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ASSESSING LOCAL MUTUAL CREDIT AS A SOCIOECONOMIC TOOL FOR FARMERS IN NEW YORK STATE'S HUDSON VALLEY

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ABSTRACT

Thousands of local mutual credit networks and other complementary currency systems have been developed worldwide in the last several decades. Many of these systems strive to support local economic activities such as small-scale agriculture. Although mutual credit systems and similar schemes have had significant social and economic impacts under certain conditions, they often fail to meet participants' goals. Nevertheless, new mutual credit systems continue to emerge. This paper analyzes the complete transactional history of one such system—the Hudson Valley Current (HVC)—from March 1, 2014, to February 28, 2015. Building on existing community currency metrics, a transaction performance ratio is introduced to understand credit flow within the HVC. Network linkage densities are also calculated to gauge potential for social capital creation. While the HVC has not been used as a significant means of exchange for farmers, metrics indicate that the HVC is a generally viable source of mutual credit and social linkage creation for some participants, at least in the short-run. Continued application of these metrics by mutual credit administrators, combined with purposeful partnerships with local farmers, might allow any potential benefits of system participation to be maintained and extended to include local farmers in a significant way.

KEYWORDS

mutual credit, transaction performance ratio, farm(s)/farmer(s), Hudson Valley

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1. INTRODUCTION

The 21st century has seen a proliferation of community-based complementary currencies, often promoted as tools for strengthening local economies and supporting environmentally-oriented initiatives such as sustainable energy programs or community-oriented agriculture (Seyfang, 2006; Hess, 2012; Seyfang & Longhurst, 2013a; Joachain & Klopfert, 2014). This paper examines the viability of one complementary currency system in an agricultural area of New York State and develops a set of socioeconomic metrics for analyzing mutual credit systems in similar—and potentially a broad variety—of settings. Over 3,400 community-based complementary currency systems have been identified in 23 countries spanning six continents (Seyfang & Longhurst, 2013a). Yet, despite their widespread emergence, the success of complementary currencies has been mixed (Aldridge & Patterson, 2002; North, 2005; Stodder, 2009; Dittmer, 2013; Naqvi & Southgate, 2013; Seyfang & Longhurst, 2013a; Seyfang & Longhurst, 2013b). Nevertheless, new adaptations of community-based complementary currency systems continue to be developed throughout the United States and around the world (Seyfang & Longhurst, 2013a; Gilbert, 2014).

Given the continued proliferation and persistence of community currency networks with broad environmental and socioeconomic sustainability goals, researchers and advocates have called for more robust analysis of such systems (Seyfang & Longhurst, 2013a; Place & Bindewald, 2013). The existence of a mutual credit network—the Hudson Valley Current— in an agricultural area of upstate New York provides an opportunity to analyze a community currency system using both social and economic metrics that gauge the functioning of a mutual credit network.

In Section 2, I provide a brief background on the issues facing Hudson Valley agriculture and introduce mutual credit networks and similar systems as potential tools to overcome the types of the challenges faced by Hudson Valley farmers. In Section 3, I build upon existing community currency assessment methods and apply metrics such as transaction performance ratios and network linkage density to gauge the health of the HVC mutual credit system and explore its actual and potential engagement with local farms. The results of these applied metrics are discussed. Based on the preceding discussion as well as participant observation, I draw conclusions in Section 4 regarding the viability of the Hudson Valley Current as a local exchange platform for area farmers.[i] Finally, I close by making recommendations regarding future research and civil society engagement in mutual credit networks and similar systems.

2. BACKGROUND: AGRICULTURE IN NEW YORK STATE'S HUDSON VALLEY AND THE POTENTIAL OF MUTUAL CREDIT SYSTEMS

2.1 Problems Facing Hudson Valley Farmers and a Potential Solution

Agriculture is a long-established component of the economic, cultural, and land use fabric of New York State's Hudson Valley region.[ii] Nevertheless, although the Hudson Valley's approximately 4,100 farms together generate over $430 million in annual revenue, only around one third reported profits in the most recent agricultural census (USDA, 2014). A lack of access to local processing, distribution, and marketing services has been cited as an underlying impediment to financial viability for Hudson Valley farms (Glynwood, 2010).

This situation is particularly difficult for smaller farms. Hudson Valley farmers operate within a national phenomenon of highly concentrated agricultural processing and retail markets characterized by high-volume production that can be sold at low cost to consumers and discourages cropping diversity (Reganold et al., 2011; Sexton, 2013; Bowman & Zilberman, 2013). Federal subsidies and insurance programs aimed at a few agricultural commodities exacerbate this trend (Reganold et al., 2011; Bowman & Zilberman, 2013). Scaling up production requires considerable initial capital and access to credit—in addition to potentially negative environmental impacts associated with increased synthetic inputs (Sexton, 2013; Bowman & Zilberman, 2013). Given these factors, many smaller farms seek alternative markets as a strategy for socioeconomic sustainability (Schmit & Gomez, 2011). For example, community supported agriculture operations (CSAs) and other direct marketing strategies connect growers with consumers who may be willing to pay more for qualities such as freshness, local production, or use of organic practices (Low & Vogel, 2011; Schmit & Gomez, 2011; Bowman & Zilberman, 2013; Galt, 2013). CSAs also allow community members to purchase farm shares prior to the growing season in return for agricultural products throughout the year. It also allows farmers to partially overcome capital and biophysical constraints without debt-

based financing (Flora & Bregendahl, 2013). Many CSA farmers seek to benefit from the community bonds and social capital that can potentially be developed through direct interaction with consumers (Galt, 2013; Flora & Bregendahl, 2013).

Indeed, given the significant economic challenges facing smaller scale Hudson Valley farms, the number of CSAs and other direct market activities in the region increased during the first decade of the 21st century (Glynwood, 2010). And yet, although Hudson Valley farms appear generally well positioned to take advantage of various localized marketing strategies, economic sustainability remains unrealized for many farms (Glynwood, 2010; USDA, 2014).

Mutual credit networks present one potential solution to the problems described above. Complementary currency systems such as mutual credit networks have been promoted as tools that can facilitate access to local food markets while removing short-term cash constraints for system participants (Seyfang, 2006; Hess, 2012). If tools such as mutual credit systems can in fact be used to facilitate a range of exchanges while removing short-term cash constraints, this could prove beneficial for small to mid-sized farmers in regions such as the Hudson Valley.

In February 2014, a new mutual credit network called the Hudson Valley Current (HVC) began operation in the mid-Hudson Valley. The HVC describes itself as "a nonprofit in the Mid-Hudson Valley Area that helps match unmet needs with underutilized resources— a way for people in our community to exchange goods and services without US dollars (Hudson Valley Current, 2017). The HVC's stated values and interests include "a sustainable society… economic and social justice, the environment, community participation… and community self reliance" (Hudson Valley Current, 2017). During the first years of operation, HVC participants were almost exclusively small businesses or self-employed individuals. Although the HVC is directed toward local businesses in general, administrators have expressed particular interest in supporting local farmers through avenues such as organizing and participating in community forums on local food security. It is therefore salient to ask whether a local mutual credit system can indeed be a viable marketing and credit tool for farmers. The existence of a mutual credit system in an area with significant agricultural production provides an opportunity to explore this question.

2.2 Complementary Currency and Local Mutual Credit in Context

Complementary currencies are forms of money that users voluntarily agree to accept alongside a national or supranational currency such as the dollar or euro (Kennedy et al., 2012). Complementary currency systems have been initiated as tools for local economic development, as vehicles for community building and social capital creation, and as strategies to advance ideological goals such as localism and degrowth (Kennedy et al, 2012; North, 2005; Collom, 2011, Hess, 2012; Dittmer, 2013).[iii] The creation and use of these systems tends to increase during economic downturns—when the exchange of goods and services in an official currency contracts, complementary currencies provide an additional means of exchange (Stodder, 2009; Kennedy, Lietaer, & Rogers, 2012; Seyfang & Longhurst, 2013a; Naqvi & Southgate, 2013). One type of complementary currency is the mutual credit network. The HVC is an example. Mutual credit networks are associations in which members receive accounts that fluctuate based on the receipt or provision of goods and services. Transaction are typically conducted and monitored through an online software system (Seyfang & Longhurst, 2013a). Each time a transaction occurs in a mutual credit network, the purchaser's account is debited and the seller's account receives an equal and corresponding credit. Member accounts begin at "0.00" and members are typically allowed to spend even when their accounts are below "0.00." This allows exchange to occur even when faced with an immediate shortage of money. Debits do not bear interest and are reciprocated by selling goods and services to any other member for network credit. In this way, credits are backed by trust in participants' willingness and ability to reciprocate "debt" by providing goods or services. Debit limits reduce the risk of so-called free riders accruing large amount of debit without reciprocation (Schraven, 2001; Dittmer, 2013). As previously mentioned, mutual credit networks and similar systems have been promoted as tools to overcome short-term fiscal restraints in local food markets while also building social capital between producers and consumers (Seyfang, 2006; Hess, 2012). In this sense, local mutual credit systems could perform a role similar to CSAs, insomuch as both provide a community-based way to access money prior to the direct provision of a good (Schraven, 2000; Flora & Bregandahl, 2013). Additionally, interpersonal trust is important to the successful continuation of both systems (Schraven, 2000; Flora & Bregandahl, 2013). The role that trust plays in mutual credit systems underscores social motivations such as community inclusion and

social capital creation that are at work in a large number of mutual credit systems (Seyfang & Longhurst, 2013a). Many farmers, particularly those engaged in smaller scale production and direct marketing, share these social motivations (Flora & Bregandahl, 2013; Galt, 2013).

Complementary currencies that specifically seek to advance social goals such as community inclusion and social capital creation are commonly referred to as "community currencies" (Seyfang & Longhurst, 2013a). In their survey of mutual credit networks and related community currency systems, Seyfang and Longhurst (2013a) identified roughly 1,400 mutual credit networks in 14 countries and five continents (Seyfang & Longhurst, 2013a).[iv] Given the proliferation of mutual credit networks and other community currency systems in the United States and throughout the world, community currency advocates and researchers have called for the development of robust community currency assessments (Place & Bindewald, 2013; Seyfang & Longhurst, 2013a). Several informative community currency case studies do already exist (see, for e.g., Aldridge & Patterson, 2002; Jacob et al., 2004; North, 2005; Gomez & Helmsing, 2008). There have also been a few of quantitative community currency analyses (see Collom, 2005; Krohn & Snyder, 2008; Stodder, 2009; Stodder, 2011; Collom, 2011). Some of these studies have found that mutual credit networks and similar complementary currecy systems can provide significant and widespread economic benefits under certain conditions (North, 2005; Gomez & Helmsing, 2008; Stodder, 2009).[v]

These cases notwithstanding, the general consensus in the literature—based primarily on studies in the global North—is that the economic benefit provided by community currencies is limited (e.g. Aldridge & Patterson, 2002; Jacob et al., 2004; North, 2005; Krohn & Snyder, 2008; Naqvi et al., 2013). Complementary currencies have had more success, however, as community-building tools (Dittmer, 2013). While social benefits are often restricted to a discrete community of complementary currency users, community currencies frequently demonstrate the ability to develop interpersonal networks of reciprocity that foster social capital creation (Aldridge & Patterson, 2002; Jacob et al., 2004; North, 2005; Collom, 2008; Collom, 2011; Dittmer, 2013).

However, while several systems succeed at connecting networks of likeminded individuals, these systems and networks have not been able to expand to broader segments of society (North, 2005; Dittmer, 2013). They have also not succeeded at leveraging participants' ideologies toward broader societal or policy reforms (North, 2005; Dittmer, 2013; Seyfang & Longhurst, 2013b). Others maintain that community currency initiatives could thrive with proper institutional support and point to cases such as the Palmas in Brazil, where community currencies have received support from the national government and international organizations in the form of financial aid and institutional training (Kennedy et al., 2012).[vi]

Community currency systems also continue to emerge throughout the United States as civil society initiatives (Gilbert, 2014). These systems often focus on building social connections within communities. At the same time, they also market their services to local business owners who could benefit from a network of like-minded enterprises and individuals that provide an additional opportunity for exchange (Kirschner, 2011; Gilbert, 2014). The HVC is one example of this kind of system. As such systems continue to spread, developing assessment tools becomes increasingly salient (Place & Bindewald, 2013; Seyfang & Longhurst, 2013a).

3. APPLYING SOCIOECONOMIC METRICS TO A MUTUAL CREDIT SYSTEM

3.1 Identifying Appropriate Metrics to Assess Complementary Currencies

Recently, a few different quantitative methods have been advanced as tools for assessing the socioeconomic functioning of community currency systems (Collom, 2012; Greco, 2013). Greco (2013) suggests using a sales performance ratio (SPR) to assess the health of individual accounts as well as the health of a mutual credit system as a whole. SPR is calculated by taking the outstanding debit in an account at the end of a certain period of time and dividing by the average daily sales of that account at the end of the given period of time. This will provide an estimate of the number of days it takes users to clear their debts, that is, to reciprocate debits. A lower number typically indicates a healthy rate of sales; a higher number indicates account stagnation (Greco 2013). The equation for SPR, based on Greco (2013), is shown below.

$$SPR = \frac{D}{c}$$

where D is outstanding debit at the end of a given period and c is average daily credits during that same period.

A variety of metrics have also been suggested to measure the social impact of complementary currency credit systems (Collom, 2012). For example, the number of reciprocated exchanges in which a member engages can indicate the creation of social capital for that member, that is, the ability to call upon the assistance of others within one's social circle (Collom, 2012). A broader measure of social capital that can be applied to mutual credit networks is ego network density (Collom 2012). Ego network density measures the extent to which one's trading partners also trade with each other (Collom, 2012). Networks with a higher percentage of density usually indicate a higher propensity for social capital creation (Collom, 2012).

These metrics provide the opportunity for quantitative assessments regarding the extent to which mutual credit networks can be considered viable sources of community credit and social capital creation (Greco, 2013; Collom, 2012). Such analysis can provide a way to evaluate the general goals that community currency practitioners seek (Greco, 2013; Collom, 2012). If an understanding of credit flow and network linkage development can be attained, it may also help guide community currency users and administrators as they seek to leverage their institutional capacity to impact food systems or other socioeconomic structures. With this in mind, the methods and analysis presented in the following sections utilize metrics based on those described above to evaluate a local mutual credit network and its relationship to small farmers.

3.2 Applying Socioeconomic Metrics to the Hudson Valley Current: Discussion of Methodologies

In order to gauge the viability of the HVC as a socioeconomic tool for farmers, I analyze the system's complete transactional records from March 1, 2014, to February 28, 2015, and measure transaction performance ratios and ego-network densities for every member. These metrics are discussed below. Some contextualization is provided based on participant observation.

3.2.1 Transaction Performance Ratios

Transaction performance ratios in a mutual credit network reveal the amount of time, on average, that one can expect balances to be fully reciprocated, that is, brought back to zero. This includes the amount of time taken to fully reciprocate positive balances as well as negative balances. Outstanding negative balances have long been a concern for mutual credit administrators (Schraven 2001; Dittmer, 2013). However, negative balances are not inherently undesirable. In fact, since credits are created by a user's willingness to take on a debit, negative balances are part of a well-functioning mutual credit system, so long as debits tend to be reciprocated within a certain length of time (Greco, 2013). One way to measure the rate of negative balance reciprocation is Greco's (2013) sales performance ratio, discussed above. A sales performance ratio (SPR) can be a useful metric to gauge debit reciprocation in a mutual credit system, that is, the rate at which participants with negative accounts reciprocate their expenditures by selling goods or services. However, SPR does not measure the rate at which positive accounts are reciprocated, that is, brought back down to zero by purchasing goods or services. This is an important point because the purpose of a mutual credit network is to provide a unit of account that facilitates exchange, not to serve as a store of value over an extended period of time (Greco, 2013). In other words, mutual credit networks are not intended to act as long-term savings mechanisms.

When users have outstanding positive accounts that have not been reciprocated by purchasing goods or services through the system, this effectively takes credits out of circulation, insomuch as the these credits cannot be received by others who may be looking to earn them. Of course, high positive balances indicate that value has been provided to other network participants in the form of goods or services. However, because mutual credit networks are transactional systems (i.e. designed to facilitate exchange rather than act as savings mechanisms), it is important that users are able to reciprocate what they earn, as well as what they spend.

If a large proportion of credits in a mutual credit system is unreciprocated, or is reciprocated slowly, this can indicate the need for more diverse goods or services, or more highly demanded goods and services, within the system.

System administrators can address this problem by brokering trades and recruiting new members (Greco, 2013). However, even when highly demanded goods are available within a community currency system, stagnating pools of positive credits can build and cause the system as a whole to be less viable as a transactional network (see, for e.g., Krohn & Snyder, 2008).

It is therefore useful to measure the transaction reciprocation ratios of all accounts for a given period of time, regardless of whether they have a positive or negative balance. I develop a simple equation (shown below) based on the SPR, except that accounts with an outstanding positive balance are divided by average daily purchases rather than sales. The resulting figure can be referred to as a transaction performance ratio, or TPR. Tracking TPRs can alert administrators to stagnating pools or credit, regardless of whether stagnation is caused by debits or credits. To the best of my knowledge, a measurement such as TPR has yet to been used in the community currency literature. TPRs were calculated for each active HVC participant using the following equation:

$$TPR = \begin{cases} \frac{B}{d}\ if\ B\ > 0, \\ \frac{B}{c} if\ B\ < 0, \\ 0\ otherwise \end{cases}$$

where B is each participant's balance at end of a given period, d is average daily debits during the period, and c is average daily credits during the period.

Metrics such as SPR or TPR have yet to be widely used in community currency assessment. There is therefore no standard target reciprocation rate for mutual credit systems. However, based on previous research and experience with such systems, Greco (2013) suggests a target SPR of 100 days. This is provided with the caveats that ideal SPRs will likely vary from system to system, and that it may be wise for newer systems to strive for a lower member SPRs as they seek to establish healthy patterns of exchange (Greco, 2013). I therefore use 90 days as the target TPR for the HVC system participants. I used the 365-day period from March 1, 2014 to February 28, 2015 to calculate each member's TPR since this was the first full fiscal year of the HVC as a New York State nonprofit corporation.[vii]

3.2.2 Ego-Network Densities

In addition to TPRs, sociological metrics such as reciprocated relationships and ego-network densities can be used to understand the functioning of a mutual credit network. Sociological metrics are useful for two primary reasons. First, the development of social networks and social capital is one goal of many complementary currency systems, including the HVC (Seyfang & Longhurst, 2013a). Second, interpersonal linkages and social capital within a mutual credit network can facilitate exchange and encourage reciprocity (Schraven, 2001; Collom, 2012).

One sociological metric that has been applied to complementary currency systems is reciprocated relationships (Collom, 2008; Collom, 2012). A reciprocated relationship exists when a user has provided at least one good or service to another user and has also received at least one good or service from that same user. Although reciprocated relationships can be a useful indication of bilateral social capital, community credit networks are not designed to be solely bilateral exchange networks; a member can reciprocate debits by selling a good or service to any other member in the network, not only the member with whom the initial transaction took place (Collom, 2012). A broader measure of social capital in mutual credit systems, ego-network density, was therefore also calculated for the HVC system (Collom, 2012).

Ego-network density measures the extent to which one's trading partners also trade with each other (Collom, 2012). In social network theory, an ego is an individual that is the subject of inquiry (Collom, 2012). Applied to community currencies, an ego is the particular participant whose activities are being analyzed. Other users with whom a particular mutual credit participant, or ego, has traded constitute that participant's network (Collom, 2012). If every member of a participant's ego-network has traded with every other member of the ego-network, ego network density is 1.0; if half of all possible trades within an ego-network have occurred, ego network density is 0.5 (Collom, 2012). The network density of every active HVC participant was calculated by taking the total

number of users in each member's network who had also traded with each other (regardless of direction) and dividing by the total possible combinations of bilateral trading relationships within that network. This can be expressed by the following:

$$END = \frac{a_i}{\binom{n_i}{2}} = \frac{2!\,(n_i - 2)!\ \times\ a_i}{n_i!} = 2a_i\ \frac{2!\,(n_i - 2)!}{n_i!} = \frac{2a_i}{n_i \times\ (n_i - 1)}$$

where ai is the number of bilateral relationships for member i, and ni is the total number of other users in each member's network.

Networks with a higher density usually indicate a higher propensity for social capital creation (Collom, 2008). Denser networks also tend to transfer system information, such as the existence of potential trades, more quickly than less dense networks (Collom, 2012). Larger networks tend to have smaller densities since it is more difficult for larger numbers of people to all be connected (Collom, 2012). The network density of every active HVC participant was calculated by taking the total number of users in each member's network who had also traded with each other (regardless of direction) and dividing by the total possible combinations of bilateral trading relationships within that network. Ego-network density may be of particular interest when one considers the participation of farmers in the HVC network. Case studies of farmers who use CSAs as strategies for direct marketing and community-sourced credit have found that such farmers tend to highly value social linkages and reciprocal relationships (Flora & Bregendahl, 2012; Galt, 2013). In some cases, the existence of social linkages and reciprocal relationships incentivizes continued participation in CSAs (at least in the short-run) even when economic advantages are minimal (Flora & Bregendahl, 2012; Galt, 2013).[viii]

To calculate these metrics, complete transactional data was collected from the HVC database. A spreadsheet matrix containing every user and their complete balance history, as well as every transaction from March 1, 2014 to February 28, 2015, was then created and used for analysis. Based on this information, I tabulated the number of system participants and also calculated transaction reciprocation ratios as well as ego-network densities.

3.3 Results

The transaction reciprocation ratios and ego-network densities of HVC participants reveal that although the system has been a significant source of mutual credit and social linkage creation for a small number of users, farmers have not similarly benefited from system participation. An overview of HVC transactions is presented below, followed by more detailed discussions of the transaction reciprocation ratios and ego-network densities of HVC users and what these metrics reveal about the functioning of the mutual credit network.

3.3.1 Overview of Current Use

A total of 38,800 credits were exchanged through the HVC system from March 1, 2014 to February 28, 2015. System credits are called "Currents" and one Current is equal to one US dollar. During the period of analysis, the system had 88 participants, that is, registered users who had made at least one transaction. Six of these participants were farmers or farm associations. While a substantial minority of system participants (27 out of 88) made only one trade during the period of analysis, a number of members did make considerable use of the Current. Five users each spent and earned over 4,000 Currents. None of these users are farmers. Six farms and farm associations, four of which are small or mid-sized produce farms, earned and spent a combined total of 1,540 Currents. Farms earned 1,230 Currents and spent 310 Currents. Of these, a little more than half of Currents earned were for produce or some other product available at an on-farm market; the remainder was earned as fees or donations to a farm association. Items purchased by local farms using Currents include lumber and advertising space in a local publication.

3.3.2 Transaction Performance Ratios

The flow of Currents among farmers and the system as a whole can be further analyzed by examining TPRs.[ix] As shown in Figures 1 and 2, a larger proportion of farmers have stagnating balances than the proportion of all users

with stagnating balances. A stagnating balance indicates that a user either spent or earned Currents but never made a reciprocal transaction. Users with a TPR greater than 365 days have made at least one reciprocal transaction but based on their transaction histories are not expected to fully reciprocate their balances within one year.

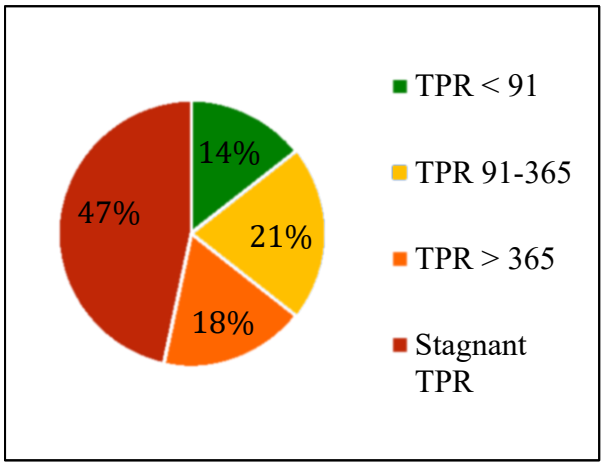

Figure 1: TPRs by proportion of all participants. N = 88

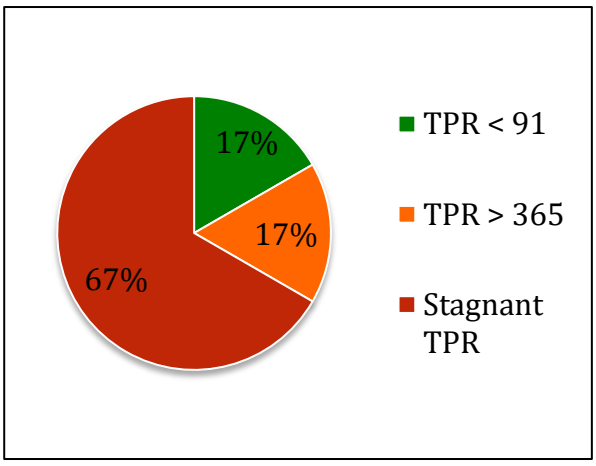

Figure 2: TPRs by proportion of all participant farmers. n = 6. Note: No farmer had a TPR between 91 and 365

Users with a TPR between 91 and 365 can be expected to fully reciprocate their balances between three months to a year. Both farmers and the HVC system as a whole have a low number of members with healthy TPRs, that is, a low number of members who can be expected to reciprocate outstanding balances in less than 91 days (based on the 90 days or less target mentioned in section 3.2.1). Although a low number of members have healthy TPRs, these users are responsible for a large proportion overall Currents exchanged. A substantially different picture is therefore seen when looking at member TPRs as a proportion of overall debits and credits in the system (Fig. 3).

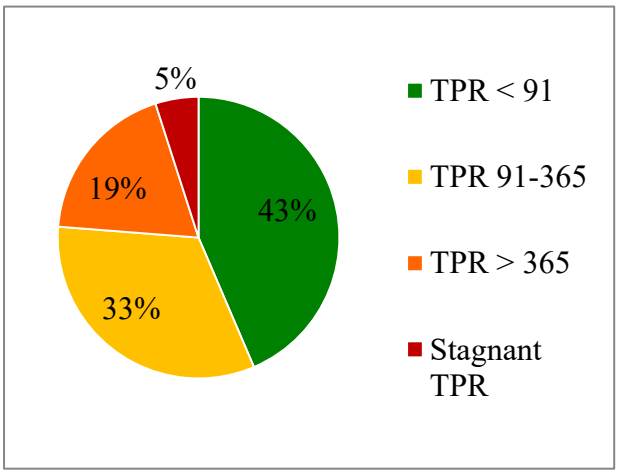

Figure 3: TPRs by proportion of total system credits and debits

Considering member TPRs based on the proportion of total credits and debits for which they are responsible provides an overall picture of credit and debit reciprocation and can help assess the health a mutual credit network. While only 14% of users with at least one transaction have healthy TPRs, these users account for 43% of the total sales and purchases made through the Current system. At the same time, while 47% of users with at least one transaction have never made a reciprocal transaction through the system, their combined outstanding balances are only 5% of the system's total sales and purchases. Additionally, about one third of all purchases and sales are associated with a TPR greater than the 90-day maximum threshold for a healthy rate, but their reciprocation can be expected within the next year. A fifth of total purchases and sales are not completely stagnant but will nevertheless take more than one year to reciprocate based on previous exchange performance.

It is not uncommon in mutual credit networks for some proportion of exchanges to remain unreciprocated (Greco, 2013). Greco (2013) argues that a small proportion of unreciprocated credits should not cause too much concern, as long as most credits are being reciprocated at a healthy rate. Ideal proportions are likely to vary from system to system and be determined by experience (Greco, 2013). As such measurements have yet to be widely applied in mutual credit assessments, it is difficult say for certain how the HVC as a whole is performing. Given that some unreciprocated transactions are to be expected, the 5% of transactions (in terms of value) that are unreciprocated

does not appear to be cause for alarm.[x] At the same time, only slightly more than two-fifths of credits can be expected to be reciprocated in 90 days or less. System administrators will likely want to improve this figure, especially while the system is still in early stages of development.

Farmer TPRs as a proportion of that group's total credit and debit are less healthy than the HVC as a whole (Fig. 4). A large majority, 64%, of all farmer or farm association exchanges (in terms of value) are associated with stagnant accounts. However, these are entirely positive outstanding balances. This could indicate that the HVC does work to some extent as a marketing platform for farmers (i.e. facilitating revenue generation), but is less suited as a micro-credit or purchasing platform as there are not enough goods or services available through the system that farmers are willing to purchase using the Current's debit mechanism, or farmers are simply unaware of their existence. At the same time, 30% of all farmer or farm association credits and debits are associated with an account that has an outstanding negative balance and a TPR greater than 365. It is possible that this farm does not use growing methods that are desirable to system users, or there is simply not enough demand within the system to support healthy transaction rates for more than two or three farms.

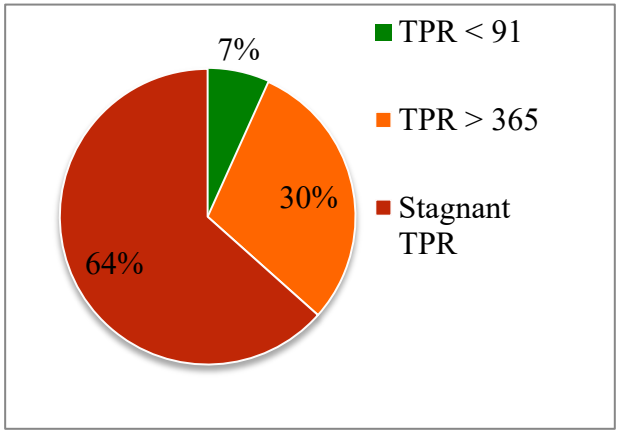

Figure 4: TPRs by Proportion of Farmers' Total Credits and Debits.

3.3.3 Ego-Network Densities

One factor that can enhance transactional activity is social capital; social capital potential in multi-lateral transaction platforms like the HVC can be measured by ego-network densities (Collom, 2012). The average ego-network density in the HVC during the year analyzed was 0.32. Farmers and farm associations had an average density of 0.6.

Although this measure has not been widely used in other community credit systems, Collom (2012) reports the average ego-network density of a service credit system in Oregon to be 0.14 over a four-and-a-half year period. It is not uncommon, however, for network densities to be higher in early stages of network development, as users tend to connect first to those with whom they have already have some connection or are similar to in some way (Collom, 2008). If a credit network succeeds as a platform for social capital creation, this trend can be reversed. For example, the average ego-network density in one service credit system studied by Collom (2008) actually increased as the number of active users increased. In general, however, as the number of active users in a system increases, it becomes increasingly less likely that all members will have interacted with each other (Collom, 2008; 2012).

This phenomenon can already be observed in some parts of the Current network. While farmers as a group have relatively dense networks, their average network size is only 3.33. Therefore, while this may indicate a propensity for social capital creation within farmer networks, the extent of any generated social capital can be expected to be limited.

Ego-network density is quite different for the top five Current users in terms of overall number of credits and debits exchanged. This group has 20 exchange partners on average and an average ego-network density of 0.22. The high number of exchange partners that these users have indicates that they are not cliquish; cliquishness can be a barrier to expanding trade in a mutual credit network (Aldridge & Patterson, 2002). Also, while this group's lower average network density is not surprising given group members' greater number of connections to other members, their density still appears to be relatively high given the number of connections that exist, at least compared to the few limited examples that exist elsewhere in the community credit assessment literature (Collom, 2008; 2012).

One important aspect to consider regarding these social metrics is how they may change moving forward. Community credit networks, and social networks in general, tend to become less dense as they grow (Collom, 2008; Collom, 2012). However, as previously mentioned, one service credit system studied by Collom (2008) demonstrated a positive correlation between network size and ego-network density, indicating a strong capacity for

social capital creation between users. If this is a factor that administrators and potential funders or social investors of mutual credit systems like the HVC care about, then the metrics presented here can be used as a baseline to gauge and direct future endeavors as an organization. The application of the socioeconomic metrics presented above will be briefly discussed in the following section.

4. DISCUSSION, RECOMMENDATIONS, AND CONCLUSION

4.1 Discussion

The socioeconomic metrics discussed and analyzed above indicate that the HVC have not been used as a significant means of exchange for local farmers. At the same time, these metrics also suggest that the HVC, as a whole, can be a viable source of mutual credit and social linkage creation for some users, at least in the short-run. This is relevant to local farmers if existing benefits of participation can be maintained and extended to include local farmers in a significant way.

The owners of one farm that had signed up to use the HVC indicated interest in using Currents as a source of micro-credit to access goods and services such as seeds, electrical or plumbing work, and farmers' market space. They also expressed a desire to use the Current as a marketing platform by accepting Currents as payment for supplying local restaurants and stores.

There are indeed some goods and services available through the Current network that may be useful to farmers. These include lumber, advertisements, farmers' market space, plumbing, and electric services. There are also potential business customers such as a local café. During the period of study, however, the farm mentioned above had made only a few small transactions using Currents. Farmers cited an information gap as one factor limiting their Current transactions. This included a lack of clarity about how the Current works, as well as uncertainty about how to identify other Current members with whom to make exchanges. An information gap may also partially explain the poor transaction performance ratios of farmers during the period of study. Although farmers tended to have relatively high network densities, which can facilitate the exchange of information, the average size of farmer networks included only three other members. This is compared to the five most active Current members, who each spent and earned over 4,000 Currents and had about 20 trading partners on average.

Below is one basic recommendation for administrators of a mutual credit system such as the HVC that, if implemented, might help to focus and leverage any marketing or credit benefits to local farmers, with the goal of expanding those benefits in the long-run. This is followed by a recommendation for future community currency research and application of socioeconomic metrics.

4.2 Recommendations for Research and Application

Based on the analysis of transaction performance ratios in the HVC system, it is clear that farmers have generally not used the HVC as a means of exchange. However, as previously mentioned, certain goods and services that may be useful to farmers are available for purchase with Currents, and potential buyers also exist within the network. Administrators can work to identify barriers to higher trade volumes, but it seems unlikely, based on the results discussed above, that the HVC could presently facilitate vibrant exchanges for more than two or three farmers.

It may therefore be beneficial to identify two or three farmers, or farm associations, that are particularly interested in the Current and willing to act as "innovation partners" with the organization. A growing number of farms in this region are already engaged in alternative marketing activities such as CSAs (Glynwood, 2010). The Current could further facilitate community cash flow by encouraging small business owners and freelancers to purchase seasonal farm shares with Currents. Farms, in turn, could spend their Current credits on services such as professional marketing and bookkeeping, or perhaps to pay farmers' market fees. As more transactional relationships are made using community credit, this could also facilitate expanded social capital networks for farmers. However, a greater variety of physical goods, including seeds and farm tools, will be necessary if famers are to more fully benefit from participating in the HVC.

Such efforts can be guided and informed by continued research and application of basic socioeconomic metrics such as those used in this paper. This can allow researchers, administrators, and potential funders to establish baselines, gauge success, and set measurably achievable goals for mutual credit networks and similar systems.

One potential direction for future research is to employ more advanced network analysis (Frankova et al. 2014). Such analyses can provide useful additional insights regarding the flow of credits and social capital creation. More basic metrics, however, might be more wieldy from an administrative perspective, particularly for systems managed by community-based non-profit organizations.

Of course, any set of metrics should not be used as absolute standards, and qualitative assessment will be necessary to contextualize and effectively operationalize quantitative data. Future studies should include extensive qualitative assessment in combination with socioeconomic metrics. Nevertheless, the metrics used above can help system administrators develop quantifiable assessments that are congruent with the values and goals of reciprocity and social capital creation, and that can be efficiently communicated to policy makers and potential funders in the private and public sectors.[xi]

Similarly, utilizing socioeconomic metrics such as transaction reciprocation ratios and ego-network densities may help mutual credit system administrators communicate the goals and activities of mutual credit networks to active and potential participants. This would be useful since potential participants may be unsure how to engage the network given that mutual credit networks have generally had limited circulation and are therefore not widely familiar transactional tools.

5. CONCLUSION

While the Hudson Valley Current has not been used as a significant means of exchange for farmers and others, the transactional analysis and metrics used in this paper provide some evidence that the Hudson Valley Current, as a whole, can be a generally viable source of mutual credit and social linkage creation, at least in the short-run.

The transactional analysis used in this paper provides a set of basic social and economic metrics to help analyze mutual credit networks and other community currency systems. This is significant given the fact that complementary currency systems are often promoted as both social and economic tools for local and regional communities. The continued application of these metrics by mutual credit administrators, combined with purposeful partnerships with local farmers, might allow any benefits of system participation to be maintained and extended to include farmers—and others—in a significant way.

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ENDNOTES

[i] *I worked as a research associate for the HVC approximately 18 months from 2014-2016.*

[ii] *The Hudson Valley stretches approximately 150 miles north to south along the Hudson River between the state capital of Albany to New York City, with the Catskill Mountains to the west and Taconic Hills to the east.*

[iii] *See Hess (2012) for a localist perspective on complementary currencies. See Dittmer (2013) for a degrowthist perspective on complementary currencies.*

[iv] *In addition to community currencies that operate as mutual credit systems, Seyfang and Longhurst (2013a) identified three related systems being used as community currencies: service credits, locally printed currencies, and barter market credits.*

[v] *For example, during Argentina's financial crisis in the late 20th century, barter credits were adopted in thousands of barter market locations, peaking at about 4,500 markets with an estimated 2.5 million participants in 2002 (North, 2005; Gomez & Helmsing, 2008). A 2004 survey of over 360 Argentinian barter market participants found*

that about two-thirds of surveyed participants covered at least half of their household expenses with barter credits (Gomez & Helmsing, 2008). Additionally, Stodder (2009) compared Swiss GDP to the velocity of the Swiss Wirtschaftstring (Wir) mutual credit system from the mid-1900s to early 2000s and found a strong countercyclical effect; Wir velocity was higher in years of recession and lower in years of stronger GDP growth. This suggests that Wir users rely more heavily on the interest-free mutual credit of the Wir system when it is more difficult to access Swiss francs (Stodder, 2009).

[vi] *It should be noted that community banks and local currencies such as Palmas function differently than mutual credit networks like the HVC. A discussion on the structural differences and outcomes achieved by various community currency types is beyond the scope of this paper, but see Dittmer (2013) and Michel and Hudon (2015).*

[vii] *TPRs of members who joined the system after March 1, 2015, were calculated based on number of days in the system.*

[viii] *Although this paper does not address the motivations of farmers or any other HVC participants, when such knowledge is available to system administrators, metrics such as reciprocations and network densities can be used to understand how well a system tends to meet the social goals of users.*

[ix] *Because only one fiscal year had occurred at the time of data collection, the TPRs presented here are baseline. If various systems' baselines are analyzed, comparisons can be made to determine if and how initial TPR rates predict future performance.*

[x] *Local currency stagnation became an issue in Ithaca, NY, when one business earned over $30,000 worth of local currency that it was unable to spend; this represented about 30% of the total local currency in circulation (Krohn & Snyder, 2008). There is, however, little data in the complementary currency literature regarding cases such as this.*

[xi] *For research on community currency users' motivations and values, see Collom (2011) and Smith and Lewis (2016).*