meaning of a given textual corpus. Our paper draws upon this latter set of methods.

2.1. The design of the textual corpus

We initially set 38 French keywords related to the term "complementary currencies". We chose to keep 10 web page results for each keyword, so as to end up with a textual corpus of around 300 web pages. Our raw data then underwent three types of "cleaning" procedures. First we procedure tested Google search results for each keyword. Here, we chose to withdraw a given keyword from our initial list if: (i) its first ten URL results gave webpages not related to complementary currencies or (ii) its URL results were exactly the same as some other keywords in the list. Consequently, our textual corpus does not include duplication webpages, and subpages of the same main domain name do not count as individual pages. The second "cleaning" procedure dealt with the selection of data collected from the extracted webpages. We chose to focus only on webpages that included informative data directly available in a textual form on each webpage we extracted. As a result, we dropped multimedia URLs (for instance, links to videos and radio programs), homepages without any informative content, and finally URLs related to translated webpages. Likewise, in order to keep our textual corpus balanced, we chose to drop URLs that linked to pdf files. Moreover, we also canceled URLs that referred to books (for example, e-commerce sites, Google books and editor webpages). Therefore, our textual corpus is constituted from four main sources: (i) newspapers and magazines, (ii) blogs, (iii) free online encyclopedias and (iv) webpages from different actors of complementary currency systems. Finally, the third "cleaning" procedure was based on the extracted webpages themselves and consisted in keeping only text data from each webpage (i.e., we dropped web navigation terms such as tags, signs and pictures). We additionally removed internet user comments, since they were often extremely long and so risked skewing the amount of extracted text for each keyword.

In the end, our textual corpus includes 320 webpages from the extraction of the URLs of the first ten Google search results associated to each of the 32 final French keywords used to depict non-bank currency systems.

2.2. Descriptive statistics of the textual corpus

Our textual corpus is made up of 320 distinct webpages. Starting from this raw data, we resorted to a corpus lemmatization in order to reduce vocabulary diversity and better emphasize semantic proximities between words. This method can be viewed as a way to "undress" words from their grammatical shape, so as to gather them into one family. For instance, all conjugations of the verb "have" (avoir) will be combined into the same lemma "have" (avoir). This seems to be especially relevant in our context, since we are only interested in the informative content of texts and not in form.

Furthermore, when processing lexical data, we divided our final textual corpus into segments of 20 consecutive words after lemmatization. Consequently, the final partition of our corpus is the following:

- 320 Initial Context Units (ICU).
- 17,939 Elementary Context Units (ECU), also called text segments, which represent subsets of 20 successive words in a given ICU.
- 359,223 words and 22,369 words after lemmatization (i.e., distinct terms).

Appendix 2 gives the 50 most frequent words in our corpus, with their respective total frequency. Since webpages were extracted with keywords including the term "currency", it seems logical that this term is the most frequent word found in our corpus, with 4,733 occurrences. The three next most frequent terms are "exchange" (1,569 occurrences), "local" (1,443 occurrences) and "system" (1,314 occurrences).

2.3. Downward hierarchical clustering and similarity analysis

2.3.1. Downward hierarchical clustering

In order to implement our downward hierarchical clustering, we apply the Reinert's (1983, 1990) ALCESTE (Analyse des Lexèmes Cooccurrents dans un Ensemble de Segmentation du Texte Etudié) method using IramuteQ software. Downward hierarchical clustering (henceforth DHC) is an algorithm, which starts by assuming that all words in a corpus belong to the same category. For each algorithm iteration, we derive the two most distinct categories of words. This iterative process stops when the extracted variance is not improved by a new partition of data. From this perspective, the final number of classes is left a priori undetermined, which in our case is especially relevant for deriving an endogenous classification of non-bank currency systems without ex ante hypotheses.

Once we have divided our corpus into k classes, we need to determine features related to each estimated class, which entails analyzing the words included in each class and especially the contribution of each word j to a given class k. For this purpose, we use a Chi-square statistic, to assess the extent of connection between each word and each class. From these estimated connections, the use of a Factor Component Analysis (henceforth FCA) enables us to characterize similarities and oppositions between estimated classes by pooling them into factors that delimit their respective outlines.

Note that it is possible to implement a DHC on texts (each webpage is processed as a whole), on simple segments (fractions of a given text), or on pooled segments (gathering of text fractions). Our classification tests based on texts were inconclusive, since the estimated classes were somewhat dispersed and uninformative. This is because most webpages contain several topics, so that considering a webpage as a whole does not make sense from a semantic point of view. Therefore, text partitioning into segments turns out to be essential in order to carry out an efficient text analysis. Our classification tests based on simple text segments proved to be more significant. However, one obvious requirement here is to define the length of segments to be considered. When importing a corpus, IramuteQ offers different types of segmentations, based either on the number of successive words needed to be considered or based on signs or paragraphs. In our case, a classification based on the number of successive words seemed to be the most appropriate, given that webpages are not necessarily structured by paragraphs and classification based only on words would not make sense. We did several tests for different segment sizes (40, 30, 20 and 10 words), and the most clear-cut results were obtained from a classification based on 20 successive words, although few discrepancies appeared between classifications based on 20 and 10 successive words. However, classification with more than 30 words led to poorer results, indicating that longer segments include too much heterogeneous information and make classification less efficient.

Lastly, we implement a DHC for both simple segments and pooled segments. Classification leading to the most convincing results is based on pooled segments, which consist of a two-part classification. In a first step, we specify a given number of words to be pooled and then a DHC is applied to the segments in order to keep the pooling of segments, which maximizes the variance extracted from words included in each segment. In a second step, a DHC is applied to pooled segments in order to derive our final estimated classes. As a result we are able to gather similar segments in terms of included words before resorting to the estimation of the k classes. With this method, the

estimated classes are much more cohesive and significant than those obtained on simple segments, which is logical since the final classification is derived from groups of words generated according to their proximity and not only according to a given size of successive words (as in classification on simple segments). Hence, we chose to keep classification estimates obtained through the implementation of a DHC on pooled segments of 20 occurrences.

2.3.2 Similarity analysis

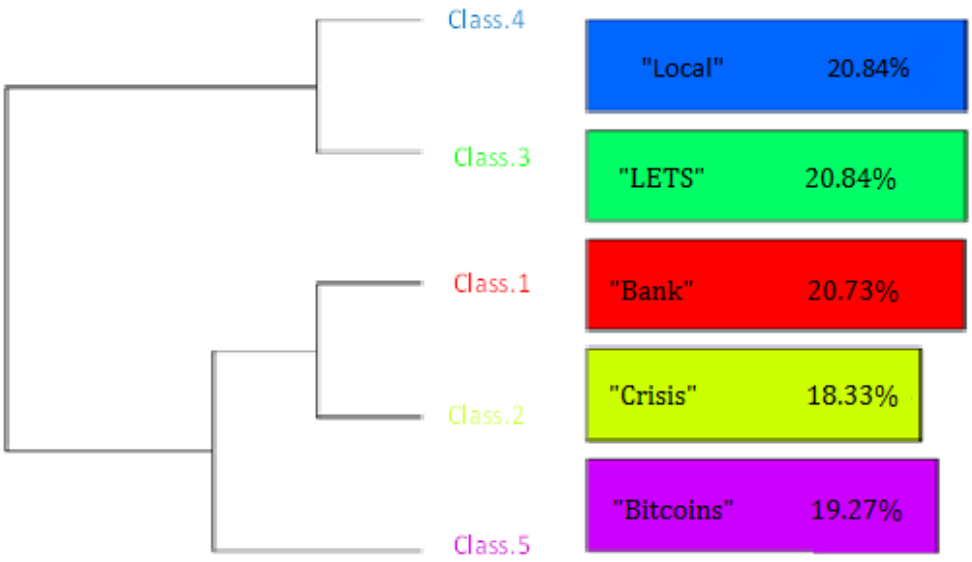
Similarity analysis measures distances between different semantic territories. In our case, this identification work is required if we want to highlight differences or similarities in the relationship between lexical representations of money. Therefore, after implementing our DHC, we undertake identification of semantic categories in an attempt to gauge the distance between the k estimated classes. Indeed, although DHC enables us to endogenously estimate a given number of classes according to specific features, it is not able to depict either the relationship between close semantic territories or combinatory territories between several classes.

To assess distances between semantic territories, we chose to work with a method from applied graphs theory. This method, based on Blondel et al. (2008) and Lambiotte et al. (2009), allows us to depict nodes and links from a modularity calculation in order to statistically determine groups of nodes (in this case semantic continents) that gather several nodes and share common features. As a result, we are able to endogenously identify central and peripheral entities in a given graph containing lexical data. In this case, a node is said to be central when most of the possible paths that connect the graph pass through the node. Here, the Betweeness Centrality algorithm from Brandes (2001) allows us to compute the node, through which most of the possible paths in the graph pass. In terms of interpretation, the closer a node is to the center of the graph, the more central it is for the definition of non-bank currencies. Conversely, nodes further away from the center of the graph are more peripheral to the definition of non-bank currencies. When applied to lexical data, this centrality algorithm leads to the identification of reference classes, i.e., classes which serve as the origin point (or center of gravity) for the definition of other classes.

3. RESULTS FROM THE DOWNWARD HIERARCHICAL CLUSTERING

When first applying a DHC to our corpus using IramuteQ, we derived 5 classes. The following dendrogram helps to better visualize this result:

Graph 1. Dendrogram



This dendrogram shows that our five estimated classes are well balanced in terms of the text segments they respectively include, since each of them covers around 20% of all segments. In order to see which classes have been endogenously created, we now analyze the lexical content of each of them. Table 1 below gives the 20 most specific terms from each estimated class (according to their Chi-square statistic).

Table 1. The 20 most specific terms of each estimated class

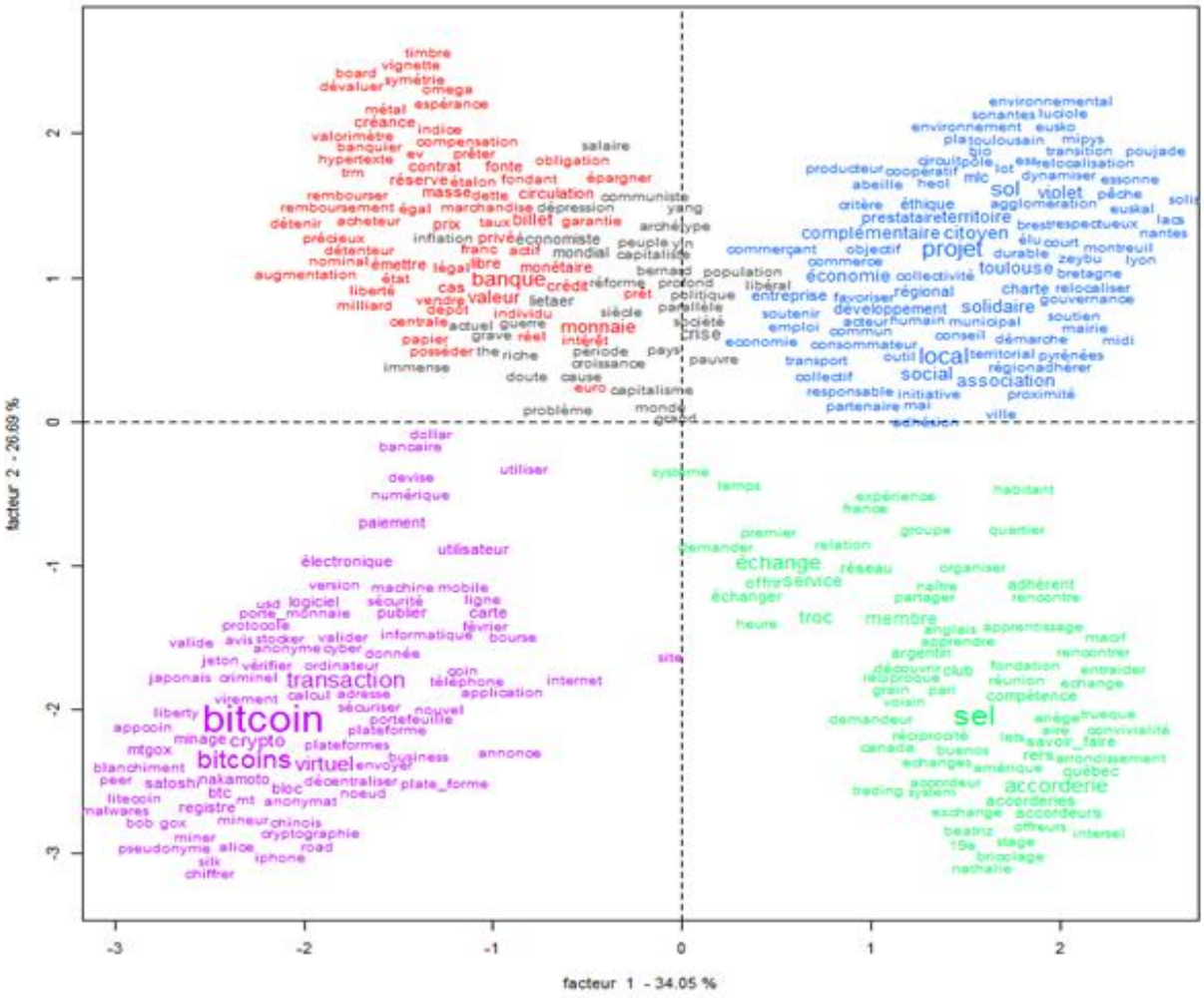
Class 1. "Bank"	Class 2. "Crisis"	Class 3. "LETS"	Class 4. "Local"	Class 5. "Bitcoins"
% of segments : 20.73	% of segments: 18.33	% of segments: 20.84	% of segments: 20.84	% of segments: 19.27
Bank	Crisis	LETS	Local	Bitcoin
(Banque)	(Crise)	(SEL)	(Local)	(Bitcoin)
Value	Global	Accorderie	Project	Transaction
(Valeur)	(Mondial)	(Accorderie)	(Projet)	(Transaction)
Money	Economist	Exchange	Sol	Virtual
(Monnaie)	(Economiste)	(Echange)	(Sol)	(Virtuel)
Banknote	Bernard Lietaer	Barter	Solidarity	Crypto
(Billet)	(Bernard Lietaer)	(Troc)	(Solidaire)	(Crypto)
Issue	Monetary	Service	Citizen	Payment
(Emettre)	(Monétaire)	(Service)	(Citoyen)	(Paiement)
Price	Capitalism	Member	Social	Satoshi Nakamoto
(Prix)	(Capitalisme)	(Membre)	(Social)	(Satoshi Nakamoto)
Debt	Reform	Network	Violet[i]	Electronic
(Créance)	(Réforme)	(Réseau)	(Violet)	(Electronique)
Contract	Inflation	Club	Association	Card
(Contrat)	(Inflation)	(Club)	(Association)	(Carte)
Free	Country	Accorderies	Economy	Bloc
(Libre)	(Pays)	(Accorderies)	(Economie)	(Bloc)
Monetary	People	Adherent	Territory	Mining[ii]
(Monétaire)	(Peuple)	(Adhérent)	(Territoire)	(Minage)
Reserve	War	Accordeur	Complementary	User
(Réserve)	(Guerre)	(Accordeur)	(Complémentaire)	(Utilisateur)

Mass **(Masse)**	Depression (Dépression)	REN[iii] (RERS)	Toulouse (Toulouse)	Software (Logiciel)
Credit **(Crédit)**	Communism (Communisme)	Skill (Compétence)	Development (Développement)	Register (Registre)
Circulation **(Circulation)**	Politics (Politique)	Argentinian (Argentin)	MLC (MLC)	Publish (Publier)
Private **(Privé)**	Big (Grand)	Offer (Offrir)	Service provider (Préstataire)	MTGOX (MTGOX)
Case **(Cas)**	Cause (Cause)	Quebec (Québec)	Charter (Chartre)	Platforms (Plateformes)
Fonte **(Fonte)**	Current (Actuel)	Exchange (Echanger)	Firm (Entreprise)	Computer science (Informatique)
Valorimeter[iv] **(Valorimètre)**	Poor (Pauvre)	Know-how (Savoir-faire)	Regional (Régional)	Decentralize (Décentraliser)
Central **(Central)**	Population (Population)	Reunion (Réunion)	Ethical (Ethique)	Calculation (Calcul)
Melting **(Fondant)**	Society (Société)	Mutual (Réciproque)	Sustainable (Durable)	Computer (Ordinateur)

We chose to name each class after the most representative word according to the Chi-square statistic, i.e., the first word in each column. Class 1 or "Bank" can be interpreted as depicting the traditional representation of the standard monetary system since we find large quantities of vocabulary depicting monetary creation, banks, currencies and their uses. This is not surprising since this class is the result of the representation of the standard monetary system by web sources related to non-bank currencies. Class 2 or "Crisis" can be viewed as referring to the recent financial and economic crisis, and contains many terms related to its causes and consequences. This result is especially interesting as it supports previous works that emphasize the countercyclical dimension of complementary currencies (Lietaer, 2012, 2013; Herlin, 2012, 2015). As such, non-bank currencies are clearly defined in our corpus as an alternative way to deal with the consequences of financial and economic crises. For instance, recent experiments, such as in Europe (e.g., France, Germany and Belgium) and Latin America (Argentina and Brazil), and older experiments like the Swiss's WIR during the Great Depression of the 1930's, show that surges in complementary currencies often arise in troubled financial and economic times during which people have less access to liquidity. Class 3 or "LETS" depicts Local Exchange and Trading systems (LETS) and barter clubs and refers to all currencies that represent ways of directly exchanging goods or services between people, without resorting to intermediaries, such as accorderies, LETS, or REN (Reciprocal Exchanges Networks). As a result, these organizations operate outside the traditional market system. Class 4 or "Local" can be interpreted as describing social money projects located in a specific territory and based on ethical and social values. These projects are distinct from the LETS category since they are used like traditional money on the market system (meaning they do not have price mechanisms such as timebanks). Finally, Class 5 or "Bitcoins" is clearly related to virtu-

al currencies, of which bitcoin is hands down the most well-known representative. In this class, the most recurrent vocabulary deals with references associated to virtual moneys.

Graph 2. Factor Component Analysis of the classified segments



Now, we need to go one step further and study which precise components drive the separation between these five estimated classes in order to derive classification criteria at the root of non-bank currency systems. To this end, we use a Factor Component Analysis (henceforth FCA), which enables us to interpret factors that gave rise to our DHC classification. Given that the first two factors are those that contribute most to our classification (together they account for 61% of the total variance in our data) and are also the most meaningful in terms of class division, we focus our interpretation on these two factors only. In order to get better insight on the distribution of our five estimated classes according to Factors 1 and 2, as well as their respective distance to these factors, Graph 2 shows Factor 1's values on the horizontal axis and Factor 2's values on the vertical axis. Each class is depicted with a specific color, and words that belong to each class are located according to their respective coordinates in Factor 1 and 2.

Graph 2 clearly shows that Classes 1 "Bank" (in red, in the upper left) and 2 "Crisis" (in black, top center) are closely related to each other, whereas Classes 4 "Local" (in blue, upper right), 5 "Bitcoin" (in purple, lower left) and 3 "LETS" (in green, lower right) are opposed to Classes 1 and 2.

Classes 1 and 2 appear to be embedded in each other. This result seems logical since they correspond to the standard monetary system and the recent financial and economic crisis, respectively. As a result, local currencies stand out from the standard monetary system through Factor 1, but are linked together through Factor 2. Moreo-

ver, it is worthwhile to note that Class 2, which refers to the recent financial and economic crisis, reflects a link between standard moneys and social moneys. Indeed, since the perceived failure of the standard system in times of crises usually gives rise to a surge in social money systems, it seems relevant to see Class 2 located in between Classes 1 and 4, which are associated to the standard monetary system and local currencies, respectively. Class 3 (LETS) appears to be the most distant class from the standard monetary system, differentiating from it through both Factors 1 and 2. Finally, Class 5 (Bitcoin) and Class 4 (Local currencies) are the two next most opposing classes. Putting together these results, it is therefore possible to derive the meaning of the two factors behind our five estimated classes.

When we look at Graph 3, the implementation of the FCA shows that Classes 1 "Bank" and 2 "Crisis" with respect to Class 4 "Local", as well as Class 3 "LETS" compared to Class 5 "Bitcoin" are opposed to each other through Factor 1. As a result, Factor 1 enables us to distinguish local moneys from standard moneys, as well as bitcoin and other crypto-currencies from LETS and barter clubs. Therefore, Factor 1 could be interpreted as depicting the objectives and values of existing moneys, whether (i) profit-making and speculative (negative values of Factor 1), or (ii) social (positive values of Factor 1). On the other hand, Graph 3 also points out that Class 3 and Class 5, compared to Classes 1, 2 and 4, are opposed to each other through Factor 2. As a result, Factor 2 enables us to distinguish standard and local money from LETS and bitcoins and can be interpreted as a separation factor based on a more functional criterion, namely the anchoring to national or supranational moneys. Indeed, to our knowledge, the similarity between bitcoins and most of the LETS and barter club currencies is their independence with respect to national or supranational currencies. As a result, negative values of Factor 2 are related to independence from national or supranational currencies, i.e., monetary creation outside any anchoring to standard money, whereas positive values correspond to reliance on national or supranational currencies.

Consequently, by pooling results from the implementation of a DHC to our lexical corpus, we have endogenously derived two structural features of non-bank currency systems that enable us to classify most existing currency systems in a rather simple way. Table 2 below gives our resulting classification of non-bank currencies.

Table 2. Classification of non-bank currencies

		Goals/values	
		Profit/commercial value	Non profit/social value
Dependency	Dependent on standard currencies	National and supranational legal currencies	Complementary local currencies, citizens' currencies, social currencies
	Independent from standard currencies	Transaction currencies like bitcoin, crypto-currencies	LETS, barter clubs, accorderies, Reciprocal Exchange of Knowledge Networks

Table 2 allows us to make some interesting conclusions. First, local currencies seem to largely contest standard money values (speculation, concentration of wealth; see Blanc, 2013). Thus, it makes sense that these currencies are in opposition on this issue, while still linked to standard money, owing to their convertibility in national or supranational currencies and to their monitoring by monetary authorities. Furthermore, local currencies are completely in opposition to cryptocurrencies, not only with regard to their respective values, but also in terms of dependence with respect to standard moneys bitcoin being independent from the standard monetary system. However, we can see that virtual currencies share common goals associated with standard moneys such as profit seeking, speculation and wealth accumulation.

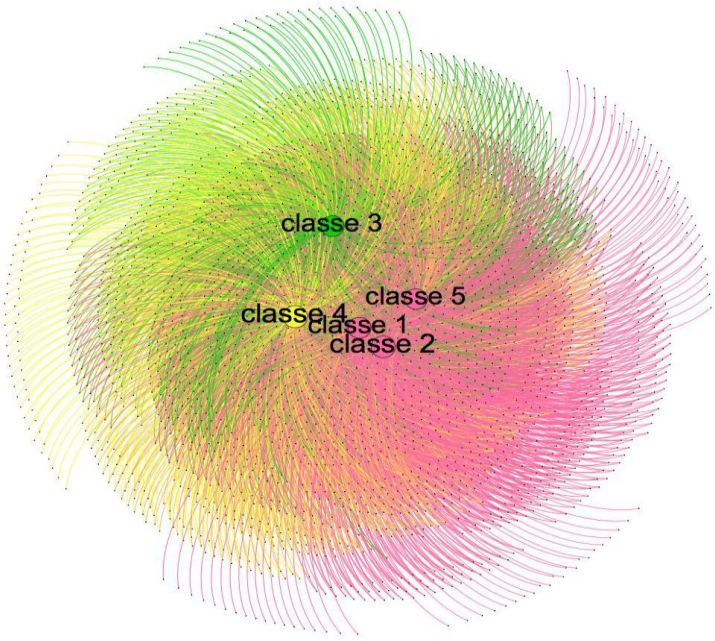
As we have already seen with Graph 2, LETS and barter clubs most strongly oppose standard monetary projects. They share with virtual currencies the feature of not being reliant on the standard monetary system. Nevertheless, LETS and barter clubs are distinct from cryptocurrencies in terms of their respective values, since barter clubs advocate social, mutual, ethical and environmental values, whereas cryptocurrencies do not.

Finally, one additional interesting feature of our results is that they strongly echo Blanc's (2013) complementary currencies classification. Indeed, like the author, we find the same partition between LETS and barter clubs on one side and local currencies on the other and surprisingly, according to the same criteria. However, contrary to Blanc (2013), our typology does not enable us to differentiate between public and profit-making moneys within the standard money class. This could stem from a lack of data regarding this class in our corpus as well as from the limitation of our methodology itself in finding more classification criteria in a given set of lexical data. Yet, our classification accounts for cryptocurrencies while Blanc's (2013) classification does not.

4. SIMILARITY ANALYSIS RESULTS

In this section, we go one step further and perform a similarity analysis in order to better understand the outlines associated to our five previously estimated classes, including their semantic similarities and discrepancies. To do this, we draw upon the lexicometrical literature dealing with the distance measurement between lexical fields from different documents.

Graph 3. Semantic community detection using similarity analysis



Graph 3 displays the results. First of all, we notice that the estimated relationships between classes show that Class 1 "Bank" is at the center of this graph, hence representing the center of gravity of the other classes. Furthermore, this statistical method allows us to identify three distinct lexical "continents". The first two continents related to Classes 3 "LETS" and 4 "Local" are mono-classes. However, Classes 1 "Bank", 2 "Crisis" and 5 "Bitcoin" belong to the same continent. We can therefore interpret results from our similarity analysis in the following way: (i) banking moneys are the center of gravity, the central semantic reference to non-bank currencies. This reference might therefore justify the denominations "complementary currencies" or "non-bank currencies", since these two terms rely on a similar reference norm: standard money; (ii) only LETS currency types appear not to be reliant on this reference to standard money, as they are farthest away from the center of the graph; (iii) "cryptocurrencies", "crisis" and "standard money" classes belong to the same semantic community and, therefore, potentially to the

same system of values and social representations. This result can also be interpreted as a semantic oppositional expression formulated by people's knowledge stemming from local or complementary currency projects. Indeed, currency systems define themselves in reaction to behaviors and values associated to the standard monetary system. In addition, we can further extend this remark to currencies related to Class 3.

5. CONCLUSION

This paper offers a new classification of non-bank currency systems based on a lexical analysis from French-language web data. Starting from the observation that it is often difficult to access exhaustive and factual data on complementary currencies, we attempt to circumvent this drawback by using lexical web data as a source. In light of the recent literature, the classification of existing complementary currencies clearly appears to be a thorny issue and has not yet succeeded in finding a clear-cut typology (see also Blanc, 2013). From our point of view, the existing classifications are very hard to compare because authors focus on different monetary objects or systems, favor some specific features of projects they believe more significant and representative and carry out their own subdivisions within each classification.

In order to avoid these pitfalls, we built a vast lexical corpus covering the largest possible set of these new monetary objects and then resorted to an endogenous classification method, enabling us to identify structural factors behind our lexical data. The corpus was created from 32 French-language keywords that referred to complementary currencies. We kept the first 10 URL results for each Google keyword search and then extracted their respective content. As a result, our corpus is made up of 320 webpages, corresponding to 1,210 text pages and 342,585 words or 17,939 segments of 20 successive words.

In the first step we ran a downward hierarchical clustering (DHC) on text segments. This algorithm recursively finds the best way to divide data into cohesive groups and derives the optimal number of monetary project classes. Next, the implementation of a Factor Component Analysis (FCA) allowed us to determine the latent factors behind the previously DHC estimated classes. This classification method enabled us to derive 5 consistent and significant classes from our lexical corpus: (i) standard currencies, (ii) the recent financial and economic crisis, (iii) local currencies, (iv) LETS and barter clubs and (v) cryptocurrencies. One clear advantage of this method is that it neither resorts to a priori hypotheses about factors driving the typology nor focuses on specific subsets of monetary projects. Indeed, by using a larger sample size of data related to complementary currencies, our methodology mitigates the issue of data-bias author preferences and leads to a more objective classification. However, even if there is a possible ideological bias in most sources that discuss complementary currencies, our methodology, by gathering many different sources dealing with this topic, offers a way to derive a more representative discourse on complementary currencies. Our results lead to a simple and clear classification of most existing current monetary forms and uncover two fundamentals sources of differentiation between them, namely: (i) dependence on or independence from national or supranational currencies and (ii) values and goals behind monetary projects. Finally, the implementation of a similarity analysis allowed us to better understand the outlines associated to our five estimated classes and their semantic similarities and discrepancies. Results derived from this method show that, except for LETS and barter clubs, all new monetary forms define themselves with respect to the standard monetary system. We believe that our results are a valuable contribution to the existing literature, in particular, because typologies are useful to appropriately evaluate CCS against their own and diverse targets, as underlined by Place and Bindewald (2015). Our results allow us to classify all CCS according to two very simple criteria and should lead to the development of only three different evaluation models. Moreover, since our results strongly echo theoretical classifications from Blanc (2013), our paper can be viewed, to a certain extent, as an empirical test of his non-bank currencies typology.

We acknowledge that this paper has focused only on French lexical data. Hence, one relevant extension of this work would be to apply the same approach and methodology to other languages, such as English, German and Spanish, so as to foster lexical comparisons between monetary projects according to their geographic origins and/or the language used to describe them.

Finally, we believe that this paper opens a new methodological field of research by showing the possibility of deriving relevant typologies from various economic or social phenomenons through the analysis of lexical data from the internet. Consequently, beyond our conclusions relative to non-bank currencies, we hope that this paper will contribute to the increased diffusion and use of textual statistics in economic and social studies.

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APPENDIX

Table 1. Final keywords used to extract web data

1. Complementary currency (Monnaie complémentaire)	9. Depreciating money (Monnaie fondante)	17. Cyber money (Cyber monnaie)	25. Monetary innovation (Innovation monétaire)
2. Regional currency (Monnaie régionale)	10. Unofficial money (Monnaie parallèle)	18. Global money (Monnaie mondiale)	26. Accorderie (Accorderie)
3. Local currency (Monnaie locale)	11. Alternative money (Monnaie alternative)	19. Time bank (Banque de temps)	27. Local Exchange System (Système d'échange local)
4. Complementary local currency (Monnaie locale complémentaire)	12. Fair money (Monnaie equitable)	20. Time money (Monnaie temps)	28. Proximity Exchange Systems (Systèmes d'échanges de proximité)
5. Community currency (Monnaie communautaire)	13. Ethical money (Monnaie éthique)	21. Cryptocurrency (Crypto-monnaie)	29. Universal Exchange Garden (Jardin d'échange universel)
6. Social currency (Monnaie sociale)	14. Electronic money (Monnaie électronique)	22. Local Exchange and Trading Systems (Systemes d'échanges locaux)	30. Barter system (Système de troc)
7. Solidarity currency (Monnaie solidaire)	15. Virtual money (Monnaie virtuelle)	23. Reciprocal Knowledge Exchange Networks (Réseaux d'échanges réciproques des savoirs)	31. Inter-firm compensation system (Système de compensations inter-entreprises)
8. Free money (Monnaie libre)	16. Digital money (Monnaie numérique)	24. Barter clubs (Clubs de trocs)	32. Supplementary currency (Monnaie supplémentaire)

Table 2. The 50 most recurrent terms in the lexical corpus with their respective frequency

1. Currency [4733] (Monnaie)	11. Value [702] (Valeur)	21. Euro [551] (Euro)	31. To use [426] (Utiliser)	41. Credit [339] (Crédit)
2. Exchange [1569] (Echange)	12. Network [679] (Réseau)	22. Barter [547] (Troc)	32. Electronic [419] (Eléctronique)	42. Exchange [329] (Echanger)
3. Local [1443] (Local)	13. To enable [650] (Permettre)	23. Project [526] (Project)	33. Association [398] (Association)	43. New [321] (Nouveau)
4. System [1314] (Système)	14. Bitcoin [650] (Bitcoin)	24. Firm [477] (Entreprise)	34. Big [391] (Grand)	44. Website [319] (Site)
5. Bank [885] (Banque)	15.Complementary [648] (Complémentaire)	25. France [471] (France)	35. Payment [385] (Paiement)	45. Member [319] (Membre)
6. Monetary [863] (Monétaire)	16. Article [617] (Article)	26. Money [466] (Argent)	36. Solidarity [383] (Solidaire)	46. Banknote [319] (Billet)
7. Service [820] (Service)	17. Time [604] (Temps)	27. To see [462] (Voir)	37. Transaction [365] (Transaction)	47. Activity [316] (Activité)
8. Social [792] (Service)	18. Economic [569] (Economic)	28. Account [439] (Compte)	38. Market [363] (Marché)	48. Society [315] (Société)
9. LETS [777] (SEL)	19. To create [568] (Créer)	29. Financial [438] (Financier)	39. Country [360] (Pays)	49. Example [315] (Exemple)
10. Economy [720] (Economie)	20. To put [554] (Mettre)	30. First [432] (Premier)	40. World [355] (Monde)	50. To offer [314] (Offrir)

ENDNOTES

[i] We did not translate the French word « violet » to « purple » because this term directly refers to a complementary currency used in the French town of Toulouse and is called « Sol Violette».

[ii] In the cryptocurrencies context, "mining" refers to the process by which computer calculation power is partly allocated to make virtual money transactions via computer easier and more secure. This service is paid for in virtual moneys.

[iii] REN stands for Reciprocal Exchanges Networks.

[iv] In this class context, a valorimeter can be viewed as a reference that assigns value to moneys.

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THE "COMMODITY – MONEY – COMMODITY" MUTUAL CREDIT COMPLEMENTARY CURRENCY SYSTEM

Marxian money to promote community trade and market economy

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ABSTRACT

The Mutual Credit Currency System, this most radical form of endogenous money, was evaluated and compared with Marx's Commodity-Money-Commodity requirement. A simple simulation of a small community closed loop economy was used to illustrate the functioning of two types of mutual credit currency systems. The first, dubbed MCSG, behaved according to the specifications and recommendations of the mutual credit currency system's founding fathers, Riegel and Greco. The second, dubbed the Komoko Monetary System, or abbreviated to KMS, was a sub-type of the mutual credit currency system with some additional restrictions and one additional liberty. The main restriction introduced in the KMS was that it almost exclusively supported the exchange of only newly produced goods and services. The liberty introduced is forecast-based credit allocation. It was shown that the MCSG has an inconsistency that could potentially lead to instability. The restrictions applied within the KMS can provide a remedy for this potential flaw, while at the same time rendering the KMS compliant with Marx's requirement. The monetary control measures applicable in KMS were discussed, which guarantee robustness and stability and make KMS a true complement to the official fractional reserve banking.

KEYWORDS

Mutual credit system , Commodity – money – commodity, Cash flow forecast, Currency circuit, Monetary control, Endogenous money

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1. INTRODUCTION

The financial crisis of 2008 once again popularised Marx's critique of capitalism and his prophesy of its impending doom. Can the present day free-market economy, in spite of Marx's inimical attitude to capitalism, draw any positive lessons out of his works? In his Capital Volume I, Marx stated that the very precondition for exploitation lies in the capability of capitalists to conduct business in a perverted way. Instead of exchanging goods for money to produce new goods (Commodity-Money-Commodity or C-M-C), businesses are run so as to exchange money for goods in order to earn more money (Money-Commodity-Money or M-C-M) . In his Capital Marx introduces the two ways of the money circle i.e. C-M-C and M-C-M but he doesn't elaborate on this division. There are no further references to these money circles in Marx's works. Most likely Marx thought that the deplorable M-C-M money circle would, in any case, be eradicated in the communist paradise. Nevertheless, it will be shown in this paper that reference to the C-M-C money circle has inherent value. Other Marxian ideas are ignored.

According to DeMeulenaere (2008) mutual credit currency systems (MCS) ranked third and LETS systems ranked second globally among the complementary currency systems. While the former are nominated in monetary units, LETS are nominated in hours of labour. MCS and LETS systems feature mutual i.e. dispersed issuance of currency pertaining to all members and thus both systems can be classified as of mutual credit type. Mutual credit type systems differ from the existing official fractional reserve banking (FRB) in that FRB features concentrated money issuance authorities embodied in central and commercial banks. In FRB, however, there is one exception to this rule, that is overdrafts. In the UK, for instance, in 2012 around 8% of bank money supply needed by businesses was created from overdraft facilities, which, in essence, is identical to mutual credit dispersed issuance of money. The basic tenets of MCS were laid down by Riegel (1949, 1978) and further developed by Greco (2001, 2009, 2013). MCS, by design, is endogenous money as there is no central money issuing authority. All money is created by the economic agents drawing down on their overdraft facility according to the needs of their trade, or, as Riegel (1949) puts it:

Each person or corporation is entitled to create as much money, by buying, as he or it is able to redeem by selling.

It is arguable to which extent the contemporary FRB currencies can be considered endogenous money taking into account recent exogenous shocks such as quantitative easing. However, there is one much more pronounced difference between FRB and MCS. MCS is community money never intended to support speculation, whereas FRB's monetary authorities are doing whatever they can to satisfy and balance the needs of productive and speculative economic agents simultaneously and continuously.

Can the mutual credit system (MCS), if implemented consistently with its basic tenets, fulfil the rather rigorous Marxian C-M-C requirement, seemingly incompatible with the free-market economy, and does this fulfilment have anything in common with MCS's successful growth and stability? A special implementation of MCS called 'komoko' for short, and phonetically 'Commodity-Money–Commodity' and written in its longer form as the Komoko Monetary System (KMS) will be explained. In contrast to MCSG, KMS leaves not just the issuance of currency to businesses, but, based on their own forecasts, also the authority to allocate the overdraft limits. It will be shown that KMS is compliant with Marx's requirement and that this compliance has potential beyond just improving the performance of the existing mutual credit currency systems. KMS only, and not an arbitrary implementation of MCS, can in fact successfully complement, in the true mathematical meaning of this word, the fractional reserve banking (FRB) monetary system as intended by the founding communities in the support of its basic goals (DeMeulenaere, 2008). It will be shown that the 'complementary' must pertain in as much as possible to the exchange of newly created goods and services in contrast to the exchange of old durable and capital goods.

Neither Riegel nor Greco dealt with MCS monetary control in particular. This paper introduces a novel monetary control measure called overdraft limit offset (OLO) applicable to MCS.

The approach is theoretical, but its purpose is to provide a set of practical guidelines to improve the performance and the success of the existing MCS and to encourage their broader adoption by the interested communities. The

discussion presented in this paper is based on a simple simulation which is not included fully in the journal issue for the sake of clarity. Simulation can be provided to interested parties by the author.

List of novel abbreviations used:

KMS - komoko monetary system

MCSG - mutual credit monetary system which allocates overdraft limits according to the specifications and recommendations of the mutual credit currency system's founding fathers, Riegel and Greco

MCS - mutual credit monetary system (generic term which covers KMS and MCSG)

KMK - komoko currency

OLO - overdraft limit offset

2. MODEL AND SIMULATION

The features of KMS were tested and compared to MCSG using a simple simulation consisting of six scenarios, all using the economy of a fictional self-sufficient Midwestern town as its subject. Excel was used as the simulation tool and the results of the first scenario can be seen in the ledger table S1E1 shown in Appendix A. The relevant economic entities are: the people, the merchant, sector I+II, sector III, the town and a carpenter. The people column stands for the population of the town and its neighbourhood, consisting of farm workers, industry workers, services workers, public servants and owners of businesses. Agriculture (farming and cattle breeding) and mining are considered as sector I. Industry is considered as sector II. Sector I and sector II are grouped together as there is no difference between the two with respect to the money use in the presented examples. The services sector is displayed as sector III. The carpenter, who could be qualified as sector II or sector III, depending on what kind of project he/she is working on, is displayed separately to expose some special features of KMS. The merchant is considered separately from the previous three sectors. The public sector is displayed simply as "town". The ledger table shows transaction and balance data for the respective accounts. Both the carpenter's and the merchant's accounts displayed are their business accounts, their private accounts are aggregated in the people's account. The period of interest covers those economic events taking place within one month. The year used throughout all the examples is 2017.

The currency used is 'komoko' with the abbreviation KMK. The basic assumption is that simulations pertain to a scenario of zero growth and zero net capital formation. The premise of zero net capital formation is that all the goods created and services rendered in the economy are consumed within the same period and there is no additional accumulation of assets. Zero growth means that Gross Domestic Product (GDP) of the current period is the same as GDP of the previous period. Two thought experiments will be described in the following sub-sections which will explain how KMS can support zero, positive or negative growth and also zero, positive or negative net capital formation.

2.1 List of scenarios:

S1E1 KMS - operation of KMS in a monthly cycle clearing all accounts and destroying all money at month end

S1E1 MCSG - analogous operation of MCSG in a monthly cycle not being able to clear all accounts at month end

S2E1 KMS- operation of KMS where the carpenter does not clear his account at month end

S2E2 KMS - explains the lending and borrowing in KMS

S2E2 MCSG - analogous to S2E2 KMS

S2E3 MCSG - analogous to S2E2 KMS, continuation of S2E2 MCSG.

3. FORECAST-BASED CREDIT ALLOCATION

Riegel (1978) proposed that, as he called it, debit limits should be determined for businesses by the class of industry and gross sales, and for employees according to their salary. Greco (2013) agrees with Riegel and provides some empirical guidelines about how to calculate the value of the overdraft limit (also credit line or overdraft privilege or credit allocation). According to Greco, the overdraft limit should, in essence, equal 100 days of average daily sales and the daily sales figures should be retrieved from the records of past transactions. However, it will be shown in this sub-section that Greco's method of credit allocation provides no guarantee that his discretionary figures will actually match the needs of the community for exchange.

The approach taken by KMS with respect to credit allocation is quite different. KMS calculates the real need of the community for exchange and, based on that, assigns overdraft limits as close as possible to the target values. Too generous overdraft limits could lead to inflation, too stringent overdraft limits could lead to a period of depression. Riegel (1978) and Greco (2001) are of the opinion that it is better to distribute a bit too much of the credit allocations rather than too little. However, to know what is too little, one must know what is enough. The ideal, set by Riegel (1978), which MCS implementations could measure against, is stable exchange. This translates into money supply being in sync with the supply of goods, services and labour on the market by constant values. Every economic unit has to have on their account enough credits or enough unused overdraft limit to purchase its intended goods, services or labour at any time. How much is that? Greco proposes that a thorough analysis of the past transactions of the account holder should be conducted in order to discern the right amounts. I contend, that this may well be good for some accounts, under the assumption that sophisticated software analysis tools are at hand. But why steer the system by looking back on past data when the events ahead of us could be anticipated in the first place? Account holders may have various spending and earning patterns. It is true that the most frequent pattern is that of earning and spending of employees. They spend minor amounts every day and they earn once a month. Businesses have distinctive earning and spending patterns. Each industry has its own specifics. Farmers usually earn only once or twice a year when they sell their crops. They spend on a daily basis for their living expenses and spend seasonally on seeds, fertiliser and so on. The patterns of income and expenditure for some businesses may appear unclear if observed as time series data by a computer programme, yet for businesses their respective earning and spending patterns should be quite predictable. The very core of running any business is to prepare a forecast of money (cash) flow. That information is sometimes requested even by ordinary banks from their credit applicants. Mutual credit currency systems are based in communities which should exercise a higher level of connectedness compared to the relationships in a society governed just by the rule of law. So, it is not overly ambitious for the KMS to request regular cash flow forecasts from those businesses who have less predictable earning and spending patterns. Every business should regularly submit its forecast as the building block of a KMS regulatory mechanism, whether they need an overdraft, a loan, or are just part of the exchange. Every forecast, if made properly, should have the timeline of expected revenues and expenses. As such, it should yield enough data to calculate the necessary account's limit(s) in the forecasted period. In this manner, KMS will provide every economic agent with the funds necessary to participate in the production and exchange. More precisely, on a revolving basis KMS will finance working capital plus anticipated profits for businesses and salaries or other incomes for consumers. The forecasts do not need to be consolidated as this isn't necessary for the purpose of overdraft limit calculation and is also not possible in real life. For every account, the running balance is calculated based on the timeline of expected deposits and withdrawals in the forecast. Based on the running balance, the monthly and cumulative period overdraft limits are calculated.

In KMS there will be two types of forecasts. Simple forecasts will be done by the KMS itself for the account holders who agree and have predictable forecasts. It is expected that the majority of employees will fall into this category. The complex forecasts will be done by the businesses themselves. The forecasted period in the complex forecast must be equal, or longer than, the minimal period required by the KMS, and the closing balance of the forecast must be non-negative but not bigger than the opening balance. This requirement mandates the businesses to re-

veal their sales and business cycles. The business cycle of an account holder is the period in which its account balance is brought to zero. The sales cycle is the period between two major sales whereby not just the delivery of goods or services but also the related collection of revenue i.e. payment, is taken into consideration. If account holders anticipate excess funds in the forecasted period, they should forecast a transfer of their funds to some other account to comply with the requirement. This forecasted withdrawal could be a payout of dividends or some other KMS permitted investment or saving, such as a purchase of bonds or shares. This will promote the clearing of the credits. Analogously, if account holders anticipate lack of incomes out of sales in the forecasted period, they should forecast the requisite funding from other sources as they are supposed to do as part of running a business, however, this should be indicated in their forecasts. If the forecasted funding is named a KMS loan, then this would be considered as a loan application by the KMS. When the business outlook is bleak and the non-negative closing balance requirement can't realistically be fulfilled, then the business doesn't need working capital, it needs investment. The overdraft privilege isn't the right instrument to cover such needs, neither may this be a loan granted by the KMS bank based on the savings of the other account holders.

The issue with business forecasts is their credibility. Businesses might be tempted to make their forecasts more pessimistic with respect to time and more optimistic with respect to revenue as the mutual credit currency system will provide potentially as much working capital as they need. In other words, businesses will try to inflate the expected revenues, but at the same time they will try to predict them being shifted further in the future. The initial strategy of KMS to cope with this tendency is to anchor the forecasts. This anchor is based on past transactions. At the beginning of KMS operations the account holders are expected to provide some proof of past sales revenues and business outcomes. Tax returns and bank statements may suffice for small businesses and payslips may suffice for employees. Medium and large businesses should provide their P&L and balance sheet data. Those who can't provide verifiable data should not be granted a serious overdraft privilege. The history of transactions may be preventing the business from receiving more credit in the current period than previous period incomes and expenses allow. So, the anchor should be offset for sales patterns such as seasonality, steady long-term growth and similar. In addition, the anchor should be offset for the agreed upon economic outlooks by the community.

Schraven (2001) showed that community currency systems need not collapse under opportunistic behaviour. This means that with time, and with proper MCS design principles being implemented (Schraven, 2001), it can be expected that the level of trust among the community members will rise. The anchoring of forecasts should become less and less stringent. The forecasted growth rates which exceed the growth rates extrapolated from the past transactions (offset for the sales patterns), would be translated into the overdraft limits increases ever more.

When a business predicts growth, which demands an increase in working or fixed capital that exceeds the overdraft limit granted based on the anchored forecast, then the business should apply for a loan at a KMS bank or seek some other source. Not all loans applied for may be granted in the KMS, even when there are enough savings announced in the forecasts. So, not all forecasted savings may be balanced by the loans granted. The surplus of forecasted aggregate savings plus the surplus of the forecasted aggregate bond and share purchases and sales plus the forecasted aggregate net exchange of KMK are the forecasted aggregate net savings, a measure used in the KMS monetary control.

Throughout all simulations, the assumption is that the forecasted overdraft limits in KMS equal the actual overdraft limits. Thus, the overdraft limit of each account was calculated simply as the account's minimum balance in the whole period of simulation. In reality, discrepancies should be expected. How to deal with them will be explained in the monetary control sub-section. KMS limits are calculated so that the account holders are always liquid. Businesses never run out of working capital to cover the costs of labour and material. However, once in the period, every account is cleared.

The MCSG limits are set differently. According to Greco (2013), an absolute maximum line of credit, based on past experience, would be the volume of sales made within the system over about a three- month period, rounded up to 100 days. At the start-up phase of the MCSG, Greco proposes a much lower limit of up to 20 days of sales.

In any MCS, the buying potential of an account holder at the beginning of operations equals the overdraft limit. Once transactions are recorded the buying potential equals overdraft limit plus balance. The question is wouldn't

business and individual account holders be tempted to convert the excess buying potential into savings to earn some interest? In KMS the transactional accounts won't yield any gain through interest. The interest on the saving accounts will be regulated by the supply and demand, which means some positive interest gain is hypothetically possible. So, the idea of converting the excess buying potential into savings seems plausible. However, in KMS this isn't possible. The calculated buying potential of any account holder in KMS reaches zero at least once in its business cycle, because the overdraft limit of the account is calculated so. The excess part of the buying potential is, thus, never exploited.

The initial simulation S1E1 of KMS is set up so that at the end of the month no liabilities remain open, all the money is cancelled out. Theoretically, such an economy could have gone on perpetually using money and destroying it in a monthly cycle. This demonstrates the basic capability of KMS to comply with the Marxian requirement of a Commodity-Money-Commodity type of economy. In reality, this would probably never happen because different businesses have very different business cycles which overlap and some portion of the total money mass is always in the system. However, KMS is designed so that each business alone reaches a point where all its money is exchanged for goods or services and its balance is cleared of credits and debits once in its forecasted business cycle.

The comparable behaviour of MCSG in scenario S1E1 would probably be quite different. The overdraft limit of account holders, when calculated according to Greco as 20 days of sales, would yield enough buying potential for some account holders to carry on with their business undisturbed, whereas it would leave some other account holders without enough credits to conduct their business, which, as a consequence, would surely impact exchange within the community. In scenario S1E1, the carpenter's buying potential at some point during the month is calculated at - 47.58 KMK, which is clearly impossible and just displays the inadequacy of 20 days of sales allocation principle. The second, more generous principle of MCSG, which assigns an overdraft limit equal to 100 days of sales to the account holders, does not leave any of the businesses in this scenario to conduct their daily business without necessary funding. However, it does lead to a different problem. In scenario S1E1 the buying potential of the carpenter is positive throughout the whole period with a minimum surplus of 662.10 KMK.

The surplus means that in MCSG, in addition to buying all the goods produced and services rendered in the period, some businesses can exploit the leftover and create money either by crediting so-called saving accounts or by directly investing into old durable and capital goods.

In scenario S1E1 MCSG, the working of MCSG is simulated with the overdraft limits set to their maximum, according to Greco, at 100 days of average daily sales. In this scenario, the smart merchant exploits its excess overdraft limit and buys a used car for 300 KMK. Now, this sum of 300 KMK lingers in the system. When overdraft limits are based on sales turnover and credits can be spent on old durable and capital goods, then MCSG can never be cleared or can be cleared only after reducing the overdraft limits to a level which causes a shortage of funds for some account holders and thus leads to a downward spiral. Hence, the arbitrary implementation of MCS does not comply with the Marxian C-M-C requirement. At the same time, under the assumption that the overdraft limits in MCSG are granted generously so as not to cause a shortage of funds, a situation ensues which can run out of control. Even if the only goods in the MCSG economy would be the newly produced goods and services, the surplus money supply of the account holders may drive prices up. For instance, the businesses may be interested in purchasing more materials than usual to make their production more flexible. This alone requires corrective measures. Greco recommends careful monitoring of the accounts. Neither Riegel, nor Greco provide any systemic solution to the problem of stability due to excess overdraft limits. When the MCSG economy isn't restricted to the exchange of newly produced goods and services, then the possible discrepancies between money demand and money supply are even more pronounced, and a question arises if any monetary control is good enough to cope with that.

4. SEPARATION OF EXCHANGE CIRCUITS AND CURRENCIES

Productive economy is, for the purpose of this paper, defined as an economy which exchanges newly produced goods and services and doesn't deal with the exchange of old durable and capital goods. It will be proven that any MCS, KMS inclusive, can successfully support the productive economy only and can offer very limited support, if any, to the exchange of old durable and capital goods. Keynes (1930) recommended various monetary policies to a Currency Authority contingent upon the needs of what he called Industrial circulation and Financial circulation

respectively. His division of currency circulation between Industrial circulation and Financial circulation coincides fairly closely with the division of exchange between the exchange of new goods and services and old capital and durable goods as used in this paper. The most quoted purposes for implementing a complementary currency system (DeMeulenaere, 2008) are the following: Community Development, Micro and Small Enterprise Development, Activating the Local Marketplace and Social Integration. One could easily imagine that founding a social business running a local version of the flea market using an alternative currency as the means of exchange is the perfect fulfilment of the alternative currency's mission. Furthermore, it is out of the question that any institution, organisation, movement, or even individual, truly devoted to the founding and development of complementary currency systems would think of using an alternative currency for speculative purposes such as trading shares, derivatives or other securities. Yet, the innocent local flea market and the highly speculative stock market or foreign exchange market, where most of the speculations take place, all have something in common which puts them in opposition to the common food marketplace. They all trade old goods in the sense that the substance which carries the value has, as such, already been purchased.

Let's suppose that a KMS account holder would exploit his/her buying potential and purchase an old puppet for 20 KMK in the local flea market instead of buying the usual meal in a nearby restaurant. Next, the hungry stall tenant would run into the restaurant and spend this 20 KMK to buy himself a meal. No harm would be done to KMS operations or market prices or the economy as a whole. The hungry stall tenant would step in place of the original buyer in the restaurant. This is possible because the velocity of money in the exchange of old goods is very high if the sums are small in comparison to the sales cycle of the individual economic unit. This means that no saving (hoarding) was necessary. If, however, the value of the old goods needed to be exchanged implies saving, then in KMS, or any other MCS, it gets more complicated. Hoarding means that the usual new goods or services aren't purchased and there is nobody to step in place of the buyer because the credits are still being hoarded for the sake of the purchase of the old goods. In reality, the velocity of money in the exchange of old durable goods isn't quite as extreme as described in the above flea market example. Buying and selling old durable goods, even when the values are small, still takes some time. The velocity of money in the exchange of old capital goods, securities in particular, is, however, quite high due to stock exchange transactions. Nevertheless, every flow of money needs some volume, even when the velocity is very high. In any monetary system, the flow of money that is dedicated to the exchange of old goods thus requires its own money mass, which must exist and flow through the economy in addition to the money mass necessary to exchange new goods and services. However, creating and infusing money mass into an economy for the exchange of old durable and capital goods represents an insurmountable challenge for any MCS.

One of the basic tenets of the MCS which differentiates it from the existing FRB is the nature of sureties required from the community members or loan applicants respectively. According to Riegel or Greco, in MCSG the credit allocation should be in proportion to the sales turnover, in contrast to FRB where loans are primarily granted in proportion to the value of assets. At first glance, it doesn't seem that the credit allocation policy would have any influence on the status of goods, either old or new, that can be exchanged for the respective currency. This should be no surprise in the case of the FRB policy, which in general does not discriminate on the type of assets either old or new when granting a loan, whether as collateral (i.e. a surety) or as the subject of the purchase. It is more complicated, however, in the case of MCSG. There is no explicit statement anywhere in the literature (Greco, Riegel), but it can be discerned that the sales turnover as the main criteria of the MCSG credit allocation policy pertains to the regular incomes, either salaries or revenues, of an account holder. Having an old house and wanting to sell it, or just being in a need of some money, shouldn't be grounds for credit allocation equivalent to the value of the house, or should it? Let's first analyse the more plausible interpretation, which is not to allocate the credit. How should the house then be sold? Where should the money come from? It is very unlikely that such a purchase could be financed from the transactional account. It could possibly be financed with a loan stemming from a so-called capital account (Greco, 2001). The capital account is supposed to finance the purchase of goods that hold value. Account holders who want to save would invest their credits and the account holders who want to purchase something valuable will get a loan out of this facility.

The following scenarios were simulated to explain the working of KMS and the inconsistency in MCSG reasoning:

- S2E1 simulates a situation in which the liabilities aren't cleared out at the end of the period (month) when the carpenter ends up with 275 KMK negative balance. People and sector I, II and III businesses have positive balances, but these balances can be named savings only in monetary terms. Economically these savings are balanced out by the depreciation of capital assets, but this isn't a monetary issue and thus isn't reflected in the transactions. All the simulations show only the monetary flows and balances, as this suffices to illustrate the hypothesis. Thus, a thought experiment can be performed which assumes that monthly depreciation of a community's assets is smaller or greater than 275 KMK and, consequently, the economy exhibits positive (or negative) net capital formation respectively. Yet, the underlying spreadsheet remains the same. This explains how KMS can also support net capital formation. Another thought experiment can be performed which assumes that the forecasted and actual overdraft limits were 5% lower in the previous period. Since KMS is designed to periodically clear accounts, the beginning of a period has no record of the past and thus a 5% increase of overdraft limits should lead to a 5% GDP growth, provided that forecasts are credible and the elasticity of supply can cope. Yet, the underlying spreadsheet remains the same. This explains how KMS can also support a growing (or declining) economy. In reality, the growth rates of different account holders will differ and the transactions among them will not change proportionally when compared to the previous year. Finding new ways to clear their accounts will remain the responsibility of each economic unit, much as it is their responsibility to remain solvent in any free market economy. The actual growth will then reflect their average success in doing that. How KMS deals with residual balances will be explained in the monetary control sub-section. In this scenario the carpenter has an established business and he builds one new house every year. According to the accepted policy coded in KMS, the carpenter is assigned an overdraft limit of 275 KMK per month and cumulatively 3300 KMK for one year.

- S2E2 interprets the lending and borrowing mechanism of KMS. After a year of construction, the house has been completed and is ready for sale according to the carpenter's forecasts. To make the example simpler, the house's market value is supposed to equal the costs incurred during the construction, plus VAT, and that amounted to 3960 KMK. However, now the carpenter faces a problem. No single entity in the economy has enough money to purchase the house. The only possibility for the house to be properly sold and paid for is by a loan. In the scenario the credit balances from people, sector I+II and sector III, were transformed into savings. Based on these savings, the bank was able to grant two loans. The new house was bought in two pieces. The second floor of the house was bought by a family which borrows 1440 KMK from the bank. The ground floor of the house was bought by a business which borrows 2520 KMK from the bank. After that purchase, no money exists in the system. From the perspective of risk taking, KMK loans correspond to credit union loans in FRB. The basic assumption of KMS loans is that a community of members exist who know, trust and care for each other enough, so that eventual individual losses from defaults would be consciously carried by other members of the community. KMS loans cannot maintain maturity transformation for saving deposits as usual in FRB. Maturity transformation means that loans issued would have longer maturity than the savings which supply them. The maturity of KMS deposits must correspond to the maturity of loans issued as their counterpart. The KMS bank would maintain an exchange facility where saving deposits could be exchanged for sight deposits at certain discount when the owners of the saving deposits would need money. The rate of discount would be dictated by the supply and demand of new investors versus sellers of saving deposits respectively. For individuals and businesses with enough fixed capital, there would be the possibility of borrowing from FRB banks under the usual terms. It is supposed that such FRB loans, if used to purchase new goods, would immediately be exchanged for the komoko currency. Inversely, individuals and businesses could make their savings within FRB, or an equivalent system, by exchanging the komoko currency for the official FRB currency. It is expected that individuals and businesses would choose the currency of their savings according to their expected expenses in the future.

- Two additional simulations S2E2 MCSG and S2E3 MCSG were performed which simulate the behaviour of MCSG implementation to compare it with the analogous S2E2 KMS implementation.

It can be concluded from S2E2 MCSG and S2E3 MCSG that MCSG empowers economic units to exploit the overdraft limits which exceed their need for working capital several times. MCSG can indeed support the exchange of

old durable and capital goods, at least to some degree, however, two questions arise. Why should economic units exploit their overdraft limits beyond their need for working capital, and by doing that can they act in any way better than the existing FRB bankers? Since there is no clear guideline in Greco (2009,2013) whether this is possible or not, both options must be discussed. If it is not possible or profitable for economic units to exploit their overdraft limits beyond their need for working capital, then MCSG fails to supply the additional currency needed, even to support the businesses which have inventory turnover cycles of longer than a quarter, for example, construction. This means that MCSG is even less able to supply the additional currency needed to support the exchange of old durable and capital goods. If it is possible, however, for economic units to exploit their overdraft limits beyond their need for working capital, then the businesses with positive money flow, or inventory turnover cycles of shorter than a quarter, must finance the businesses with longer than a quarter inventory turnover cycles via savings and lending. In the same way, the exchange of old durable and capital goods might be financed partially, or in whole, depending on the volume of exchange and the capacity of the MCSG limits. The only reason why the businesses would do this is interest. There are two differences between such versions of MCS and FRB. The first difference is that large businesses would step in place of bankers, but the deplorable nature of their incomes, stemming from the interest for fiat money, wouldn't change at all. The second difference is the risk of default, which is at least theoretically taken by the FRB banks, isn't taken by the issuers of money in MCS, but is instead taken by the MCS itself (via loan committee, Greco 2001). This would be a situation even worse than FRB.

The other option is that MCSG also allocates credit based purely on the value of old capital and durable goods. However, again, what then is the benefit of MCSG? It is also this feature of FRB, to create money based on the asset value only, which is the target of criticism of MCS's founding fathers and the cause of many of FRB's flaws and instability. So, in fact, any MCS, according to its basic tenets, cannot support the whole exchange taking place in an economy. It can only support the exchange of newly created goods and services. However, this is no disadvantage. Quite the opposite, this is the solution. The exchange of newly produced goods and services is a matter of the life and death of society as they must all be exchanged for money. Nevertheless, old capital goods don't need to be purchased at all as they can serve a purpose. For example, they can be rented out. The last financial crisis reminded us once again that there is a lot of speculation involved in the exchange of capital goods and that this market is exposed to huge price fluctuations and consequently to defaults. It would be very desirable if these disturbances could be contained within the sphere of speculation and the real productive economy could be somehow isolated from that. That is exactly what KMS can offer.

Keynes (1930) identified possible situations on the market which could lead to conflicting monetary control measures with respect to promoting Industrial or Financial circulation. Further, when dealing with the contemporary situation in the UK, Keynes (1930) writes (Book 5, p.14): "... nevertheless any change is desirable which would make it easier for the Central Bank to consider and deal separately with the Industrial and Financial Circulation."

The feature of KMS which more than fulfils this proposition by Keynes is a total separation of exchange circles by implementing two currencies, one for each of the exchange circles respectively. Let FRB, or some other currency, deal with the exchange of old capital and durable goods and let the KMS take over the support of the productive economy. Both exchange circles should be separated and connected at the same time by the floating exchange rate of their respective currencies.

For the separation to be effective, KMS when compared to MCSG introduces the following restrictions:

1. Limited trading with old durable and capital goods

    a. KMS banks will not grant loans to businesses for the purchase of old goods
    b. No overdrafts will be granted based on the value of assets only.
    c. Assets, if not bought as new goods and own shares when purchased for komoko, are the property of KMS. This includes all purchases of securities. There are only two exceptions to this rule. One is the acquisition of bonds from non-financial businesses. The other is the acquisition of new shares issued by non-financial businesses if the new shares raise the capital of the issuer. To this end, businesses are mandated to report on the value and composition of their non-current assets, equity and shares. Thus, the KMS community has the possibility to control the composition of a

business's own shares and the origin of its assets. Neither the former nor the latter, when not acquired new, dare to be purchased for komoko.

d. Aging of deposits and, following a grace period, progressive demurrage (=negative interest) for deposits on non-business accounts. When transactions are made between individuals, the deposits won't be rejuvenated.

e. If there is a business which is adding value to old goods, then only the added value of labour, raw materials and related margin, should enter into the KMS forecast. Consequently, sales turnover and credit allocation will reflect just the added new value. When these goods are sold on the market, the accounting must separately record the added new value in KMK and the purchase value of old goods in the original FRB currency. The transaction must be split and performed separately in each currency.

2. Businesses are mandated to provide forecasts.

3. Anything produced within the KMS system, meaning using a KMS overdraft or using a KMS loan, must be sold for komoko. This should be the contractual obligation of any account holder. The goods produced are the property of KMS until redeemed by the komoko currency. If an account holder produces goods within the KMS system without using an overdraft or loan, then he/she is also free to sell for some other currency.

4. Monthly overdraft limits for businesses that have longer sales cycles should be applied in addition to the cumulative overdraft limit based on the forecasted working capital requirement.

5. To assure C-M-C compliance, restrictions on KMS saving and lending such as:

   a. No transfer of funds via KMS saving and lending between the household and business sectors.
   b. Short term saving and lending within the business sector upon approval only to prevent bogus clearing of accounts.
   c. The forecasted payments of KMS loans and bonds should not exceed the forecasted profits for any business.

Keynes (1930) writes that attempts were made both in Great Britain and the United States to discriminate in terms of lending between financial and industrial borrowers, though with dubious success. However, there is much more potential in the total separation of the exchange circles than just easier and less conflicting monetary control measured quantitatively in terms of effort and costs expected from the Central Bank. The separation of the industrial and financial circulation by two currencies introduces not one, but three stabilising elements into the economy. As previously mentioned dealing with separate currencies for industrial and financial circulation reduces the complexity of monetary control and dispenses with the conflicting effects of monetary control measures upon one or the other exchange circle. Secondly, KMS, by design, does not permit the level of indebtedness usual in FRB. This is because KMS does not create new money when providing loans (not to be confused with overdrafts) in support of purchasing new goods and services, and, hence, does not create excess liquid assets which could be transformed into additional loans. Finally, KMS, by design, is a regulatory mechanism which, in itself, is much more rigorous than the Financial Conduct Authority (FCA) and the Prudential Regulation Authority (PRA), or its USA counterpart the Securities and Exchange Commission (SEC). In addition to bonds issued by the industrial sector, KMS supports one-time trading with one type of securities only i.e. new issued stock. The US Financial Crisis Inquiry Commission (FCIC 2011) contended that the main causes of the recent Great Recession can be attributed, apart from the issues of accountability and ethics, to inadequate control by the Federal Reserve, excess indebtedness of households and lack of regulation.

5. MONETARY CONTROL

KMS maintains the balance between money supply and money demand by design. KMS is a forward looking and bottom up monetary system, in sharp contrast to FRB, which is reactive and top down using statistical feedback. In KMS, the forecasts contain future sales (incomes) and purchases (expenses) which is the demand and the supply of money, balanced as predicted by the businesses. The other feature of KMS is that it deals almost exclusively

with a productive economy which has a very stable output and hence a very stable money demand. This makes KMS, for an order of magnitude, more stable than FRB. As such, KMS should only need minor adjustments while in operation. There are three main causes of instability which are targeted by monetary control measures in KMS. One is hoarding, i.e. saving on transactional accounts, for later use. The second is the lack of money supply due to the discrepancies between the forecast-based overdraft limits and actual data of the businesses. The third is the forecasted aggregate net savings.

The basic mechanism of control in any monetary system is interest. Complementary monetary systems, in contrast to FRB, in practice also apply negative interest (demurrage). KMS features one additional measure of monetary control. This measure is overdraft limit offset (OLO) which is an offset to the initially calculated overdraft limits. Overdraft limits can be changed, combined, or for the consumer and business sphere, separated. Usually OLO will be a proportional rise and sometimes to a lesser degree, it will be a reduction of the calculated overdraft limits. OLO can compensate for all three causes of instability. The basic purpose of this measure is to increase the money mass by raising all overdraft limits when there is a shortage or when the velocity of money falls. The latter is usually due to hoarding. The former is due to the other two causes of instability i.e. discrepancies of forecasts and forecasted aggregate net savings. These two causes can only be compensated by the proportional rise of overdraft limits. The goal is to keep the money flow at the target level. The money flow equals the exchange. Once risen above the forecasted levels, when the money flow and prices dictate so, the overdraft limits can be proportionally lowered in the next monetary control period, but probably never below the forecasted levels. The monetary control period most likely can't be shorter than a month, but it can be longer. OLO changes the periodical C-M-C account clearing requirement which is thus shifted from zero balance to the value of account's limit offset.

There are many possible reasons for hoarding. Keynes (1936) identifies three main motives for what he calls liquidity preference. These are transactions-motive, precautionary-motive and speculative-motive. While the money mass demand spawned by the first two motives do not vary much as they depend on general economic activity, according to Keynes (1936) it is the speculative-motive which causes changing money demand sensitive to the varying proportions between interest rates of bank money, bonds and shares of different maturity. From a KMS perspective, the transactions-motive can be satisfied by the overdraft facility. The speculative-motive does not need to be satisfied by KMS at all, as KMS does not support speculations. Individuals and businesses that are apt to speculate can do this as usual in FRB with the official currency under the authority of SEC and other known institutions.

The satisfaction of the precautionary-motive in KMS however, requires a bit more explanation. When the aggregate hording of cash and demand deposits of individuals tends to be neutral i.e. close to zero, then the precautionary-motive can be satisfied in KMS by an adequate OLO for all individuals. When the aggregate hording of cash and demand deposits of individuals tends to be positive, meaning that on the average individuals prefer to hoard credits instead of being in debt, then the precautionary-motive can be satisfied in KMS by positive OLO for businesses. Businesses are more rational. When provided with cheap loans, they can increase inventories and thus render their production more flexible and responsive.

So, even in KMS, no demurrage or other policy can totally eradicate hoarding induced by the precautionary motive. Hoarding can only be, and must be, compensated for by an increase of money mass. The recent popular quantitative easing is FRB's way of increasing the money mass. Luckily, KMS has a much more direct possibility of infusing money into an economy. The raise must be done as an offset to the anchored forecast-based overdraft limit in proportion to the sales turnover of the business unit, not in proportion to the assigned overdraft limit. Thus, the businesses with forecasted permanent positive balance will also be granted an overdraft to compensate for the effects of hoarding or mistakes in forecasts. To make KMS more robust, a certain positive OLO must be introduced at the beginning of KMS operations.

6. CONCLUSION

Pondering the repercussions of its present day control measures such as quantitative easing and close to zero interest rates, combined with the questionable ethics of those in charge of money issue, the existing FRB monetary system offers little confidence that it will suit the needs of communities any better than it has done so far. In such a situation one would expect Complementary and Community Currency Systems (CCS) to flourish, yet, I quote

Gomez (2015): "...the failure of CCS to scale up remains unexplained, quite like the question on whether they should scale-up, to what extent and on what grounds."

This paper answers the above question. Komoko introduces a borderline between the economy of used goods and the economy of new goods and services to which CCS should scale-up.

In a broader perspective, the progressive demurrage for deposits on non-business accounts, and the obligation to balance the accounts once in their business cycle for businesses in KMS, combined with OLO, should generate constant demand for new goods and services even in situations that provoke thrift, which together should render Keynesian type state intervention redundant and thus support the much valued autonomy of CCS when scaling-up to their full potential.

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APPENDIX

Table S1E1:

No		date	people		merchant		I+II sector		III sector		town		carpenter		people	merch.	I+II sec.	III sec.	town	carpent.	agg.	agg.
			D	C	D	C	D	C	D	C	D	C	D	C	balance	balance	balance	balance	balance	balance	debit	credit
0	opening balance	1. 1. 2017													0,00	0,00	0,00	0,00	0,00	0,00	0	0
1	weekly shopping	3. 1. 2017	90,00			90,00									-90,00	90,00	0,00	0,00	0,00	0,00	-90	90
2	weekly services	3. 1. 2017	90,00							90,00					-180,00	90,00	0,00	90,00	0,00	0,00	-180	180
3	shopping carpenter	3. 1. 2017				10,00							10,00		-180,00	100,00	0,00	90,00	0,00	-10,00	-190	190
4	services carpenter	3. 1. 2017								10,00			10,00		-180,00	100,00	0,00	100,00	0,00	-20,00	-200	200
5	salary public serv.+social transfers	5. 1. 2017		403,32							403,32				223,32	100,00	0,00	100,00	-403,32	-20,00	-423	423
6	weekly shopping	10. 1. 2017	90,00			90,00									133,32	190,00	0,00	100,00	-403,32	-20,00	-423	423
7	weekly services	10. 1. 2017	90,00							90,00					43,32	190,00	0,00	190,00	-403,32	-20,00	-423	423
8	shopping carpenter	10. 1. 2017				10,00							10,00		43,32	200,00	0,00	190,00	-403,32	-30,00	-433	433
9	services carpenter	10. 1. 2017								10,00			10,00		43,32	200,00	0,00	200,00	-403,32	-40,00	-443	443
10	weekly shopping	17. 1. 2017	90,00			90,00									-46,68	290,00	0,00	200,00	-403,32	-40,00	-490	490
11	weekly services	17. 1. 2017	90,00							90,00					-136,68	290,00	0,00	290,00	-403,32	-40,00	-580	580
12	shopping carpenter	17. 1. 2017				10,00							10,00		-136,68	300,00	0,00	290,00	-403,32	-50,00	-590	590
13	services carpenter	17. 1. 2017								10,00			10,00		-136,68	300,00	0,00	300,00	-403,32	-60,00	-600	600
14	weekly shopping	24. 1. 2017	90,00			90,00									-226,68	390,00	0,00	300,00	-403,32	-60,00	-690	690
15	weekly services	24. 1. 2017	90,00							90,00					-316,68	390,00	0,00	390,00	-403,32	-60,00	-780	780
16	shopping carpenter	24. 1. 2017				10,00							10,00		-316,68	400,00	0,00	390,00	-403,32	-70,00	-790	790
17	services carpenter	24. 1. 2017								10,00			10,00		-316,68	400,00	0,00	400,00	-403,32	-80,00	-800	800
18	weekly shopping	31. 1. 2017	90,00			90,00									-406,68	490,00	0,00	400,00	-403,32	-80,00	-890	890
19	weekly services	31. 1. 2017	90,00							90,00					-496,68	490,00	0,00	490,00	-403,32	-80,00	-980	980
20	shopping carpenter	31. 1. 2017				10,00							10,00		-496,68	500,00	0,00	490,00	-403,32	-90,00	-990	990
21	services carpenter	31. 1. 2017								10,00			10,00		-496,68	500,00	0,00	500,00	-403,32	-100,00	-1000	1000
22	VAT I+II sector	31. 1. 2017			100,00							100,00			-496,68	400,00	0,00	500,00	-303,32	-100,00	-900	900
23	VAT III sector	31. 1. 2017							100,00			100,00			-496,68	400,00	0,00	400,00	-203,32	-100,00	-800	800
24	salary I+II sector	31. 1. 2017		246,08			246,08								-250,60	400,00	-246,08	400,00	-203,32	-100,00	-800	800
25	income tax advance I+II sec.	31. 1. 2017					61,52					61,52			-250,60	400,00	-307,60	400,00	-141,80	-100,00	-800	800
26	salary III sector	31. 1. 2017		253,60					153,60				100,00		3,00	400,00	-307,60	246,40	-141,80	-200,00	-649	649
27	income tax advance III.sec	31. 1. 2017							38,40			63,40	25,00		3,00	400,00	-307,60	208,00	-78,40	-225,00	-611	611
28	owners' income merchant	31. 1. 2017		50,00	50,00										53,00	350,00	-307,60	208,00	-78,40	-225,00	-611	611
29	company tax	31. 1. 2017			10,00							10,00			53,00	340,00	-307,60	208,00	-68,40	-225,00	-601	601
30	owners' income I+II sector	31. 1. 2017		17,00			17,00								70,00	340,00	-324,60	208,00	-68,40	-225,00	-618	618
31	company tax	31. 1. 2017					3,40					3,40			70,00	340,00	-328,00	208,00	-65,00	-225,00	-618	618
32	owners' income III sector	31. 1. 2017		50,00					50,00						120,00	340,00	-328,00	158,00	-65,00	-225,00	-618	618
33	company tax	31. 1. 2017							10,00			10,00			120,00	340,00	-328,00	148,00	-55,00	-225,00	-608	608
34	paying out the carpenter	31. 1. 2017	100,00				60,00		115,00					275	20,00	340,00	-388,00	33,00	-55,00	50,00	-443	443
35	VAT	31. 1. 2017	20,00				12,00		23,00			55,00			0,00	340,00	-400,00	10,00	0,00	50,00	-400	400
36	settlement supplies II->III	31. 1. 2017						10,00	10,00						0,00	340,00	-390,00	0,00	0,00	50,00	-390	390
37	settlement supplies II->carpenter	31. 1. 2017						50,00					50,00		0,00	340,00	-340,00	0,00	0,00	0,00	-340	340
38	settlement-replenish. of goods	31. 1. 2017			340,00			340,00							0,00	0,00	0,00	0,00	0,00	0,00	0	0