

The Great ATM Shakeout

BY DAVID A. PRICE

Editor's Note: *Welcome to the inaugural "At the Richmond Fed" column, a new series profiling economic research activities at the Richmond Fed.*

Highlighted Research

"Innovation, Deregulation, and the Life Cycle of a Financial Service Industry." Fumiko Hayashi, Bin Grace Li, and Zhu Wang. *Review of Economic Dynamics*, October 2017, vol. 26, pp. 180-203.

Soon after banks introduced automated teller machines (ATMs) in the late 1960s and early 1970s, shared networks of the machines — that is, networks in which multiple banks participated — began to emerge. The number of shared networks grew steadily until reaching a peak of around 120 in the mid-1980s. Then a massive shakeout took place: Only half of the networks remained by the mid-1990s, and less than half of the rest remained by the mid-2000s. Around 35 percent of the exits took place through mergers or acquisitions, while the other networks simply disappeared.

What happened? That's the question asked and answered in recent research by Richmond Fed economist Zhu Wang, together with Fumiko Hayashi of the Kansas City Fed and Bin Grace Li of the International Monetary Fund. Several suspects were on the scene. One was the general banking deregulation that started taking effect in the mid-1980s that allowed banks to operate statewide and across state lines, which led to consolidation in the banking industry. Another was an ATM-specific deregulation: The U.S. Supreme Court in 1986 let stand an appeals court ruling that national banks were allowed to use ATMs in shared networks across state lines without violating federal branching restrictions. Finally, an important technological innovation occurred in the mid-1980s with the introduction of debit cards that could be used at both retail locations and ATMs, increasing the usefulness of the cards.

Wang, who joined the Richmond Fed in 2011, had done extensive research on payment systems. But before he became interested in the life cycle of the ATM industry, he was mainly involved in another line of research — namely, the life cycle of the television manufacturing industry. In that work, he studied the shakeout of TV manufacturers in the United States and the United Kingdom.

The ATM industry seemed to present a related, yet novel, research frontier. "It's popular to look at the shakeout pattern in manufacturing industries from the industry's birth to its peak number of firms and then its consolidation," Wang says. "But for the service sector, there are very few studies of the life cycle. And the

shakeout pattern among ATM networks was intriguing — what can explain this?"

Hayashi, a former colleague at the Kansas City Fed, collected detailed historical data on the ATM industry. For the years in their study (1983 to 2005), the data they looked at included the entry and exit of networks, the number of ATM-only and hybrid ATM-debit networks, the number of cards in circulation for each network, and the number of ATM transactions for each network. (Some of the networks were owned by a single bank, others by multiple banks in partnership.)

An early version of their article focused on the effect of the debit innovation. But during the revision process, an editor and an anonymous referee encouraged them to be more ambitious — to create a more complete model that would also capture the regulatory changes. "At that point," Wang recalls, "we added a third author, Bin Grace Li, who made major contributions to the structural modeling and computation."

The results indicated that the introduction of retail debit cards was the most important cause of the shrinking number of networks. "The debit innovation probably accounted for most of the shakeout," Wang says, "but banking and ATM deregulation added quite a bit of welfare gain to the consumers by reducing the cost of providing the service."

The researchers concluded that the debit-card innovation drove the shakeout by creating a "technological gap" between networks that adopted it early and those that didn't, a gap that continued to widen — eventually blocking new entrants and causing the laggard networks to exit. With regard to the welfare gain to consumers, the researchers estimated that as of 2008 (roughly a quarter-century after the various shocks that they were studying), 43 percent of the gain was due to deregulation and 57 percent to the debit innovation.

The study also found that large ATM networks had a higher annual adoption rate for the debit-card innovation. The researchers noted that with a large base of cardholding customers, large networks may have had an advantage in persuading retailers to accept their debit cards — which, in turn, may have made it easier for those networks to justify investing in debit technology.

The hardest part of the project for Wang and his co-authors, he says, was working out "how to put things together" — how to act on the editor's request to assemble a broader structural model and match it with the data. But it was worth it, he says, to build up "a coherent framework to understand the evolution of a service industry and the roles played by innovation and deregulation." **EF**