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# A System Dynamics Approach to Understanding the Use of Banks and Alternative Financial Services in St. Louis



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## **Introduction**

This report summarizes a project sponsored by the Federal Reserve Bank of St. Louis to explore the complex social system that influences households' decisions to use banks and other financial institutions. The Office of Community Development of the Federal Reserve Bank of St. Louis approached the Social System Design Lab (SSDL) at Washington University in St. Louis to develop a grounded theory describing St. Louis households' experience related to financial institutions, and how financial decisions based on that experience impacted household economic security. The SSDL utilized a participatory method called Group Model Building (GMB) to create a System Dynamics model of how banks, community members, and alternative financial institutions interact in ways that seem rational when considered separately, yet together create a system that produces unintended consequences for people and business. The project was planned and carried out by members of the Bank, three community-based organizations, and the Social System Design Lab during the fall of 2010.

## **Background**

In January of 2009 the Federal Deposit Insurance Corporation (FDIC) issued The National Survey of Unbanked and Underbanked Households (FDIC Unbanked/Underbanked Survey Study Group, 2009). This report indicated that the St. Louis metropolitan statistical area (MSA) had one of the highest prevalence rates of unbanked and underbanked African-Americans in the country. Thirty-one percent of all African-American households in the MSA are unbanked, the highest of the 20 most populated MSAs in the country. The 160-page report offered some reasons that respondents gave about what drives households to underutilize banks, but did not provide details of local situations. The study was not designed to understand decisions made in St. Louis households to use or not use banks and so-called alternative financial services, such as pawn shops and payday lenders. Many theories had been discussed, but the Bank was aware that the people closest to the situation—the families in St. Louis—were not consulted.

## **Methods**

**The Social System Design Lab (SSDL)** at Washington University in St. Louis is known for community driven system dynamics modeling of complex issues. Areas of research include community responses to domestic violence, mental health transformation, innovation implementation, natural resources and rural communities, obesity, violence in schools, and juvenile/criminal justice systems. The SSDL has created new methods of developing system dynamics models of problems in complex social systems involving the people most impacted by the system that produces the problems.

**System Dynamics** is a visual and analytical way of investigating how complex systems work. Pioneered by Forrester (1990, 1999) at the Massachusetts Institute of Technology, it models the relationships between elements in a system and how these relationships influence the behavior of the system over time. For example, how do aspects of culture, livelihood, education, and environment impact people's decisions to use or not use banks and alternative financial institutions such as payday lenders? The SSDL works in collaboration with others to take what they know about the details of the specific issues and develop computerized models, which enable stakeholders to visualize, communicate, and analyze interconnected issues. Thus, system dynamics can help identify the root causes of the problems and discover and model potential solutions.

**Group model building (GMB)** as practiced by the SSDL is a process based on the body of work described by Vennix (1996), Richardson and Anderson (1997; 1995), and others that consists of one or more group meetings, or sessions, designed to co-create system dynamic models with people who are closest to the topic being addressed (e.g., health, safety, education, social welfare, economic growth). In the co-

creation of the models, a learning network is formed that increases understanding about the topic, appreciation for community history and community members' experiences, and skills related to model building.

For this particular project, a Core Modeling Team (CMT) comprised of representatives from the Federal Reserve Bank of St. Louis, the SSDL, and three Community-Based Organizations worked for a period of two months to plan and design the GMB sessions with community members. The CMT is responsible for all aspects of the modeling process, including GMB session design, time and location, and recruitment of participants. CMT members also serve as facilitators of the GMB sessions. In this way the community members of the CMT develop new knowledge, skills, and abilities to use system dynamics to understand causal relationships contributing to complex social problems in their communities. During the session, facilitators ensure the focus of the discussion is on understanding the participants' life experiences related to the topic. Through close interaction with the modeling team, GMB participants help to shape the language and structure of the system dynamics model. While no formal knowledge of modeling is required or expected, participants' input is crucial to creating a model that reflects their experience of the community issue being modeled.

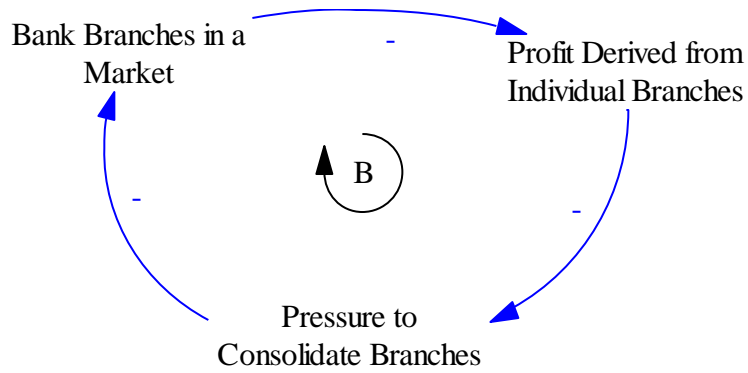
This project consisted of five 120-minute GMB sessions. Three sessions involved residents of north St. Louis, one session was held with bankers, and another session included representation from the alternative financial institution industry. Each session resulted in a system dynamics model that reflected the combined input of the participants in the session. SSDL staff then combined the three community member models into one that included feedback loops that were common to the sessions. The two financial institution sessions were similarly combined into one model, and ultimately the community and institutional models were integrated into one combined model that described how the various perspectives fit together into a system in which all stakeholders participate.

## A guide to interpreting the following diagrams

System Dynamics uses a particular visual grammar to describe causal relationships among variables in a model. Arrows are used to indicate causal relationships. But system dynamics goes another step, to define the *direction* of that influence. In the case of a fixed, stagnant market, it could be argued that as the number of branches in a market *increases*, profits from individual branches would *decrease* (if everything else remained constant). That relationship would be represented by adding a "minus" sign on the arrow, indicating that the direction of change is OPPOSITE to the first variable's direction as shown below:

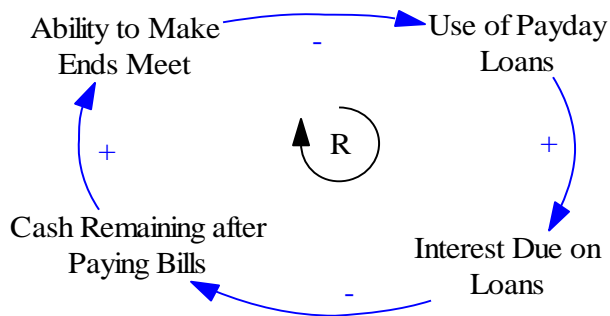


A feedback loop is created when the influence of original input (in this case, increasing the number of branches in a market) "feeds back" to itself. For example, as the number of bank branches in a market *increases*, profit derived from individual branches *decreases*. This *increases* pressure to consolidate branches, which then "feeds back" and *decreases* the number of bank branches in a market. The visual representation of this is shown below:



In this feedback loop, each variable changed in the opposite direction from its predecessor. This feedback loop is labeled as a “balancing loop” and denoted with a “B” enclosed within the clockwise arrow.

The second type of feedback loop in system dynamics is a reinforcing loop, which has the effect of reinforcing the direction of initial change. For example, as interest due on loans **increases**, the borrower’s leftover cash after paying bills **decreases**, which further **decreases** their ability to make ends meet, and further **increases** the use of payday loans (if everything else remained constant), creating the reinforcing loop shown below:



# Model

The final integrated model shown in Figure 1 is organized into five interacting subsystems: (1) competition and revenue, (2) revenue and customers, (3) customer and employers, (4) trying to make ends meet, and (5) dependence on alternative financial institutions. Figures 2-6 expand the feedback loops within each subsystem that contribute to stakeholders' experience from their perspectives.

**Figure 1: Overview of Integrated Model**

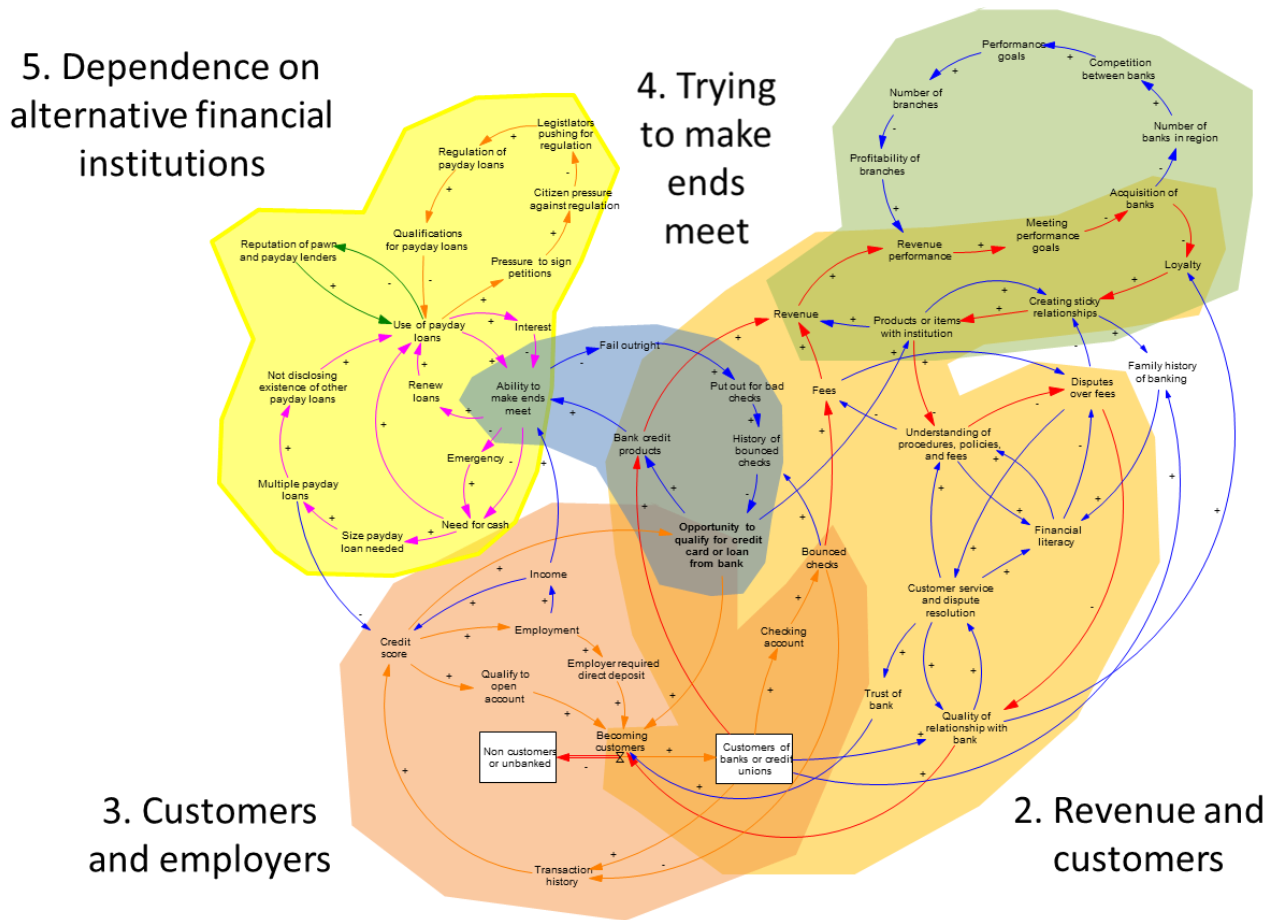


Figure 2 expands the example from above to describe the effects of competition between banks, branch proliferation, and pressure for branch financial performance (fee and interest income) on how customers experience loyalty to the bank. Increased competition among banks leads to more branches and less profitability of individual branches. In efforts to reduce competition, banks acquire other banks (fewer banks = fewer consumer choices) forming the balancing loop (B1). Meanwhile, acquisition of banks reduces customer loyalty to banks which reduces revenue and leads to even more acquisitions (R1).

**Figure 2:** Competition and Revenue

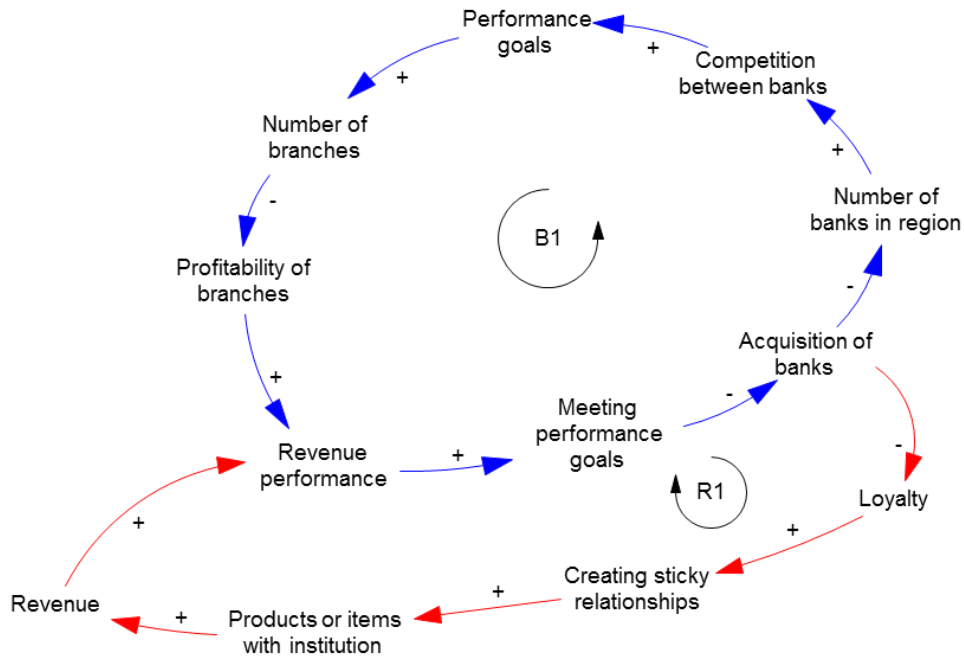


Figure 3 depicts how a bank's seemingly reasonable desire to protect revenue performance actually feeds back to create customer confusion about products offered and disputes over fees associated with those products, undermining customer loyalty and the bank's ability to create "sticky" customer relationships (i.e., the more of a bank's products a customer uses, the "stickier" the relationship). So less understanding of products offered and more disputes over fees leads to fewer customers and therefore decreased revenue from bank credit products (B3). Likewise, this dynamic may reduce profits by alienating customers, thereby decreasing revenue from fees earned from bounced checks (B4).

**Figure 3: Customers and Revenue**

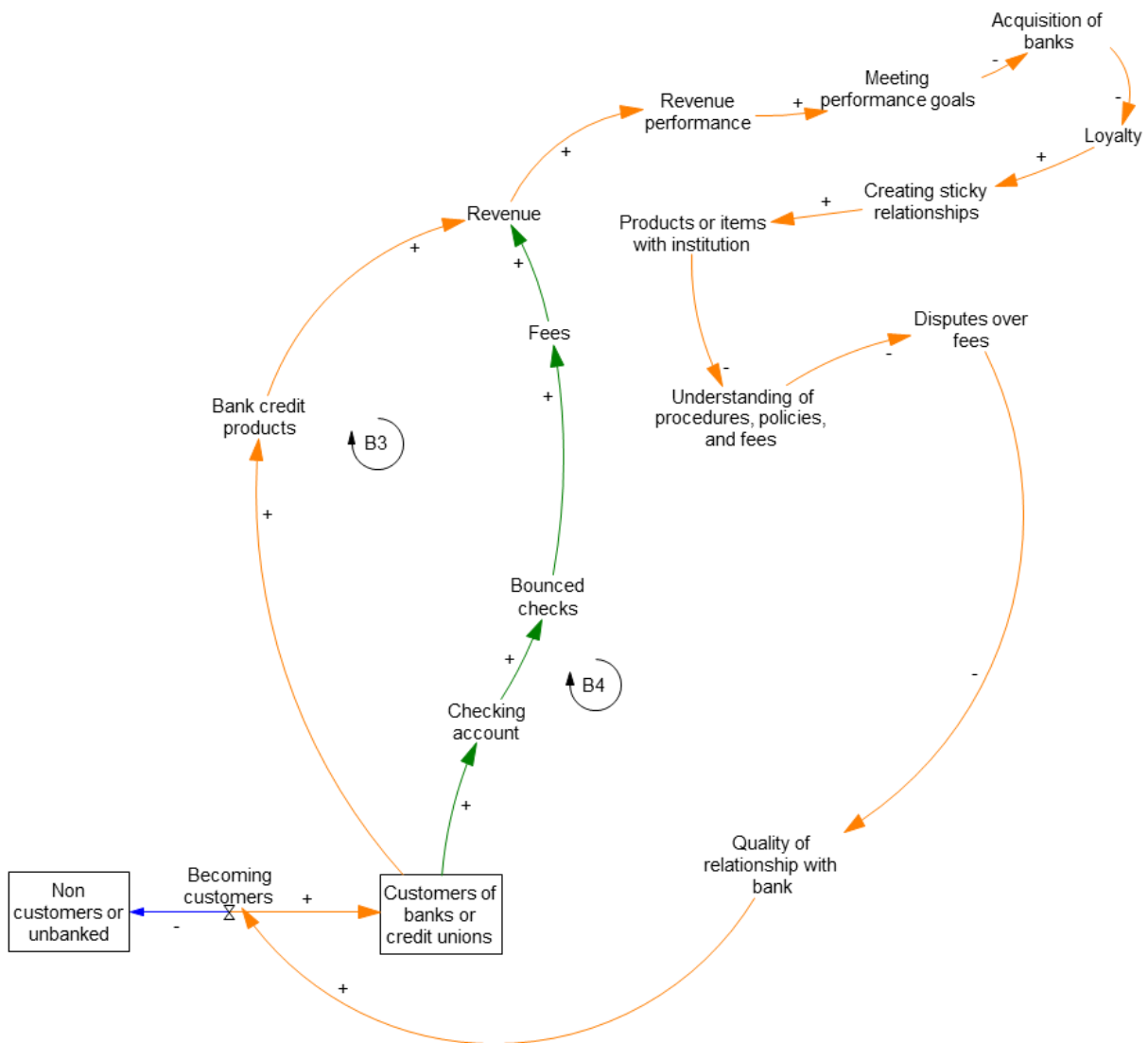






Figure 5 describes the beginning of a cycle (R5) that comes from a customer's inability to have access to credit products. This may actually drive people to use payday loans and other products that eventually reduce household economic security. Access to credit is important to individuals and business, as many people experience cash flow problems. Households who live paycheck-to-paycheck are more financially insecure and therefore have more cash-credit emergencies, increasing their need for cash flow assistance.

**Figure 5:** Trying to Make Ends Meet

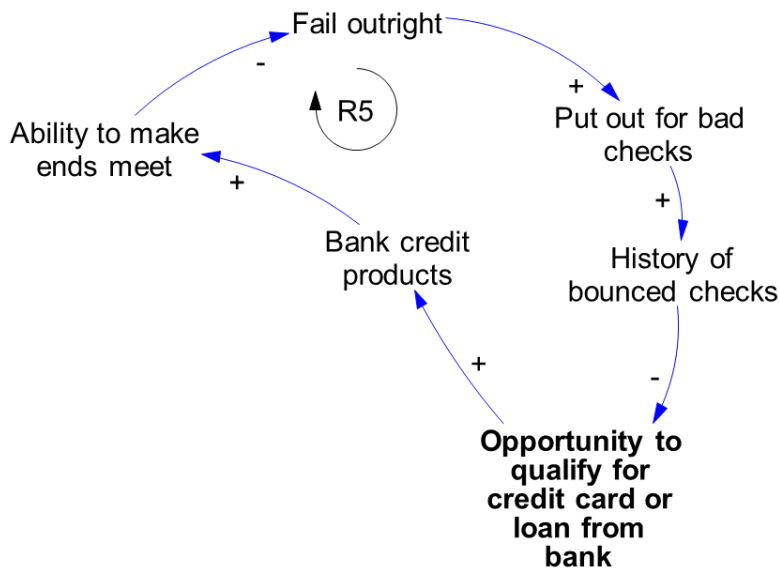
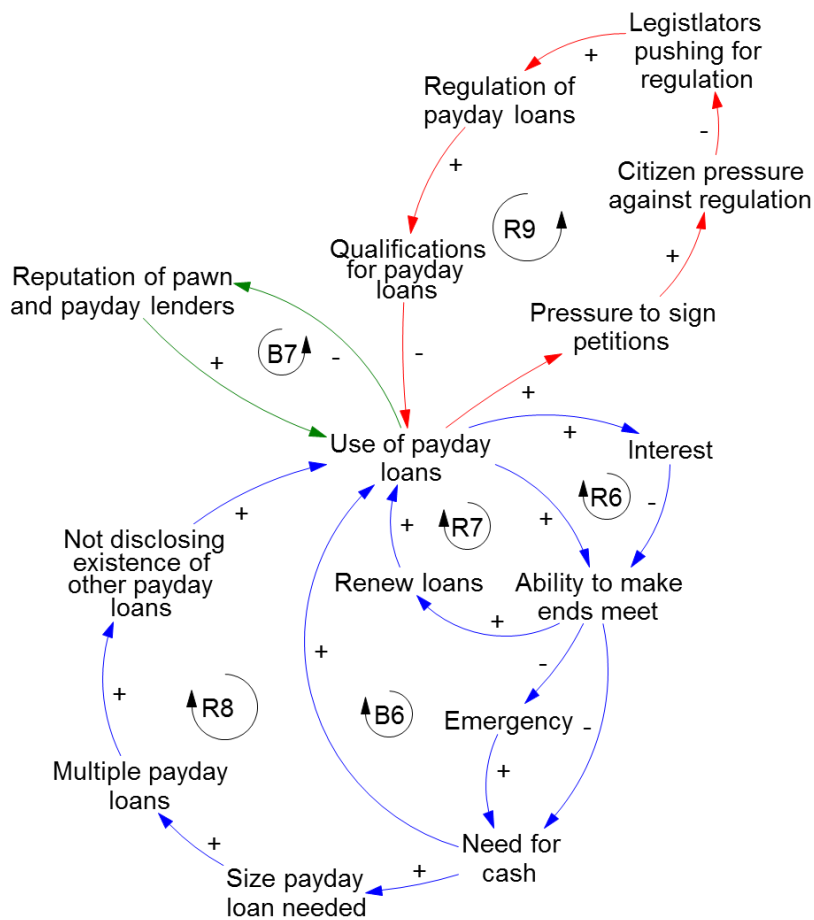


Figure 6 traces the impact of emergencies for unbanked people and depicts how they become more dependent on high-interest loans and less able to use traditional banking products. An inability to make ends meet creates a need for cash, which leads to the use of payday loans. This increases *the short term* ability to make ends meet (B6). However, the fees and interest rates associated with payday and title loans make it difficult to make ends meet (R6). This leads individuals into a vicious cycle of renewing loans (R7), and over time another vicious cycle of seeking multiple payday loans without disclosing other payday loans (R8). While customers of payday loans quickly learn from experience (B7), they are now caught in a series of vicious cycles (R6, R7, and R8). Moreover, payday loan industry participants reported that some establishments place pressure on customers to prevent reforms (i.e., signing petitions or participating in campaigns to prevent regulation of the industry), creating another reinforcing loop that allows the use of payday loans to increase even further (R9).

**Figure 6:** Dependence on Alternative Financial Institutions



## Discussion

Residents of St. Louis and bankers who serve the community are a diverse group comprised of unique individuals. Each person has commitments and concerns, and unique reasons for using or not using banks and the alternative financial industry. A number of themes emerged from the GMB sessions.

- Community residents' comments were generally centered around (1) transactional services for personal and business reasons, and (2) the need for access to cash and credit.
- Transactional services include the need to use and accept checks and paying bills. Most residents' experiences with the financial system, both good and bad, are driven by these transactional services. People talked about being forced to have bank accounts by employers who require direct deposit, or by vendors such as cable companies that require customers to have a bank account. People without bank accounts have developed a strong system of coping mechanisms, such as knowing which stores accept third-party checks, using check-cashing facilities, and frequently carrying cash.
- People also need to pay their bills when due. Many participants talked about financial emergencies. When the car needs repairs and an individual cannot get to work, he or she needs access to cash or credit to get it fixed. Unfortunately, many people have little or no savings, and because of past experience with banks they do not have timely access to credit products. This drives some to use pawnshops or payday lenders to fill short-term cash flow needs, which decreases buying and bill paying power in the long run. Interestingly, small business owners also reported using payday lenders as a lender of last resort to fund their payrolls or other cash flow needs while waiting for receivables to be paid.
- Individuals and business owners both reported having experienced institutional racism in lending. Individual stories reflected perception of unfair access to credit products based on race. Many felt that the financial "system" was intentionally making it more difficult for African-Americans.
- Mistrust of the banking system was a strong theme for residents. Often resulting from lack of understanding of banking policies and procedures, residents commonly reported multiple episodes of disputes over fees and availability of funds. The extent to which these disputes were resolved in the customer's favor influenced residents' trust or distrust of the banks.
- While residents and business owners talked about discrimination, transactions, and access to cash, the bankers and alternative institutions talked about pressure to maximize profits and minimize risk. Banks feel caught between profitability pressure and their customers' needs. One of their tactics is to try to create so-called "sticky relationships" that make it difficult for customers to terminate their relationships with banks. Many bankers felt that the regulatory environment made it impossible to create financial products that could help meet the needs of low- and moderate- income customers. They described tactics of the payday industry that prevent the development of state regulation to limit usurious lending practices. The payday lenders talked about simply extracting as much business from people as they could, and then moving on to another customer.
- Another clear result of the modeling was that all parties involved understood the risks of using payday lenders. Residents and business owners all expressed that they knew what they were

getting into; they simply felt they had no other alternative to meet their short-term financial needs and resorted to these sources during emergencies.

- Many residents expressed appreciation of banks that provide “second chance” opportunities. Some people get into trouble with fees and overdrafts, and need time and multiple second chances to get past that part of their lives. Clearly, usurious lending practices favor business profits over household economic security. Banks would do well to develop products and services that meet the needs of the community. But until this happens, alternative institutions will grow and thrive at the expense of individuals.

Sometimes during system dynamics modeling, concepts emerge that are a result of looking at the system as a whole. These emergent properties may not be articulated in a modeling session but become obvious during the integration of several models. In this project it became clear that there were several segments of the population that neither bankers nor alternative industry representatives had identified. The notion of treating all customers and potential customers as a homogenous group with common financial needs may be a blind spot for people who want to create products and services to serve people with diverse needs and attitudes about banking. Even the label “underbanked” that was originally used in the FDIC report is itself a banking industry-centric concept. Some people would really prefer not to use banks, and only use them to the extent required by work or life circumstances. See Table 1 for more details.

**Table 1** Customer Segments

	Voluntarily Banked	Involuntarily Banked	Voluntarily Unbanked	Involuntarily Unbanked
<b>Why Banked?</b>	<ul style="list-style-type: none"> <li>• Good credit history</li> <li>• Family history of banking</li> </ul>	<ul style="list-style-type: none"> <li>• Job or provider – required</li> <li>• Use banks as little as possible</li> </ul>		
<b>Why Underbanked?</b>		<ul style="list-style-type: none"> <li>• Mistrust</li> <li>• Preference for cash</li> </ul>	<ul style="list-style-type: none"> <li>• Anonymity</li> <li>• Negative banking experiences</li> <li>• Family history</li> <li>• Culture</li> </ul>	<ul style="list-style-type: none"> <li>• Unaware of how to return to being banked</li> <li>• Rather not be</li> </ul>
<b>Why do they use “payday lenders” and other alternative services?</b>	<ul style="list-style-type: none"> <li>• They generally don’t because they have better alternatives</li> </ul>	<ul style="list-style-type: none"> <li>• No access to traditional sources of credit</li> <li>• Quick access to cash</li> <li>• Perceived certainty of fees</li> <li>• Advertising</li> </ul>	<ul style="list-style-type: none"> <li>• No access to traditional sources of credit</li> <li>• Quick access to cash</li> <li>• Because they are unbanked</li> </ul>	<ul style="list-style-type: none"> <li>• They have to</li> </ul>

## Summary

This project involved approximately 60 people in five GMB sessions designed to describe and define the system that influences households' decisions to use banks and other financial institutions such as pawnshops and payday lenders. Community residents, bankers, and representatives of the payday lender community participated in the creation of system dynamics models that were integrated into one combined model of the system that contributes to those household financial decisions. Business policies and practices of banks, such as decisions about location and disposition toward second-chance banking, were explored as experienced by community residents. Multiple perspectives provided a means to integrate each stakeholder group's limited view to include how they all interact to contribute to household economic security. The resulting model described how people, banks and alternative institutions interact in ways that are consistent with what they believe are in their best interests.

## Acknowledgments

The Social System Design Lab would like to acknowledge that our method is inherently dependent on the contribution and participation of others. We want to thank the following organizations and their people for contributing to this project: Residents of the various St. Louis communities who participated; West End Mount Carmel Full Gospel Baptist Church; Beyond Housing; Grace Hill Settlement House; Federal Reserve Bank of St. Louis, Office of Community Development; and the students and staff from the Brown School of Social Work, Washington University in St. Louis who participated in the project.

Questions regarding the results of this project can be directed to: Yvonne Sparks or Daniel Davis, Office of Community Development, Federal Reserve Bank of St. Louis, P.O. Box 442, St. Louis, MO 63166-0442 or via email at [CommunityDevelopment@stls.frb.org](mailto:CommunityDevelopment@stls.frb.org). Questions about the methods used, including group model building and system dynamics, can be directed to Mr. Timothy Hower or Dr. Peter Hovmand at the Social System Design Lab, Brown School of Social Work, Washington University in St. Louis, Campus Box 1196, One Brookings Drive, St. Louis, MO 63130 or via email at [BrownSSDL@wustl.edu](mailto:BrownSSDL@wustl.edu).

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