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**Local Mutual Credit as a Socioeconomic Tool for Farmers in New York State's
Hudson Valley: Assessing the Possibility and Practice**

**Crédito Mútuo Local como uma Ferramenta Socioeconômica para Agricultores do Hudson
Valley to Estado de Nova York: Avaliando a Possibilidade e Prática**

**Credito local mutuo como herramienta socioeconomic para agricultores (granjeros) en el
Valle Hudson del estado de Nueva York: Evaluando la posibilidad y práctica.**

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Abstract

This paper seeks to answer two main questions. First, to what extent can a local mutual credit system be a viable means of exchange for agricultural producers with significant local markets? Second, to what extent has a particular local mutual credit system, the Hudson Valley Current (HVC), actually been used by fruit and vegetable farmers in New York State's mid-Hudson Valley as a platform for exchanging goods and services? Over 1,000 local mutual credit 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 economic impacts under certain conditions, they often fail to meet participants' goals. Nevertheless, new adaptations such as the HVC continue to emerge. This paper analyzes the complete transactional history of the HVC from March 1, 2014, to February 28, 2015. Drawing on the mutual credit literature, transaction reciprocation ratios and network linkage densities are calculated to understand the flow of credit within the system and to gauge the system's potential for social capital creation. While these metrics indicate that the HVC has not been used as a significant means of exchange for farmers, they also suggest that the HVC, as a whole, is a generally viable source of mutual credit and social linkage creation for some participants, at least in the short-run. The 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 so as to include local farmers in a significant way.

Keywords: mutual credit, transaction performance ratio, farm(s)/farmer(s)

Resumo

Este relatório objetiva responder a duas perguntas principais. Primeiramente, até qual ponto pode um sistema de crédito mútuo ser uma maneira viável de troca por produtores agrícolas com significantes mercados locais? Segundo, até qual ponto um particular sistema de crédito mútuo, o do Hudson Valley Current (HVC), tem sido usado por agricultores de frutas e vegetais no meio-Hudson Valley do Estado de Nova York como uma plataforma de troca de produtos e serviços? Mais de 1,000 sistemas de crédito mútuo tem sido desenvolvidos ao redor do mundo nas últimas décadas. Muitos desses sistemas se esforçam para apoiar atividades econômicas locais, como a agricultura em pequena escala. Apesar de que esses sistemas de crédito mútuo e semelhantes esquemas terem causado significantes impactos econômicos sob certas condições, eles frequentemente falham em alcançar os objetivos dos participantes. No entanto, novas adaptações, como o do HVC, continuam a surgir. Este relatório analisa a história transacional completa do HVC desde 1 de Março de 2014 até 28 de Fevereiro de 2015. Partindo da literatura sobre crédito mútuo, as relações de reciprocidade das transações e a densidade da conexão da rede são calculadas para entender o fluxo de crédito existente dentro do sistema e para medir o potencial para a criação de capital social do sistema. Enquanto que essas medidas indicam que o HVC não tem sido usado como uma significativa maneira de troca entre agricultores, elas também sugerem que o HVC, como um todo, é uma fonte viável de crédito mútuo e de criação de conexão social para alguns participantes, pelo menos no curto prazo. A aplicação contínua dessas medidas por administradores de crédito mútuo, combinada com parcerias intencionais com agricultores locais poderão permitir alguns potenciais benefícios de participação do sistema, mantendo-o e estendendo-o no intuito de incluir agricultores locais de uma forma significativa.

Palavras-chave: crédito mútuo, relação transação performance, fazenda (s)/agricultor(es)

Resumen

Esta artículo busca responder dos preguntas. La primera, ¿en qué medida un sistema de crédito mutuo puede ser un método viable de intercambio para productores agrícolas con mercados locales importantes? La segunda, ¿en qué medida un sistema local de crédito mutuo, Hudson Valley Current (HVC), ha sido usado por agricultores de frutas y vegetales en el medio Valle Hudson del estado de Nueva York como una plataforma para intercambiar bienes y servicios? Más de 1, 000 sistemas locales de crédito mutuo han sido desarrollados en todo en las últimas décadas. A pesar de que los sistemas de crédito mutuo y esquemas similares han tenido un significativo impacto bajo ciertas condiciones, regularmente fallan al alcanzar los objetivos de los participantes. Sin embargo, nuevas adaptaciones como el HVC continúa. Este artículo analiza toda la historia transaccional de HVC desde el 1 de marzo de 2014 al 28 de febrero de 2015. Revisando la literatura sobre crédito mutuo, las razones de transacciones recíprocas y densidades de cadenas de vínculos son calculadas para entender el flujo de crédito dentro del sistema y para estimar el potencial del sistema para la creación de capital social. Mientras esas medidas indican que el HVC no ha sido usado como un método importan de intercambio para agricultores, también sugieren que dicho mecanismo, de manera completa, es generalmente una fuente viable de crédito mutuo y de creación de vínculos sociales para algunos participantes, al menos en el corto plazo. La aplicación continúa de estas cifras por los administradores de crédito mutuo, combinadas con asociaciones con agricultores locales, pueden permitir que los beneficios potenciales de sistemas de participación sean mantenidos y extendidos para incluir a agricultores locales de manera significativa.

Palabras clave: crédito mutuo, razón de rendimiento transaccional, agricultor (es)

1. Introduction

Agriculture is a long-established aspect of the economic, cultural, and land use fabric of New York State's Hudson Valley region. Nevertheless, many Hudson Valley farms struggle financially (USDA, 2014). A new mutual credit system, the Hudson Valley Current, could potentially benefit Hudson Valley farmers as a source of micro-credit and as a marketing platform. This paper therefore seeks to answer two main questions. First, to what extent can a local mutual credit system be considered a viable means of exchange for agricultural producers with significant local markets? Second, to what extent has a local mutual credit system actually been used by fruit and vegetable farmers in New York State's mid-Hudson Valley as a source of micro-credit or as a marketing platform?

In answering these questions, I briefly discuss the issues facing Hudson Valley agriculture and then introduce mutual credit networks and similar systems as potential tools to overcome some of the challenges faced by Hudson Valley farmers. Following an overview of mutual credit networks and similar systems, the literature assessing impacts of such systems is reviewed. Drawing from the available literature, I identify and employ metrics such as transaction performance ratios and network linkage density to gauge the health of the Hudson Valley Current mutual credit system.

Based on the results of these metrics and an interview conducted at one farm participating in the Hudson Valley Current, I draw conclusions regarding the viability of the Current as a local exchange platform for HV farmers. Finally, two recommendations are made regarding future civil society engagement in mutual credit networks or similar systems.

2. Background

2.1 Motivation: US Agriculture and Hudson Valley Farms

Hudson Valley (HV) farms operate within a national phenomenon of highly concentrated agricultural processing and retail markets (Reganold et al., 2011; Sexton, 2013). United States agricultural markets are characterized by high-volume production that can be sold at low cost to consumers and discourages cropping diversity (Reganold et al., 2011; Bowman & Zilberman, 2013). Federal subsidies and insurance programs aimed at a few agricultural commodities such

as corn, cotton, rice, soybeans, and wheat, contribute to this trend (Reganold et al., 2011; Bowman & Zilberman, 2013). Small-scale farmers, therefore, face significant challenges. Agricultural markets characterized by large scale production place small farmers at a competitive disadvantage, as most supply chains require high-volume production and small farmers are typically unable to produce large enough volumes to be competitive (Sexton, 2013). Scaling up production requires considerable initial capital and access to credit (Sexton, 2013; Bowman & Zilberman, 2013).

Given these factors, many smaller farms seek alternative markets as a strategy for economic sustainability (Schmit & Gomez, 2011). One strategy that has increased in recent years is to seek out more direct, local markets (Low & Vogel, 2011). This provides farmers an opportunity to capture price premiums by differentiating their products from the products of other producers (Schmit & Gomez, 2011; Bowman & Zilberman, 2013). For example, community supported agriculture operations (CSAs) and other direct marketing strategies connect growers directly 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; Miller, 2015). CSAs also allow community members to purchase farm shares prior to the growing season in return for agricultural products throughout the year (Flora & Bregendahl, 2013). This allows farmers to partially overcome capital and biophysical constraints without debt-based financing (Flora & Bregendahl, 2013). Many CSA farmers also 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).

Farms that are most likely to utilize localized marketing strategies such as CSAs tend to be smaller than average in terms of both sales and acreage, tend to grow fruits, nuts, vegetables, or a combination thereof, (hereafter “produce”) and tend to be closer than average to urban centers (Low & Vogel, 2011). Given the factors described above, New York State’s HV appears to be one region that is particularly poised to benefit from the direct marketing of agricultural products.

The HV stretches approximately 150 miles north to south along the Hudson River from around the state capital of Albany to New York City, with the Catskill Mountains to the west and Taconic Hills to the east. Farmers in this region are in close proximity to the very large and

generally wealthy New York City consumer market and also have potential access to smaller urban and suburban markets within the valley itself (Glynwood, 2010).

The HV contained more than 4,100 farms during the most recent federal census of agriculture (USDA, 2014). Together, these farms generated over \$430 million in revenue (USDA, 2014). However, only around one third of HV farms reported profits in the most recent census year (USDA, 2014). A lack of access to local processing, distribution, and marketing services has been cited as an underlying impediment to financial viability for HV farms (Glynwood, 2010). Additionally, although disaggregated data on profits for the Hudson Valley's over 1,000 produce farms is not directly available, these farms are more impacted by labor costs than others, due in part to the labor intensive nature of growing produce, as well as relatively high labor costs in the HV (USDA, 2014; Glynwood, 2010).¹

The significant economic challenges facing HV agriculture underscore the appeal of alternative local marketing strategies for many HV farmers. Indeed, 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 HV farms appear generally well-positioned to take advantage of various localized marketing strategies, economic sustainability remains unrealized for many farms (Glynwood, 2010; USDA, 2014).

2.2 A Potential Solution

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 indeed prove beneficial for small to mid-sized farmers in regions such as the HV. In February 2014, a new mutual credit network called the Hudson Valley Current (HVC) began operation in the mid-Hudson Valley. 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

¹ The Hudson Valley's 1,000 produce farms (including orchards) earned an average of \$76,000 in 2012 (USDA, 2014). In the United States, a farm with \$76,000 in yearly revenue can be considered a small or smaller mid-sized farm (Low & Vogel, 2011; Miller, 2015).

therefore becomes 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 agriculture production provides an opportunity to explore this question.

2.3 Local Mutual Credit in Context

Mutual credit networks like the HV Current are a type of complementary currency. 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).² 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).

Mutual credit networks create the opportunity for exchange by acting as associations in which members receive accounts that fluctuate based on the receipt or provision of goods and services.³ Each time a transaction occurs, 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 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

² See Hess (2012) for a localist perspective on complementary currencies. See Dittmer (2013) for a degrowthist perspective on complementary currencies.

³ Transactions are typically conducted and monitored through an online software system (Seyfang & Longhurst, 2013a).

sense, local mutual credit systems would perform a role similar to CSAs, inasmuch 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 sometimes 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).⁴

Although socially-oriented local mutual credit networks were popular in parts of Europe around the turn of the 21st century and produced certain social benefits for participants, they generally faltered as tools for economic development and their popularity has declined in recent years (Aldridge & Patterson, 2002; North, 2005; Dittmer, 2013; Seyfang & Longhurst, 2013a). Recently, however, some mutual credit systems in the United States have attempted adapted models that remain focused on building social connections within communities while also marketing their services to local business owners that could benefit from a network of like-minded enterprises and individuals that provide an additional means of exchange (Kirschner, 2011; Gilbert, 2014). The HV Current is one example of this kind of system.

2. Literature Review: Finding a Framework to Measure the Impacts of Complementary Currency Systems

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

⁴ 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.

have called for the development of robust community currency assessments (Place & Bindewald, 2013; Seyfang & Longhurst, 2013a).

A number of 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 smaller number of quantitative community currency analyses (see Collom, 2005; Krohn & Snyder, 2008; Stodder, 2009; Stodder, 2011; Collom, 2011).

A few of these studies have found that complementary currencies can provide significant economic benefits under certain conditions (North, 2005; Gomez & Helmsing, 2008; Stodder, 2009). For example, during Argentina's severe financial crisis in the late 20th century, twenty neighbors outside Buenos Aires agreed to accept paper credits amongst themselves in exchange for goods and services at a physical "barter market" (North, 2005).⁵ As the Argentinian financial crisis deepened, this model was adopted in thousands of locations, peaking at about 4,500 credit markets with an estimated 2.5 million participants in 2002 (North, 2005; Gomez & Helmsing, 2008).

A 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 market credits in 2004 (Gomez & Helmsing, 2008). Although over 90% of survey participants reported at least one additional income source outside of the barter network, only 25% reported a stable income source (Gomez & Helmsing, 2008). Additionally, virtually all respondents claimed that their standard of living either improved or remained stable after participation in the barter markets (Gomez & Helmsing, 2008). These findings suggest that the Argentinian barter credit systems acted as an economic buffer for economically marginalized individuals affected by a severe economic crisis (Gomez & Helmsing, 2008).

The Swiss *Wirtschaftstring* (or *Wir*) mutual credit system was created under somewhat similar conditions during the Great Depression (Stodder, 2009). The *Wir*, started in 1934, is the world's oldest operational mutual credit system (Stodder, 2009). Although originally open to individual participants, today the *Wir* operates solely as a business-to-business system (Stodder, 2009). Yet, the *Wir* still acts as an economic buffer during economic downturns (Stodder, 2009;

⁵ Barter market credits, a form of community currency closely related to mutual credit networks, utilize printed notes, or credits, to facilitate exchange. Although barter exchange credits are typically issued for use at particular markets, in practice credits have been used at any market where others are willing to accept them (North, 2005).

Stodder; 2011). Stodder (2009) compared Swiss GDP to the velocity of *Wir* credit 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).

These cases notwithstanding, the general consensus in the literature is that the economic benefit provided by community currencies is limited (Aldridge & Patterson, 2002; Jacob et al., 2004; North, 2005; Krohn & Snyder, 2008; Naqvi et al., 2013). Case studies of local mutual credit networks in England have found that a limited number of credits are created and exchanged as members often have difficulty finding desired goods and services available within the network (Aldridge & Patterson, 2002; North, 2005).

Complementary currencies have had more success 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). In a survey of Ithaca HOURS users, over 60% of respondents reported that local currency use allowed them to increase their circle of friends, establish trust between other users, and improve their quality of life (Jacob et al, 2004).⁶ Collom (2008; 2011) has found that participation in service credit systems can increase individuals' social linkages and create social capital between users as they engage in a reciprocal network.⁷

However, while some 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).

⁶ Ithaca HOURS is a locally printed currency. Locally printed currencies are a subset of community currency in which physical notes are printed by a group of individuals for use in economic transactions within a limited geographical region (Seyfang & Longhurst, 2013a).

⁷ Service credit systems (e.g. Time Banks) are a type of community currency in which participants earn credits through labor; credits are often based on time worked, regardless of said work (Seyfang & Longhurst, 2013a).

The often limited impact of community currency systems leads some researchers to propose that rather than focusing on unproven bottom-up civil society strategies, time and resources will be better focused toward pursuing national legislation and regulations that align with the goals and values of community currency practitioners (Aldridge & Patterson, 2002; Dittmer, 2013). Others argue that community currency initiatives could thrive with proper institutional support and point to cases 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).

Community currency systems also continue to emerge throughout the United States as civil society initiatives (Gilbert, 2014). These systems tend to seek both local economic vitality as well as the development of interpersonal networks (Gilbert, 2014). As such systems continue to spread, developing assessment tools becomes increasingly salient (Place & Bindewald, 2013; Seyfang & Longhurst, 2013a).

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 to assess the health of individual accounts as well as the health of a mutual credit system as a whole. A sales performance ratio is calculated by taking an account's debit balance at the end of a given period of time and dividing by that account's average daily sales over the same period of time (Greco, 2013). This will give an estimate of the number of days it will take an account to clear its debt (Greco, 2013). A lower number typically indicates a healthy rate of sales; a higher number indicates account stagnation (Greco 2013).

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).

The metrics discussed above would allow 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.

4. Discussion of Methodologies

In order to answer the two main questions stated at the outset of this paper, I calculated and analyzed transaction performance ratios and ego-network densities for the HVC. Some contextualization of these metrics is later provided from a semi-structured interview I conducted with the owners of one farm participating in the HVC.

4.1 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 that has been suggested in the mutual credit literature is to calculate a sales performance ratio (SPR) (Greco, 2013). 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 reciprocate debits. 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.

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, and 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, in so much as 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, 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 would therefore be 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. An equation similar to the SPR can be used, 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 reciprocation 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:

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

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.⁸

4.2 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, 2013). Second, interpersonal linkages and social capital within a mutual credit network can facilitate exchange and encourage reciprocity (Schraven, 2001; Collom, 2012).

⁸ TPRs of members who joined the system after March 1, 2015, were calculated based on number of days in the system.

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 makes up 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).

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. This can be expressed by the following:

$$\begin{aligned}
 \text{END} &= \frac{a_i}{\binom{n_i}{2}} \\
 &= \frac{2!(n_i - 2)! \times a_i}{n_i!} \\
 &= 2a_i \frac{(n_i - 2)!}{n_i!} \\
 &= \frac{2a_i}{n_i \times (n_i - 1)}
 \end{aligned}$$

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

Ego-network density may be of particular interest when one considers the participation of farmers in the HVC network. At least two 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).

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.

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.⁹

One limitation of this research is that although calculating social and economic metrics can be useful, qualitative contextualization would facilitate the interpretation and application of such metrics. Although one semi-structured interview with a HVC farm was conducted to provide some contextualization for my data analysis, future studies should include more extensive qualitative assessment.

5. 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

⁹ Further information on methods, including a complete list of database variables, may be available from the author upon request.

transaction reciprocation ratios and ego-network densities of HVC users and what these metrics reveal about the functioning of the mutual credit network.

5.1 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 made only one trade during the period of analysis, a number of members did make considerable use of the Current.¹⁰ 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 credits 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.

5.2 Transaction Performance Ratios

The flow of Currents among farmers and the system as a whole can be further analyzed by examining TPRs.¹¹ 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. Users with a TPR between 91 and 365 can be expected to fully reciprocate their balances between three months to a year.

¹⁰61 out of 88 participants made at least two trades during the period of analysis; 27 participants made a single trade.

¹¹ 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.

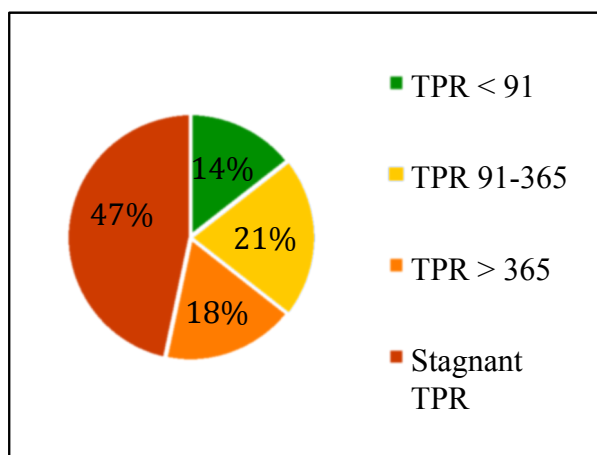


Figure 1: TPRs by proportion of all participants. n = 88

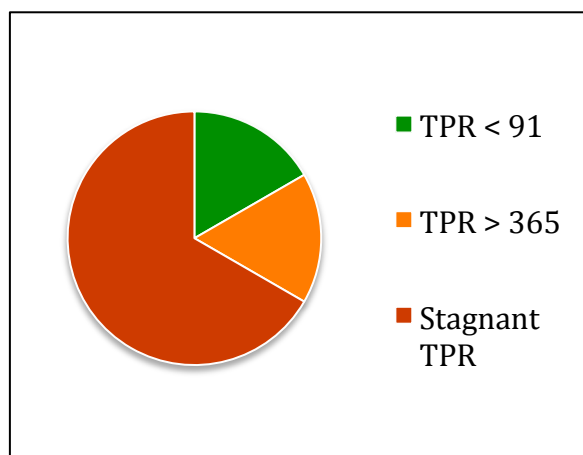


Figure 2: TPRs by proportion of all participant farmers. n = 6. Note: No farmer had a TPR between 91 and 365.

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 4.1).

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 (Figure 3).

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.

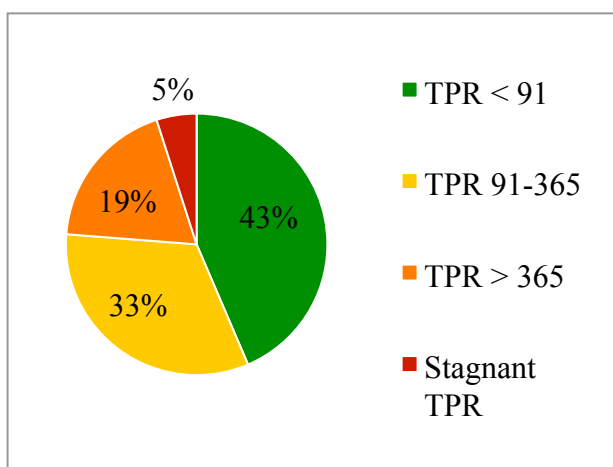


Figure 3: TPRs by proportion of total system credits and debits.

Although 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. Just under 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.¹² 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

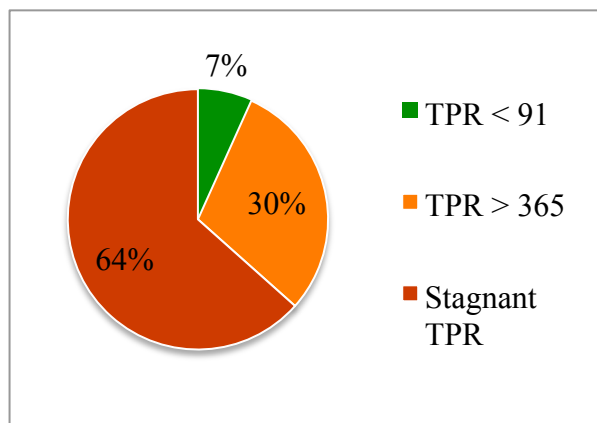


Figure 4: TPRs by Proportion of Farmers' Total Credits and Debits.

the HVC as a whole (Figure 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 (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

¹² 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, very little data in the complementary currency literature regarding cases such as this.

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 perhaps there is simply not enough demand within the system to support healthy transaction rates for more than two or three farms.

5.3 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.

6. Discussion, Recommendations, and Conclusion

6.1 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.

The 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 are two policy recommendations for administrators of a mutual credit system such as the HVC that, if implemented, may help to focus and leverage any marketing or credit benefits to local farmers, with the goal of future expanding those benefits in the long-run.

6.2 Recommendations

6.2.1 Employ “Mutual Metrics”

Using metrics such as transaction reciprocation ratios and ego-network densities can allow researchers, administrators, and potential funders to establish baselines, gauge success, and set measurably achievable goals for mutual credit networks and similar systems. Of course, these metrics should not be used as absolute standards, and qualitative assessment will likely be necessary to contextualize quantitative data. 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.

Similarly, utilizing “mutual metrics” such as transaction reciprocation ratios and ego-network densities may help 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 are relatively uncommon and therefore not familiar transactional tools. In order to effectively communicate goals and activities, mutual credit administrators would have to develop straight-forward explanations and graphical representations of metrics such as transaction performance ratios, reciprocations, and network densities. A possible medium for sharing this information could be monthly or quarterly

statements that allow users to visualize and gauge their own performance in relation to the larger system or to benchmarks established by administrators.

6.2.2 Form “Innovation Partnerships” with Local Farmers

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.

Clearly, high volumes of trades are not occurring spontaneously. 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 farmers are to more fully benefit from participating in the HVC.

6.3 Concluding Statements

While the Hudson Valley Current has not been used as a significant means of exchange, 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.

This transactional analysis used a set of social and economic metrics based on the available mutual credit and community currency literature. To the best of my knowledge, no

previous complementary currency transactional analysis has employed this set of social and economic metrics. This is significant given the facts that complementary currency systems are often promoted as both social and economic tools.

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 so as to include local farmers in a significant way.

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