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## **AN ECONOMIC ANALYSIS OF CONTEMPORARY LOCAL CURRENCIES IN THE UNITED STATES**

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### **ABSTRACT**

Since 1991, over 80 communities in the United States introduced locally printed money. It is argued by proponents that community currency systems revitalize local economies by keeping money circulating locally rather than flowing out, but this study is the first known in-depth economic analysis of these systems. Monetary theory and the experience with local currencies in Argentina indicate that in periods of financial instability and high unemployment, local currencies might provide widespread economic benefits. The experience of the United States during the 1990s, however, suggests that local paper currencies do not promote local economic development during periods of economic and financial stability. Seigniorage from local currencies is small, and cities in the United States that attempted local currencies during the 1990s did not experience higher rates of growth in income than other cities. Eighty-five percent of the local paper currency systems initiated in the United States since 1991 have become inactive.

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## **INTRODUCTION**

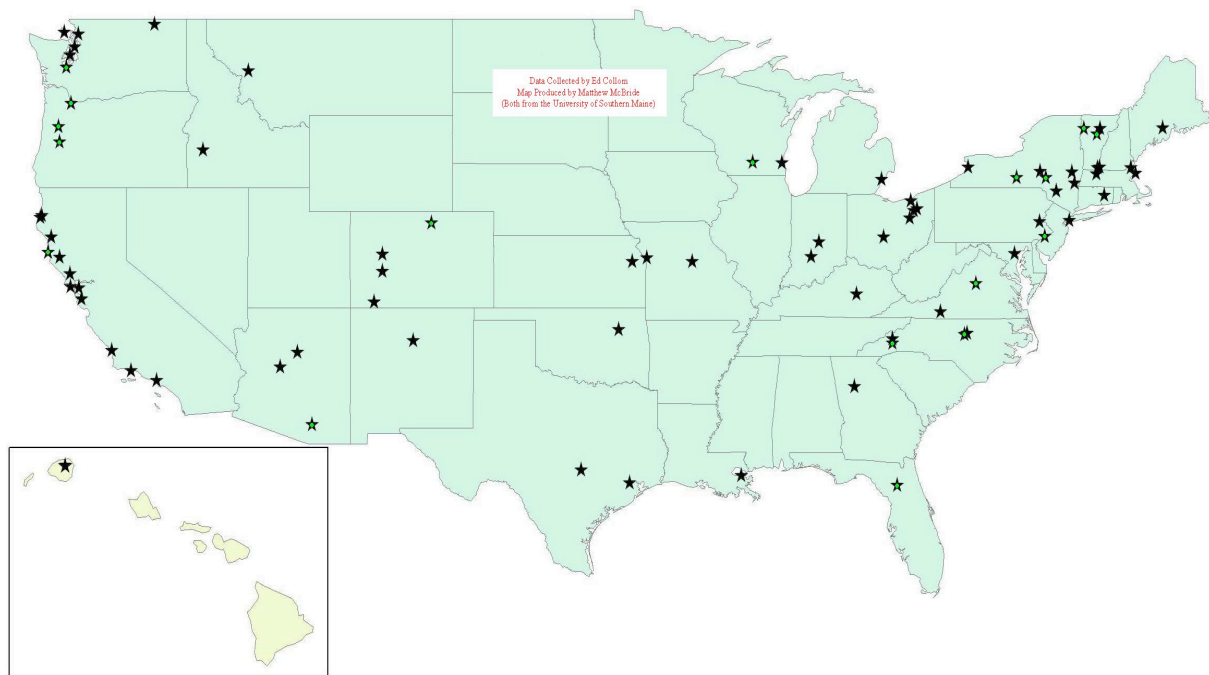
Beginning with Ithaca, New York in 1991, over 80 communities in the United States introduced printed local currencies (Figure 1). This is a curious phenomenon. Over the same period of time, the United States economy was relatively stable by historical standards, electronic payments grew sharply, and 15 European countries abandoned their national currencies and adopted a common currency, the euro. Why did so many communities in the United States introduce their own currencies?

Local paper currency is a subset of the community currency movement that emerged in a number of countries during the 1980's and 1990's. One indication of the extent of the community currency movement is the establishment in 1997 of the online, peer-reviewed *International Journal of Community Currency Research*. Proponents argue that, as part of the anti-globalization movement, community currency systems empower the economically marginalized, foster social relationships, revitalize local economies by keeping money circulating locally rather than flowing out, and promote ecological sustainability (Collom, 2005, and Solomon, 1996: 30).

The present study focuses on the economics of local paper currencies in the United States. To our knowledge, this is the first in-depth economic analysis of these systems. Community currencies in the United Kingdom have been written about extensively in the social science literature, but systems in the United States have received less attention. Jacob et al. (2004) conducted a case study of the local paper currency system in Ithaca, New York, and concluded that the local currency functions as social and cultural capital but does little to increase access to goods and services. Collom (2005) provided the first known comprehensive scientific study of U.S. local paper currency systems. He applied social movement theory and analyzed data on United States cities to identify the types of social environments in which community currencies emerge and survive. Little is known about the extent to which local paper currencies revitalize local economies in the United States.

The study makes several contributions to the literature on local currencies. First, a review of monetary theory and the experience with local currencies in Argentina earlier this decade indicate that in periods of financial instability and high unemployment, local currencies might provide widespread economic benefits. Second, the concept of seigniorage (profit from creating money) is introduced, and estimates of seigniorage in the Ithaca, New York system are provided. Third, a challenge is made to the claim that, because of their limited circulation area, local currencies increase the local expenditure multiplier. Finally, evidence is provided that cities in the United States which introduced local paper currencies during the 1990s grew no faster than those that did not. One conclusion drawn is that local paper currencies do not appear to promote local economic development during periods of economic and financial stability.

**Figure 1. Cities in which printed local currencies were attempted, 1991-2004.**



Source: Collom (2005)

### **HISTORICAL PERSPECTIVES ON COMMUNITY CURRENCIES**

The emergence of community currencies in the 1980's and 1990's had a precedent in the use of scrip during the first half of the twentieth century in the United States. Scrip is a localized medium of exchange that is redeemable for goods or services sold by the issuer. Scrip was issued by thousands of coal mining companies, and hundreds of companies in other industries, such as agriculture, canneries, lumber, and paper (Timberlake, 1987).

Enterprises such as coal mining and lumbering were often located in isolated communities with few businesses providing specialized services such as banking services. Mining companies built residences, churches, schools, and water works, opened company stores, and issued scrip to be used in lieu of ordinary money. Mining company scrip was essentially an interest-free loan between paydays. Scrip was issued at the request of the miner and deducted from his next paycheck. The miner could buy household goods at the company store with the scrip or redeem it in standard money on the next payday. Scrip's alternative in an urban setting was the pawn shop or loan shark.

Scrip was widely used in the United States during the depression years 1932-1935.

"Depression" scrip was issued (1) by local governments due to decreases in tax revenues, (2) by chambers of commerce after local bank failures to increase their members' share of business, (3) by "home-owned stores as a weapon against . . . chain-store competition," (4) by "barter groups as a means by which the unemployed could more conveniently exchange services," and (5) by charitable organizations to needy persons (Harper, 1948 as reported in Timberlake, 1987).

Contemporary community currencies are somewhat different than scrip. Collom (2005) identified three types of community currency systems in operation worldwide: Local

Exchange and Trading Systems (LETS), Time Banks, and Hours systems (printed local currencies). LETS were created in British Columbia in 1983 and have been the most widespread form of community currency schemes. LETS are modern bartering systems. Offers and requests for goods and services are published in a list distributed to members. Transactions between members create credits for the seller and debits for the buyer in units of the national currency. Transactions are reported via telephone, the Internet, or credit notes (checks) to a coordinator who records them in the members' accounts. Most systems have debit and credit limits to discourage free-loading or hoarding. Although uncommon in the United States, in 2000 it was reported that over 2000 communities worldwide had established LETS, but it appears that a substantial proportion of LETS have ceased operations.

Time Banks originated with the Time Dollar Network in Miami, Florida in 1983. Time Banks credit members with a Time Dollar for each hour of service provided to another member, and debit their computerized accounts for each hour of service received. In effect, Time Banks are barter systems restricted to trading hours of service, where each hour of service is equally valued regardless of the skill of the provider. Time Banks USA currently lists 56 Time Dollar networks in the United States and over 200 worldwide.

Unlike LETS and Time Banks where no physical currency changes hands, Hours systems use a paper currency. Hours systems get their name from the first of these systems, Ithaca Hours, established in Ithaca, New York in 1991. One Ithaca Hour can be purchased at a fixed rate of US\$10 because this was the approximate average hourly wage in the area at the time the system was started. The use of printed currency makes the administrative costs of Hours systems lower than those of LETS and Time Banks. The latter require every transaction between members to be accounted for. With paper currency, no transactions are recorded, although there are printing costs and costs of recruiting businesses to accept local currency, as well as the inconvenience of carrying and handling two different currencies. The unpopularity of the two-dollar bill (United States Department of Treasury, 2007) suggests that people may be reluctant to embrace several denominations of a local paper currency.

Collom (2005) found 82 local paper currency systems that had been attempted in 80 United States cities between 1991 and 2004. Of those, only 17 remained active in 2004. A recent internet search found only 10 of these 17 local currency systems to be functional. Two more systems have been established recently: BerkShares in Berkshire County, Massachusetts, and Trade Community Currency in Nevada County, California (Table 1).

**Table 1. Communities with active local paper currency systems as of April 2007.**

System name	City	State
1. Humboldt Exchange	Arcata	CA
2. Trade Market	Nevada City	CA
3. Northern Colorado Local Currency and Barter Project	Fort Collins	CO
4. BerkShares	Great Barrington	MA
5. NCPlenty, Inc.	Chapel Hill	NC
6. Ithaca Hours	Ithaca	NY
7. Corvallis Hours	Corvallis	OR
8. Cascadia Hours	Portland	OR
9. Equal Dollars	Philadelphia	PA
10. Charlottesville Barter Network	Charlottesville	VA
11. Burlington Currency Project	Burlington	VT
12. Madison Hours	Madison	WI

Sources: Collom (2005) and authors' on-line search.

A few additional types of currency systems are listed in the "2006 Annual Report of the Worldwide Database of Complementary Currency Systems" (DeMeulenaere, 2007). Complementary currencies are defined as "currencies that operate separately or in combination with the national currency, and are not limited to a specific geographical area" (DeMeulenaere, 1998), making complementary currencies a broader category than community currencies.

Federal law does not prohibit local paper currency, but its use is restricted, and private coinage is prohibited. "Nothing in the Constitution barred private manufacture of coin and through the first half of the nineteenth century Congress did not act against private coinage . . . General contract law allowed any contractor to issue his notes and circulate them so far as the market would take them" (Hurst, 1973: 37). In 1862, however, Congress outlawed any note, memorandum, token, or other obligation "for a less sum than one dollar intended to circulate as money or to be received or used in lieu of lawful money of the United States" (Timberlake, 1987). Then in 1864, Congress prohibited the issue of any private coins intended to circulate as "current money," defined as a general medium of exchange (Hurst, 1973: 37, note 21). Under these statutes, local paper currencies such as Ithaca Hours are allowed as long as the minimum value is one dollar or more and the notes are dissimilar to the lawful currency of the United States (Solomon, 1996: 98-99).

The present study focuses on the economics of printed local currencies in the United States (Hours systems). To understand better how these systems work and the extent of their economic benefits, the original and still active contemporary local currency system, Ithaca Hours, will be described in further detail.

## **ITHACA HOURS**

Ithaca Hours is a local currency established in 1991 with a fixed value of \$10 per Ithaca Hour. Hours are not backed by any commodity such as gold, nor are they redeemable in dollars. The current denominations of Ithaca Hours are One Hour, One-Half Hour, One-Quarter Hour, One-Eighth Hour, and One-Tenth Hour. A Two Hour note is still in circulation but is no longer being printed. Each denomination is imprinted with the motto, "In Ithaca We Trust," and an image representing some aspect of Ithaca, New York. For example, Lick Brook Falls is depicted on the One-Hour note, and a salamander appears on the One-Eighth Hour note (Figure 2). The One-Tenth Hour note, equivalent to \$1, was introduced five years ago to facilitate making change. To reduce production and handling costs, it was suggested at the time that the One-Eighth Hour note, worth \$1.25, be discontinued. The suggestion, however, was met with opposition. Some users did not want to see the salamander go. The opposition prevailed, and the salamander was saved (Burke, 2007).

The stated purpose of Ithaca Hours is to promote "local economic strength and community self-reliance in ways which will support economic and social justice, ecology, community participation and human aspirations in and around Ithaca, New York. Ithaca Hours help to keep money local, building the Ithaca economy. It also builds community pride and connections." These aims resonate with some of the reasons for issuing Depression scrip in the 1930's. Over 900 participants publicly accept Ithaca Hours for goods and services, including a hospital and a credit union. Some local employers and employees have agreed to pay or receive part of wages in Ithaca Hours (Ithaca Hours, Inc., 2007).

Although anyone can exchange Ithaca Hours, individuals and businesses that pay a \$10 fee receive 2 Hours (worth \$20) and a listing in the Ithaca Hours Directory, indicating that they accept some amount of Ithaca Hours for the goods or services provided. The Directory is the system's "yellow pages" and is distributed throughout Tompkins County and on the system's web site. Low-cost publicity and a small amount of local currency are incentives for businesses to participate in the system.

**Figure 2. Denominations of Ithaca Hours**



Source: Ithaca Hours, Inc. Home page on-line.

Disbursements to those who pay for a listing in the Directory are one way that new Hours get into circulation. Small grants to community organizations, loans to business participants, and paying printing and administration costs also put Hours into circulation (Ithaca Hours, Inc., 2006). For example, 30 Hours were given in 2006 to support the Fall Creek Elementary School's reading program. Another 30 Hours were granted to Catholic Charities for building repairs. In 2006, 566 new Hours worth \$5,660 were circulated through disbursements, community grants and system expenses. An additional 97.60 Hours worth \$976 were sold or exchanged for damaged notes (Feuer, 2007). It was estimated that in 2005 approximately 10,000 Hours worth \$100,000 circulated in Ithaca (Ju, 2005). The supply of Hours is controlled by the Circulation Committee of Ithaca Hours, Inc.

It is recognized that businesses must take in United States dollars to meet obligations outside of the Ithaca Hours system. Merchants are asked by officials of the system to accept only a



quantity of Hours that they are able to spend in the local economy. For example, a credit union accepts Hours for 100 percent of any fees and up to one Hour per loan payment. To spend the Hours, the credit union gives preference to vendors who accept Hours in partial payment, pays staff members partially in Hours, and gives Hours as change (Chernikoff, 2007). In spite of the guidance offered, a problem that the system faces is the stockpiling of Hours at businesses. It can be difficult for larger businesses to spend Hours they receive. A food co-op, for example, reported to have stockpiled \$33,731 worth of Hours at the end of 2007 (Notice posted at the Green Star Cooperative Market, 2008), approximately one-third of the amount in circulation. The stockpiling of Hours threatens their acceptability at that establishment and therefore throughout the local economy. To address this issue, the co-op recently reduced the maximum number of Hours it will accept for purchases.

For the first five years or so of its existence, the Ithaca Hours system had no formal structure. Upon request of the state government of New York, a non-profit organization, Ithaca Hours, Inc., was formed to manage the system. An eight-person Board of Directors is elected from the membership and meets on a monthly basis. The biggest tasks of the organization are to disburse the currency, to collect listing fees, and to update the directory. A part-time administrator was hired a few years ago to perform and direct some of the tasks, and at least 25 percent of the administrator's pay is in Hours (Burke, 2007).

The largest annual expenses for Ithaca Hours, Inc. are for the administrator and other professional services (\$4,464 in 2006) and the Directory (\$2,899). The currency is printed in bulk every several years to reduce printing costs. The last printing was six or more years ago. At that time, Hours worth \$50,000 were printed at a cost of approximately \$5,000, or 10 percent of the face value of the currency (Burke, 2007, and Feuer, 2007).

### **SOME ECONOMICS OF MONEY AND LOCAL CURRENCIES**

In this section, we take an economic approach to understanding the emergence and economic impact of contemporary local paper currencies in the United States. We begin by reviewing the nature of money, its benefits to a society, and the role of governments in monetary systems. We then consider several economic factors that might result in the beneficial use of multiple currencies. These include the scarcity of money and credit and the accompanying unemployment, inflation, seigniorage, and restrictions on circulation.

Money is anything that is generally accepted as payment for goods and services or in the repayment of debt. Money benefits society by lowering the costs of transactions, which encourages specialization and raises the standard of living. Money accomplishes this by serving as a unit of account, which lowers the costs of price information and record-keeping, and by eliminating the double coincidence of wants necessary for barter. Like other assets, money is a store of value (Hubbard, 2005: 7-21).

Governments involved themselves in early monetary societies to certify the purity and weight of coins. This resulted in coins being more readily acceptable which stimulated trade. Governments also sought seigniorage as a source of public revenues. Seigniorage, the profit from creating money, is equal to the value of money in exchange minus the cost of producing and distributing it. Especially during war when their expenditures grew rapidly, governments obtained seigniorage by debasement (a reduction in the value of metal contained in coins), issuing token coins (coins whose face value is greater than the value of the metal in the coin), and issuing paper fiat money (money by decree). The seigniorage from printing fiat money is

nearly 100 percent (Simpson, 1976: 24-25). However, because the seigniorage from fiat money is so large, governments may be tempted to issue it at such a high rate as to cause inflation, which reduces the value of money and, if high enough, leads to a substitution of another currency for the official currency (Feige, 2003).

To explain the existence of dual or multiple currencies in societies, economic theorists have developed over the past 20 years monetary search models. As the result of trading frictions and the lack of credit in these models, traders use multiple fiat currencies (Craig and Waller, 2000). Colacelli and Blackburn (2006) applied a monetary search model to analyze the use of a private fiat currency called the *crédito* in exchange clubs in Argentina during its national monetary problems in 2001-2002. They emphasize the scarcity of the national currency in explaining the widening circulation of the *crédito*. The money stock of Argentina declined nearly 18 percent in 2001. In July 2002, the unemployment rate soared to over 20 percent, and approximately 7 percent of the population was using *créditos* to trade in exchange clubs. This experience is similar to that of the United States with Depression scrip in the 1930s, although a smaller percentage of the United States population is estimated to have participated in self-help and barter organizations. Colacelli and Blackburn estimate that *crédito* use increased the gross domestic product of Argentina by 0.6 percent in 2002. The acceptability of *créditos* declined in 2003 after the government expanded unemployment insurance benefits and the supply of pesos increased.

A transaction that would not have taken place without the complementary currency is called trade creation by DeMeulenaere (1998). Excess production capacity that is left idle within the existing national monetary system can become employed through the creation of local currency and the demand for goods and services it generates. The Colacelli and Blackburn study of *créditos* in Argentina provide evidence of trade creation through complementary currencies during a period of scarce money and high unemployment.

Scarcity of money and high unemployment do not, however, explain the emergence of local currencies in the United States during the 1990s. The stock of money (M1) increased by 7.6 percent per year on average in the 1980s (December to December) and 3.5 percent per year in the 1990s. From 1983 to 2000, the United States economy experienced two long economic expansions separated by a mild recession in 1990-1991 (National Bureau of Economic Research, 2007). Neither does a high rate of inflation account for the appearance of local paper currencies in the 1990s. The rate of inflation has been low and fairly stable since 1982. The period of relative stability of the United States economy since the mid-1980s has been dubbed "the Great Moderation" (Bernanke, 2004).

Another economic benefit of local paper currencies is seigniorage. The situation is similar to a country using a domestic currency rather than a foreign currency. Fischer (1982) argued that if there are no costs of exchanging domestic for foreign money in international transactions, then a rational, self-controlled government would use its own currency to obtain seigniorage. Fischer showed seigniorage to be an important source of revenue for most governments, averaging about 1 percent of gross national product (GNP) per year. There is also a one-time benefit of switching to a domestic currency of about 8 percent of GNP on average. This argument for using a domestic currency might be overturned if the transaction costs of exchanging domestic for foreign money are large enough, as might be the case for small open economies, or if a country lacks the discipline to control its money supply.

Local paper currencies, of course, do not replace the national currency, rather they are complementary currencies. Therefore, the seigniorage from local currencies is likely to be much less than 1 percent of local production and income. How large is the seigniorage from local currencies? For the Ithaca Hours system, a crude measure of seigniorage is the new issues of Hours through disbursements and grants minus the costs of printing the currency. As stated earlier, printing costs are approximately 10 percent of the value of the Hours. In 2006, this crude measure of seigniorage is  $\$5,660 - \$566 = \$5,094$ . Money income in Ithaca was approximately \$393 million in 1999, so this measure of seigniorage from Ithaca Hours is less than one-hundredth of a percent of income (Gaquin and DeBrandt, 2006: 1066, 1069 and authors' calculation).

A better measure of seigniorage from Ithaca Hours would account for administrative costs, the cost of the Directory (which enhances the acceptability of Hours), and revenue from the Directory and sales of Hours. As shown in Table 2, one such measure of seigniorage is \$5,550. This particular measure might overstate true seigniorage because it excludes the value of volunteer labor supplied to the system and includes in revenues some transfers from other accounts. The conclusion, however, is the same reached by the crude measure above: Seigniorage from Ithaca Hours is small relative to the size of the local economy.

Proponents of local currencies claim that local currencies revitalize local economies by restricting the currencies to circulate locally (for example, see Meeker-Lowry, 1996, and Solomon, 1996: 31-32). Whereas the national currency drains out of the local economy when it is spent on non-locally owned businesses or on goods that are imported from outside of the community, local currencies are not generally acceptable outside of the community and must circulate within the local economy. This is called a "multiplier effect" (DeMeulenaere, 1998), meaning that local currencies are thought to increase the size of the local expenditure multiplier.

**Table 2. Seigniorage from Ithaca Hours, 2006**

Values in dollars.

	Ithaca Hours	US\$
Revenue	8,465	6,301
New issues of Hours (disbursements and grants)	5,660	
Directory income (fees and ads)	2,305	3,660
Hours sold/exchanged		976
Other revenue	500	1,665
Costs	3,101	6,115
Printing new issues (estimate)		566
Directory expenses	1,271	1,628
Professional services	1,375	3,089
Other costs	455	832
Seigniorage = Revenue – Costs		
= (8,465 + 6,301) – (3,101 + 6,115)		
= 5,550		

Sources: Feuer (2007), Burke (2007), and authors' calculations.

The concept of the local expenditure multiplier is related to the circular flow of income and expenditures. An initial increase in expenditures on locally produced goods and services creates income for the seller. Part of the increase in the seller's income gets spent on other goods and services, creating more income and spending, and so on. The total amount of local income created per unit of initial local expenditures is referred to as the local expenditure multiplier. The size of the local expenditure multiplier is limited by the fraction of additional income that leaks out of the circular flow for spending on goods and services not produced locally, saving, and taxes. The smaller the fraction of additional income spent on non-locally produced goods and services, for example, the larger the multiplier.

The fact that local currencies are restricted to circulating locally is not sufficient, however, to establish that they will increase the size of the local expenditure multiplier and thereby revitalize local economies. It is possible that a transaction made in a local currency merely substitutes a transaction formerly made in the national currency. This is called trade substitution, and has no direct net effects on income and employment (DeMeulenaere, 1998). For a local currency to increase the size of the local expenditure multiplier, the fraction of additional income spent on locally produced goods and services must be increased. Substituting a local currency for the national currency in some transactions will not necessarily accomplish this. The existence of a multiplier effect from local currencies is an empirical issue. We are unaware, however, of evidence of the effects of local paper currencies on local expenditure multipliers.

To assess the combined effects of trade creation, seigniorage, and the multiplier effect on local economies, a model was estimated to compare the rates of economic growth of United States cities that used local paper currencies to growth rates of cities that did not.

### **LOCAL CURRENCIES AND CITY INCOME GROWTH IN THE 1990s**

The model of city income growth developed by Glaeser, Scheinkman, and Shleifer (1995) was adapted to assess the effects of local currencies on local economies. In their model, income growth is related to population, income level, education level, unemployment rate, industrial composition, government expenditures, and geographical location. The model is similar to national models of economic growth with the inclusion of initial income to test for income convergence, education to account for human capital, and geographical location as a proxy for weather. Compared to countries, however, there is relatively free movement of labor, capital, and ideas among cities, so additional variables related to the quality of life and to migration are included in the city growth model. Cities with local paper currency systems active in 2004 are identified by a dummy variable whose value equals one if the city has a local paper currency and zero otherwise. Similarly, cities that attempted local paper currency systems since 1991 but which were inactive in 2004 are identified by another dummy variable. The cities with active and inactive local currency systems were separated to allow for the possibility that active systems had greater effects on local economies than did currently inactive systems.

The model can be represented by the following equation:

$$\text{INCOME GROWTH}_i = \beta_0 + \beta_1 * \text{ACTIVE}_i + \beta_2 * \text{INACTIVE}_i + \beta_3 * \text{OTHER VARIABLES}_i + \varepsilon_i, \quad (1)$$

where  $i$  denotes the city and  $\varepsilon$  is an unobserved error term. If the unknown parameters  $\beta_1$  and  $\beta_2$  are positive, then cities with local paper currencies had higher rates of economic growth than cities that did not have local currencies.

Data used to estimate the parameters of model came from the 1994 County and City Data Book and the 2006 County and City Extra (Gaquin and DeBrandt, 2006), the original source being the U.S. Census Bureau. A city is defined here as an urban area of at least 10,000 population (Office of Management and Budget, 2000). The sample consisted of 1051 cities that had 25,000 or more citizens in 1990 less the 55 observations with missing government expenditure data. None of the cities with missing data had a local currency. Of the 17 communities with active local currencies in 2004, 14 were in the sample. Of the communities which attempted local currency systems but were inactive in 2004, 33 were in the sample. Growth in city per capita income was measured by the difference in the logarithm of per capita money income between the years 1989 and 1999. The mean of this variable in the sample was 0.371, meaning that the average growth in city income from 1989 to 1999 was approximately 37 percent. Manufacturing's share of employment was from 1987. Other variables use 1990 values.

The model was estimated by feasible generalized least squares due to an indication of heteroskedasticity, a non-constant variance of the error term (Greene, 1997: 558-559). Heteroskedasticity is common in models estimated with cross section data. If the variance of

the error term is not constant, the method of ordinary least squares provides invalid estimates of the standard errors and, therefore, invalid tests of parameters. Feasible generalized least squares is one method that can produce valid parameter tests in large samples.

The estimation results for the city income growth model over the 1990s are similar to those found by Glaeser et al. for 1960-1990. City per capita income growth was negatively related to initial population and per capita income, and positively related to education level as measured by the percentage of the population with a bachelor's degree (see the column labeled Coefficient in Table 3). The statistical significance of the coefficient estimates can be assessed by the t-statistics and probability values (p-values, or marginal significance levels). Conventionally, a coefficient is judged to be statistically significant in large samples if the t-statistic is greater than 1.96 or if the p-value is 0.05 or less. By these standards, the coefficients on initial population, per capita income, and education level were statistically significant (Table 3). Manufacturing's share of employment was statistically insignificant, but per capita government expenditures were positively related to per capita income growth and its coefficient was statistically significant. To control for differences in regional growth, dummy variables were included for the South, Northeast, and Midwest regions of the United States, leaving out the West for comparison. As found by Glaeser et al. for earlier time periods, cities in the South grew faster, and cities in the Northeast grew slower, than those in the West during the 1990s, as shown by the positive and negative coefficients, respectively, on their regional dummy variables (Table 3). Two differences with the Glaeser et al. results are that the coefficient on the unemployment rate was insignificant and that per capita income in the Midwest grew faster than similar cities in the South in the 1990s (a coefficient of 0.055 on the Midwest dummy variable compared to 0.025 for the South).

Of central concern here are the effects of local paper currencies on local economic growth. The results in Table 3 show no significant difference between the growth rates of per capita income for cities that have active or inactive local paper currency systems compared to those that never did. The estimate of  $\beta_1$ , the coefficient on the active local currency dummy variable, is negative (-0.012) and insignificant (p-value = 0.405). The estimate of  $\beta_2$ , the coefficient on the inactive local currency dummy, is positive (0.002) but insignificant (p-value = 0.736). The economic effects of local paper currencies were too small to be detected in data on the growth of local per capita income over the 1990s.

There are some limitations of the statistical analysis worth noting. One is that the cities are not distinguished by the starting date of the local currency systems. It is likely that the effects of a local currency on city income growth from 1989 to 1999 would have been greater for cities that introduced the local currencies earlier in the decade rather than later. The estimated effects might be biased downward as a result. Another limitation is that some income received in the form of the local currency might go unreported. A third limitation of the analysis is that while the aggregate economic benefits of local currencies appear to have been negligible, the increases in income might have been more substantial to the subset of businesses and community organizations exchanging the local currencies.

**Table 3. Estimation Results**

Explanatory variable	Coefficient	t-statistic	p-value
Active local currency dummy	-.012	-.83	.405
Inactive local currency dummy	.002	.34	.736
Log population (1990)	-.006	-2.35	.019
Per capita income (1989)	-5.24E-06	-5.96	.000
Percent bachelor's degree (1990)	.003	8.13	.000
Unemployment rate (1990)	.001	.52	.605
Manufacturing share employment (1987)	.000	.97	.333
Per capita government expenditure (1990)	7.13E-06	1.97	.049
South dummy	.025	3.31	.001
Midwest dummy	.055	7.75	.000
Northeast dummy	-.026	-2.93	.003

Dependent variable: Change in log per capita income, 1989-1999.

Number of observations: 996.

Method of estimation: Feasible generalized least squares.

## CONCLUSION

Local currencies have a history of spontaneously arising to the benefit of local populations in circumstances of inadequate banking services, shortages of money, and high unemployment. The benefits are consistent with monetary theory and have been quantified for Argentina in the early 2000s. The experience of the United States during the 1990s, however, suggests that local paper currencies do not offer large economic benefits during periods of economic and financial stability. Seigniorage from local currencies is small, and it is debatable that restrictions on circulation imply that a local currency increases the size of the local expenditure multiplier. Cities in the United States that attempted local currencies during the 1990s did not appear to experience higher rates of growth in income than other cities. Perhaps most telling is the observation that more than 85 percent of the local paper currency systems begun since 1991 in the United States have become inactive. In relatively good economic times, printed local currencies do not appear to foster local economic development as proponents assert. If the financial turmoil, credit restrictions, and sharp increases in the prices of oil and food during 2007 and 2008 result in a severe economic recession, however, conditions would be in place for local paper currencies to provide greater economic benefits.

## REFERENCES

- Bernanke, B. (2004) "The Great Moderation." Speeches of Federal Reserve Board Members. Internet on-line. <<http://www.federalreserve.gov/>>. [10 July 2007].
- Burke, S. (2007) Interview by authors. 13 April, Ithaca, NY.
- Chernikoff, C. (2007) Interview by authors. 13 April, Ithaca, NY.
- Colacelli, M. and D.J.H. Blackburn (2006) "Secondary Currency: An Empirical Analysis," Manuscript, Barnard College.
- Collom, E. (2005) "Community Currency in the United States: The Social Environments in Which it Emerges and Survives." *Environment and Planning A*. Vol 37(9) (September) pp. 1565-87.
- County and City Data Books, 1994 Edition. Retrieved from the University of Virginia, Geospatial and Statistical Data Center: <<http://fisher.lib.virginia.edu/collections/stats/ccdb/>>. [October 2006].
- Craig, B.R. and C.J. Waller (2000) "Dual-Currency Economies as Multiple Payment Systems." *Economic Review*. Vol 36(1) (Winter) pp. 2-13.
- DeMeulenaere, S. (1998) "An Overview of Parallel, Local and Community Currency Systems." Complementary Currency Resource Center. Internet on-line. <<http://www.complementarycurrency.org/materials.php>>. [28 June 2007]
- DeMeulenaere, S. (2007) "2006 Annual Report of the Worldwide Database of Complementary Currency Systems." *International Journal of Community Currency Research*. Vol 11 pp. 23-35.
- Feige, E.L. (2003) "Dynamics of Currency Substitution, Asset Substitution and De Facto Dollarisation and Euroisation in Transition Countries." *Comparative Economic Studies*. Vol 45(3) (September) pp. 358-83.
- Feuer, C. (2007) Email message to authors, 14 March.
- Fischer, S. (1982) "Seigniorage and the Case for a National Money." *The Journal of Political Economy*. Vol 90(2) (April) pp. 295-313.
- Gaquin, D. and K. DeBrandt, eds. (2006) *2006 County and City Extra*. (Bernan Press, Lanham, MD).
- Glaeser, E., J. Scheinkman, and A. Shleifer (1995) "Economic growth in a cross-section of cities," *Journal of Monetary Economics*. Vol 36 pp. 117-43.
- Greene, W. (1997) *Econometric Analysis, Third Edition*. (Prentice Hall, Upper Saddle River, NJ)
- Harper, J. (1948) Scrip and Other Forms of Local Money. Ph.D. dissertation, University of Chicago.



Hurst, J. (1973) *A Legal History of Money in the United States, 1774-1970*. (University of Nebraska Press, Lincoln, NE).

Ithaca Hours, Inc. (2006) *2006 Ithaca Hours Directory*. (Privately printed, Ithaca, NY).

Ithaca Hours, Inc. (2007) Home page on-line. <<http://www.ithacahours.org/index.php>>. [7 July 2007].

Jacob, J., M. Brinkerhoff, E. Jovic and G. Wheatley. (2004) "The Social and Cultural Capital of Community Currency: An Ithaca HOURS Case Study." *International Journal of Community Currency Research*, Vol 8 pp. 42-56.

Ju, A. (2005) "Ithaca HOURS: Local currency 'backed by relationships'." *Ithaca Journal*, Vol 19 (October). Internet on-line. <<http://www.ithacahours.org/index.php>>. [7 July 2007].

Meeker-Lowry, S. (1996) "Community money: the potential of local currency." In Mander, J. and E. Goldsmith (Eds.) *The Case Against the Global Economy*. Sierra Club Books, San Francisco, CA. pp. 446-59.

National Bureau of Economic Research. (2007) "Business Cycle Expansions and Contractions." Internet on-line. <<http://www.nber.org/>>. [10 July 2007].

Notice posted at the Green Star Cooperative Market, April 2008. Ithaca, NY.

Office of Management and Budget. (2000) "Final Report and Recommendations From the Metropolitan Area Standards Review Committee to the Office of Management and Budget Concerning Changes to the Standards for Defining Metropolitan Areas." Internet on-line. <<http://www.whitehouse.gov/omb/infoereg/metro2000.pdf>>. [23 May 2008]

Solomon, L. (1996) *Rethinking Our Centralized Monetary System: The Case for a System of Local Currencies*. (Praeger Publishers, San Francisco, CA).

Timberlake, R. H. Jr. (1987) "Private Production of Scrip-Money in the Isolated Community." *Journal of Money, Credit and Banking*. Vol 19(4) (November) pp. 437-47.

United States Department of the Treasury. "FAQs: Currency--Denominations". <<http://www.ustreas.gov/education/faq/currency/>>. Internet on-line. [13 July 2007].