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Introduction and summary

Like many other industrialized countries, the United States continues to transition from paper-based payments (cash and checks) to electronic payments. For society as a whole, the benefits of this shift may be substantial, since the marginal cost of an additional transaction on an electronic payment network is almost always considerably less than it would be on a paper-based network. For most households in the U.S. today, currency (cash) still represents a transactions vehicle, but one that is increasingly being upstaged by a variety of substitutes, such as debit cards. However, as we detail in this article, for many Latin American immigrants, currency represents not only their primary transactions vehicle, but may also represent their only savings vehicle. Indeed, in our study of Latin American immigrants in Chicago, we find evidence that the dramatic increase in the number of immigrants is supporting a growing demand for currency, notably in the \$100 denomination. We argue that this trend has quite possibly contributed to the increase in domestic demand for currency since the late 1990s—an increase that is at odds with the generally accepted view that cash is on the way out.

For some time, underlying economic forces have suggested to a number of observers that electronic money was poised to replace cash. James Gleick, the author of *Chaos: Making a New Science*, declared over a decade ago:

Cash is quaint, technologically speaking—unless you're impressed by intaglio-steel-plate-printed paper with embedded polyester strips (meant to inconvenience counterfeiters). Cash is expensive—tens of billions of dollars drain from the economy each year merely to pay for the printing, trucking, safekeeping, vending, collecting, counting, armored-guarding, and general care and feeding of our currency. Cash is obsolete.¹

As the *Economist* magazine put it recently, “The economics of handling cash ... is suddenly subsumed by Moore's law,” which speaks to the ongoing technological advances in computing capability that can be expected over time.² In some fashion, these technological improvements will be echoed in lower effective costs of creating and operating digital networks, including digital payment networks. These devel-

opments, in turn, will make cash substitutes more attractive to payment providers and users. As the digital networks garner greater shares of payments, cash usage will decline. This development will then raise the cost of handling cash (as the current scale economies in cash-handling networks diminish), leading to a further decline in cash usage.³

Against the tide of this trend toward replacing cash with electronic payment instruments is the fact that, over the past decade, the amount of U.S. currency held domestically has increased, particularly notes in the largest denomination in circulation, \$100 bills. Since 1995, the aggregate value of \$100 bills in circulation has more than doubled, yet the share of \$100 bills held abroad has decreased from its peak of 70 percent, and, more recently, held steady at about 65 percent. How does the rising Latin American immigrant population in the United States factor into recent trends in currency use? Our research suggests that barriers to participation in the mainstream financial system and other factors continue to make cash more attractive than alternative payment instruments among this growing immigrant population. For example, a 2002 survey of 302 Latin American immigrants found that about 59 percent of payments were made using cash. The second most popular method was check, used for about 20 percent of payments.⁴

In the next section, we examine recent trends in the use of cash, particularly the recent upswing in domestic currency use. Next, we analyze factors underlying currency demand. We discuss the financial participation of immigrants and the reasons why a large number of immigrants do not make use of mainstream financial institutions. Then, we use the 2000 U.S. Census and Federal Reserve data to analyze currency use among the Latin American population in Chicago, and assess the economic implications of these developments. Though limited to a relatively small geographic area, metropolitan Chicago provides an initial testing ground for our hypotheses, helping us to assess whether they warrant examination on a broader scale.

We find that the demand for \$100 bills is greater in Chicago neighborhoods with higher concentrations of foreign-born Latin Americans than in other immigrant neighborhoods or other Chicago neighborhoods in general. Our results suggest that Latin American immigrants hold these bills as a store of value, since the convenience of this denomination in most day-to-day transactions is quite limited. Although the timing is suggestive, additional research is needed to determine whether this immigrant group (and, in particular, the growing number of undocumented workers from Mexico and Central America) represents the source of the recent upward trend in real per capita domestic currency holdings.

Trends in domestic currency use

The economic tide now running against currency is many-sided. In most circumstances, the competitors to currency, for example, credit cards, offer more: Some have higher yields, better record-keeping mechanisms, points/benefits (such as airline miles or “cash back” offers), and/or resolution mechanisms for transactions that turn sour. And while using currency at the checkout used to be more convenient than using checks, credit cards, or debit cards (mainly because currency transactions were quicker), electronic networks have reversed that in many venues. Today, drivers with transponders pay tolls electronically as their vehicles speed through Illinois Tollway plazas, while drivers without transponders wait in lines to hand over cash to toll collectors or to throw coins into 1950s-era coin hoppers. Radio frequency identification (RFID) technology similar to that embedded in the Illinois Tollway transponders is now also available on contactless cards marketed by the major card networks. Contactless cards allow time-constrained customers to pay more quickly at the retail checkout or the automated gas pump with a quick swipe of the hand. Finally, the storage technology embedded in currency has shrunk drastically. Fifty years ago, the highest denomination note in real terms was approximately equal to one full year of disposable income for the average household, whereas now it is closer to only 1.3 days of salary.⁵

A recent survey by the American Bankers Association and Dove Consulting bears out many of these suppositions about the emergence of cash substitutes in the retail marketplace. This survey of consumer payment preferences found that over the last two years respondents reported using cash less often (versus more often) by a margin of nearly three to one.⁶ Moreover, the growing use of cash substitutes was widely dispersed over a variety of retail outlets: grocery stores (94.5 percent reported using cash less frequently), gas stations or convenience stores (90.9 percent), department stores (96.0 percent), discount stores (88.3 percent), drug stores (88.5 percent), and restaurants (83.9 percent).⁷ A variety of reasons were offered for this change in behavior: Respondents were more comfortable using noncash payment methods; they gained access to other payment methods besides cash; they found noncash payment methods faster to use; they noted that more merchants accepted noncash payments; they enjoyed the rewards for making noncash payments; and they found noncash payment methods easier to use.⁸

So it appears that in many venues the rewards for using electronic payment methods outweigh those for using cash. But is cash truly becoming outmoded? Not necessarily. Some categories of transactions, including many illegal or “off-the-books” ones, are likely to remain “cash and carry.” Another area of growth in demand for U.S. currency has been overseas markets, such as Argentina and Russia. Residents

of such countries have become accustomed to holding U.S. bank notes as a hedge against banking sector instability and/or hyperinflation in their home currencies. Indeed, as a result of strong growth in overseas demand for U.S. currency in the 1990s, Federal Reserve Board Governor Lawrence Lindsey called the dollar America's most ignored export.⁹

Although these general observations offer direction on the recent trends in currency, we also examine broad aggregate indicators of currency usage. If the ratio of currency to gross domestic product (GDP) was declining, it might suggest a transition to the hypothesized decline-of-currency scenario. To explore this possibility, figure 1 displays the time series of the ratio of total currency in circulation outside of banks to nominal GDP from 1965 through 2005. This ratio declined as other payment media such as credit cards displace some cash payment over the early part of the period shown. Beginning in the late 1980s and continuing well into the 1990s, however, cash shipments to foreign destinations, particularly to Argentina and subsequently to Russia, dominated movements in overall currency and reversed the initial downtrend (see Porter and Judson (1996)).¹⁰

If we subtract the estimate of currency held abroad from the numerator, the pattern changes dramatically, as shown in figure 2.¹¹ We now see a more uniform downward trend in this ratio, as we would expect if domestic currency usage was declining relative to other payment means. Near the end of the period shown, however, we see a reversal in the downward trend. Figure 3 reorders the information in figure 2 by highlighting per capita domestic currency balances. For most of the period shown, these balances fluctuate in real terms between \$800 and \$900, but they rise sharply (by nearly 40 percent) near the end. Moreover, both the ratio of aggregate domestic currency to GDP (figure 2) and domestic currency per capita (figure 3) show this sharp increase starting around 1997 and continuing through the last observable year shown, 2005.

One denomination in particular—the \$100 bill—is producing this trend. Table 1 lists the U.S. bank notes in circulation, including \$100 bills in circulation and the estimated portion held abroad. Since 1995, the aggregate value of \$100 bills in circulation has more than doubled, yet the share of \$100 bills held abroad has decreased from its peak of 70 percent, and, more recently, held steady at about 65 percent. This reverses a trend of growing foreign demand for U.S. currency.¹²

Table 2 shows the shipments of three denominations of U.S. currency—\$5 bills, \$20 bills, and \$100 bills—by Federal Reserve District for 2005. The first column under each denomination, labeled “received,” lists the values of that particular denomination received by each of the Federal Reserve Banks from its customers, that is, the financial institutions located within that Federal Reserve District. The “paid” column contains dollar values shipped out by the individual Federal Reserve Banks to their customers, and the “net” column is the net flow that may be held either abroad or domestically. Net shipments of \$5 bills are negligible compared with the shipments in and out; the net is under 4 percent of the total paid out. Similarly, for the \$20 bills, the net makes up less than 3 percent of shipments out. Net shipments of \$100 bills, in contrast, are a little over 11 percent of the total paid out. The relatively large net figures for New York, San Francisco, and Atlanta are not necessarily surprising, since these Federal Reserve Districts have traditionally processed substantial amounts of currency from, or to, foreign endpoints. The larger positive flows for Richmond and Chicago, however, are more surprising. This increase may reflect the surge in Latin American immigration (which is described in detail later) in these two Federal Reserve Districts. Together, tables 1 and 2 suggest that \$100 bills are being held, and increasingly so at home rather than abroad.

Explaining currency demand

What reasons could help to explain the increase in domestic demand for currency? Traditionally, an individual’s demand for currency is viewed along inventory theoretic lines, in which money demand depends positively on income received in a period and a brokerage (or transaction) fee for getting into and out of an interest-bearing instrument and negatively on a short-term nominal interest rate.¹³ The traditional transaction demand for money depicts money holdings as following a saw-tooth pattern over income periods; that is, money holdings (whether in currency or in a bank account) rise rapidly with receipt of income or other source of payment, and then fall slowly as the money is spent continuously over time.¹⁴ When nominal interest rates are low or the brokerage fee is high relative to income, it may not pay to have an interest-bearing account at all. In this case, the individual only holds one financial instrument, currency.

In addition to interest rates and brokerage fees, Cagan’s classic analysis of the demand for currency, considers three additional candidates that could explain this trend: crime, tax evasion, and travel.¹⁵ A downward movement in nominal interest rates will lower the opportunity cost of holding currency and raise desired currency balances. Interest rates have been very low over the past several years; the federal

funds rate averaged only 3.2 percent in 2005, while interest-bearing checking accounts paid depositors about 0.31 percent in interest per year over this period. Thus, it is conceivable that the low level of interest rates generally prevailing after the events of September 11, 2001, might account for the recent increase in domestic currency demand. However, figure 3 (p. 5) shows that nominal interest rates do not appear to have had a powerful enough influence on real domestic currency per capita to explain the changes in levels. This result is in line with estimates that suggest that currency demand is not that elastic with respect to nominal interest rates.

What about crime and tax evasion? Our earlier work has cast doubt on the crime explanation for currency demand, and current crime statistics support our prior assessment.¹⁶ Evidence using either the overall variation in crime or in drug arrests (figure 4) suggests that crime is not the missing link in currency demand.¹⁷ Moreover, the movements of average marginal tax rates in the United States do not indicate that there has been an increase in the incentive to evade federal taxes (and therefore hold more cash), as displayed by the tax rate series compiled by the National Bureau of Economic Research in figure 5.

Finally, Cagan argues that the volume of currency used to transact a given volume of retail trade may vary with the *volume of travel per capita*. Writing near the end of the 1950s, he reasoned that payments by check or credit require that the parties making the exchange know each other. When travel increases, currency is likely to supplant checks. Why? Simply because the traveler will be buying where he or she is not known or has not had an opportunity to establish a line of credit.

Consider, in particular, workers who move from Mexico and other Latin American countries to Chicago.¹⁸ Like other immigrants, they are travelers and make relatively frequent return visits to their hometowns where they maintain family ties.¹⁹ Even if they have been settled in Chicago for some time, they remain less likely to participate in the formal banking sector here. For a variety of reasons, such as language barriers, lack of documentation, and distrust of banks, these immigrants tend to use checks, credit cards, and debit cards much less often than the general population does. Using Cagan's framework, one might classify them as being perpetual travelers.

Unlike the other explanations we have considered—interest rates, crime, and tax evasion—travel (specifically, immigration) provides the most viable explanation. Immigration from Mexico and other Latin

American countries has grown at astonishing rates in recent years. Moreover, the brokerage fees (discussed earlier) may not be similar for all residents. If an individual is familiar with banking and can readily open and use a checking account or other bank account, then the brokerage fee in getting to a bank or automatic teller machine (ATM) to deposit or withdraw funds may represent only the classic “shoe leather” costs.²⁰ On the other hand, for immigrants there are often other impediments that stand in the way of their establishing a banking relationship. As a result, they may choose not to bank with depository institutions and instead hold their wealth entirely in cash. Because of these impediments (leading to higher transaction costs),²¹ the optimal *deposit holdings* for many of these immigrants might be negligible.

Immigration to the United States

While the deposit holdings of a small group of residents might not affect domestic demand for currency on a larger scale, Latin American immigrants make up a rapidly growing proportion of U.S. residents. Since 1980, immigration to the United States from Latin American countries has increased considerably. In 1980, foreign-born Latin Americans represented 1.9 percent of the total U.S. population. By 2005, that share grew to 6.6 percent, of whom 56.8 percent were from Mexico.²² Mexican immigrants alone represented a greater share of the U.S. foreign-born population (29.5 percent) at the end of the twentieth century than German and Italian immigrants (23.7 percent) collectively did at the end of the first great immigration wave to the United States in 1920.²³ Table 3 summarizes immigration to the United States from 1850 through 2000. The rise in immigration from Latin America from the 1980s onward is dramatic, with Mexican immigrants making up a growing proportion of the total amount of Latin American immigrants. In 1980, immigrants from Mexico made up 74 percent of total Latin American immigrants; by 2000 that proportion had grown to 84 percent. Figure 6 shows the cumulative influx from Mexico to the United States over the past 150 years, and table 4 highlights recent patterns of Mexican immigration.²⁴

Immigration from Mexico gained traction as the Mexican debt crisis of the early 1980s unfolded. It accelerated sharply in the latter part of the 1990s, partly spurred by the economic boom (and higher employment rates) in the United States. Importantly, too, the estimated number of undocumented immigrants entering this country now exceeds that of legal immigrants. This has implications for financial participation because, as we discuss in more detail in the next section, undocumented immigrants often face higher barriers to participation in the financial system than do legal residents.

By and large, immigrants tend to migrate to areas in the United States where other residents from their hometowns or countries now live. Chicago is among the oldest and most established Latino immigrant gateways in the country (Singer, 2004), and Chicago's Latin American population has swelled along with the national trend. Between 1990 and 2000, the Latino population (both native-born and foreign-born members) in the Chicago metropolitan area increased by 73 percent.²⁵ Over half of that increase (56 percent) was due to immigration; the rest was due to population growth among existing Latin American residents. An estimated 421,000 thousand immigrants arrived in the Chicago area directly from Mexico between 1980 and 2000,²⁶ and as of 2000, more than 586,000 Mexicans were living in the Chicago metropolitan area.²⁷

Financial participation of immigrants

While an estimated 8 percent to 9 percent of all U.S. households do not have a transaction account, a much higher proportion of the immigrant population has no banking relationship (or is unbanked) compared with their native-born counterparts.²⁸ The U.S. Census Bureau's *Survey of Income Participation* (SIPP) puts the number of unbanked Mexican immigrants at 53 percent and other Latin American immigrants at 37 percent over the period 1996–2000 (see table 5).²⁹

The most commonly reported reasons given by U.S. households for not having a transaction account are they write too few checks to make it worthwhile (28 percent), do not like dealing with banks (23 percent), have insufficient funds (14 percent), or find service charges too high (12 percent).³⁰

Immigrants have additional reasons for not opening a transaction account. In many cases, undocumented immigrants are unable to open savings or checking accounts at banks because they lack the required official identification (such as a Social Security number, driver's license, or tax identification number). Moreover, undocumented immigrants may feel they risk their livelihood in the United States by revealing their immigrant status to a bank. To close these gaps, the U.S. Department of the Treasury now allows banks to decide what forms of identification they will accept from individuals who want to open a bank account. As a result, Mexican immigrants with *Matricula* cards (identification cards issued by Mexican consular offices in the United States) are now permitted to open bank accounts in some states, including Illinois.

Many Latin American immigrants may have had little financial education or direct experience in dealing with financial institutions. In addition, many Latin American immigrants also have historical reasons to view banks as risky institutions. Many have experienced banking crises in their home countries with outright banking failures and liquidity disruptions that have often harmed depositors. As a result, they may view banks with suspicion.

Language barriers present further obstacles for immigrants. In most cases, it is necessary for bank customers to learn how to manage their accounts in English; for example, they need to learn how to fill out the proper dollar amount in English on a check. Though some banks now offer services to cater to customers who speak Spanish, language barriers can still remain an obstacle at these venues. Since as many as 10 percent of Mexicans speak a language other than Spanish, this customization may not be valuable to all Mexican immigrants.³¹

Several other factors push immigrants into cash. Some workers are paid in cash for work that is not documented, and must pay bills and other expenses (such as rent) in cash. Also, some immigrants do not expect to stay very long in the United States and, therefore, may feel they would not benefit from learning how to open and operate a bank account.³² Furthermore, newly arriving immigrants tend to locate in areas inhabited by other immigrants from the same countries or regions. Once settled, new immigrants often learn about U.S. customs and procedures from their local social network. If their neighbors or coworkers do not tend to make use of banks, the new immigrants will not either.³³

Many Mexicans living in Mexico choose to hold some U.S. dollars. Mexicans living in Mexico are estimated to have average *dollar* holdings of U.S. bank notes about equal to half of the average bank note holdings for U.S. residents living in the United States.³⁴ For undocumented immigrants, payments to so-called coyotes, who help them to enter or reenter the United States undetected, may require substantial amounts of dollars—often several thousand dollars per person.³⁵ Finally, many immigrants send remittances to their families living in their home country. Because the role of remittances in the demand for cash is significant, we discuss this topic in detail next.

Role of remittances

Workers in the United States transferred more than \$40 billion to Latin America and the Caribbean in 2005.³⁶ This represents about 75 percent of the total remittances sent to Latin America and the Caribbean in 2005 from all countries. About half of the total remittances (approximately \$27 billion) went directly

to Mexico—an amount greater than Mexico’s revenues from tourism and about equal to Mexico’s annual income from oil exports in recent years.

Remittance transfers are primarily a cash-to-cash process: Remitters pay cash to a money transmitter or financial institution, and the recipient of the remittance in the home country picks up the funds in cash. In recent years, banks have begun to offer cash checking or money transfer services as a way to capture a larger share of this growing market, although they have not made large inroads to date.³⁷ As of 2004, less than 5 percent of transfers were done via direct deposit into bank accounts.³⁸

A large portion of these remittances are paid in cash to money transmitting institutions (wire transfer services), such as Western Union and MoneyGram, that primarily accept cash. What is not captured in this estimate of total remittances is the amount that immigrants remit to their home countries by carrying cash in their (often annual) return visits or by entrusting money to family members or friends who are traveling home.

The average size of recorded remittances to Latin America was between \$200 and \$300 per transaction in 2005, with 20 percent of participants sending less than \$100, 36 percent sending between \$100 and \$200, 26 percent sending between \$200 and \$300, and 18 percent sending more than \$300. The average size of remittances increased significantly in 2006 to approximately \$315 per month.³⁹ On average, Mexican immigrants remit more than their counterparts from other Latin American countries—about \$450 a month in 2002. They also bring a considerable sum of cash back to Mexico when they visit—almost \$3,000 per visit.⁴⁰

Linking immigration and currency demand

To establish a link between the surge in immigration and the increased demand for currency in the U.S., we correlate currency disbursements with the proportion of immigrants (both from Latin America and from all other regions) by five-digit zip code, using U.S. Census data for metropolitan Chicago, where Latin Americans are the largest immigrant group. Table 6 shows that metropolitan Chicago neighborhoods (measured at the zip code level) with larger proportions of Latin American immigrants are positively correlated with the number of \$100 bills per capita. For immigrants from regions other than Latin America, this correlation becomes negative.

This difference suggests that Latin American immigrants' currency demand may be larger than that of other immigrant groups simply because they will be more likely to be unbanked, as shown in table 5 (p. 9). A number of other factors could explain this finding. Table 7, which contains the summary statistics for neighborhoods in our data sample (discussed in the next section), highlights some differences between Latin American immigrants and immigrants from other regions. The concentration of Latin American immigrants ranges from less than 1 percent to 49 percent per zip code (with a mean of 6 percent), while the concentration of immigrants from all other regions ranges between less than 1 percent to 41 percent.⁴¹

Polish immigrants are the second largest immigrant group in the Chicago area. As of 2000, the largest population of Polish immigrants in the United States lived in Illinois (almost 140,000), and this Illinois contingent represented almost 30 percent of the nation's total foreign-born Polish population. Thus, examining the currency demand for foreign-born Polish residents provides a contrast by which to gauge the results from Latin American immigrants. In our sample, the proportion of foreign-born Polish residents per neighborhood ranges between zero percent and 21 percent of the population per zip code (with a mean of 2 percent). The lower mean and standard deviation for the proportion of all other immigrants combined and for the Polish immigrants (compared with the Latin American immigrants) illustrates that Latin American immigrants tend to be more concentrated in some neighborhoods than other immigrant groups.

A comparison of neighborhoods with a high concentration of foreign-born Latino residents (those with foreign-born Latinos accounting for at least 30 percent of the resident population) versus neighborhoods with a high concentration of foreign-born non-Latino residents (those with foreign-born non-Latinos accounting for at least 30 percent of the resident population) reveals the following: Foreign-born Latino residents are younger, are less educated, earn a lower income on average, and have immigrated to the U.S. more recently. It is likely that linguistic barriers to banking are larger in the Latin American immigrant communities. Both groups tend to be more likely to live in neighborhoods with higher proportions of renters, but this effect is somewhat more pronounced for Latin American immigrants.

Data and empirical analysis

As table 6 suggests and research finds, Latin American immigrants tend to establish themselves in neighborhoods having relatively high densities of their fellow immigrants.⁴² Since most Mexican immi-

grants in the United States come from the central and southern parts of Mexico, “migration networks may be developed in this area to the point that migration costs are generally low for most families and migration decisions largely reflect wage differences.”⁴³ As a result of these forces, Mexican immigrants in the Chicago area have tended to locate in neighborhoods such as Pilson and Little Village, which already have a high proportion of Mexican and other Latin American immigrants. Using U.S. Census data, we can study these clusters at the five-digit zip code level, enabling us to use a rich mix of socioeconomic and demographic factors that are available at this geographic level.

Our data consist of annual cash orders *from* the Federal Reserve Bank of Chicago *to* bank branch offices in the Chicago area in 2005, aggregated by zip code. The aggregated data allow us to measure the aggregate flows of currency to a cross-section of zip codes in the Chicago area. Note that these orders represent *flows* (rather than stocks) of currency from the Federal Reserve Bank of Chicago to depository institutions in various zip codes.

Because of data limitations, we cannot use all of the cash orders we have. Since some larger banks operate as correspondent banks to smaller (community) banks in the Chicago area, it is not possible to determine what proportion of ordered currency stays with each correspondent bank and what proportion ends up at the smaller respondent banks.⁴⁴ Therefore, we remove the large correspondent banks from our sample. Our restricted data set contains 543 banks dispersed over 175 zip codes. Because we aggregate the data to the zip codes in which the community banks operate, our results implicitly reflect the behavior of an assortment of community banks.⁴⁵

To this aggregated cash data, we add socioeconomic and demographic data on the native-born and foreign-born population at the zip code level from the 2000 U.S. Census. This includes data on income, age, and education of residents at the zip code level. These three factors influence bank account ownership for both immigrants and native-born residents. Higher levels of education are generally reflected in more sophisticated financial decision-making. Individuals with bachelor’s or advanced degrees are 21 percent more likely to have a checking account than those who have not completed high school.⁴⁶ Age may affect a resident’s choice of payment method, with younger residents more likely to embrace newer payment methods, such as debit cards, and older residents more likely to stick with traditional payment instruments, such as checks, cash, and, to some degree, credit cards.⁴⁷ Income will also affect a resident’s decision (and perhaps ability) to maintain a bank account.⁴⁸

The type of housing in which immigrants live may have a bearing on their currency usage. Residents in low-income neighborhoods who rent are more likely to pay that rent in cash than residents in middle- to high-income neighborhoods.⁴⁹ We therefore include the proportion of renters per neighborhood to capture this fact. We then interact this variable with our measure of income, because low-income neighborhoods are the ones where property owners tend to demand cash payments. This tendency might be more pronounced in neighborhoods with higher concentrations of more transient groups, such as immigrants. We also consider a number of factors that likely affect transaction costs (shoe leather costs) for getting into and out of an interest-bearing instrument (a bank account). As stated earlier, it is reasonable to assume that these transaction costs differ across demographic segments of the population. Specifically, immigrants may face higher implicit transaction costs to obtain an interest-bearing instrument, such as a checking or savings account, because of language barriers, lack of documentation, and distrust of the banking system.

While we tend to think of traditional depository institutions (that is, banks) as representing the financial sector, immigrants often make use of financial institutions that are more on the “fringe,” such as payday lenders, check cashers, and money transmitters, which provide a number of important services and are often conveniently located. We include (per zip code) the number of money transmitters per capita, as well as the number of payday lenders per capita to represent the relative size of the fringe banking sector. Migrants predominantly use money transmitters to remit money to their home country—70 percent of Mexican immigrants use them to remit money home. These institutions often charge hefty fees.⁵⁰

Payday lenders, on the other hand, provide cash to residents, and the number of these institutions has been on the rise in lower-income and immigrant neighborhoods. We separate these two types of fringe institutions because we expect demand for currency to vary across neighborhoods based on the concentration of each of these types of institutions. If residents are hoarding currency to remit it through a money transmitter, then we would expect demand for currency to be positively associated with the number of money transmitters per 1,000 residents. However, residents receiving a loan from payday lenders are most likely to be in lower-income neighborhoods, where it is more common to live from paycheck to paycheck. These residents would tend to demand less currency. Under payday lending arrangements, they are required to give the lender a post-dated check (not cash), and if they are living from paycheck to

paycheck, they are likely to be liquidity constrained. We anticipate, therefore, that the number of payday lenders per capita will be negatively associated with the demand for currency.

We also add two variables to represent local (geographic) demand for currency. The first variable proxies the demand by tourists and consists of total 2005 attendance at large tourist attractions in the Chicago area.⁵¹ The economic activity surrounding these highly visited spots should tend to increase the local demand for currency in the surrounding neighborhoods. The second geographic variable is the ratio of workers to residents in each zip code. We include this variable to account for the increase in the demand for currency by people commuting into a neighborhood to work. In addition, places of larger-scale employment in Chicago are often surrounded by restaurants and bars that cater to the workers and whose employees are often paid in cash.⁵²

Criminal activity, such as drug sales and bookmaking, might result in increased demand for cash, in that these activities ordinarily entail anonymity between parties involved in a transaction. We therefore include a measure of overall criminal activity per neighborhood. Specifically, we use an index of risk of violent or property crime developed by the Federal Bureau of Investigation (FBI), where ten represents the highest risk and one the lowest.⁵³

Finally, we include two variables to test our hypotheses that the demand for currency differs between immigrant and native-born residents. We include the percentage of Latin American immigrants and the percentage of foreign-born residents that are not of Latin American descent to assess the effect of immigration on cash acquisition.⁵⁴

Figure 7 illustrates the 175 zip codes with orders available for \$5, \$20, \$100, and all denominations; these zip codes are shaded in dark orange to distinguish them from the other zip codes. In our restricted sample, some of the zip codes did not receive any shipments of particular denominations during 2005, and so our sample size for the different denominations ranges from 158 to 175 zip codes.

Table 7 illustrates that, on average, residents of our sampled zip codes are about 35 years old, 31 percent of them have a college degree, and they earn an average annual income of \$58,475 per household. On average, gross payments to residents per zip code in 2005 were \$10.32 in \$5 bills (log 1.42), \$539.16 in \$20 bills (log 4.11), \$168.68 in \$100 bills (log 4.22), and \$891.95 in all denominations (log 5.42).

The maps in figures 8 and 9 highlight the two most important components of our data set. Figure 8 depicts the spatial demand for \$100 bills by zip code; zip codes exhibiting demand for \$100 bills above the 75th percentile are shaded in dark orange, while those exhibiting demand below the 75th percentile are in light orange. Figure 9 displays where foreign-born Latin American communities reside by zip code; zip codes that have more than 6 percent foreign-born Latin American residents—the state’s average—are in dark orange, while those that have less than 6 percent are in light orange.⁵⁵ While the maps do not match perfectly, we see some striking similarities between them; many zip codes in *both* figures are either light orange or dark orange. Like our bivariate correlation table (table 6, p. 10), these two maps together suggest that the areas that demand more \$100 bills tend to be areas with a higher proportion of Latin American immigrants.

Given our observations, the visual and statistical arguments, and the facts presented earlier, we introduce four hypotheses to test empirically.

1. Neighborhoods (measured at the zip code level) having a greater share of Latin American immigrants will demand more \$100 bills, all else being equal. These neighborhoods are likely to have a large share of residents who do not have bank accounts and who use cash to pay bills, accumulate cash, and remit funds to their home countries.
2. Immigrants from other regions of the world may or may not demand more \$100 bills. These immigrants are, on average, more educated and earn more. They speak English more competently than Latin American immigrants, though by a very slim margin. Thus, it is difficult to predict whether they might demand less, more, or the same amount and denomination of currency as Latin American immigrants.
3. The demand for other denominations (\$5 bills and \$20 bills) will be lower for Latin American immigrants than the demand for \$100 bills. Twenty dollar bills (dispensed by about 94 percent of ATMs in the U.S. in 2006) will be received by virtually all residents who obtain cash from ATMs; \$5 bills, the third smallest denomination available in U.S. bank notes, will not likely be used as a store of value or to pay large bills in cash (such as rent).⁵⁶
4. Residents in low-income neighborhoods who rent are more likely to pay that rent in cash than residents in middle- to high-income neighborhoods. Therefore, the demand for cash will be greater in lower-income neighborhood with a higher proportion of renters.

Regression analysis

To empirically test our hypotheses, we estimate a model of cash orders (flows) as a function of the foreign-born Latin American population and the control variables listed previously.

The regression equation is as follows:

$$CashOrders_i^d = \alpha_i + \beta_{1i} LA + \beta_{2i} NonLA + XB_{3i} + e_i \quad (1)$$

where *CashOrders* are, alternatively, either the amount per capita (in logs) of \$5 bills, \$20 bills, \$100 bills, or all denominations of currency in the Chicago area; *i* indexes zip codes; *d* represents the alternative denomination (\$5 bills, \$20 bills, \$100 bills, or all denominations) used in our analysis; and *e* is an unobserved error term. The variable *LA* is the proportion of Latin American immigrants to total residents per zip code, and the variable *NonLA* is the proportion of immigrants not from Latin America to total residents per zip code. Finally, *X* is a vector of variables (discussed earlier) that accounts for differential transaction costs of holding currency and local demand for currency. It includes the following: ratio of workers to residents, money transmitters per capita, payday lenders per capita, median age of residents, log of median household income, attendance at tourist attractions per capita, proportion of residents with college education (of those 25 years and older), crime index, and proportion of residents who rent, which is also interacted with the log of median income. The regression coefficients are represented by α , β_1 , and β_2 and the vector, B_3 , in the equation.

Empirical results

Table 8 contains our regression results. We find highly statistically significant results for the regressions using the log of \$100 bills per capita, but less significant results for the other currency breakdowns (statistical significance levels are noted in the table). The first column of results in table 8 lists our results for the regression using the log of \$5 bills per capita as the dependant variable (*CashOrders*). The R-squared is 0.2900. The only coefficients that are statistically significant at the 1 percent level are the proportion of immigrants not from Latin America (with a coefficient estimate of -10.9114) and median age (0.1413). This suggests that areas with a higher proportion of immigrants from regions other than Latin America tend to use fewer \$5 bills, and neighborhoods with older populations tend to hold more cash.

The second column contains regression results using the log of \$20 bills per capita. In this regression, the following coefficients are statistically significant: the log of median household income at the 10 percent level (with a coefficient estimate of 3.2890), the proportion of foreign-born residents not from Latin America at the 1 percent level (-7.0775), and the crime index at the 5 percent level (0.2261).

The third column, the focus of our regression analysis, contains results using *CashOrders* equal to the log of \$100 bills per capita as the dependant variable. These results are strikingly different from those using the log of \$5 bills per capita and the log of \$20 bills per capita. The coefficient on Latin American immigrants is positive and significant for \$100 bills—a result that supports our hypothesis that this group demands more \$100 bills than both native-born residents and immigrants from regions other than Latin America. The coefficient is 3.9110 and is significant at the 5 percent level. Moreover, the economic implication of this finding is significant; a one standard deviation increase in the percentage of Latin American immigrants increases the demand for \$100 bills by 42 percent. Converting these semi-elasticity results to dollars, the coefficient represents an average holding of \$266 per capita per year for Latin American immigrants. A similar result (not shown in the table) for 2004 of \$329 gives us an average holding of about three extra \$100 bills for each Latin American immigrant.

Several other coefficients are statistically significant in this regression as well. The number of money transmitting firms is positive and statistically significant (8.3612) at the 10 percent level, suggesting that in neighborhoods with a greater number of money transmitting firms, residents tend to demand more \$100 bills. Presumably this behavior reflects the accumulation of cash to make periodic remittances to the home country.

Median age is positive and significant (0.1473) at the 1 percent level, a result that implies that older residents tend to hold more \$100 bills. This could reflect a legacy of distrust of the banking system, because the residents themselves or their immediate family members experienced losses at banks in the past.

The log of the median household income is positive and significant (3.7920) at the 1 percent level, implying that higher income earners tend to hold more \$100 bills. The proportion of college educated, however, is negative and significant (-4.3087) at the 5 percent level, which we interpret as meaning that more education leads them to utilize other payment methods. The coefficient on rented housing units is

positive and significant, while the coefficient on the interaction term between rented housing units and the log of median household income is negative and significant (both at the 1 percent level), with the overall net effect of the two terms being positive. We infer from this result that the demand for \$100 bills in neighborhoods with a greater proportion of rental units is higher because some proportion of those tenants will pay their rent in cash, especially in lower-income neighborhoods. This result is consistent with our hypothesis that demand for cash will be greater in neighborhoods with higher proportions of lower-income residents and rental units.

The fourth column contains results similar to those using the log of \$100 bills per capita; it lists the regression coefficients using the log of the value of all denominations of currency per capita as the dependent variable. Since \$100 bills tend to make up the largest proportion of the “all denominations” variable, it is no surprise that the results for this variable parallel those for the log of \$100 bills per capita. The R-squared statistic of this regression is 0.2059. The following variables are statistically significant: median age (with a positive coefficient), log of median household income (positive), the proportion of immigrants from regions other than Latin America (negative), attendance at tourist attractions (negative), and the proportion of college educated (negative).

The proportion of foreign-born residents not from Latin America is negative and significant in all four regressions, which implies, generally, that neighborhoods with a greater percentage of foreign-born residents who are not from Latin America demand less currency, all else being equal. There are a number of possible explanations. It could be that such foreign-born residents are more likely to have bank accounts and conduct transactions using electronic payment methods and less currency. We will explore this issue in future research.

To check for robustness, we also explore the demand for currency among two other groups, African Americans and Polish immigrants. Currency demand may be different for African Americans than other native-born residents because many African Americans remain unbanked—an estimated 46 percent of them, according to the SIPP (see table 5, p. 9). Moreover, a recent study finds that both Latin Americans and African Americans perceive that they do not have sufficient income to justify having a bank account.⁵⁷ If this is true, African Americans should hold more cash. We test this hypothesis. We find that African Americans demand slightly more \$20 bills than other residents, though this result is relatively weak (significant at only the 10 percent level). We find no difference in the demand for currency for any

other denomination for African Americans relative to other native-born residents. Next, we examine currency demand among Polish immigrants. We find that the demand for currency among Polish immigrants is similar to that of other foreign-born non-Latino residents and has the opposite sign to that for Latin American immigrants. This result might suggest that Polish immigrants have a faster rate of assimilation than Latin American immigrants do with regard to banking activities.

We interpret our regression results, specifically those using \$100 bills, as directly bearing on the obstacles to financial access that Latin American immigrants face and/or their reluctance to open and maintain bank accounts. Moreover, these results may tell us more about portfolio holdings than the traditional transaction demand for money. Presumably the \$5 and \$20 denominations matter more than the \$100 denomination for many day-to-day smaller-scale transactions, while the \$100 bills are primarily used as a store of wealth, in part because some retail outlets will not accept them in exchange for goods or services. Thus, the significant statistical finding for the \$100 denomination for immigrants is suggestive of wealth accumulation in this denomination. For recent immigrants, the two important uses for \$100 bills are for wired remittances (through such vehicles as Western Union), which are often done monthly, and for in-person cash remittances, which are often done on a yearly basis. Other important uses include paying rent and large bills.

Conclusion

In this paper, we examine the demand for cash (namely, \$5 bills, \$20 bills, and \$100 bills) among Latin American immigrants. As a result of their background and obstacles to obtaining and using deposit accounts at financial institutions, a larger portion of Latin American immigrants (compared with native-born residents and foreign-born non-Latino residents) appear to hold the cash they acquire rather than depositing it in a transaction account. We investigate to what degree Latin American immigrants hold more cash than other population groups by examining neighborhoods (by zip codes) with high densities of Latin American immigrants and testing whether there is a significant increase in cash usage in those locations. We find that the demand for \$100 bills is greater in areas with high concentrations of foreign-born Latin Americans. Our results suggest that Latin American immigrants are holding these bills as a store of value, since the convenience of this large denomination in day-to-day transactions is limited.

Our study adds to the sizable literature on the unbanked population in the United States. Generally, these studies describe characteristics of those who are unbanked. They are, on average, more likely to have a

lower income, lower net worth, and lower level of education than the general population; also, the unbanked are less likely to own a home and are more likely to be a member of a minority race and be foreign-born. Our study complements this literature; it provides some evidence that unbanked Latin American immigrants may store their wealth in \$100 bills. This behavior is not surprising. Many foreign-born residents from Latin America in the United States were familiar with the U.S. currency before arriving; they see U.S. bank notes as an attractive brand that holds its value (unlike some currencies that have experienced dramatic inflation).

Transaction costs associated with getting a bank account, language barriers, and general distrust of banking systems all contribute to Latin American immigrants' predisposition to accumulate wealth in the form of cash. To move these immigrants into the formal financial sector requires overcoming these barriers and transaction costs. A sense of trust in banks must be instilled among Latin American immigrants. This might be achieved through banks providing a similar set of products and services to those offered by fringe institutions (and with which immigrants are familiar), at attractive prices. Banks are beginning to realize the importance of encouraging Latin American immigrants to establish relationships with them, and some have established check-cashing or remittance (money transfer) services, though, as we noted earlier, they have not yet made significant inroads into this market.⁵⁸

At the outset, we raised the question of whether the behavior of this immigrant group and, in particular, the rapidly growing number of undocumented workers from Mexico and Central America might lie behind the recent increase in real per capita domestic holdings of currency in the U.S. With the data we analyze in this article, we cannot answer this question for the entire country. However, our study of the Chicago metro area suggests that this topic warrants deeper investigation.

NOTES

¹Gleick (1996).

²Economist Newspaper Limited (2007); Moore (1965); and Jovanovic and Rousseau (2002).

³The check infrastructure has already witnessed such disruptions.

⁴Suro et al. (2004).

⁵This shrinkage is less mysterious if one recognizes that in 1956 the largest denomination was a \$10,000 note, while in 2006 it was a \$100 note. For 2006, the calculation assumes that the average worker works 215 days a year.

⁶American Bankers Association and Dove Consulting (2005), table 1.11a. The survey reported 45.4 percent of respondents used cash less often, while just 16.2 percent of respondents used cash more often.

⁷American Bankers Association and Dove Consulting (2005), table 1.11c.

⁸*Ibid.*, table 1.11b.

⁹Lindsey (1994–95).

¹⁰Currency demand rose in the year and a half preceding the date change. When no disruption occurred in financial systems across the globe around Y2K, households shed some of the additional precautionary cash balances they had acquired relatively quickly. This latter action *reduced* the ratio temporarily.

¹¹For a discussion of these estimates, see Bach (1997) and Porter and Judson (1996).

¹²See Porter and Judson (1996) and Judson and Porter (2004).

¹³See Baumol (1952) and Tobin (1956).

¹⁴If currency accumulates over longer periods until it is used for remittances or for precautionary expenditures, the pattern will also follow a saw-tooth pattern, but with higher peaks and sharper drop-offs.

¹⁵Cagan (1958).

¹⁶See, for example, Porter and Bayer (1989), Porter and Weinbach (1999), and Judson and Porter (2004).

¹⁷A basic difficulty is that the sign on crime in the demand for currency regression is not obvious a priori. If criminals use currency to the exclusion of other payment methods, an increase in criminal activity may be associated with an increase in currency. The effect of such an increase on noncriminal elements depends on the nature of the crime. It is generally believed that in countries with relatively low rates of crime like Japan and Switzerland, cash holdings tend to be larger. However, one cannot rule out the possibility that an increase in violent crime might lead to some increase in currency holdings held merely to placate erstwhile robbers.

¹⁸Chicago has been an important gateway for the Mexican community into the upper Midwest for over 125 years.

¹⁹Massey and Espinosa (1997).

²⁰To minimize the negative effect of inflation on the purchasing power of money, individuals have to spend time and effort protecting the value of their nominal assets—wearing out their shoes on the way back and forth to the bank. Economists use the shorthand “shoe leather” costs to describe these “brokerage” fees.

²¹Mulligan and Sala-i-Martin (2000).

²²See the U.S. Census Bureau’s 2005 *American Community Survey*.

²³Borjas and Katz (2005), p. 3.

²⁴These series are from Passel (2005) with his estimate shown for 2010.

²⁵Suro and Singer (2002).

²⁶Paral and Norkewicz (2003).

²⁷The source of data is the 2000 U.S. Census. For this reason, we concentrate our study on the Chicago area. Of the 12 Federal Reserve Districts, five have a significant Latino presence:

Atlanta, Chicago, Dallas, Richmond, and San Francisco. But several of the cash offices serving these Districts also represent significant transshipment locations for international shipments into and out of the United States. This international dimension confounds any analysis of local currency orders, particularly for cash offices in New York, Miami, and San Francisco and three Texas offices (El Paso, San Antonio, and Houston) in the Dallas Federal Reserve District. See Judson and Porter (2004) for panel data regression results that include and exclude various offices from currency demand specifications.

²⁸A transaction account is defined as a savings or checking account.

²⁹The SIPP estimate of the unbanked among all U.S. born is 17 percent (about twice as high as the Federal Reserve Board's 2000 *Survey of Consumer Finances*). This disparity arises because the SIPP purposely attempts to sample a higher proportion of respondents in lower-income categories.

³⁰Bucks, Kennickell, Moore (2006). Other reasons cited (with less than 10 percent frequency) were as follows: cannot manage a checking account, find the minimum balance is too high, do not want an account, and have credit problems.

³¹As a result of the geographic isolation in Mexico, with innumerable mountain valleys separating native groups, a number of distinct dialects and/or languages emerged. It is estimated that around 10 percent of the Mexican population speaks one of these indigenous Indian languages. See, for example, www.houstonculture.org/mexico/ling.html.

³²Orozco (2004).

³³Suro et al. (2004).

³⁴See Porter and Judson (1996), table 1, and U.S. Department of the Treasury, Board of Governors of the Federal Reserve System, and U.S. Secret Service (2003), table 3.3.

³⁵Massey and Espinosa (1997). Merriam-Webster's online dictionary defines a coyote as "one who smuggles immigrants into the United States."

³⁶Inter-American Development Bank and Multilateral Investment Fund (2005). Countries included are: Argentina, Belize, Bolivia, Brazil, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Suriname, Trinidad and Tobago, Uruguay, and Venezuela.

³⁷Suro et al. (2004).

³⁸Orozco (2004).

³⁹Detailed remittance information is available from the Inter-American Development Bank; see www.iadb.org/mif/remittances/usa/INDEX.cfm?language=en&parid=2&item1id=2&item2id=2.

⁴⁰Amuedo-Dorantes, Bansak, and Pozo (2004).

⁴¹The Mexican immigrant neighborhoods in Chicago also include some second- and third-generation Latin American residents, who may also tend to hold more currency as payment patterns change slowly over time.

⁴²Ibarraran and Lubotsky (2007).

⁴³Ibid., p. 32.

⁴⁴Correspondent banks generally perform services for other banks (such as check clearing, currency, and courier services). The correspondents give these smaller banks access to financial markets to which they might not otherwise have entry (such as the foreign exchange or derivatives markets).

⁴⁵To test whether the elimination of these institutions creates any direct bias in our empirical tests, we check whether the location of the community banks in our sample is correlated with the share of Latin American immigrants. The two series are uncorrelated.

⁴⁶Paulson et al. (2006).

⁴⁷Ibid.

⁴⁸Amuedo-Dorantes, Bansak, and Pozo (2004).

⁴⁹See American Bankers Association and Dove Consulting (2005), table 3.6a, which shows that of those with an annual income of less than \$40,000, 10.6 percent self-report paying their rent or mortgage with cash, compared with 4.1 percent of those with an annual income of \$40,000 to \$99,999 and 0.9 percent of those with an annual income of \$100,000 or more.

⁵⁰Suro et al. (2004).

⁵¹This information can be found at www.chicagotraveler.com/chicagos-largest-attractions.htm.

⁵²Judson and Porter (2004) find implicit evidence for this at the cash office level.

⁵³See www.fbi.gov/ucr/05cius/. The crime index includes violent crimes (murder, forcible rape, robbery, and aggravated assault) and property crimes (burglary, larceny-theft, motor vehicle theft, and arson). This FBI index reflects actual crime. It is therefore only indirectly an index of the risk of falling victim to crime. We assume that currency holders gauge the risk that they will encounter crime by the past experience in the neighborhood. We obtained these data by zip code at <http://realestate.yahoo.com/Neighborhoods>.

⁵⁴The Mexican immigrant neighborhoods in Chicago will also include some second- and third-generation Latinos, who may also tend to hold more currency as payment patterns change slowly over time. These numbers are drawn from the 2000 U.S. Census, which was conducted in the midst of the most recent immigration boom from Mexico and Central America. As a result, it is quite possible that the next U.S. Census will reveal higher concentrations of Latinos than shown here.

⁵⁵At 6 percent, Illinois ranks ninth in foreign-born Latin American residents, following California (15 percent), Florida (12 percent), Texas (10 percent), New York (10 percent), Nevada (10 percent), Arizona (9 percent), New Jersey (8 percent), and New Mexico (just over 6 percent). See the 2000 U.S. Census.

⁵⁶The \$2 denomination still exists but is used very infrequently. There are about seven times as many \$5 bills as \$2 bills in circulation.

⁵⁷Seidman, Hababou, and Kramer (2005).

⁵⁸In particular, the substitution of prepaid cards for currency in the immigrant community may also hold some promise. Prepaid cards are cards that are purchased (say, with cash) and can be used on the existing card networks in the United States and elsewhere, just as debit cards and credit cards are used (Chakravorti and Lubasi, 2006).

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Table 1
U.S. Banknotes in Circulation
(Billions of dollars, except as noted)

| District | \$20s, billions | | | \$100s, billions | | |
|-----------------|------------------------|-------|------|-------------------------|-------|------|
| | Received | Paid | Net | Received | Paid | Net |
| Boston | 19 | 18.8 | -0.2 | 4.3 | 5.5 | 1.2 |
| New York | 48.4 | 48 | -0.4 | 76.5 | 89.8 | 13.3 |
| Philadelphia | 25.2 | 23.5 | -1.7 | 10.4 | 7.7 | -2.7 |
| Cleveland | 16 | 16.6 | 0.6 | 4.9 | 5.9 | 1 |
| Richmond | 32.5 | 37.9 | 5.4 | 12.9 | 18 | 5.1 |
| Atlanta | 47.4 | 44.1 | -3.3 | 34.6 | 34.3 | -0.2 |
| Chicago | 31.1 | 34.1 | 3.1 | 10.8 | 14.9 | 4 |
| St. Louis | 11.3 | 11.8 | 0.6 | 6.4 | 8 | 1.6 |
| Minneapolis | 6.4 | 6.7 | 0.4 | 2.3 | 3 | 0.7 |
| Kansas City | 13.2 | 13.8 | 0.6 | 6.3 | 7.6 | 1.4 |
| Dallas | 20.1 | 19 | -1 | 14.9 | 15.1 | 0.1 |
| San Francisco | 49.9 | 45.7 | -4.3 | 35.4 | 39.9 | 4.5 |
| Total | 320.4 | 320.2 | -0.2 | 219.7 | 249.6 | 29.9 |

Source: United States Department of the Treasury, Board of Governors of the Federal Reserve System and U.S. Secret Service (2006).

Table 2
Shipments of \$5s, \$20s, and \$100s by District, 2005

| Fed District | \$5s, billions | | | \$20s, billions | | | \$100s, billions | | |
|---------------|----------------|------|------|-----------------|-------|-----|------------------|-------|------|
| | Received | Paid | Net | Received | Paid | Net | Received | Paid | Net |
| Boston | 0.6 | 0.7 | 0 | 19 | 19 | 0.3 | 4.7 | 5.7 | 1 |
| New York | 1.7 | 1.6 | -0.1 | 48 | 49.4 | 1 | 70.9 | 88 | 17.1 |
| Philadelphia | 0.6 | 0.8 | 0.1 | 21 | 22.7 | 1.8 | 9.2 | 7.2 | -2 |
| Cleveland | 0.8 | 0.8 | 0 | 17 | 18.1 | 1.4 | 5.8 | 7.3 | 1.4 |
| Richmond | 1.1 | 1.2 | 0.1 | 34 | 36.2 | 2.6 | 14.1 | 17.9 | 3.7 |
| Atlanta | 2.5 | 2.4 | 0 | 48 | 45.4 | -2 | 44.3 | 36.9 | -7.5 |
| Chicago | 1.4 | 1.5 | 0.1 | 31 | 34.3 | 3.8 | 11.1 | 15 | 4 |
| St. Louis | 0.5 | 0.5 | 0 | 9.5 | 9.8 | 0.3 | 6.5 | 7.9 | 1.4 |
| Minneapolis | 0.3 | 0.3 | 0 | 5.9 | 6.4 | 0.5 | 2.4 | 3.1 | 0.7 |
| Kansas City | 0.6 | 0.7 | 0 | 13 | 13.5 | 1 | 6.4 | 8.1 | 1.7 |
| Dallas | 1.1 | 1.1 | 0 | 21 | 21.3 | 0 | 16.5 | 17.7 | 1.2 |
| San Francisco | 2.5 | 2.6 | 0.1 | 51 | 47.9 | -3 | 37.4 | 43.1 | 5.7 |
| Total | 13.7 | 14 | 0.5 | 316 | 324.1 | 7.7 | 229.2 | 257.7 | 28.5 |

Source: Federal Reserve System

Table 3
Region of Birth of the Foreign-Born Population
1820-2000

| Period | Total | Europe | Asia | Americas | Africa | Oceania |
|-----------|-----------|-----------|-----------|-----------|---------|---------|
| 1820-30 | 151,824 | 106,487 | 36 | 11,951 | 17 | 33,333 |
| 1831-40 | 599,125 | 495,681 | 53 | 33,424 | 54 | 69,911 |
| 1841-50 | 1,713,251 | 1,597,442 | 141 | 62,469 | 55 | 53,144 |
| 1851-60 | 2,598,214 | 2,452,577 | 41,538 | 74,720 | 210 | 29,169 |
| 1861-70 | 2,314,824 | 2,065,141 | 64,759 | 166,607 | 312 | 18,005 |
| 1871-80 | 2,812,191 | 2,271,925 | 124,160 | 404,044 | 358 | 11,704 |
| 1881-90 | 5,246,613 | 4,735,484 | 69,942 | 426,967 | 857 | 13,363 |
| 1891-00 | 3,687,564 | 3,555,352 | 74,862 | 38,972 | 350 | 18,028 |
| 1901-10 | 8,795,386 | 8,056,040 | 323,543 | 361,888 | 7,368 | 46,547 |
| 1911-20 | 5,735,811 | 4,321,887 | 247,236 | 1,143,671 | 8,443 | 14,574 |
| 1921-30 | 4,107,209 | 2,463,194 | 112,059 | 1,516,716 | 6,286 | 8,954 |
| 1931-40 | 528,431 | 347,566 | 16,595 | 160,037 | 1,750 | 2,483 |
| 1941-50 | 1,035,039 | 621,147 | 37,028 | 354,804 | 7,367 | 14,693 |
| 1951-60 | 2,515,479 | 1,325,727 | 153,249 | 996,944 | 14,092 | 25,467 |
| 1961-70 | 3,321,677 | 1,123,492 | 427,642 | 1,716,374 | 28,954 | 25,215 |
| 1971-80 | 4,493,314 | 800,368 | 1,588,178 | 1,982,735 | 80,779 | 41,254 |
| 1981-90 | 7,338,062 | 761,550 | 2,738,157 | 3,615,225 | 176,893 | 46,237 |
| 1991-2000 | 9,095,417 | 1,359,737 | 2,795,672 | 4,486,806 | 354,939 | 98,263 |

Source: U.S. Census

Table 4
Recent Patterns of Mexican Immigration

| Mexican Immigrants to U.S. | 1980-1989 | 1990-1994 | 1995-1999 | 2000-2004 |
|----------------------------|--------------------|-----------|-----------|-----------|
| | Thousands per year | | | |
| undocumented | 130 | 450 | 750 | 700 |
| legal | 650 | 670 | 660 | 610 |
| total | 780 | 1,120 | 1,400 | 1,310 |

Source: Passel (2005)

Table 5
Percent of Unbanked in the US (2000)
U.S.-Born and Foreign-Born Populations
(As a percentage of each group)

| U.S. Born | | Foreign-born | |
|------------------|-----|----------------------|-----|
| White | 14% | Mexican | 53% |
| Black | 46% | Other Latin American | 37% |
| Hispanic | 34% | Asian | 20% |
| Other Race | 34% | European | 17% |
| Total | 17% | Total | 32% |

Source: United States Census Bureau, 2000 Survey of Income Program Participation.

Table 6
Bivariate correlation between currency demand and proportion of immigrants
per zip code, 2005

| | \$5s per capita | \$20s per capita | \$100s per capita | all \$ per capita | Proportion native-born residents | Proportion Latin American residents | % foreign born, not Latinos |
|-------------------------------------|-----------------|------------------|-------------------|-------------------|----------------------------------|-------------------------------------|-----------------------------|
| \$5s per capita | | | | | | | |
| \$20s per capita | -0.0148 | | | | | | |
| | 0.8454 | | | | | | |
| \$100s per capita | 0.411 | -0.015 | | | | | |
| | 0 | 0.8434 | | | | | |
| all bills per capita | 0.0216 | 0.9979 | 0.0473 | | | | |
| | 0.7764 | 0 | 0.5329 | | | | |
| Proportion native-born residents | 0.1127 | 0.0098 | -0.0165 | 0.0106 | | | |
| | 0.1363 | 0.8972 | 0.8283 | 0.8893 | | | |
| Proportion Latin American residents | 0.018 | -0.057 | 0.1454 | -0.0471 | -0.7348 | | |
| | 0.8129 | 0.4527 | 0.0541 | 0.5347 | 0 | | |
| % foreign born, not Latinos | -0.1854 | 0.0464 | -0.1311 | 0.0348 | -0.6889 | 0.0145 | |
| | 0.0138 | 0.5407 | 0.0828 | 0.647 | 0 | 0.8488 | |

The first (top) number in each row is the correlation and the second (bottom) number is the p-value.

Sources: Authors' calculations based on data from the Federal Reserve Bank of Chicago and U.S. Census Bureau.

Table 7
Summary Statistics

| Variable | N | Mean | Std. Dev. | Min | Max |
|--|----------|-------------|------------------|------------|------------|
| Ln \$5s per capita | 158 | 1.42 | 1.61 | -3.54 | 4.82 |
| Ln \$20s per capita | 173 | 4.11 | 1.97 | -0.81 | 11.01 |
| Ln \$100s per capita | 169 | 4.22 | 1.53 | -0.28 | 7.69 |
| Ln All denominations per capita | 175 | 5.42 | 1.48 | 1.81 | 11.18 |
| \$5s per capita | 175 | 10.32 | 16.86 | 0.00 | 123.86 |
| \$20s per capita | 175 | 539.16 | 4,582.48 | 0.00 | 60,677.80 |
| \$100s per capita | 175 | 168.68 | 270.64 | 0.00 | 2,193.73 |
| All denominations per capita | 175 | 891.95 | 5,440.23 | 6.14 | 71,974.94 |
| Ratio of workers / residents | 175 | 0.79 | 1.54 | 0.00 | 18.10 |
| ATMs per capita | 175 | 0.00 | 0.00 | 0.00 | 0.01 |
| Money transmitters per capita | 175 | 0.00 | 0.02 | 0.00 | 0.19 |
| Payday lenders per capita | 175 | 0.04 | 0.07 | 0.00 | 0.59 |
| Median age | 175 | 35.20 | 4.33 | 23.80 | 47.00 |
| Median income | 175 | 58,475 | 18,996 | 14,205 | 138,525 |
| Ln median household income | 175 | 10.92 | 0.33 | 9.56 | 11.84 |
| Proportion Latin American Immigrants | 175 | 0.06 | 0.09 | 0.00 | 0.49 |
| Proportion immigrants not from Latin America | 175 | 0.09 | 0.08 | 0.00 | 0.41 |
| Attendance at tourist attractions per capita | 175 | 11.74 | 80.09 | 0.00 | 971.10 |
| Proportion college educated (> 25 years) | 175 | 0.31 | 0.18 | 0.04 | 0.78 |
| Crime Index | 175 | 4.01 | 2.13 | 1.00 | 8.30 |
| Proportion rented housing units | 175 | 0.35 | 0.25 | 0.02 | 0.98 |
| Proportion rented housing units * Ln median household income | 175 | 3.77 | 2.64 | 0.26 | 10.95 |
| Proportion polish ancestry | 175 | 0.10 | 0.06 | 0.00 | 0.31 |
| Proportion African-American | 175 | 0.13 | 0.23 | 0.00 | 0.99 |

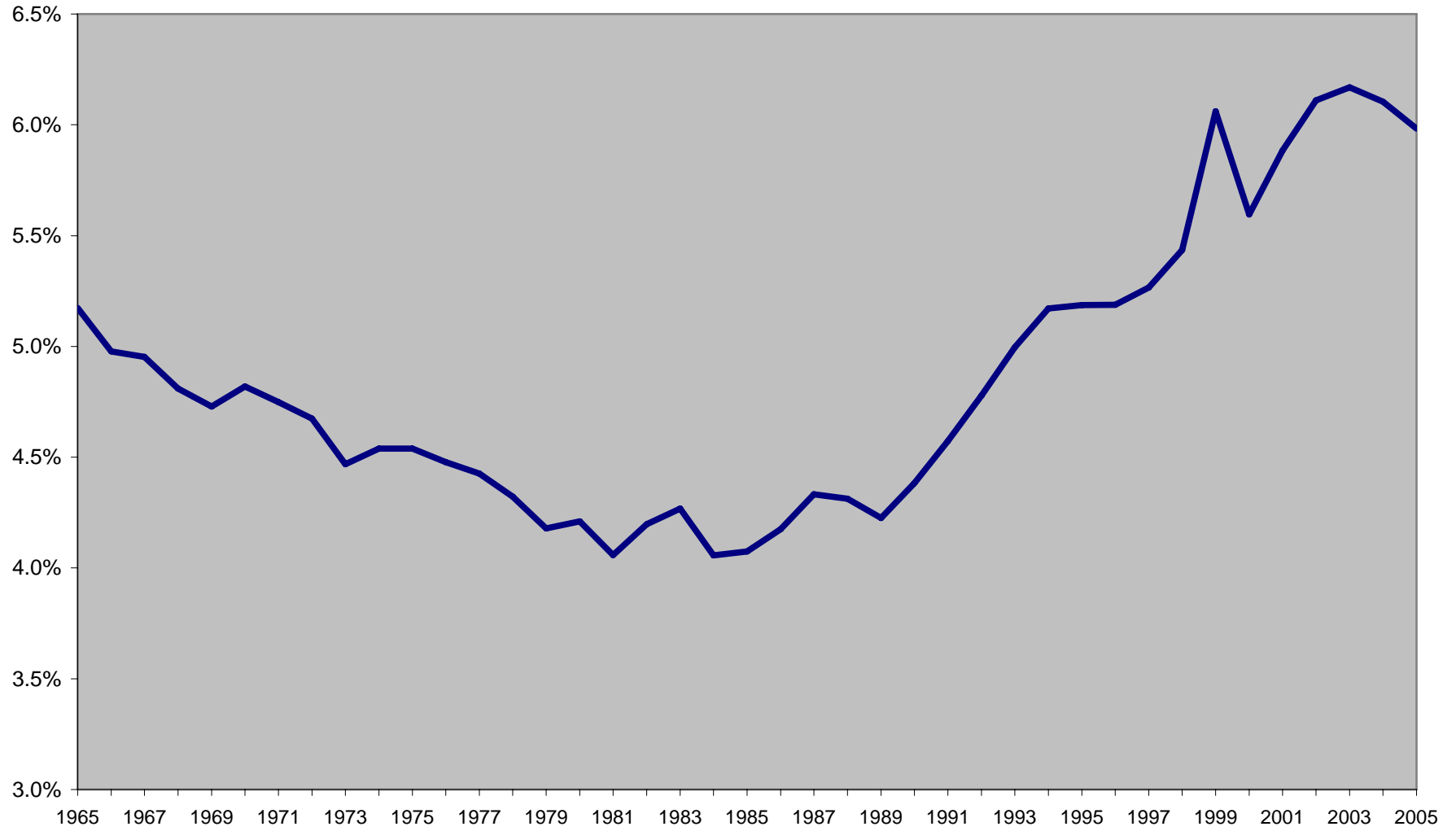
Table 8
Regression Results from Equation 1

$$CashOrders_i^d = \alpha_i + \beta_{1i}LA + \beta_{2i}NonLA + XB_{3i} + e_i$$

Standard errors are included below the coefficient estimate. The superscripts ***, **, * represent statistical significance at the 1 percent, 5 percent and 10 percent, respectively. The dependent variables (fives, twenties, hundreds, and all denominations) are logged values per capita. We use OLS with robust errors (White-corrected standard errors).

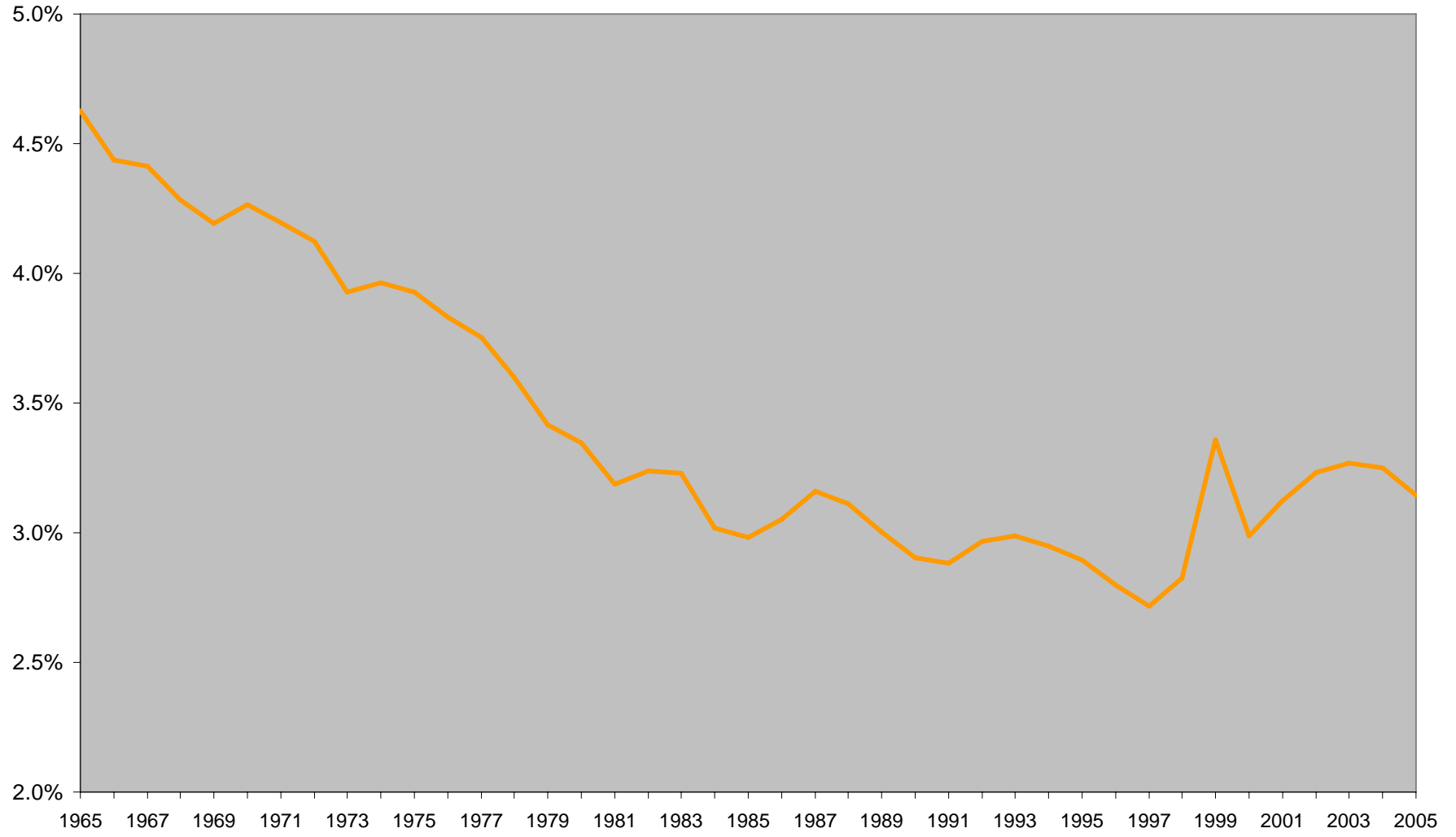
| | 1 | | 2 | | 3 | | 4 |
|---|-----------------------|--|-----------------------------|--|------------------------------|--|--|
| | Ln \$5s per capita | | Ln \$20s per cap- ita | | Ln \$100s per cap- ita | | Ln all de- noma- tions per capita |
| Ratio of workers / residents | -0.0941 | | 0.2742 | | -0.0538 | | 0.3605 |
| | 0.1413 | | 0.3517 | | 0.1936 | | 0.23 |
| ATMS per capita | 168.4424 | | 336.9934 | | 144.7178 | | 54.6092 |
| | 132.5731 | | 269.1874 | | 173.658 | | 178.5395 |
| Money transmitters per capita | -6.0245 | | -7.9953 | | 8.3612 * | | 5.558 |
| | 4.0282 | | 5.6453 | | 4.5289 | | 3.9914 |
| Payday lenders per capita | 0.4495 | | 0.21 | | 0.1198 | | -0.7994 |
| | 2.4617 | | 3.2977 | | 2.7129 | | 2.0543 |
| Median age | 0.1413 *** | | 0.0351 | | 0.1473 *** | | 0.0868 ** |
| | 0.0391 | | 0.0516 | | 0.0478 | | 0.04 |
| Ln median household income | 2.3523 | | 3.289 * | | 3.792 *** | | 3.0254 ** |
| | 1.5101 | | 1.8717 | | 1.3639 | | 1.2223 |
| Proportion foreign born Latinos | 0.7273 | | -0.4011 | | 3.911 ** | | 1.2131 |
| | 1.9928 | | 1.9181 | | 1.7138 | | 1.5443 |
| Proportion foreign born, not Latinos | -10.9114 *** | | -7.0775 *** | | -6.2651 *** | | -7.4823 *** |
| | 1.6754 | | 2.1212 | | 1.6547 | | 1.558 |
| Attendance at tourist attractions per capita | 0.0017 | | -0.0073 | | 0.0009 | | -0.0053 * |
| | 0.0022 | | 0.0045 | | 0.0022 | | 0.0029 |
| Proportion college educated (≥25 years) | -2.2807 | | -3.6899 | | -4.3087 ** | | -3.0888 * |
| | 1.7597 | | 2.2636 | | 1.7944 | | 1.6041 |
| Crime | 0.1102 | | 0.2261 ** | | -0.0425 | | 0.1133 |
| | 0.0848 | | 0.1085 | | 0.0789 | | 0.0823 |
| Proportion rented housing units | 2.6449 | | -7.2145 | | 38.6101 *** | | 11.0544 |
| | 13.632 | | 17.783 | | 13.456 | | 11.3529 |
| Proportion rented housing units * Ln median household income | 0.0661 | | 0.86 | | -3.2647 *** | | -0.7287 |
| | 1.2253 | | 1.5971 | | 1.2019 | | 1.0167 |
| Constant | -29.2618 * | | -33.1942 | | -41.8754 *** | | -30.9275 ** |
| | 16.7418 | | 20.9298 | | 15.3209 | | 13.7003 |
| # Observations | 158 | | 173 | | 169 | | 175 |
| R-squared | 0.29 | | 0.1945 | | 0.1953 | | 0.2059 |

Figure 1: Ratio of Total Currency to GDP



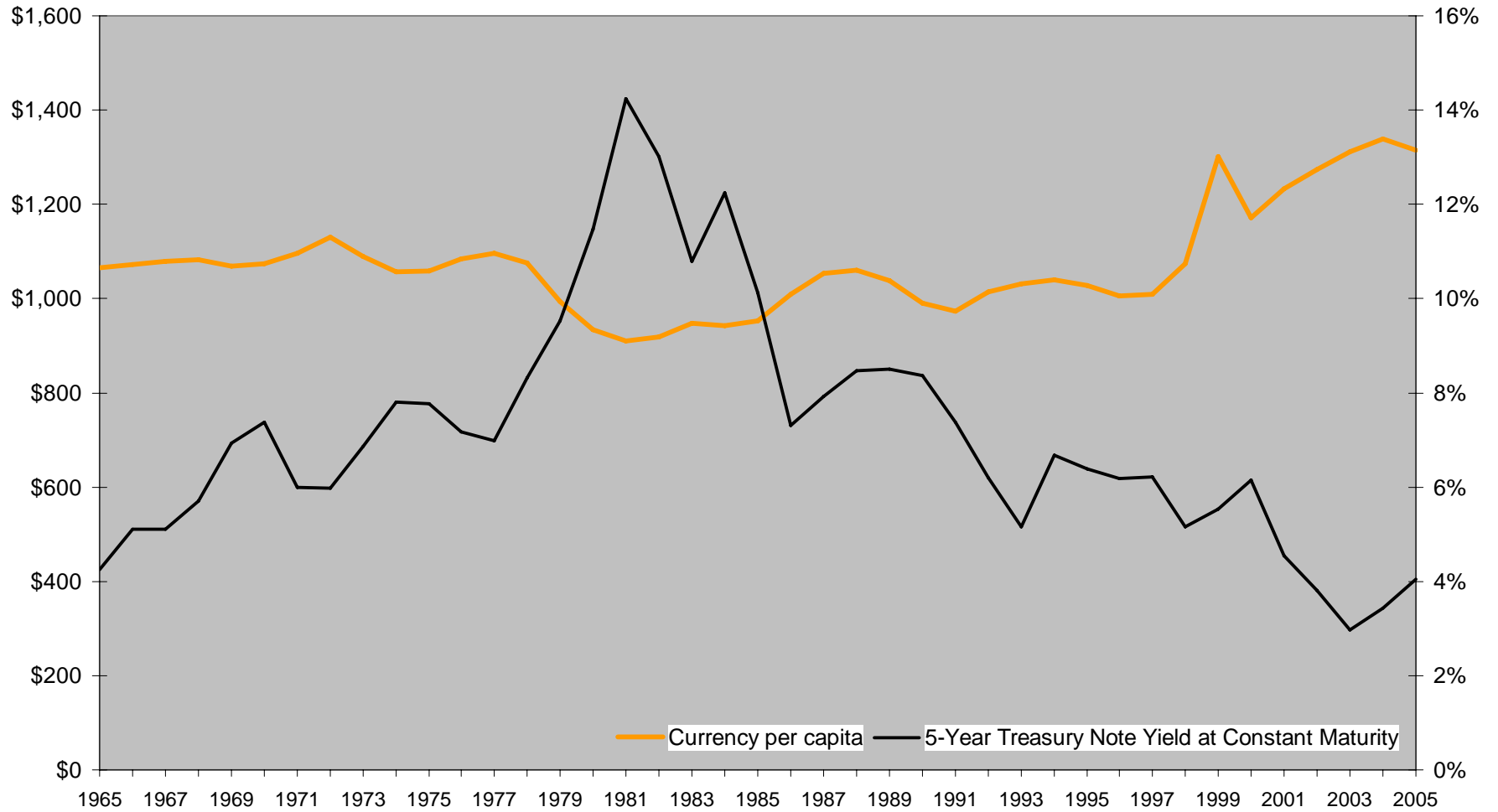
Source: Federal Reserve Board

Figure 2: Ratio of Domestic Currency to GDP



Source: Federal Reserve Board

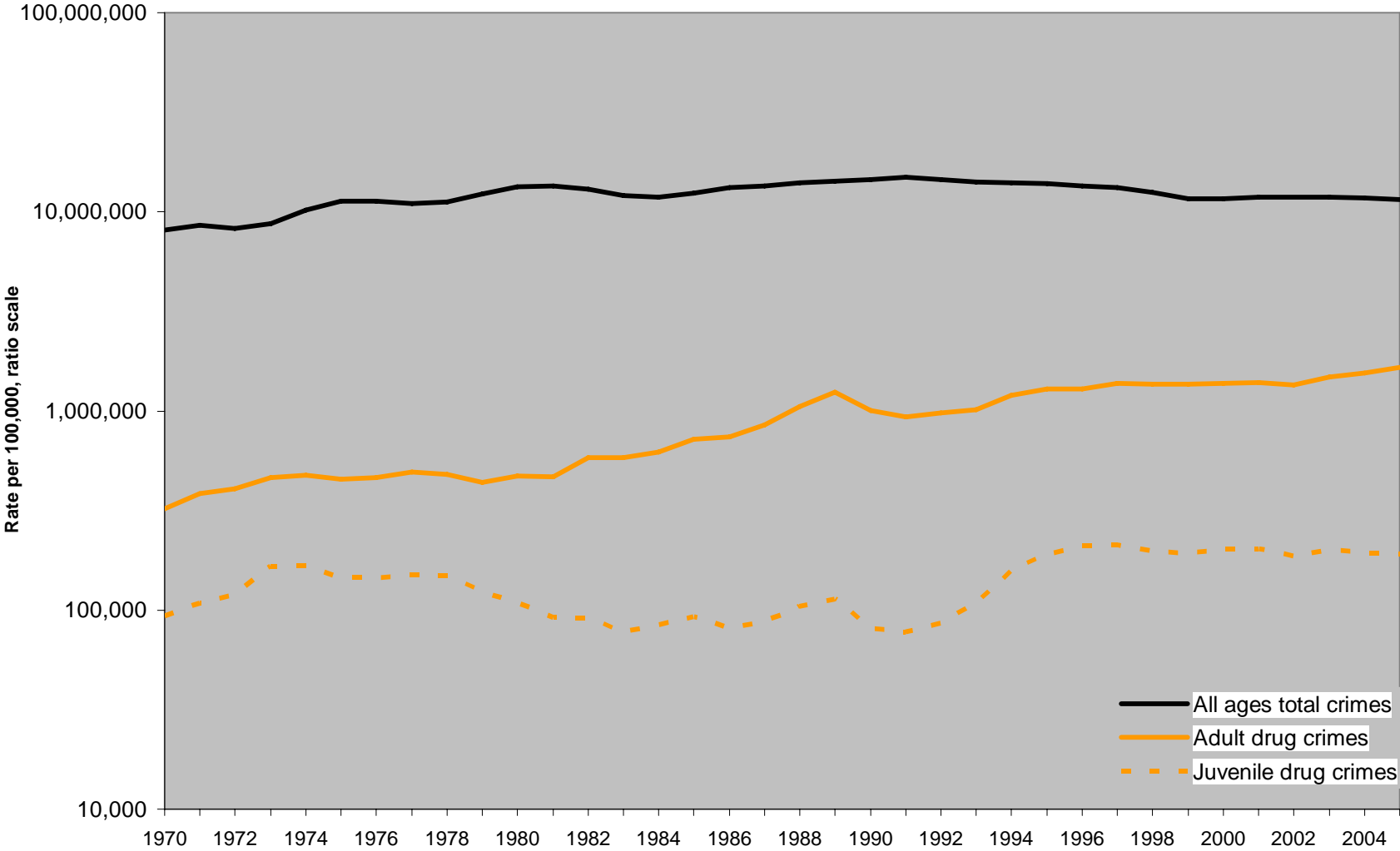
Figure 3: Currency per capita and Treasury note yield



Notes: LHS means left-hand scale. RHS means right-hand scale.

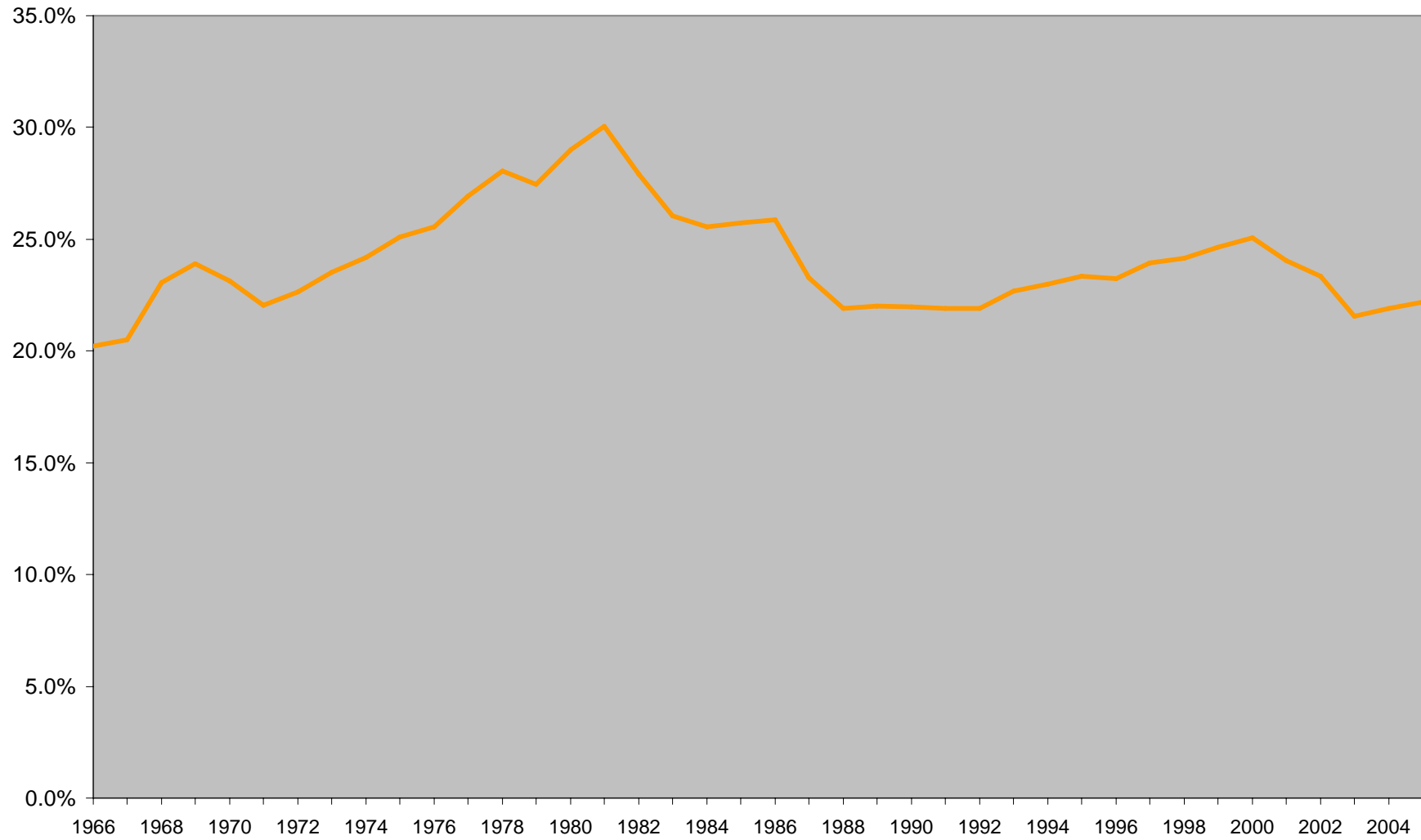
Source: Board of Governors of the Federal Reserve System from Haver Analytics; Bureau of Labor Statistics; U.S. Census Bureau with Haver Estimates; Calculations made by the authors

Figure 4: Historical Crime Rates



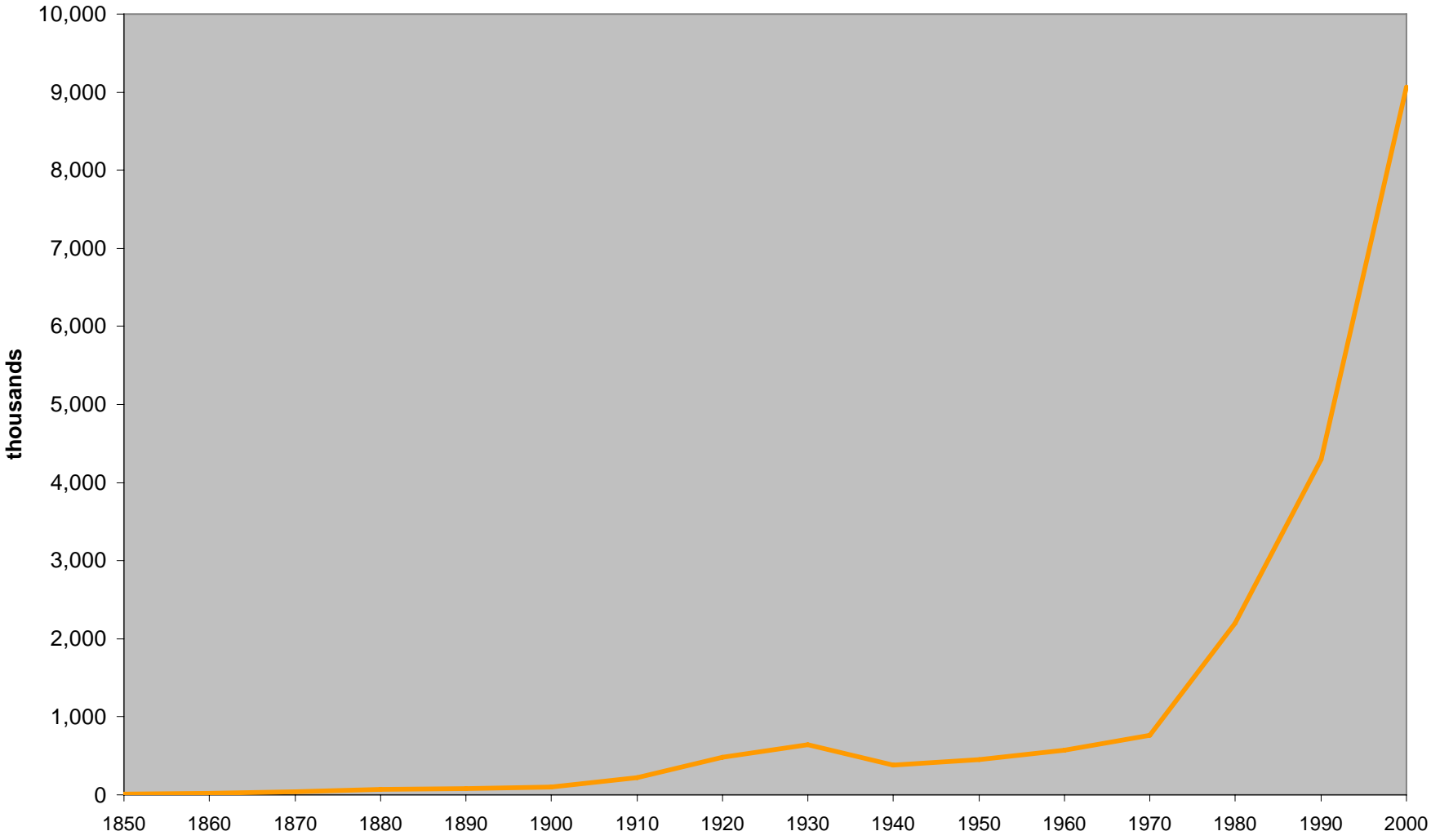
Source: FBI, Uniform Crime Reports

Figure 5: U.S. Federal Average Marginal Income Tax Rates in the NBER TAXSIM Model



Source: NBER

Figure 6: Mexican-Born Population in the U.S.



Source: Jeffery Passel, Pew Hispanic Center (see references)

Figure 7
Zip Codes included in study

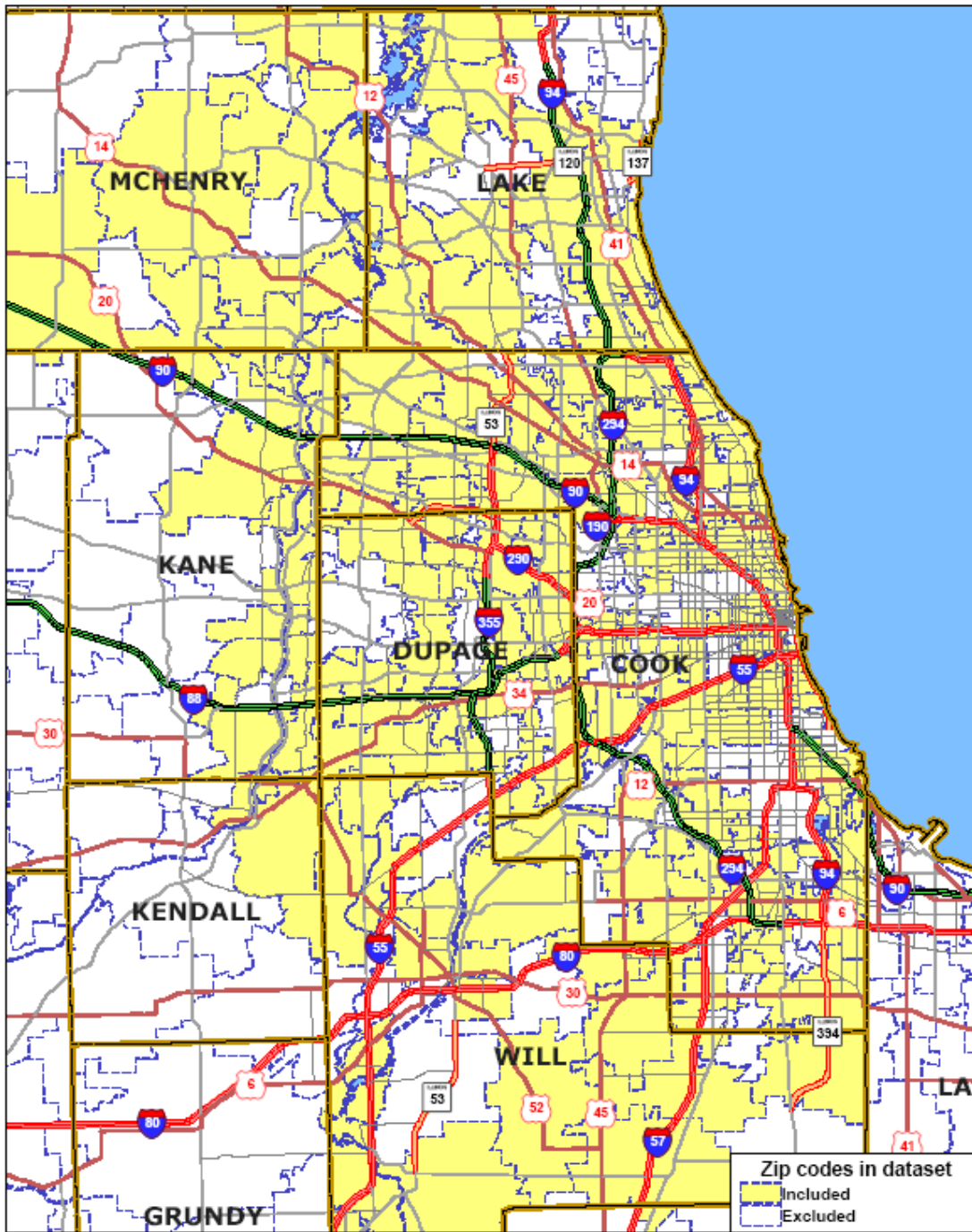
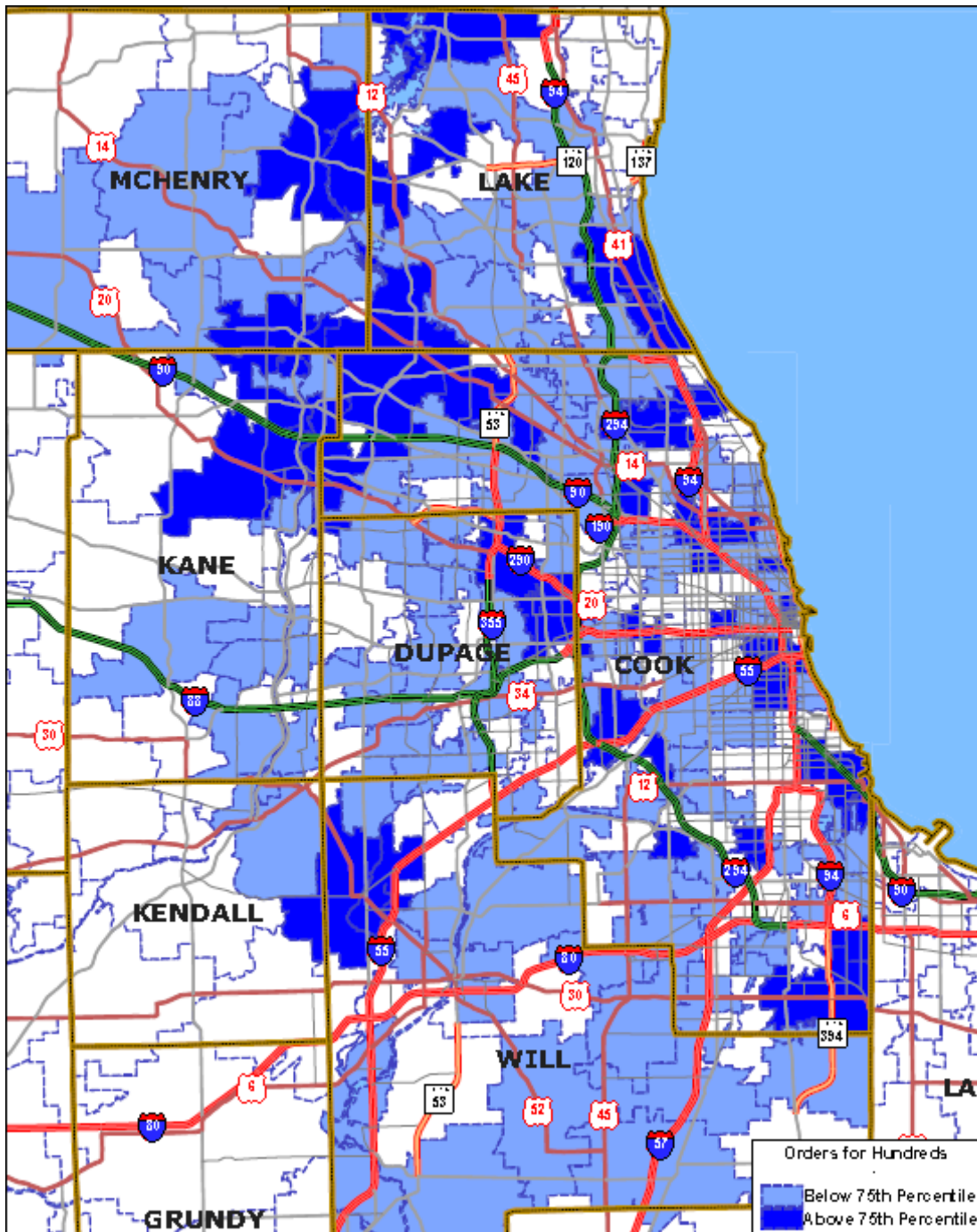
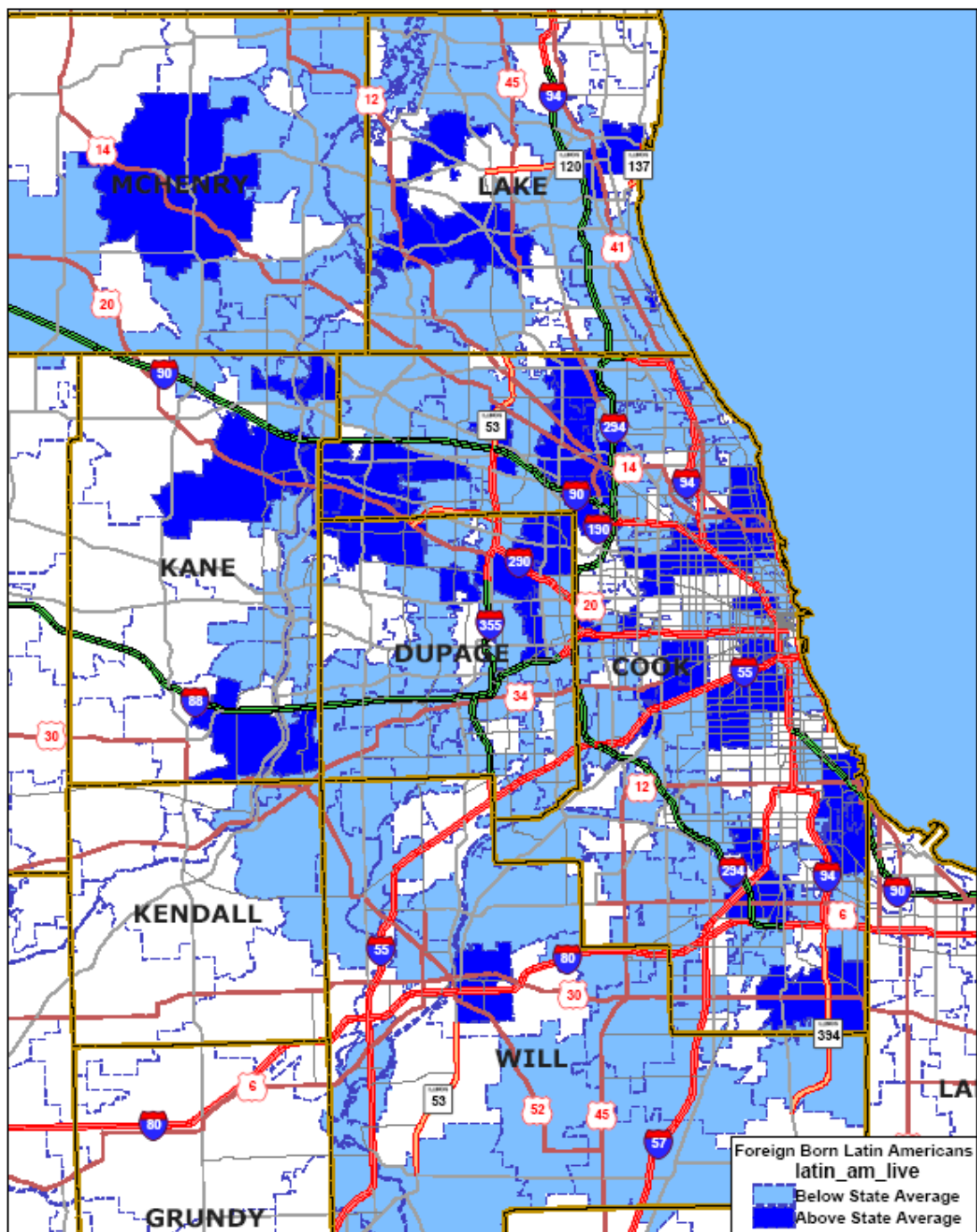


Figure 8
Aggregate Orders for \$100s per zip code in the Chicago area: 2005



Source: Authors calculations using Federal Reserve Bank of Chicago data

Figure 9
Proportion of Foreign Born Latin Americans per zip code: 2000



Source: US Census