Technology and the U.S. Retail Payments System: Challenges and Opportunities

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Technological change lies at the heart of all economic growth. Whether it's the wheel or the computer chip, the spur of new technology is a vital element in changing standards of living. Combine technological change with improvements in human capital, and add that mysterious factor associated with how people and technology work together and you have productivity growth. Increase productivity growth even by small amounts and the time needed to improve standards of living drops rapidly. Yet for all its importance, technological change is not fully understood. It seems to take forever for a new invention like the steam engine or fiber optics or even radio waves to become the foundation for productivity improvement. Why is this?

Economists have speculated that a slow rate of technological diffusion -- that period of time from the Eureka! to broad market changes -- occurs for a couple of reasons. First, it is often hard for the inventor or anyone else to understand what the uses of a new technology are. It wasn't clear at the start that the steam engine -- originally invented for use on water-- could be used to transport large quantities of goods over land, just as an example. A single invention might need others--so-called complementary inventions--to make it widely usable. We can see this recently in the combination of the communications technology and PC browser software making the decades old Internet suddenly ubiquitous. Finally, it is often not clear how an invention might actually be marketable and, of course, commercial viability will drive diffusion in a market economy. Henry Ford's innovative assembly-line manufacturing processes drove down automobile production costs enough to dramatically increase the affordability and the proliferation of automobiles in the first half of the last century. This story--manufacturing improvements yielding cost reductions and accelerating commercial viability--has been repeated time and time again, but its evolution is hard to foresee. The process of technological diffusion is almost by definition uncertain, and that very uncertainty causes it to be slow.

And even when diffusion seems fairly well along -- the use of computers by the late '80s, early '90s, for example--it is often hard to see the impact of technological change on productivity growth. In 1987, Nobel prize winning economist, Robert Solow, made his famous comment "You can see computers everywhere but in the productivity statistics".

Yet we know now that the use of ever more powerful computers, combined with advances in telecommunications and decreases in costs had a tremendous impact on productivity growth in the last decade. In the mid-90's, structural productivity growth shifted by most people's assessment to about a percentage point higher than it had been for the previous two decades -- from around one percent or so to around two percent. That change alone, if sustained, produces a doubling in standards of living in something like half the time. When economists carefully dissect the reasons for this change in productivity, capital deepening in the form of increased investment in computers, software, and telecommunications equipment is a key element. Clearly computers were impacting productivity but we just couldn't see it earlier.

So technological diffusion in the marketplace is slow, but once it happens I would argue that its effects, particularly on business processes and organizations, are large and take place rapidly. At the same time as productivity seems to have shifted upward in the mid '90s, for most of us life changed at home and at work in significant ways. The web became our constant companion; information and connection to the world became real-time and round-the-clock. Global competition and cost containment--if not cost reduction--became constant challenges prompting an increased pace of organizational consolidation and restructuring. Technological change drove market change slowly, but once the market

changed the impact on business occurred rapidly. Whether you believe in the new economy or not, something happened at the intersection of technology and the market and that has prompted broad-based change in business models and organizations.

Now why am I perhaps boring you at 8:30 in the morning with theories about technological diffusion and insightful comments from Nobel prize winning economists? Well, I want to use this general case as a way of talking about what I see happening in the retail payment system. I want to focus on the technological changes that have impacted that system, their impact on the market, and then on the retail payment business of Reserve Banks. Then I'd like to close this presentation by mentioning a few challenges we face.

Technological Change

Arguably technological change has been driving change in the retail payment system for the last 40 years or so. But for much of that time, the change was seen primarily in the "backroom". Computers got faster and more powerful; reader-sorters became more efficient and intelligent; reconcilement could be done on-line; and even digital imaging could improve efficiency and the process of error adjustment. But technology did not transform the U.S. market for non-cash retail payments to any great degree -- checks by the billions were still written, and electronic retail transactions like ACH were confined to niches like payroll deposit and social security. To be sure, credit card use was growing, and in the '90s debit cards began to be popular, but Bob Solow's thoughts were clearly with all of us who in the '70s had predicted the demise of paper. Technological change in the retail payment system was taking its time to diffuse.

But all that changed arguably sometime in the 90's. Computing, and more importantly, communications capacity and capability increased and personal computing became ubiquitous. The Internet and a growing array of web services gave anyone who wanted it access to information and transaction capability and, most importantly, taught business and personal users to expect instant access and information. And finally, the press of competition in both domestic and global markets made the use of cheaper computing and communications power a key to survival. Technology in retail payment services came out of the back room and went to the point of sale, and into the home. It made it possible to create and store digital images instead of paper, and to transfer those images as needed. It changed the way in which businesses could deal with their supply chains and their customers, and the way in which consumers deal with business and with each other. Technological change took a while but now we are clearly seeing a transformation of the retail payments market.

Retail Payments Market Changes

This transformation is fundamental, particularly as it regards the form in which retail payment takes place. The Federal Reserve's recent payments research studies confirm this. Just a year ago we thought 65 billion checks were being written annually in the United States. Now we know that consumers and businesses likely are writing only about two-thirds of that volume--42.5 billion checks--still a large number but nothing like we thought it was. And it would seem that rather than growing at a slow pace, paper payments are declining, gradually being replaced by electronic payments. Data suggest that check usage peaked in the late 1990s and has been declining ever since.

According to our estimates, the entire non-cash retail payments market likely totals in the neighborhood of 80 billion transactions annually, or a bit more than double the retail volume of twenty years ago. But now electronic payments make up almost 40 percent of this transaction volume as opposed to 15 percent, while check volume fell from 85 percent to 60 percent of the total. Clearly, consumers and businesses are choosing electronic payment vehicles, such as debit cards, ACH direct deposit and direct payments more often now. They are doing so because technological changes have made such payments easier and cheaper. We are finally on the cusp of reaching that checkless society so many of us predicted 30 years ago.

To add to this, payments system participants are finding ways to take checks that may continue to be written out of the clearing and settlement process. This is especially true for the almost 40 percent of check payments made annually by consumers to businesses. These businesses-- retailers and others-- are now aggressively pursuing opportunities to take advantage of lower cost electronic collection. At the point of sale, retailers swipe checks, hand them back to consumers, and collect the funds through ACH or ATM networks. Corporations are starting to truncate checks at the lockbox and from that point collect the funds electronically. Given these innovations and the large volumes of checks written at the

point of sale and to pay bills, we are likely to see an acceleration in the trend toward electronic collection of payments. The retail payments market is at a tipping point and soon electronic payments and electronic collection will dominate.

Technological change is also affecting electronic payment systems. Fedwire and ACH services provide good examples here. Fedwire involves individual real time credit payments with immediate finality. Traditionally, we have thought of this as a large dollar electronic payments system. The ACH is a file-based system which typically provides next day availability at a lower cost and has been thought of as a low value system. But now we are beginning to see the market move toward the convergence of these systems, with lower value payments making up a sizable fraction of Fedwire volume, and ACH becoming a viable high-value option, particularly as we begin to offer a same-day service. Clearly, our ability over the last several years to reduce the cost of both of these electronic payments options plays a role here, but more is happening as well. The market is looking for the ability to choose among a continuum of payment characteristics such as timing of settlement, degree of risk, as well as cost.

With the increasing use of electronic payment systems, interoperability has become key. Straight through processing is the byword, and that is feasible only when payments flowing between and among a variety of domestic and even international systems can quickly be translated from one to the other. And what good are digitized images of checks if Reserve Banks and financial institutions are unable to exchange them electronically with each other without manual intervention? Formats of payments systems must conform to international standards and standards development has become critical.

The power and convenience of the web has transformed the customer interface in the retail payments market. No longer can we offer a single service -- checks -- like Henry Ford's Model T in any color you want as long as it's black. Now retail payments products have to be tailored to the end user. They have to combine information with transaction capability. And they have to offer elements of self-service to increase their value and efficiency. Technological change has made all this possible, and now the market demands it.

Finally, laws and regulations are changing to reflect the changing market. Privacy concerns and the need to deal with new forms of fraud clearly are priorities. Legislation and regulation continues to evolve to address the new forms of payments that are emerging. Congress is now actively considering "Check 21" - or the Check Truncation Act. This legislation, drafted with a great deal of collaboration with the industry, will, when passed, recognize digital check images as legal substitutes for checks. This sounds relatively innocuous, but it may be the key that unlocks one of the final barriers to near full electronic collection of retail payments.

Thirty years ago many of us were forecasting the checkless society. Even two years ago few would dare to forecast the demise of checks. Now we can clearly see the market changing. Technological change moves slowly but eventually the transformation occurs. When that happens, business has to change rapidly. Certainly Reserve Bank experience recently bears this out.

Reserve Bank Business Changes

Reserve Banks are now faced with the challenge of rapidly adjusting business plans to address a declining check market and an expanding electronic payments market. We welcome, and we have encouraged, the shift from paper to electronic payments. The efficiencies that come with this shift have to be good for the U.S. economy. Looking at this solely from a Reserve Bank operations perspective, however, some might caution "Be careful what you wish for." For us, and I would imagine for some of you, the business and organizational change that is required to meet the changing market is both sizeable, and at times, uncomfortable, to say the least.

Reserve Banks and financial institutions have invested in large infrastructures to process check payments. But now, we need to find ways to reduce the costs of processing the billions of checks still being written to allow for greater investment in electronic payments services. To do this, the Banks are undertaking three major initiatives.

The first initiative is the modernization of our check services. Over the past two years the Banks have been implementing a standard check processing platform at all 45 of our processing sites. With the completion of this standardization effort this year, we will be able to deliver uniform products and services nationwide. This standard processing platform also provides the flexibility to quickly address changing volumes in different local markets. In

addition, new enterprise-wide check adjustments software and recently offered web services provide customers with the opportunity to take much of the headache, time, and cost out of the error-correction process.

The second major business change is to reduce the overall size of our check-processing infrastructure. In February, we announced plans to eliminate 13 check processing sites and consolidate processing volumes at other offices. We will also consolidate adjustments operations into 12 sites, one in each Federal Reserve District. These actions will save about $60 million in annual operating costs and will be done in ways that maintain high quality service nationwide. We believe our role is to remain in the check collection business as long as it is necessary to support the evolving retail payments system. At the same time, we must meet the requirements of the Monetary Control Act of 1980. That is, our prices must recover, over the long run, our costs, including imputed profits, of providing payments services to depository institutions. This re-engineering of our infrastructure is designed to ensure that we can meet these requirements while continuing to fulfill our service goal.

Another way to reduce check costs and simultaneously provide value-added services to financial institutions and their customers is to stop the flow of paper checks as early in the collection process as possible. We have collaborated with the industry to promote the move to more electronic collection of checks. About one quarter of all the checks collected by Reserve Banks are now either deposited or presented in electronic form, though, I should note, most still involve paper to follow. We are not alone here, the banks that make up SVPCo committed to present 50 percent of their forward collection checks electronically by the end of 2003, and the large banks for the most part are on target to meet that commitment.

Digitized images of checks clearly have a role to play as well. Both the Reserve Banks and the private sector have built national check image archives recently, and these allow industry-wide storage and access to check images. Just speaking for the Reserve Banks, our new FedImage service enables financial institutions to offer more timely cash management and other services to corporate customers, and to allow consumers access to images through home banking systems. Standard robust image services position the industry for fundamental changes in the ways checks are cleared and settled, particularly as we look forward to passage of the "Check 21" legislation.

Reserve Bank Business Changes

Electronic check presentment, image capture and archiving, the Check Truncation Act, and all our efforts to modernize and downsize our infrastructure should reduce the cost of processing the paper flow. But what about the increasing number of payments that are fully electronic from initiation through collection? What steps are being taken to make the infrastructure for those payments more robust? Increasingly, the ACH is serving as the backbone for the electronic retail payments system. It is both a primary payment conduit, and a settlement mechanism for such things as ATM networks, debit card transactions, POS transfers and other new payment types. NACHA tells us that the ACH network is used by over 115 million consumers, four million businesses, and more than 20,000 financial institutions. National ACH volume last year grew over 11 percent and we fully expect that rate of growth to continue and possibly increase.

We continue to look for ways to enhance the FedACH service to accommodate new and emerging payments needs. We have consolidated our operations and customer support to significantly reduce FedACH prices--in fact, those prices have dropped more than 60 percent in the last 5 years. Market change demands greater choice among a broader array of options related to cost, availability of funds and risk. We are currently working with several banks to design and test the feasibility of a same-day ACH service. On the international front, FedACH now provides cross border services to Canada and plans are well underway to provide services to Europe, Mexico and Panama.

The application of web-based technology and internet protocols in the payments arena offers enormous opportunities for new services and significant efficiency gains. As some of you know, Reserve Banks already provide access to information services and low-risk transactions via the web. Today, we have over 4,200 institutions that access these services, including cash and savings bonds ordering, an entire suite of check information services, as well as robust accounting and billing information. More recently we have also added both ACH and funds transfer information services.

Clearly, information services are one important step, but value transfers using open systems are yet another issue. We are pushing hard to find ways to make secure ACH and funds transfers over the Internet, or over an extranet, using web

technology and open protocols. Since we transfer on average about $2.5 trillion daily, you can be assured that we worry a lot about security in an "open environment".

So far, we have completed several pilots in which we have successfully exchanged ACH files and completed basic funds transfer transactions using internet protocols. We have completed a design for providing our value transfer services over open networks using internet protocols, including the design to secure these services. Much more work needs to be done to "prove out" this design and bring these services to market, but we expect to do this by late next year.

Finally, even as we move to open networks for existing services, we have to consider what lies ahead. What is the next generation of platforms and services that will be necessary to meet the evolution of both technology and market forces? Here we have to develop a better understanding of market needs, the gaps in our existing service offerings, and ways in which technology can be used to meet those needs and close those gaps. This understanding must encompass the payments system end-to-end, from the ultimate users--consumers, corporations and government entities--to financial intermediaries and payment service providers. At the same time, we will need to move our core payments applications off the legacy systems which have served us well for over 20 years, and onto new platforms. Clearly, new technology overall, not just on the front-end in the form of web offerings, can help transform our services. Moreover, we believe it can also provide even greater operational resiliency.

Challenges

Technological change has changed the market for retail payments, and, in the face of that, Reserve Banks have had to make rapid and fundamental business and organizational changes. Our plate, as you may have gathered, is pretty full right now as we both try to shape our paper processing capability to the market, and make the electronic payment infrastructure even more robust. And on top of that we must work to ensure that the next generation of systems stands ready to be implemented. All this change brings challenges.

We retain our commitment to serving the nation's retail payments system. As we downsize and re-engineer, we are not leaving any markets behind. We are committed to providing new products and new approaches that will continue our service levels. But we, like all of you, have to do this in a way that is cost-effective. For us, that means meeting the requirements of the Monetary Control Act. As check volumes continue to decline, this becomes a day-in, day-out, year-in, year-out challenge. It cannot be a one-time event.

As we cope with the evolution of the paper-based system, we are focused on the evolution of electronic retail payments. Of necessity, that involves managing major technological change. Using the Internet for actual payment transactions, versus simply information services, is just one example here. We've learned quite a few lessons about how to manage major technological change -- sometimes the hard way -- but we have learned. We know we have to carefully watch priorities; we know that business and technology have to be firmly joined at the hip for major projects to be successful, and increasingly we know we have to think outside the box, be innovative, to be successful. We haven't outsourced much in the past, or partnered with other service providers. We have to think harder about that now.

But knowing all this -- having learned all these lessons -- is one thing. Using those lessons and managing technological change successfully is quite another. So that ranks high on my list of challenges.

After September 11, no list of challenges can be complete without mention of the need to continually revisit and strengthen approaches to contingency. Indeed, the resilience of the nation's payment system stood out during that tragedy -- the payments system kept humming along. The Reserve Banks, working closely with the industry, kept the payments system going even when planes didn't fly, or systems didn't settle in a timely way. But no one can be complacent here.

Finally, remember when I said many in the Reserve Banks have wondered whether finally realizing the goal of moving paper payments to electronics might fall into the category of "Be careful what you wish for"? The change involved is daunting, and for those in the offices which are affected by downsizing, truly difficult. No one can or should underestimate the uncertainty and concern that faces many of the Reserve Bank staff -- not unlike, I suspect, what many of your organizations have endured. Yet in the midst of this, we have to realize that this change is what we have planned and wished for. It is exciting that the U.S. retail payments system is now moving from paper to electronics. It is exciting

that technological change has provided a key foundation to our economy's ability to grow faster and raise standards of living sooner. It is exciting that the retail payments world can serve the evolving needs of all those in the economy--end-users as well as financial intermediaries--in better ways. In the face of uncertainty and challenge, we must remember this change is exciting. Thank you.

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