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The Electronic Payment System:
An Assessment of Benefits for the US and State Economies

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Introduction and Overview

An easy to use, efficient method of purchasing goods and services is essential to a well-functioning economy. Payment methods have evolved throughout human history, from barter to primitive forms of money, to full-bodied coins and precious metals, to bank notes, to national fiat currency and checks. Each advance has brought with it more economic efficiency, productivity, and integration. More recently, various types of electronic payment mechanisms have become an increasingly large share of total transaction volume. Electronic payments are highly efficient, offering advantages such as speed, reduced costs, and accuracy. These enhancements have contributed significantly to the expansion of the US economy, increasing liquidity and stimulating personal consumption.

The essential rationale for the theory that improved efficiency in transactions processing generates economic benefits lies in two basic concepts, both of which have been known since long before economics emerged as a discipline. Initially, the basic notion that economic agents (such as consumers, producers, and investors) respond to incentives is relevant. As transactions costs are reduced, there is an incentive to engage in exchange more frequently. This notion has been widely accepted for many millennia. In fact, Aristotle wrote extensively about it.

The second key idea is the "equation of exchange," which notes that the product of the quantity of money and its turnover rate (velocity) equals the total volume of activity that can be supported. This expression was actually posited by astronomer Nicolaus Copernicus in the early 1500s and explored at length by philosopher John Locke in the late 17th century. It was formalized into economics in the early 19th century and, although often identified with the Monetarist school of thought, is actually fundamental to all major strains of economic analysis. For present purposes, it illustrates that improvements in the technology available to process transactions allows more activity to occur with a given money supply.

As would be expected, the velocity of money has tended to generally improve over time as new innovations are implemented (there has been a recent cyclical reversal in this pattern, as the Great Recession brought massive infusions of money during a period of declining output followed by very sluggish growth). By far the most significant contributor to the improvements in recent decades has been the introduction of the various aspects of the electronic payments system.

The Perryman Group (TPG) was recently asked by MasterCard Inc. (MasterCard) to evaluate the impact of electronic payments on the United States and the 50 states. This report presents the findings from this analysis.

Highlights of Study Findings

The electronic payment system enhances efficiency by making payments faster and easier. As a result, consumer spending has been enhanced, production has been facilitated, and the US economy has been able to grow at a faster pace than it would have otherwise.

- The Perryman Group estimates that electronic payment systems have, since their inception, led to gains in business activity in the United States for 2014 (compared to the results if no such system existed) totaling **$1.760 trillion** in gross product and almost **23.2 million** permanent jobs.
- Looking at the cumulative impact from 1970 to 2014, the increase in gross product is **$34.314 trillion** in gross product and **387.5 million** person-years of employment.
- The increased usage of electronic payments from 2004 to 2014 has generated **$432.927 billion** in gross product and nearly **5.7 million** permanent US jobs for 2014.

The electronic payments system and associated efficiencies have (as of 2014)

- ✓ ***increased the size of the US economy by more than 12%*** *(as measured by gross product),*
- ✓ ***increased personal consumption expenditures by almost 17%****, and*
- ✓ ***increased employment by 20%****.*

Every state economy benefits from the enhanced economic activity associated with payment system efficiencies.

Summary of Economic Benefits of the Electronic Payments System to the United States Economy*			
	Annual Impact of the Electronic Payments System Relative to 1970 (Scenario I)	**Cumulative Impact: 1970-2014**	**Annual Impact of Increased Usage of Electronic Payments Relative to 2004 (Scenario II)**
Gain in Gross Product	$1.760 trillion	$34.313 trillion	$432.927 billion
Gain in Employment	23.16 million (permanent jobs)	387.522 million (person-years)	5.652 million (permanent jobs)

SOURCE: The Perryman Group

*Scenario I measures the current (2014) effects of the electronic payments system by comparing US economic performance to a simulation of the US economy in which no such mechanism existed. The cumulative impact of the payment system covers the entire 1970 to 2014 period. Scenario II examines the economic benefits observed in 2014 resulting from growth in the use of the electronic payments system over the past 10 years (2004-2014). All results reflect the overall (direct, indirect, and induced) effects of both the stimulus to real personal consumption and the efficiency gains that are observed across the entire economy. Results are fully adjusted for gains in productivity over the relevant time horizon where necessary. Monetary values are in constant (2009) dollars for consistency with available data and to eliminate the effects of inflation. Annual results are expressed in permanent jobs to reflect their ongoing nature. Cumulative jobs impacts are in person-years, which is one person working for one year. Methods used, assumptions, and additional detail may be found elsewhere in this report as well as in the Appendices. Totals may not add due to rounding.

Electronic Transactions Payment Industry Growth

Individual large merchants began issuing credit cards to customers for use in their stores in the 1940s and 1950s. In the mid-1950s, Diners Club International expanded from a card used by customers to pay for meals in upscale New York restaurants to allow its cardholders to make purchases in retail stores. American Express also issued a card in the late 1950s for travel and entertainment expenses. Both of these cards were "charge cards" that had to be paid at the end of the month.[1] National "general purpose" credit cards date back to the 1960s, with the predecessors of MasterCard and Visa issuing cards that could be used at any merchant who chose to accept them.[2] The ability to process the payments electronically began to evolve in the 1970s.

Technological advancements and wider acceptance led to increased card usage and the development of other forms of electronic payment such as debit cards, prepaid cards, and other non-cash, electronic payment methods. The use of electronic payments has expanded dramatically through the years; about 80% of all consumer spending in 2013 was non-cash based.[3]

Several types of cards account for the majority of transactions through the electronic payments system as listed below.

- **General purpose cards** are issued by depository institutions and processed through broadly accepted card networks and carry a recognizable brand.[4] General purpose cards include credit and debit cards.
    - **Credit cards** are issued by financial institutions to consumers who use the cards as a promise to pay at a later date. Credit cards essentially allow consumers to take short-term loans.[5]

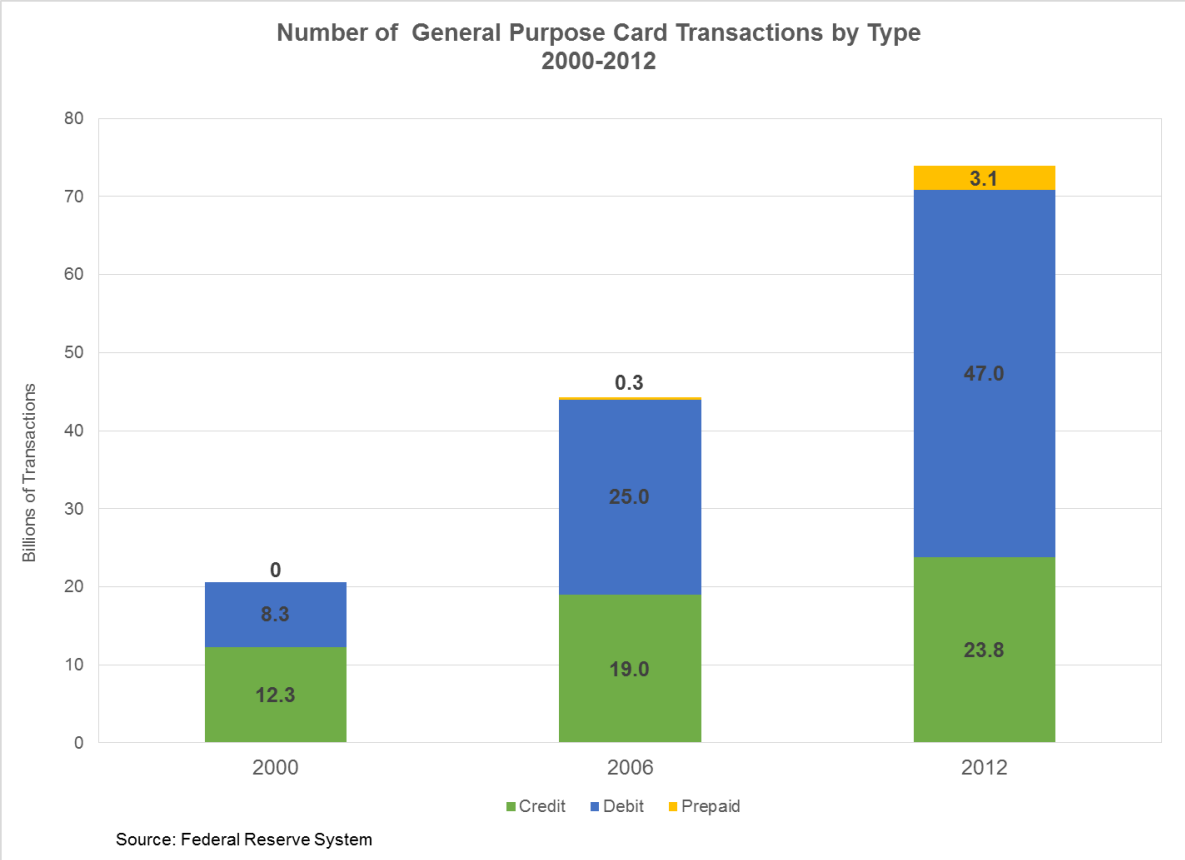
[1] Woolsey, Ben and Emily Starbuck Gerson, "The History of Credit Cards," May 11, 2009, http://www.creditcards.com/credit-card-news/credit-cards-history-1264.php
[2] Saxena, Amitabh, "Electronic Payment Systems 101," November 1, 2014. https://www.microlinks.org/library/electronic-payment-systems-101; Mastercard.us "Who We Are," https://www.mastercard.us/en-us/about-mastercard/who-we-are/history.html
[3] Imbruglia, Melissa, "IBISWorld Industry Report 52232: Credit Card Processing & Money Transferring in the US," IBISWorld, January 2015, p. 5.
[4] "The 2013 Federal Reserve Payments Study Recent and Long-Term Trends in the United States: 2000-2012 Detailed Report and Updated Data Release" Federal Reserve System July 2014.

- **Debit cards** allow customers access to their bank account funds for cash or non-cash payments. Debit card payments "are transferred directly from the cardholder's bank account, incurring no charges for payment at a later date."[6]

- **Private label cards** are typically issued by individual merchants or businesses for use at locations owned by the issuing business.
- **Electronic benefit transfer (EBT) cards** are prepaid cards issued by government entities to disburse benefits to specific individuals usually only for certain types of purchases.[7]

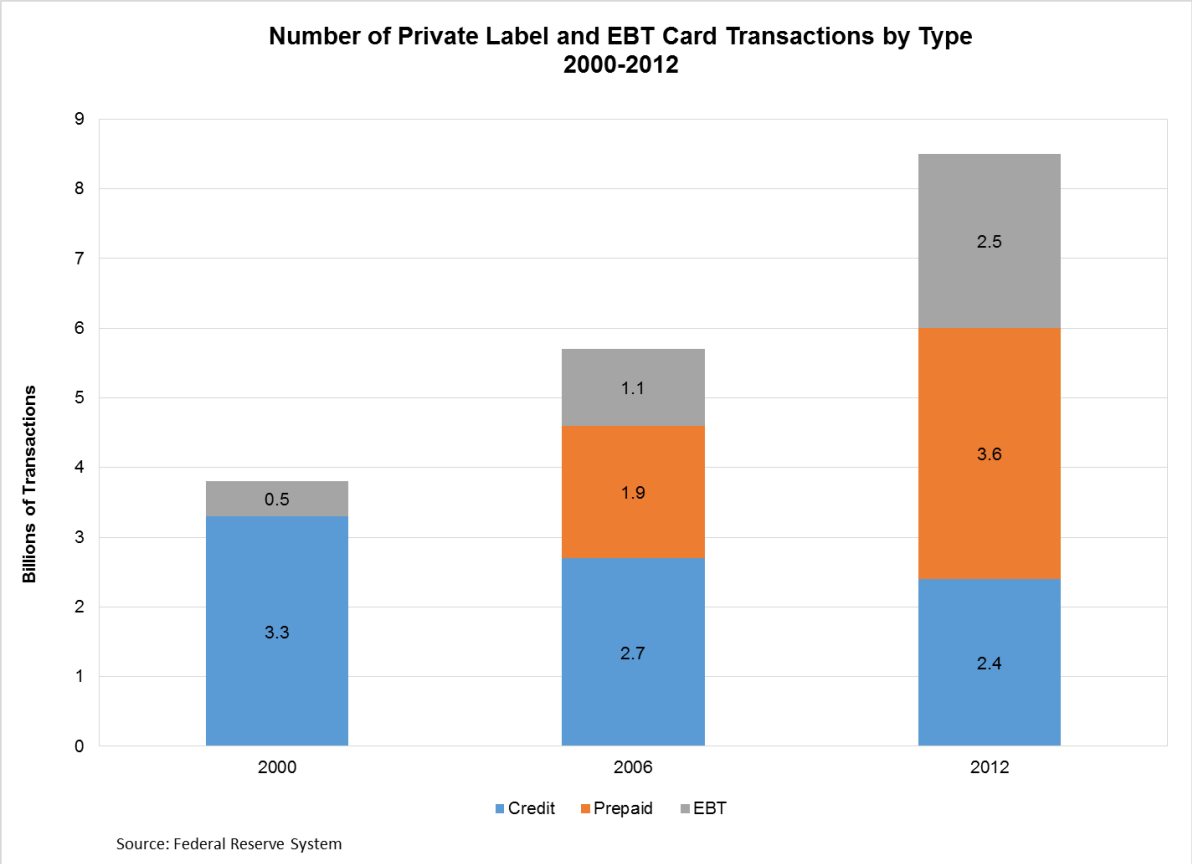
The number of transactions on general purpose cards rose from 20.6 billion in 2000 to 73.9 billion in 2012, an 11.2% compound annual growth rate as shown in the chart below.[8]

[5] "U.S. Credit Cards – Statistics and Facts," Statista, http://www.statista.com/topics/1118/credit-cards-in-the-united-states/.
[6] "Statistics and Facts on Debit Cards," Statista, http://www.statista.com/topics/1598/debit-cards/.
[7] "The 2013 Federal Reserve Payments Study Recent and Long-Term Trends in the United States: 2000-2012 Detailed Report and Updated Data Release" Federal Reserve System July 2014.
[8] "The 2013 Federal Reserve Payments Study Recent and Long-Term Trends in the United States: 2000-2012 Detailed Report and Updated Data Release" Federal Reserve System July 2014.



Private label and EBT card transactions have risen at a 6.9% compound annual growth rate from 3.8 billion in 2000 to 8.5 billion in 2012.[9] Debit card use has increased dramatically since 2000 from 8.3 billion transactions to 47.0 billion in 2012, a 15.6% compound annual growth rate.[10] The number of debit card transactions surpassed credit in 2003 and has continued to grow at a faster rate. Check usage has decreased significantly over the period, falling from 41.9 billion in 2000 to 18.3 billion in 2012.[11]

[9] "The 2013 Federal Reserve Payments Study Recent and Long-Term Trends in the United States: 2000-2012 Detailed Report and Updated Data Release" Federal Reserve System July 2014.
[10] "The 2013 Federal Reserve Payments Study Recent and Long-Term Trends in the United States: 2000-2012 Detailed Report and Updated Data Release" Federal Reserve System July 2014.
[11] "The 2013 Federal Reserve Payments Study Recent and Long-Term Trends in the United States: 2000-2012 Detailed Report and Updated Data Release" Federal Reserve System July 2014.



Growth in Dollar Volume

The total dollar volume for all general purpose credit, debit, and prepaid transactions (purchases and cash) in 2014 was $5.1 trillion, stemming from about 80.6 billion transactions.[12] Credit card transaction dollar volume was $2.7 trillion and debit and prepaid transactions dollar values were $2.4 trillion.[13]

Debit transactions continue to outpace credit, with over 52.3 billion in 2014 compared to more than 28.2 billion credit transactions.[14] From 2005 to 2014, the total dollar volume for all general purpose credit and debit and prepaid transactions nearly doubled, increasing 93.5%

[12] The Nilson Report, February 2015.
[13] The Nilson Report, February 2015.
[14] The Nilson Report, February 2015.

from $2.7 trillion in 2005 to $5.1 trillion in 2014.[15] The number of transactions over the time period more than doubled, from 31.5 billion in 2005 to 80.6 billion in 2014.[16]

[15] The Nilson Report, February 2006 and February 2015.
[16] The Nilson Report, February 2006 and February 2015.

Economic Benefits of Efficiencies in the Electronic Transaction Payments Industry

The electronic transaction payments system has enhanced efficiency by acting as a convenient method of payment, reducing payment processing costs, providing greater payment security, establishing globally accepted forms of payment, and creating greater transparency. All of these benefits generate economic growth.[17]

Electronic payments encourage private consumption by offering convenient access to funds. Cards provide consumers with immediate access to their deposits and credit lines, whereas cash is limited to the amount of funds available. Credit cards also allow for smoother consumption patterns, as consumers are provided with flexible funding in between pay periods. Electronic payments allow domestic companies to sell more easily to foreign customers by reducing the need to exchange currencies and decreasing the chance of theft when traveling.[18]

Electronic payments also reduce costs to merchants by decreasing cash and check handling.[19] In addition, paper checks and invoices slow the collection process. With electronic payments, vendors not only have a guarantee that they will receive payment, but they also receive the funds almost immediately. Additionally, the need for an in-house credit system is eliminated.[20]

Electronic payments further facilitate commerce by reducing uncertainty for both parties of a transaction. For consumers, fraudulent card charges can be easily detected, whereas lost or stolen cash is unlikely to be recovered.[21] Credit card companies will also often resolve disputes

[17] "The Virtuous Circle: Electronic Payments and Economic Growth," Global Insight, Inc. and Visa, June 2003, http://www.visacemea.com/av/pdf/eg_virtuouscircle.pdf, p. 8; Zandi, Mark, Virendra Singh, and Justin Irving, "The Impact of Electronic Payments on Economic Growth," Moody's Analytics, February 2013, http://usa.visa.com/download/corporate/_media/moodys-economy-white-paper-feb-2013.pdf, p. 7-8.

[18] Zandi, Mark, Virendra Singh, and Justin Irving, "The Impact of Electronic Payments on Economic Growth," Moody's Analytics, February 2013, http://usa.visa.com/download/corporate/_media/moodys-economy-white-paper-feb-2013.pdf, p. 7-8.

[19] Zandi, Mark, Virendra Singh, and Justin Irving, "The Impact of Electronic Payments on Economic Growth," Moody's Analytics, February 2013, http://usa.visa.com/download/corporate/_media/moodys-economy-white-paper-feb-2013.pdf, p. 7.

[20] "The Virtuous Circle: Electronic Payments and Economic Growth," Global Insight, Inc. and Visa, June 2003, http://www.visacemea.com/av/pdf/eg_virtuouscircle.pdf, p. 8; "Increasing Operational Efficiency through Electronic Payments," Bank of America Merrill Lynch, June 2014, http://corp.bankofamerica.com/documents/10157/67594/Increasing_Operational_Efficiency_Through_Electronic_Payments.pdf, p. 1-2.

[21] Zandi, Mark, Virendra Singh, and Justin Irving, "The Impact of Electronic Payments on Economic Growth," Moody's Analytics, February 2013, http://usa.visa.com/download/corporate/_media/moodys-economy-white-

between customers and merchants, decreasing the consumers' perceived risk of purchasing.[22] On the other hand, when electronic payment is unavailable, vendors can be deterred from conducting larger business transactions. For example, checks carry the risk of default, making many merchants reluctant to accept them. However, card transactions guarantee payment to merchants.[23]

Likewise, electronic payments help ensure the delivery of funds for payroll transactions. If employees do not have bank accounts, they can be spared from paying large check cashing fees by receiving their wages on prepaid debit cards. For employees who do have bank accounts, the use of direct deposit eliminates the risk of losing paychecks in the mail.[24]

For banks and lending institutions, electronic payments can reduce transaction costs by about 50% compared to paper currency transactions. The reduction in cost stems heavily from the expense of paper currency, the greater economies of scale provided by electronic payments, and the decreasing cost of telecommunication technology.[25]

Finally, electronic payments create more transparency, as they create an audit trail.[26] As a result, tracking payments to recreate and analyze spending patterns and assure proper tax compliance is facilitated.

In summary, electronic payments add economic value in a number of ways. Their convenience encourages consumption both domestically and globally. They also help lower processing costs and offer more security while reducing the number of unreported transactions. By moving payments more efficiently through the system, electronic payments effectively increase the available supply of money, enhancing economic growth.

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paper-feb-2013.pdf, p. 7; "The Virtuous Circle: Electronic Payments and Economic Growth," Global Insight, Inc. and Visa, June 2003, http://www.visacemea.com/av/pdf/eg_virtuouscircle.pdf, p. 9.

[22] Schmith, Scott, "Credit Card Market: Economic Benefits and Industry Trends," International Trade Administration, March 2008, http://www.ita.doc.gov/td/finance/publications/creditcards.pdf, p. 2.

[23] Zandi, Mark, Virendra Singh, and Justin Irving, "The Impact of Electronic Payments on Economic Growth," Moody's Analytics, February 2013, http://usa.visa.com/download/corporate/_media/moodys-economy-white-paper-feb-2013.pdf, p. 7.

[24] "Increasing Operational Efficiency through Electronic Payments," Bank of America Merrill Lynch, June 2014, http://corp.bankofamerica.com/documents/10157/67594/Increasing_Operational_Efficiency_Through_Electronic_Payments.pdf, p. 3-4.

[25] Humphrey, David, Magnus Willesson, Ted Lindblom, and Göran Bergendahl, "What Does It Cost to Make a Payment?" *Review of Network Economics*, Vol. 2, No. 2 (June 2003), p. 1-2.

[26] Zandi, Mark, Virendra Singh, and Justin Irving, "The Impact of Electronic Payments on Economic Growth," Moody's Analytics, February 2013, http://usa.visa.com/download/corporate/_media/moodys-economy-white-paper-feb-2013.pdf, p. 8.

Electronic Payments and Economic Growth

A number of studies have found that the growth of electronic payments, especially credit cards, fuels economic growth in both developed countries and developing countries. For example, a 2003 study by econometric forecasting company Global Insight concluded that between 1983 and 2003, the expanding electronic payments industry produced a substantial increase in real consumer spending in the United States of $6.5 trillion and saved at least 1% of GDP annually over paper currency.[27] Cumulatively, consumer spending grew 0.5% each year to $10 trillion, an amount equivalent to approximately 1.3 million new jobs.[28] A 2013 Moody's Analytics study found that the increased consumption caused by an elevated use of electronic payments contributed an additional 0.3% of GDP to developed countries and 0.8% of GDP to emerging countries.[29]

A review by the International Trade Administration determined that doubling the amount of private credit available in a developing country raises economic growth by 2% annually.[30] Furthermore, the continued expansion of electronic payments leads to an increase in consumer purchases of US exports, especially in the online commerce and tourism segments.[31] In addition to the macroeconomic effects, the growth in the use and acceptance of credit cards has spurred sales revenue for the vast majority of small businesses, with nearly one in every five small businesses experiencing over $20,000 per month in increased revenue.[32] In fact, according to one study, for every $5,613 in additional monthly consumer credit card expenditures, small businesses create one new job.[33]

It is important to note that in the absence of electronic payments as we know them today, it is likely that some other form of payments system would likely have developed which would

[27] "The Virtuous Circle: Electronic Payments and Economic Growth," Global Insight, Inc. and Visa, June 2003, http://www.visacemea.com/av/pdf/eg_virtuouscircle.pdf, p. 4-5; Humphrey, David, Magnus Willesson, Ted Lindblom, and Göran Bergendahl, "What Does It Cost to Make a Payment?" *Review of Network Economics*, Vol. 2, No. 2 (June 2003), p. 1.
[28] "The Virtuous Circle: Electronic Payments and Economic Growth," Global Insight, Inc. and Visa, June 2003, p. 4-5.
[29] Zandi, Mark, Virendra Singh, and Justin Irving, "The Impact of Electronic Payments on Economic Growth," Moody's Analytics, February 2013, http://usa.visa.com/download/corporate/_media/moodys-economy-white-paper-feb-2013.pdf, p. 3.
[30] Schmith, Scott, "Credit Card Market: Economic Benefits and Industry Trends," International Trade Administration, March 2008, http://www.ita.doc.gov/td/finance/publications/creditcards.pdf, p. 3.
[31] Schmith, Scott, "Credit Card Market: Economic Benefits and Industry Trends," International Trade Administration, March 2008, http://www.ita.doc.gov/td/finance/publications/creditcards.pdf, p. 2.
[32] "Fueling the Economy," The Credit Line, June 2013, http://www.thecreditline.com/issue/fueling-the-economy.
[33] "Fueling the Economy," The Credit Line, June 2013, http://www.thecreditline.com/issue/fueling-the-economy.

result in some efficiency enhancements. Nonetheless, it is clear that the current system resulted in sizable efficiency gains which have, in turn, generated economic growth.

Estimating Direct Economic Effects

An initial phase of this analysis involved quantifying the increase in consumer activity associated with the efficiency gains stemming from the electronic payments system. The Perryman Group utilized several sources of information including reports from public and private sources regarding transactions to develop a preliminary dataset of the relevant dollar volumes and penetration rates. The economic data series in the economic model were obtained from the Bureau of Economic Analysis, Bureau of Labor Statistics, and the Federal Reserve System.

It was first necessary to adjust the dataset for issues such as definitional changes, missing data points, and other variations. This process is explained more fully in the Appendices to this report.

The role of the electronic payment system as a determinant of economic activity was empirically estimated using a multi-stage approach. Initially, a traditional consumption function was determined in log linear (elasticity) form. This equation related real (in constant 2009 dollars) personal consumption expenditures to real disposable personal income, real interest rates, and the penetration rate for electronic payments. As expected, the regression model revealed a positive and statistically significant independent contribution to real personal consumption expenditures.

Once the model was finalized, it was simulated (for both credit and debit transactions) with and without the electronic payments penetration, thus allowing a determination of the overall effects on real consumer outlays. This direct stimulus was then allocated across various categories of expenditures based on observed patterns in order to assess the effects of generating the sales on the overall economy, with full adjustment for the purchase of imported goods. As described more fully in the Appendices, gains in efficiency in other elements of the economy were also integrated into the analysis.

Economic Benefits Measured

Once the basic model was established, The Perryman Group estimated the total economic benefits of enhanced efficiency associated with increased use of electronic payments utilizing the firm's US Multi-Regional Impact Assessment System (USMRIAS, described more fully below). Several simulations were conducted comparing the effects with and without electronic payments systems for both credit and debit transactions.

- **Scenario I** reflects the annual impact in 2014 compared to a situation in which the electronic payments system did not exist.
- The **cumulative** effects of the annual economic benefits of electronic payments system from 1970 to 2014 (compared to a simulation of the US economy in which no such mechanism existed) were also quantified.
- **Scenario II** focuses on the impact of the growth in electronic payments from 2004-2014, showing the impact in 2014 of the increased usage of electronic payments over the past 10 years with the implementation of debit cards.

Any economic stimulus (such as enhanced consumer spending or efficiency gains) generates multiplier effects throughout the economy. The Perryman Group developed a dynamic input-output assessment model (the US Multi-Regional Impact Assessment System, which is described in further detail in the Appendices to this report) some 30 years ago to measure these multiplier effects in order to determine total economic benefits. The model has been consistently maintained and updated and has been used in hundreds of analyses throughout the country for clients ranging from major corporations to government agencies.

The system uses a variety of data (from surveys, industry information, and other sources) to describe the various goods and services (known as resources or inputs) required to produce another good/service. This process allows for estimation of the total economic impact (including multiplier effects) of efficiency and personal consumption gains.

The submodels used in the current analysis reflect the specific industrial composition and characteristics of the United States and each state. Total economic benefits are quantified for key measures of business activity, which are different, common ways of looking at changes in the economy. These measures are briefly described below and explained in further detail in the Appendices.

- **Total expenditures** (or total spending) measure the dollars changing hands as a result of the economic stimulus.
- **Gross product** (or output) is production of goods and services that will come about in each area as a result of the activity. This measure is parallel to the gross domestic product numbers commonly reported by various media outlets and is a subset of total expenditures.
- **Personal income** is dollars that end up in the hands of people in the area; the vast majority of this aggregate derives from the earnings of employees, but payments such as interest and rents are also included.
- **Job gains** are expressed as (1) permanent jobs because they are ongoing effects that persist or (2) as person-years for a cumulative assessment over multiple years or transitory stimulus.

Direct spending was allocated to each state based on the state's level of activity in the key spending categories in each state, with adjustments for the degree of Internet usage in each area. The resulting assignments were compared to a limited set of available transactions data and found to be comparable. The distribution across spending categories was based on state-specific concentrations (which equal the national totals when aggregated). Separate simulations were conducted for each state using the appropriate geographic submodels of the USMRIAS, all of which reflect the unique industrial composition and characteristics of each area.

All monetary values are given in constant (2009) dollars for consistency with available data and to eliminate the effects of inflation. For further detail on the methods and assumptions used, see the Appendices to this report.

Benefits of the Electronic Payments System (Scenario I)

As noted, The Perryman Group measured the effects of the electronic payments system by performing a simulation of the US economy in which no such mechanism existed and comparing it to actual US economic measures as of 2014. Results reflect the overall (direct, indirect, and induced) effects of both the stimulus to real personal consumption and the efficiency gains that are observed across the entire economy.

The economic benefits of the electronic payments system and its efficiencies are substantial.

- The overall annual impact (including multiplier effects) of the electronic payments system for 2014 is estimated to include $1.760 trillion in total gross product and 23,166,967 permanent jobs in the United States.
- Of the total gross product gains, credit cards contribute $979.469 billion, while debit cards generate $780.742 billion. Credit card activity generates some 12,891,253 jobs while debit transactions lead to 10,275,714 permanent jobs.
- As a result of the electronic payments system, **US real gross product is 12.29% higher and real personal consumption expenditures are 16.65% highe**r in 2014 than would have been the case if no such mechanism existed.

Industries which have been particularly enhanced by the electronic payments system include

- retail trade, with a gain in real gross product under Scenario I assumptions of $910.0 billion;
- finance, insurance and real estate, with a gain of $128.1 billion; and
- other services, with an estimated gain of almost $214.2 billion.

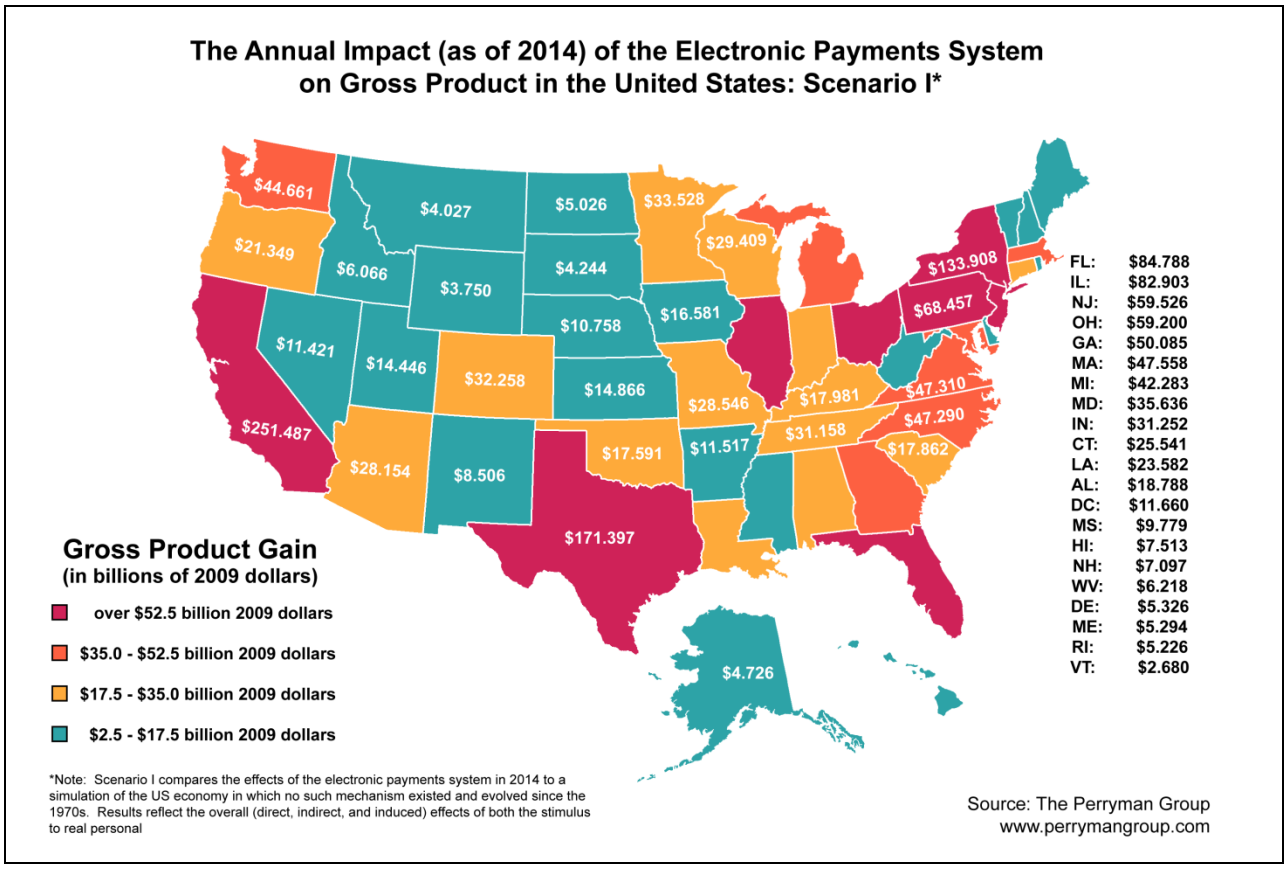
Total Annual Benefits of the Electronic Payments System to the United States Economy (Scenario I) *
(Dollar amounts in Billions of 2009 Dollars)

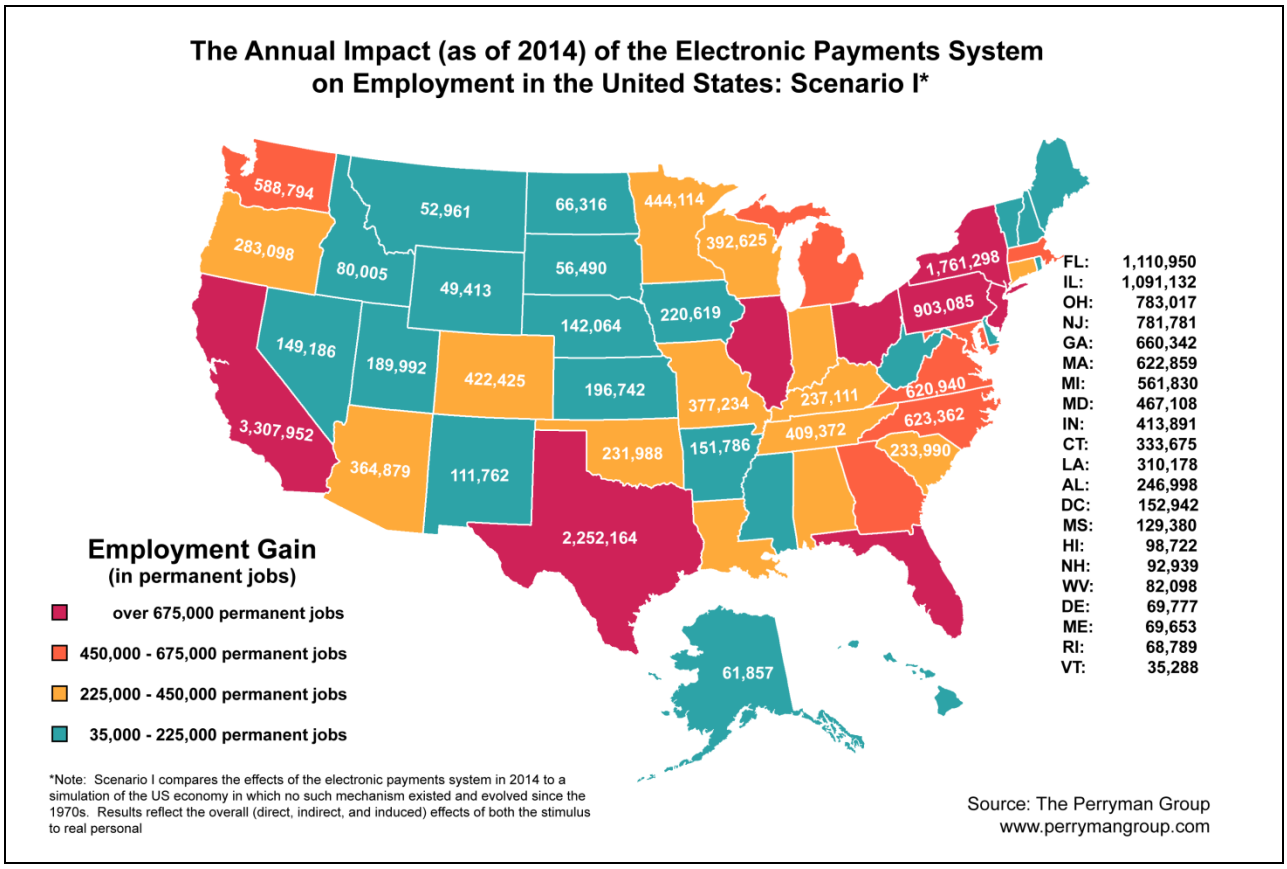
	Total Expenditures	Output *(Gross Product)*	Personal Income	Employment *(Permanent Jobs)*
Credit Cards	$1,738.900	$979.469	$587.378	12,891,253
Debit Cards	$1,386.090	$780.742	$468.203	10,275,714
TOTAL	**$3,124.990**	**$1,760.212**	**$1,055.581**	**23,166,967**

SOURCE: US Multi-Regional Impact Assessment System, US Multi-Regional Impact Assessment System, The Perryman Group

*Scenario I compares the effects of the electronic payments system in 2014 to a simulation of the US economy in which no such mechanism existed and evolved since the 1970s. Results reflect the overall (direct, indirect, and induced) effects of both the stimulus to real personal consumption and the efficiency gains that are observed across the entire economy. Monetary values are expressed in constant (2009) dollars for consistency with available data and to eliminate the effects of inflation. Methods used, assumptions, and additional detail may be found elsewhere in this report as well as in the Appendices. Totals may not add due to rounding.

The following maps illustrate the economic benefits by state. (More details are available in the Appendices.)





Cumulative Economic Benefits of the Electronic Payments System: 1970 to 2014

Adding the yearly measured gains since 1970 yields a total estimate of incremental activity over the period.

- The cumulative impact of the electronic payments system on the United State from 1970 to 2014 is estimated to be $34.314 trillion in gross product and 387,521,699 person-years of employment.
- For credit card transactions, this benefit is $22.036 trillion in gross product while for debit cards it is $12.277 trillion.
- The job gains from credit cards since 1970 total 248,867,528 person-years; for debit the total is 138,654,171 person-years of employment.

The largest impacts by industry are again in the following sectors:

- retail trade (with cumulative gains in gross product of an estimated $17,928.1 billion over the period);
- finance, insurance and real estate (with cumulative gains of $2,429.6 billion); and
- other services (with cumulative gains of $4,197.3 billion over the period).

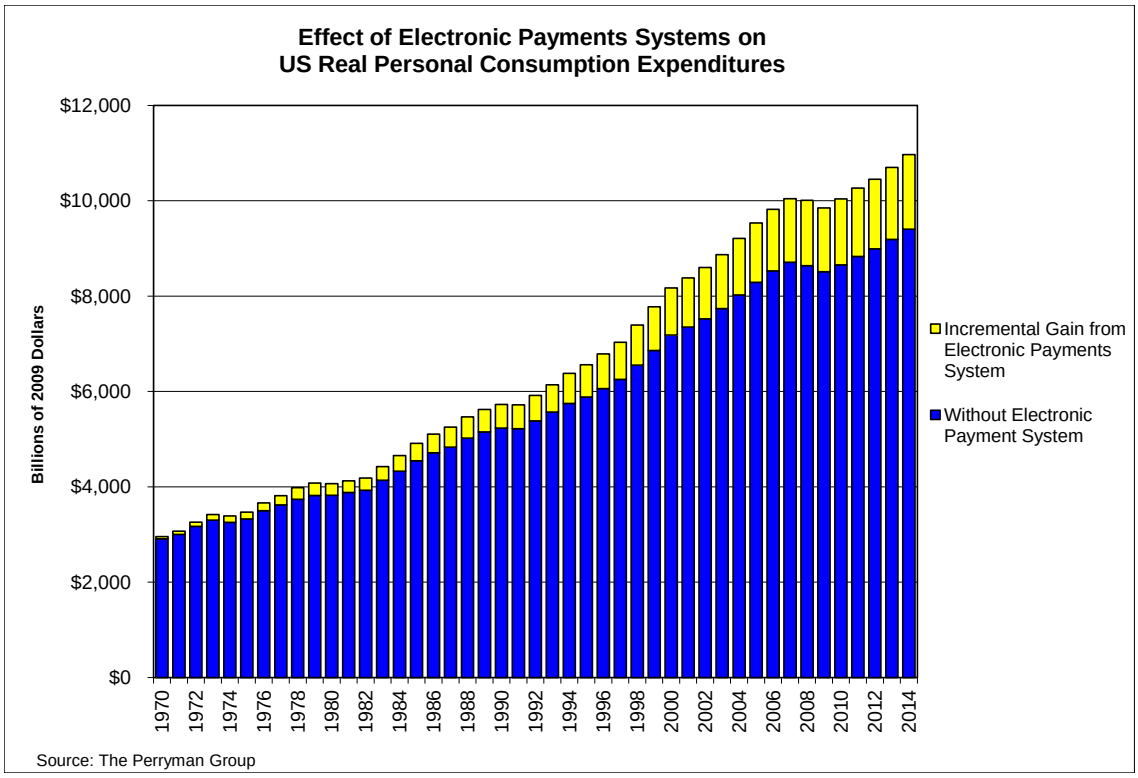
Cumulative Benefits of the Electronic Payments System on the United States Economy from 1970 to 2014 *
(Dollar amounts in Billions of 2009 Dollars)

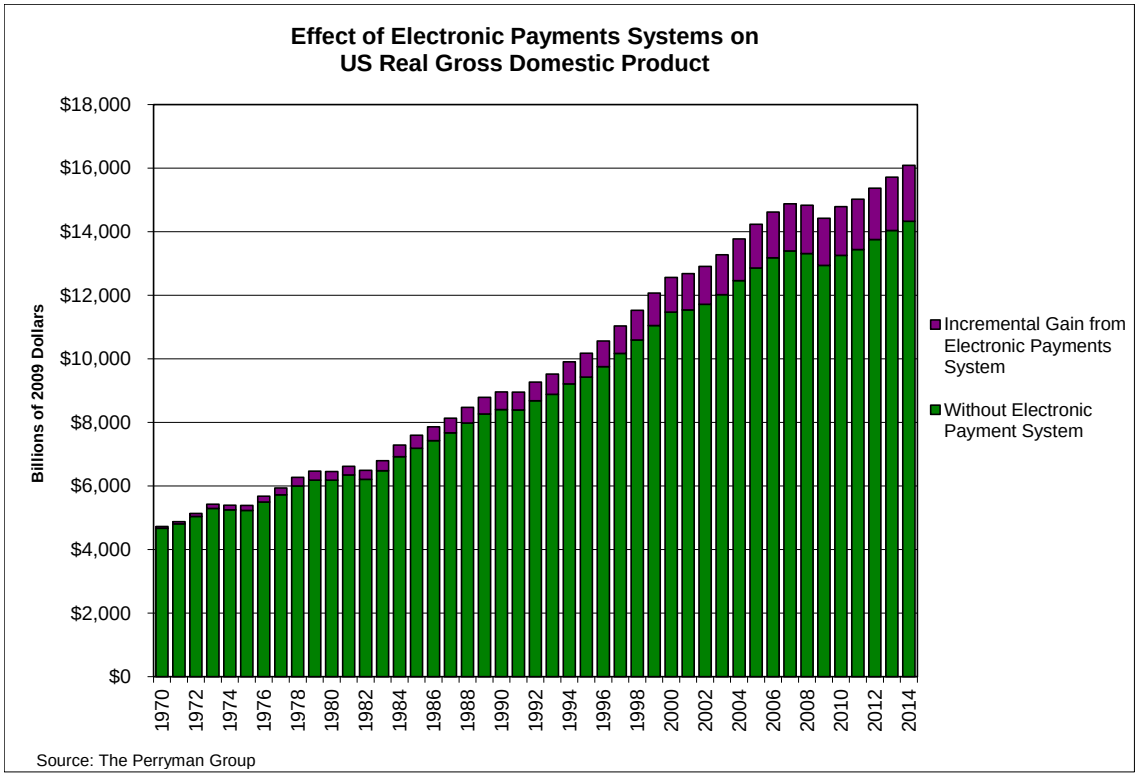
	Total Expenditures	Output *(Gross Product)*	Personal Income	Employment *(Person-Years)*
Credit Cards	$39,046.716	$22,036.452	$13,211.370	248,867,528
Debit Cards	$21,754.506	$12,277.399	$7,360.589	138,654,171
Total	$60,801.221	$34,313.851	$20,571.958	387,521,699

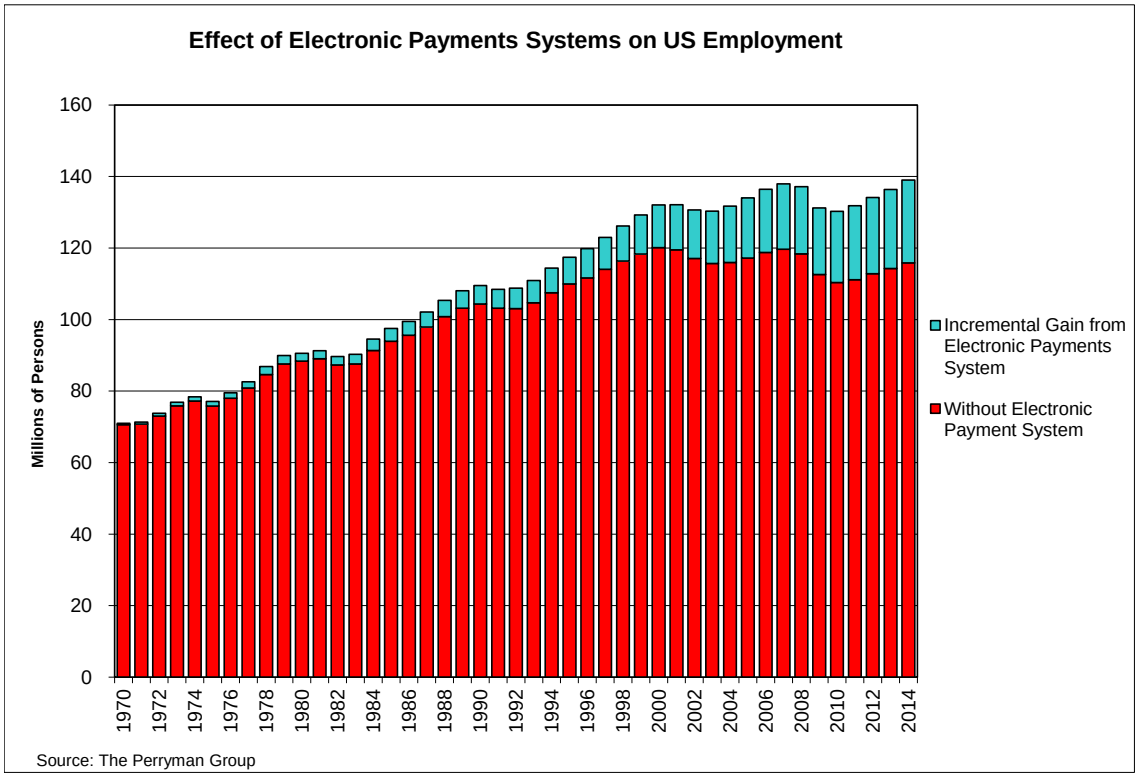
SOURCE: The Perryman Group

*This analysis examines the benefits of the electronic payments system relative to a simulation of the US economy in which no such mechanism existed and evolved over an extended period (1970-2014). Results reflect the overall (direct, indirect, and induced) effects of both the stimulus to real personal consumption and the efficiency gains that are observed across the entire economy. Results are fully adjusted for gains in productivity over the relevant time horizon. Monetary values in constant (2009) dollars for consistency with available data and to eliminate the effects of inflation. Methods used, assumptions, and additional detail may be found elsewhere in this report as well as in the Appendices. Totals may not add due to rounding.

The following graphs illustrate the incremental gains for personal consumption, real gross product, and employment stemming from electronic payments in the context of the overall US economy.

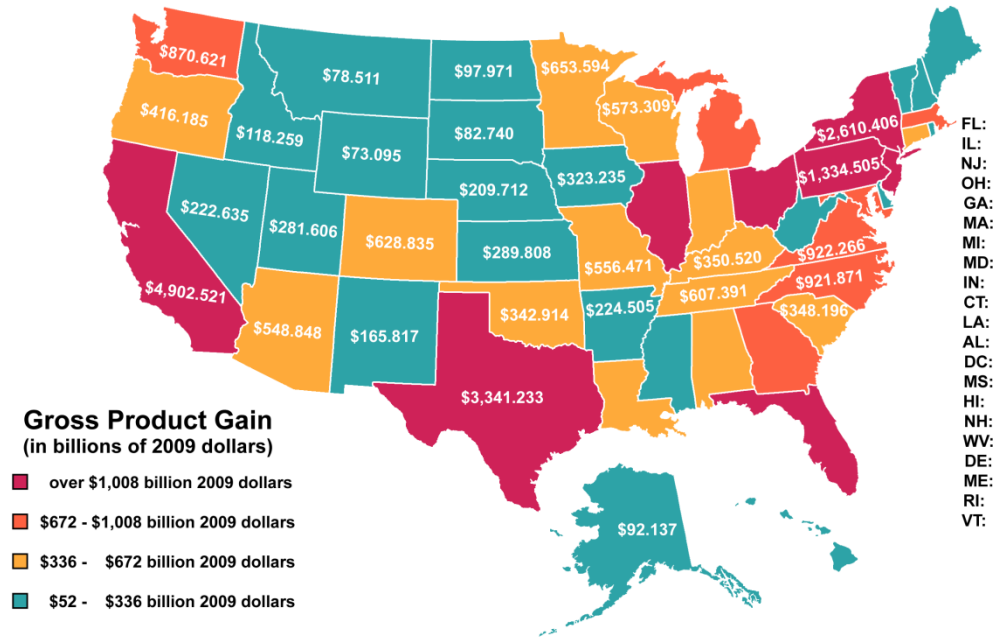






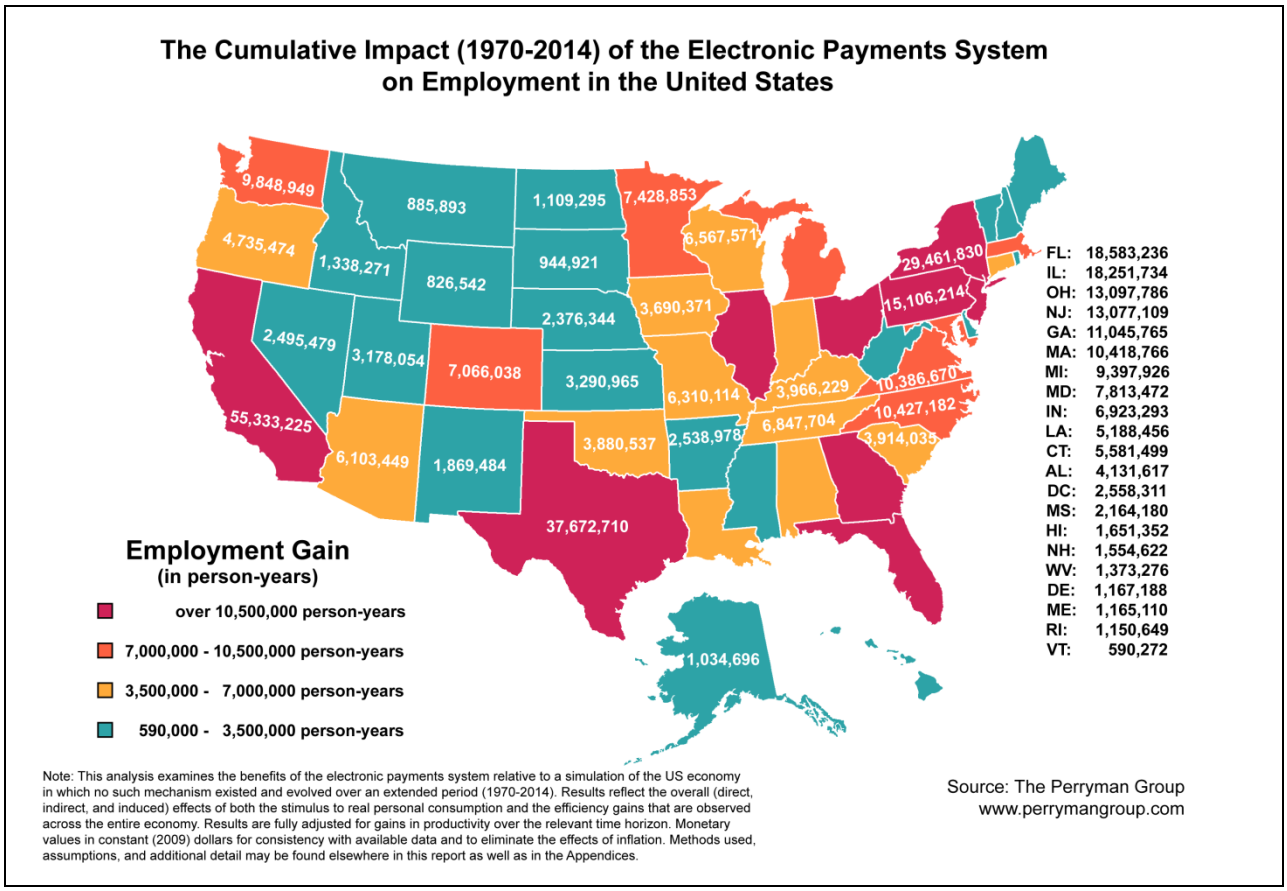
The cumulative benefits of the electronic payments system from 1970-2014 on a state by state basis are illustrated in the following maps, with additional detail in the Appendices.

The Cumulative Impact (1970-2014) of the Electronic Payments System on Gross Product in the United States



Note: This analysis examines the benefits of the electronic payments system relative to a simulation of the US economy in which no such mechanism existed and evolved over an extended period (1970-2014). Results reflect the overall (direct, indirect, and induced) effects of both the stimulus to real personal consumption and the efficiency gains that are observed across the entire economy. Results are fully adjusted for gains in productivity over the relevant time horizon. Monetary values in constant (2009) dollars for consistency with available data and to eliminate the effects of inflation. Methods used, assumptions, and additional detail may be found elsewhere in this report as well as in the Appendices.

Source: The Perryman Group
www.perrymangroup.com



It should again be noted that, while the gains observed in Scenario I and over the entire period of analysis are quite substantial, they are being compared to an alternative situation in which no such mechanism existed. In reality, it is likely that some other method would have evolved during this period that would have promoted additional transactional efficiency if the electronic payments mechanism had not been implemented and expanded.

Benefits of Growth in the Electronic Payments System Since 2004 (Scenario II)

Scenario II examines the economic benefits observed in 2014 resulting from growth in the use of the electronic payments system over the past 10 years (2004-2014), which is the period

during which debit card usage increased dramatically and online purchasing became more commonplace.

- The annual impact for 2014 from this growth is estimated to be $432.927 billion in gross product and some 5,652,464 permanent jobs.
- While credit card transactions contributed $195.152 billion in output the increased use of debit cards over the time period generated $237.775 billion in gross product.
- The biggest job growth also came from the debit card usage with 3,104,480 permanent jobs while credit card payments created 2,547,984 jobs.

As expected, the industries growing the most from the increased use of electronic payments since 2004 include retail trade (with an estimated increase in 2014 gross product of $221.3 billion); finance, insurance and real estate (with an increase of $32.4 billion); and other services (with a gain of $52.4 billion). These findings are generally consistent with those of other studies that encompass sub-periods of the era of electronic payments.

Total Benefits of the Growth in the Electronic Payments System from 2004 to 2014 on the United States Economy in 2014 (Scenario II) *

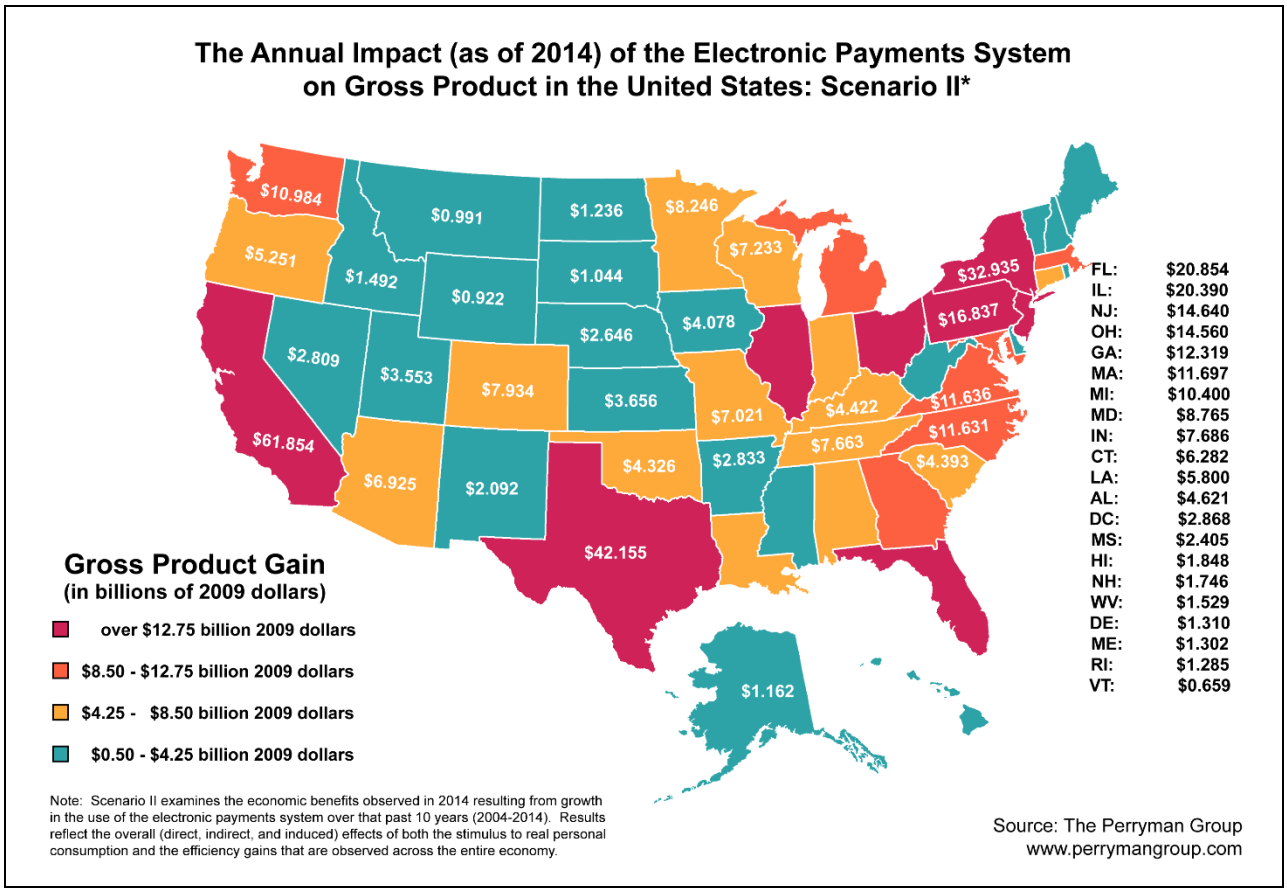
(Dollar amounts in Billions of 2009 Dollars)

	Total Expenditures	Output *(Gross Product)*	Personal Income	Employment *(Permanent Jobs)*
Credit Cards	$347.177	$195.152	$117.066	2,547,984
Debit Cards	$423.002	$237.775	$142.633	3,104,480
Total	$770.179	$432.927	$259.699	5,652,464

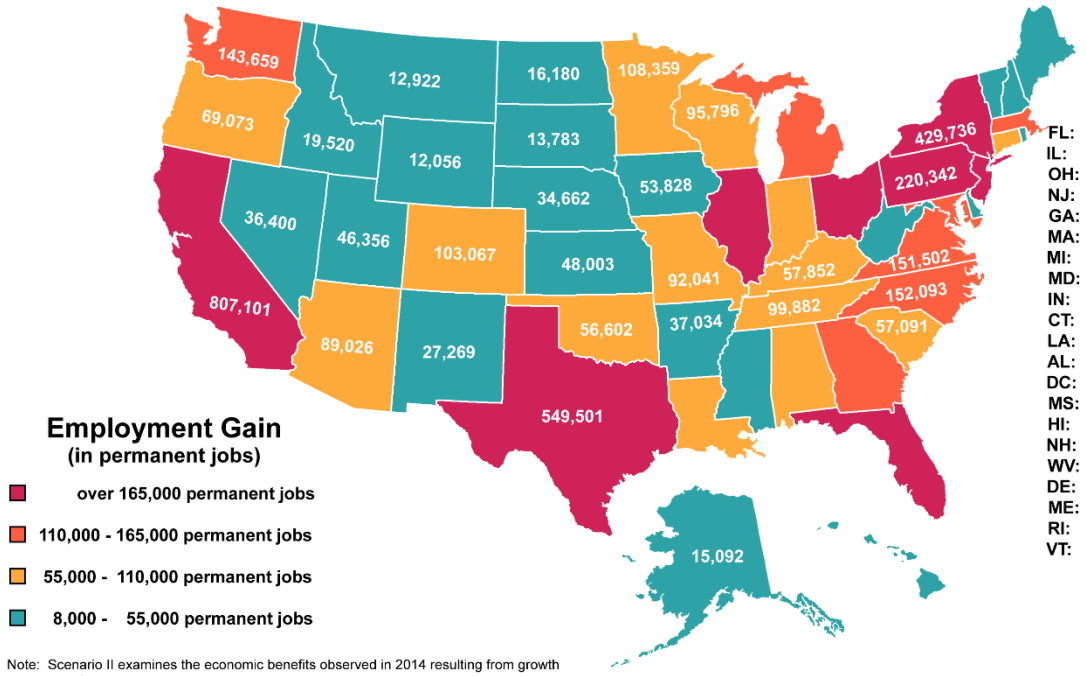
SOURCE: US Multi-Regional Impact Assessment System, US Multi-Regional Impact Assessment System, The Perryman Group

*Scenario II examines the economic benefits observed in 2014 resulting from growth in the use of the electronic payments system over the past 10 years (2004-2014). Results reflect the overall (direct, indirect, and induced) effects of both the stimulus to real personal consumption and the efficiency gains that are observed across the entire economy. Monetary values in constant (2009) dollars for consistency with available data and to eliminate the effects of inflation. Methods used, assumptions, and additional detail may be found elsewhere in this report as well as in the Appendices. Totals may not add due to rounding.

The economic gains by state are noted in the maps below (with additional detail in the Appendices).



The Annual Impact (as of 2014) of the Electronic Payments System on Employment in the United States: Scenario II*



Employment Gain
(in permanent jobs)

- over 165,000 permanent jobs
- 110,000 - 165,000 permanent jobs
- 55,000 - 110,000 permanent jobs
- 8,000 - 55,000 permanent jobs

FL:	271,059
IL:	266,223
OH:	191,047
NJ:	190,745
GA:	161,116
MA:	151,970
MI:	137,080
MD:	113,969
IN:	100,984
CT:	81,413
LA:	75,680
AL:	60,265
DC:	37,316
MS:	31,567
HI:	24,087
NH:	22,676
WV:	20,031
DE:	17,025
ME:	16,995
RI:	16,784
VT:	8,610

Note: Scenario II examines the economic benefits observed in 2014 resulting from growth in the use of the electronic payments system over that past 10 years (2004-2014). Results reflect the overall (direct, indirect, and induced) effects of both the stimulus to real personal consumption and the efficiency gains that are observed across the entire economy.

Source: The Perryman Group
www.perrymangroup.com

Conclusion

The Perryman Group estimates that the US economy is 12.29% larger (as measured by real gross product) than it would be in the absence of the electronic payment system, while personal consumption expenditures are an estimated 16.65% larger than would be observed if the gains in efficiency since 1970 had not occurred.

- Electronic payments systems generated gains in business activity in the United States (compared to the results if no such system existed) of an estimated $1.760 trillion in annual gross product and 23,166,967 permanent jobs in 2014.
- The cumulative impact from 1970 to 2014 indicates an increase in gross product of $34.314 trillion and 387,521,699 person-years of employment.
- Increased usage of electronic payments since 2004 results in an estimated gain of $432.927 billion in annual US gross product and 5,652,464 permanent jobs as of 2014.

In addition, every state economy is larger than it would be in the absence of efficiencies stemming from electronic payments systems.

Advances in payments systems have consistently facilitated business activity, leading to economic gains and growth throughout human history. It is expected that mechanisms will continue to evolve, thus promoting business expansion on a continuing basis.

APPENDICES

Appendix A: Methods Used

Modeling the Effects of Electronic Transactions Payment Systems

- The role of the electronic payment system as a determinant of economic activity was empirically estimated using a multi-stage approach. Initially, a traditional consumption function was determined in log linear (elasticity) form. This equation related real (in constant 2009 dollars) personal consumption expenditures to real disposable personal income, real interest rates, and the penetration rate for electronic payments. The relevant underlying economic series were obtained from the Bureau of Economic Analysis, the Bureau of Labor Statistics, and the Federal Reserve System. In order to capture the full period in which electronic payments have been in material use, a period from 1970 through 2014 was employed. Tests for specification stability indicated the appropriateness of this approach. A similar approach (though for shorter periods) has been used in prior studies and across other countries.[34]

- The penetration rate variable was constructed based on dollar volumes rather than number of transactions in order to capture the spending effects in a more direct manner. Most of the information used in the development of this measure was obtained from various issues of The Nilson Report[35], a widely utilized source of data regarding payments systems. In the earlier years, there were gaps in some elements of this construct. These segments exhibited relatively stable or predictably evolving relationships with those for which the full dataset was available. Thus, the missing information could be determined using regression on related series and other "shift-share" techniques. Sensitivity tests indicated that any minor random variations within the expected confidence interval would not materially impact the results of the analysis. Additional adjustments were implemented regarding private label volumes and debit cards from sources not captured in the Nilson reports using data obtained from the

[34] Zandi, Mark and Virendra Singh, "The Impact of Electronic Payments on Economic Growth," Moody's Analytics, March 2010, http://betterthancash.org/wp-content/uploads/2012/09/Moodys-WhitePaper-March-2010-Cards-contribute-to-GDP.pdf; Zandi, Mark, Virendra Singh, and Justin Irving, "The Impact of Electronic Payments on Economic Growth," Moody's Analytics, February 2013, http://usa.visa.com/download/corporate/_media/moodys-economy-white-paper-feb-2013.pdf; "The Virtuous Circle: Electronic Payments and Economic Growth," Global Insight, Inc. and Visa, June 2003, http://www.visacemea.com/av/pdf/eg_virtuouscircle.pdf.

[35] The Nilson Report, various issues from 1989-2015.

Federal Reserve System.[36] Separate series were also compiled for debit and credit transactions, thus allowing insights into the evolution of the two electronic payment mechanisms.

- It should be further noted that electronic cash withdrawals were not included in the above analysis, since much of the relevant transaction activity would have been conducted through non-electronic means (cash). On the other hand, the payment system does facilitate the process of obtaining cash, as well as other aspects of the overall economy over and above debit and credit card activity. This phenomenon was captured based on an established transactions cost model using conservative assumptions that would tend to modestly understate the overall effects.[37] Once the aggregate results were obtained, they were allocated across sectors based on patterns in overall output across more than 500 industrial sectors. Sensitivity tests revealed that minor random variations in this allocation did not significantly impact the findings. Because this approach estimates the total "efficiency" gains beyond the electronic payments mechanisms noted above, no additional multiplier effects are determined. This amount is comparatively small (less than five percent of the total effect), but is an important component of the overall impact.

- As expected, the regression model described above revealed a positive and statistically significant independent contribution to real personal consumption expenditures. Several alternative specifications of the model were tested (including alternative specifications of the real interest rate); they produced almost identical findings. The expression ultimately selected exhibited excellent statistical properties and the lowest estimated elasticity for electronic payments penetration (although all were very similar) and, thus, the most conservative overall impact. The elasticity coefficient was consistent witth those found in studies of other time periods and countries.

- Once the model was finalized, it was simulated (for both credit and debit transactions) with and without the electronic payments penetration, thus allowing a determination of the overall effects on real consumer outlays in 2014 as a result of this mechanism (Scenario I). This estimate reflects the direct impact in contrast to a situation in which the payment system did not exist. This simulation was also employed to examine the cumulative effect over the entire period. This element of the analysis requires a dynamic

[36] "The 2013 Federal Reserve Payments Study Recent and Long-Term Trends in the United States: 2000-2012 Detailed Report and Updated Data Release" Federal Reserve System July 2014.
[37] Humphrey, David, Magnus Willesson, Ted Lindblom, and Göran Bergendahl, "What Does It Cost to Make a Payment?" *Review of Network Economics*, Vol. 2, No. 2 (June 2003).

adjustment for changes in productivity over time, which is determined using data from the Bureau of Economic Analysis and the Bureau of Labor Statistics. A second simulation was conducted comparing current patterns to those that would have been observed if the level of penetration had remained at the levels observed in 2004 (Scenario II). This analysis permitted consideration of the effects of recent innovations and acceptance patterns, including the rapid increase in debit card use and online purchasing. This direct stimulus was then allocated across various categories of expenditures based on observed patterns in order to assess the effects of generating the sales on the overall economy, with full adjustment for the purchase of imported goods.

- In addition to the national analysis, separate results were determined for each state. The allocations of direct spending were determined based on the level of activity in the key spending categories in each state. Adjustments were made for the degree of Internet usage in each area.[38] The resulting assignments were compared to a limited set of available transactions data and found to be comparable. The distribution across spending categories was based on state-specific concentrations (which equal the national totals when aggregated). Separate simulations were conducted for each state using the appropriate geographic submodels of the USMRIAS, all of which reflect the unique industrial composition and characteristics of each area. The spillover effects across states are estimated based on the interregional components of the USMRIAS. This approach involves assessments of the capabilities in various states and assigns the relevant activity based on “gravity" modeling, a well-accepted technique which allocates based on proximity, production capabilities, and cost advantages. Gravity models essentially reflect the fact that economic activity between states (or other geographic entities) is proportional to the size of the states and inversely related to the distance between them.

US Multi-Regional Impact Assessment System

- Once the direct levels of enhanced economic activity associated with electronics payments and the related efficiencies were modeled, The Perryman Group’s US Multi-Regional Impact Assessment System was utilized to measure ripple effects through the economy and provide industry-level estimates of gains in business activity.

[38] Internet World Stats, Usage and Population Statistics, http://www.internetworldstats.com/unitedstates.htm#TX.

- The basic modeling technique employed in this phase of the study is known as dynamic input-output analysis. This methodology essentially uses extensive survey data, industry information, and a variety of corroborative source materials to create a matrix describing the various goods and services (known as resources or inputs) required to produce one unit (a dollar's worth) of output for a given sector. Once the base information is compiled, it can be mathematically simulated to generate evaluations of the magnitude of successive rounds of activity involved in the overall production process.

- There are two essential steps in conducting an input-output analysis once the system is operational. The first major endeavor is to accurately define the levels of direct activity to be evaluated; this process was described within the report and in the section above. In the case of a prospective evaluation, it is necessary to first calculate reasonable estimates of the direct activity.

- The second major phase of the analysis is the simulation of the input-output system to measure overall economic effects as the stimulus ripples through the economy. The Perryman Group developed the US Multi-Regional Impact Assessment System (USMRIAS) for this purpose more than 35 years ago and has consistently maintained and updated it since that time. The specific submodel used in the current application reflects the specific structure of the US and each state economy.

- The USMRIAS is somewhat similar in format to the Input-Output Model of the United States and the Regional Input-Output Modeling System, both of which are maintained by the US Department of Commerce. The model developed by TPG, however, incorporates several important enhancements and refinements. Specifically, the expanded system includes (1) comprehensive 500-sector coverage for any county, multi-county, or urban region; (2) calculation of both total expenditures and value-added by industry and region; (3) direct estimation of expenditures for multiple basic input choices (expenditures, output, income, or employment); (4) extensive parameter localization; (5) price adjustments for real and nominal assessments by sectors and areas; (6) measurement of the induced impacts associated with payrolls and consumer spending; (7) embedded modules to estimate multi-sectoral direct spending effects; (8) estimation of retail spending activity by consumers; and (9) comprehensive linkage and integration capabilities with a wide variety of econometric, real estate, occupational, and fiscal impact models. Moreover, the model uses specific local taxing patterns to estimate the fiscal effects of activity on a detailed sectoral basis. The models used for the present investigation reflect the specific industrial characteristics each state and the

nation as a whole and have been thoroughly tested for reasonableness and historical reliability.

- The impact assessment (input-output) process essentially estimates the amounts of all types of goods and services required to produce one unit (a dollar's worth) of a specific type of output. For purposes of illustrating the nature of the system, it is useful to think of inputs and outputs in dollar (rather than physical) terms. As an example, the construction of a new building will require specific dollar amounts of lumber, glass, concrete, hand tools, architectural services, interior design services, paint, plumbing, and numerous other elements. Each of these suppliers must, in turn, purchase additional dollar amounts of inputs. This process continues through multiple rounds of production, thus generating subsequent increments to business activity. The initial process of building the facility is known as the direct effect. The ensuing transactions in the output chain constitute the indirect effect.

- Another pattern that arises in response to any direct economic activity comes from the payroll dollars received by employees at each stage of the production cycle. As workers are compensated, they use some of their income for taxes, savings, and purchases from external markets. A substantial portion, however, is spent locally on food, clothing, health care services, utilities, housing, recreation, and other items. Typical purchasing patterns in the relevant areas are obtained from the ACCRA Cost of Living Index, a privately compiled inter-regional measure which has been widely used for several decades, and the Consumer Expenditure Survey of the US Department of Labor. These initial outlays by area residents generate further secondary activity as local providers acquire inputs to meet this consumer demand. These consumer spending impacts are known as the induced effect. The USMRIAS is designed to provide realistic, yet conservative, estimates of these phenomena.

- Sources for information used in this process include the Bureau of the Census, the Bureau of Labor Statistics, the Regional Economic Information System of the US Department of Commerce, and other public and private sources. The pricing data are compiled from the US Department of Labor and the US Department of Commerce. The verification and testing procedures make use of extensive public and private sources.

- Impacts were measured in constant 2009 dollars to maintain consistency with underlying data and eliminate the effects of inflation.

- The USMRIAS generates estimates of the effect on several measures of business activity. The most comprehensive measure of economic activity used in this study is **Total Expenditures**. This measure incorporates every dollar that changes hands in any

transaction. For example, suppose a farmer sells wheat to a miller for $0.50; the miller then sells flour to a baker for $0.75; the baker, in turn, sells bread to a customer for $1.25. The Total Expenditures recorded in this instance would be $2.50, that is, $0.50 + $0.75 + $1.25. This measure is quite broad, but is useful in that (1) it reflects the overall interplay of all industries in the economy, and (2) some key fiscal variables such as sales taxes are linked to aggregate spending.

- A second measure of business activity frequently employed in this analysis is that of **Gross Product**. This indicator represents the regional equivalent of Gross Domestic Product, the most commonly reported statistic regarding national economic performance. In other words, the Gross Product of Arkansas is the amount of US output that is produced in that state; it is defined as the value of all final goods produced in a given region for a specific period of time. Stated differently, it captures the amount of value-added (gross area product) over intermediate goods and services at each stage of the production process, that is, it eliminates the double counting in the Total Expenditures concept. Using the example above, the Gross Product is $1.25 (the value of the bread) rather than $2.50. Alternatively, it may be viewed as the sum of the value-added by the farmer, $0.50; the miller, $0.25 ($0.75 - $0.50); and the baker, $0.50 ($1.25 - $0.75). The total value-added is, therefore, $1.25, which is equivalent to the final value of the bread. In many industries, the primary component of value-added is the wage and salary payments to employees.

- The third gauge of economic activity used in this evaluation is **Personal Income**. As the name implies, Personal Income is simply the income received by individuals, whether in the form of wages, salaries, interest, dividends, proprietors' profits, or other sources. It may thus be viewed as the segment of overall impacts which flows directly to the citizenry.

- The fourth measure, **Retail Sales**, represents the component of Total Expenditures which occurs in retail outlets (general merchandise stores, automobile dealers and service stations, building materials stores, food stores, drugstores, restaurants, and so forth). Retail Sales is a commonly used measure of consumer activity.

- The final aggregates used are **Permanent Jobs** and **Person-Years of Employment**. The Person-Years of Employment measure reveals the full-time equivalent jobs generated by an activity. It should be noted that, unlike the dollar values described above, Permanent Jobs is a "stock" rather than a "flow." In other words, if an area produces $1 million in output in 2013 and $1 million in 2014, it is appropriate to say that $2 million was achieved in the 2013-2014 period. If the same area has 100 people working in 2013 and

100 in 2014, it only has 100 Permanent Jobs. When a flow of jobs is measured, such as in a construction project or a cumulative assessment over multiple years, it is appropriate to measure employment in Person-Years (a person working for a year). This concept is distinct from Permanent Jobs, which anticipates that the relevant positions will be maintained on a continuing basis.

Appendix B: Detailed Results

Current Benefits of the Electronic Payments System (Scenario I)

The Annual Impact (as of 2014) of the Electronic Payments System on Business Activity in the United States Credit Cards (Scenario I)

Sector	Total Expenditures	Real Gross Product	Personal Income	Employment
	(2009 Dollars)	*(2009 Dollars)*	*(2009 Dollars)*	*(Permanent Jobs)*
Agriculture	$39,513,781,468	$10,619,322,800	$6,818,154,310	101,001
Mining	$21,305,182,798	$5,321,119,911	$2,892,822,040	13,297
Construction	$29,814,920,374	$16,079,291,828	$13,176,298,230	167,543
Nondurable Manufacturing	$188,232,873,009	$55,554,372,758	$29,577,816,948	463,602
Durable Manufacturing	$43,922,486,065	$17,068,346,819	$11,429,041,518	132,607
Transportation and Utilities	$101,173,720,714	$44,145,142,873	$26,260,473,218	288,173
Information	$44,272,967,473	$26,123,937,875	$12,311,998,130	148,945
Wholesale Trade	$55,762,477,354	$38,126,739,323	$22,009,890,104	229,920
Retail Trade	$663,223,680,720	$506,374,891,971	$295,917,650,026	8,407,496
Finance, Insurance, and Real Estate	$205,001,804,613	$71,292,657,431	$25,694,117,897	239,362
Business Services	$68,346,924,597	$44,668,012,050	$36,780,207,590	409,282
Health Services	$35,308,847,994	$24,917,170,993	$21,003,607,451	329,079
Other Services	$243,020,480,336	$119,178,366,888	$83,505,847,695	1,960,947
TOTAL	**$1,738,900,147,514**	**$979,469,373,519**	**$587,377,925,157**	**12,891,253**

NOTE: Scenario I compares the effects of the electronic payments system in 2014 relative to a simulation of the US economy in which no such mechanism existed and evolved since the 1970s. Results reflect the overall (direct, indirect, and induced) effects of both the stimulus to real personal consumption and the efficiency gains that are observed across the entire economy.

SOURCE: US Multi-Regional Impact Assessment System, The Perryman Group

The Annual Impact (as of 2014) of the Electronic Payments System on Business Activity in the United States Debit Cards (Scenario I)				
Sector	**Total Expenditures**	**Real Gross Product**	**Personal Income**	**Employment**
	(2009 Dollars)	*(2009 Dollars)*	*(2009 Dollars)*	*(Permanent Jobs)*
Agriculture	$31,496,728,831	$8,464,741,115	$5,434,801,465	80,508
Mining	$16,982,519,525	$4,241,504,221	$2,305,889,944	10,599
Construction	$23,765,694,582	$12,816,922,999	$10,502,925,231	133,550
Nondurable Manufacturing	$150,041,821,814	$44,282,803,344	$23,576,697,679	369,540
Durable Manufacturing	$35,010,940,025	$13,605,306,083	$9,110,173,922	105,702
Transportation and Utilities	$80,646,324,592	$35,188,421,422	$20,932,418,341	229,705
Information	$35,290,311,360	$20,823,585,004	$9,813,985,199	118,725
Wholesale Trade	$44,448,685,064	$30,391,107,230	$17,544,246,955	183,271
Retail Trade	$528,660,524,245	$403,635,189,207	$235,878,157,768	6,701,678
Finance, Insurance, and Real Estate	$163,408,461,803	$56,827,907,006	$20,480,972,306	190,797
Business Services	$54,479,841,475	$35,605,204,328	$29,317,776,779	326,241
Health Services	$28,144,945,112	$19,861,662,155	$16,742,131,575	262,311
Other Services	$193,713,430,735	$94,997,961,848	$66,563,131,721	1,563,086
TOTAL	**$1,386,090,229,161**	**$780,742,315,962**	**$468,203,308,884**	**10,275,714**

NOTE: Scenario I compares the effects of the electronic payments system in 2014 relative to a simulation of the US economy in which no such mechanism existed and evolved since the 1970s. Results reflect the overall (direct, indirect, and induced) effects of both the stimulus to real personal consumption and the efficiency gains that are observed across the entire economy.

SOURCE: US Multi-Regional Impact Assessment System, The Perryman Group

The Annual Impact (as of 2014) of the Electronic Payments System on Business Activity in the United States Total (Scenario I)				
Sector	**Total Expenditures**	**Real Gross Product**	**Personal Income**	**Employment**
	(2009 Dollars)	*(2009 Dollars)*	*(2009 Dollars)*	*(Permanent Jobs)*
Agriculture	$71,010,510,298	$19,084,063,915	$12,252,955,775	181,509
Mining	$38,287,702,323	$9,562,624,132	$5,198,711,985	23,897
Construction	$53,580,614,956	$28,896,214,827	$23,679,223,461	301,093
Nondurable Manufacturing	$338,274,694,823	$99,837,176,103	$53,154,514,626	833,142
Durable Manufacturing	$78,933,426,090	$30,673,652,902	$20,539,215,441	238,308
Transportation and Utilities	$181,820,045,305	$79,333,564,294	$47,192,891,559	517,878
Information	$79,563,278,833	$46,947,522,879	$22,125,983,329	267,670
Wholesale Trade	$100,211,162,417	$68,517,846,553	$39,554,137,059	413,192
Retail Trade	$1,191,884,204,965	$910,010,081,178	$531,795,807,794	15,109,174
Finance, Insurance, and Real Estate	$368,410,266,415	$128,120,564,437	$46,175,090,203	430,158
Business Services	$122,826,766,072	$80,273,216,377	$66,097,984,369	735,523
Health Services	$63,453,793,106	$44,778,833,148	$37,745,739,025	591,390
Other Services	$436,733,911,071	$214,176,328,737	$150,068,979,416	3,524,033
TOTAL	**$3,124,990,376,675**	**$1,760,211,689,481**	**$1,055,581,234,042**	**23,166,967**

NOTE: Scenario I compares the effects of the electronic payments system in 2014 relative to a simulation of the US economy in which no such mechanism existed and evolved since the 1970s. Results reflect the overall (direct, indirect, and induced) effects of both the stimulus to real personal consumption and the efficiency gains that are observed across the entire economy.

SOURCE: US Multi-Regional Impact Assessment System, The Perryman Group

Cumulative Benefits of the Electronic Payments System

The Cumulative Impact (1970-2014) of the Electronic Payments System on Business Activity in the United States—Credit Cards				
Sector	**Total Expenditures**	**Real Gross Product**	**Personal Income**	**Employment**
	(2009 Dollars)	*(2009 Dollars)*	*(2009 Dollars)*	*(Person-Years)*
Agriculture	$888,951,633,290	$239,090,651,084	$154,017,505,906	1,953,805
Mining	$466,380,610,830	$113,819,864,535	$61,793,098,122	253,059
Construction	$655,506,171,153	$354,253,899,159	$290,776,422,029	3,203,510
Nondurable Manufacturing	$4,226,543,174,867	$1,248,568,301,740	$664,368,067,579	8,980,030
Durable Manufacturing	$941,825,443,228	$365,953,518,340	$242,895,748,674	2,518,627
Transportation and Utilities	$2,260,326,090,237	$990,267,433,016	$589,423,302,955	5,551,217
Information	$988,080,230,744	$580,732,431,880	$273,843,455,986	2,849,931
Wholesale Trade	$1,247,013,483,054	$849,997,210,639	$490,515,006,302	4,393,087
Retail Trade	$15,081,622,768,437	$11,513,491,755,598	$6,728,142,609,588	162,853,071
Finance, Insurance, and Real Estate	$4,507,121,270,039	$1,560,320,991,816	$564,298,949,429	4,552,579
Business Services	$1,504,294,836,207	$978,180,842,174	$803,269,468,828	7,708,887
Health Services	$779,165,583,346	$546,255,944,132	$460,868,235,292	6,161,028
Other Services	$5,499,884,340,742	$2,695,518,933,275	$1,887,157,827,287	37,888,696
TOTAL	**$39,046,715,636,174**	**$22,036,451,777,388**	**$13,211,369,697,976**	**248,867,528**

NOTE: This analysis examines the benefits of the electronic payments system relative to a simulation of the US economy in which no such mechanism existed and evolved over an extended period. Results reflect the overall (direct, indirect, and induced) effects of both the stimulus to real personal consumption and the efficiency gains that are observed across the entire economy. Results are fully adjusted for gains in productivity over the relevant time horizon.

Source: US Multi-Regional Impact Assessment System, The Perryman Group

The Cumulative Impact (1970-2014) of the Electronic Payments System on Business Activity in the United States—Debit Cards

Sector	Total Expenditures	Real Gross Product	Personal Income	Employment
	(2009 Dollars)	*(2009 Dollars)*	*(2009 Dollars)*	*(Person-Years)*
Agriculture	$495,270,931,325	$133,207,077,864	$85,809,385,723	1,088,544
Mining	$259,839,513,003	$63,413,652,892	$34,427,435,768	140,989
Construction	$365,209,016,687	$197,369,184,095	$162,003,312,613	1,784,805
Nondurable Manufacturing	$2,354,778,253,517	$695,627,931,225	$370,146,337,832	5,003,138
Durable Manufacturing	$524,729,070,677	$203,887,515,431	$135,327,051,726	1,403,229
Transportation and Utilities	$1,259,319,141,656	$551,718,063,664	$328,391,576,399	3,092,808
Information	$550,499,484,761	$323,549,540,399	$152,569,271,942	1,587,812
Wholesale Trade	$694,761,678,811	$473,567,845,956	$273,285,761,454	2,447,566
Retail Trade	$8,402,582,406,832	$6,414,632,215,126	$3,748,520,539,865	90,732,037
Finance, Insurance, and Real Estate	$2,511,099,665,504	$869,317,971,690	$314,393,782,252	2,536,426
Business Services	$838,103,532,987	$544,984,134,754	$447,533,929,893	4,294,933
Health Services	$434,104,679,792	$304,341,293,790	$256,768,345,502	3,432,558
Other Services	$3,064,208,149,924	$1,501,782,687,034	$1,051,412,000,018	21,109,326
TOTAL	**$21,754,505,525,475**	**$12,277,399,113,920**	**$7,360,588,730,988**	**138,654,171**

NOTE: This analysis examines the benefits of the electronic payments system relative to a simulation of the US economy in which no such mechanism existed and evolved over an extended period. Results reflect the overall (direct, indirect, and induced) effects of both the stimulus to real personal consumption and the efficiency gains that are observed across the entire economy. Results are fully adjusted for gains in productivity over the relevant time horizon.

Source: US Multi-Regional Impact Assessment System, The Perryman Group

The Cumulative Impact (1970-2014) of the Electronic Payments System on Business Activity in the United States—Total				
Sector	**Total Expenditures**	**Real Gross Product**	**Personal Income**	**Employment**
	(2009 Dollars)	*(2009 Dollars)*	*(2009 Dollars)*	*(Person-Years)*
Agriculture	$1,384,222,564,615	$372,297,728,948	$239,826,891,629	3,042,349
Mining	$726,220,123,834	$177,233,517,428	$96,220,533,890	394,048
Construction	$1,020,715,187,840	$551,623,083,254	$452,779,734,641	4,988,315
Nondurable Manufacturing	$6,581,321,428,384	$1,944,196,232,966	$1,034,514,405,411	13,983,169
Durable Manufacturing	$1,466,554,513,905	$569,841,033,771	$378,222,800,400	3,921,856
Transportation and Utilities	$3,519,645,231,893	$1,541,985,496,680	$917,814,879,355	8,644,025
Information	$1,538,579,715,505	$904,281,972,279	$426,412,727,928	4,437,743
Wholesale Trade	$1,941,775,161,865	$1,323,565,056,595	$763,800,767,756	6,840,653
Retail Trade	$23,484,205,175,268	$17,928,123,970,724	$10,476,663,149,452	253,585,107
Finance, Insurance, and Real Estate	$7,018,220,935,543	$2,429,638,963,506	$878,692,731,681	7,089,005
Business Services	$2,342,398,369,194	$1,523,164,976,928	$1,250,803,398,721	12,003,820
Health Services	$1,213,270,263,138	$850,597,237,922	$717,636,580,793	9,593,587
Other Services	$8,564,092,490,666	$4,197,301,620,309	$2,938,569,827,305	58,998,022
TOTAL	**$60,801,221,161,649**	**$34,313,850,891,308**	**$20,571,958,428,963**	**387,521,699**

NOTE: This analysis examines the benefits of the electronic payments system relative to a simulation of the US economy in which no such mechanism existed and evolved over an extended period. Results reflect the overall (direct, indirect, and induced) effects of both the stimulus to real personal consumption and the efficiency gains that are observed across the entire economy. Results are fully adjusted for gains in productivity over the relevant time horizon.

Source: US Multi-Regional Impact Assessment System, The Perryman Group

Current Benefits of Electronic Payments System Growth Since 2004 (Scenario II)

The Annual Impact (as of 2014) of the Electronic Payments System on Business Activity in the United States Credit Cards (Scenario II)

Sector	Total Expenditures	Real Gross Product	Personal Income	Employment
	(2009 Dollars)	*(2009 Dollars)*	*(2009 Dollars)*	*(Permanent Jobs)*
Agriculture	$7,873,254,889	$2,114,192,413	$1,352,624,843	19,919
Mining	$4,366,951,187	$1,115,761,891	$607,383,639	2,669
Construction	$6,084,409,227	$3,274,397,326	$2,678,703,175	33,458
Nondurable Manufacturing	$37,583,119,916	$11,081,200,927	$5,903,390,254	91,298
Durable Manufacturing	$9,188,101,470	$3,570,900,011	$2,411,335,578	26,668
Transportation and Utilities	$20,308,143,132	$8,823,181,614	$5,245,353,786	57,091
Information	$8,896,360,891	$5,271,100,646	$2,482,822,384	29,721
Wholesale Trade	$11,181,436,475	$7,669,911,351	$4,429,336,819	45,948
Retail Trade	$130,633,244,390	$99,752,474,441	$58,295,345,673	1,655,728
Finance, Insurance, and Real Estate	$41,835,411,190	$14,615,863,676	$5,249,194,747	48,066
Business Services	$13,932,376,035	$9,152,110,513	$7,556,479,001	83,024
Health Services	$7,178,516,974	$5,099,698,662	$4,294,872,428	67,166
Other Services	$48,115,540,750	$23,611,630,038	$16,558,672,965	387,228
TOTAL	**$347,176,866,526**	**$195,152,423,507**	**$117,065,515,292**	**2,547,984**

NOTE: Scenario II examines the economic benefits observed in 2014 resulting from growth in the use of the electronic payments system over the past 10 years (2004-2014). Results reflect the overall (direct, indirect, and induced) effects of both the stimulus to real personal consumption and the efficiency gains that are observed across the entire economy.

SOURCE: US Multi-Regional Impact Assessment System, The Perryman Group

The Annual Impact (as of 2014) of the Electronic Payments System on Business Activity in the United States Debit Cards (Scenario II)

Sector	Total Expenditures	Real Gross Product	Personal Income	Employment
	(2009 Dollars)	*(2009 Dollars)*	*(2009 Dollars)*	*(Permanent Jobs)*
Agriculture	$9,592,823,471	$2,575,945,385	$1,648,046,649	24,269
Mining	$5,320,720,901	$1,359,451,333	$740,040,060	3,251
Construction	$7,413,282,620	$3,989,546,378	$3,263,748,862	40,765
Nondurable Manufacturing	$45,791,510,615	$13,501,405,179	$7,192,727,962	111,239
Durable Manufacturing	$11,194,840,847	$4,350,807,121	$2,937,986,494	32,492
Transportation and Utilities	$24,743,569,823	$10,750,220,190	$6,390,972,173	69,560
Information	$10,839,382,283	$6,422,342,310	$3,025,086,470	36,212
Wholesale Trade	$13,623,532,803	$9,345,068,419	$5,396,731,948	55,984
Retail Trade	$159,164,369,819	$121,539,044,722	$71,027,417,261	2,017,350
Finance, Insurance, and Real Estate	$50,972,529,154	$17,808,060,591	$6,395,652,024	58,564
Business Services	$16,975,294,934	$11,150,989,238	$9,206,861,729	101,157
Health Services	$8,746,350,408	$6,213,505,051	$5,232,899,685	81,836
Other Services	$58,624,278,664	$28,768,559,129	$20,175,191,697	471,801
TOTAL	**$423,002,486,342**	**$237,774,945,045**	**$142,633,363,015**	**3,104,480**

NOTE: Scenario II examines the economic benefits observed in 2014 resulting from growth in the use of the electronic payments system over the past 10 years (2004-2014). Results reflect the overall (direct, indirect, and induced) effects of both the stimulus to real personal consumption and the efficiency gains that are observed across the entire economy.

SOURCE: US Multi-Regional Impact Assessment System, The Perryman Group

The Annual Impact (As of 2014) of the Electronic Payments System on Business Activity in the United States Total (Scenario II)				
Sector	**Total Expenditures**	**Real Gross Product**	**Personal Income**	**Employment**
	(2009 Dollars)	*(2009 Dollars)*	*(2009 Dollars)*	*(Permanent Jobs)*
Agriculture	$17,466,078,360	$4,690,137,798	$3,000,671,492	44,188
Mining	$9,687,672,088	$2,475,213,223	$1,347,423,699	5,920
Construction	$13,497,691,847	$7,263,943,704	$5,942,452,037	74,222
Nondurable Manufacturing	$83,374,630,531	$24,582,606,106	$13,096,118,216	202,537
Durable Manufacturing	$20,382,942,316	$7,921,707,131	$5,349,322,073	59,160
Transportation and Utilities	$45,051,712,954	$19,573,401,804	$11,636,325,959	126,651
Information	$19,735,743,174	$11,693,442,956	$5,507,908,855	65,934
Wholesale Trade	$24,804,969,278	$17,014,979,770	$9,826,068,767	101,932
Retail Trade	$289,797,614,209	$221,291,519,163	$129,322,762,934	3,673,078
Finance, Insurance, and Real Estate	$92,807,940,345	$32,423,924,267	$11,644,846,771	106,631
Business Services	$30,907,670,970	$20,303,099,750	$16,763,340,730	184,180
Health Services	$15,924,867,381	$11,313,203,713	$9,527,772,112	149,002
Other Services	$106,739,819,414	$52,380,189,167	$36,733,864,662	859,029
TOTAL	**$770,179,352,868**	**$432,927,368,551**	**$259,698,878,306**	**5,652,464**

NOTE: Scenario II examines the economic benefits observed in 2014 resulting from growth in the use of the electronic payments system over the past 10 years (2004-2014). Results reflect the overall (direct, indirect, and induced) effects of both the stimulus to real personal consumption and the efficiency gains that are observed across the entire economy.

SOURCE: US Multi-Regional Impact Assessment System, The Perryman Group

Results by State

The Annual Impact (as of 2014) of the Electronic Payments System on Business Activity in the United States—Scenario I: Results by State

Category	Total Expenditures (2009 Dollars)	Gross Product (2009 Dollars)	Personal Income (2009 Dollars)	Retail Sales (2009 Dollars)	Employment (Permanent Jobs)
Alabama	$33,513,691,879	$18,787,699,244	$11,280,913,939	$12,740,969,944	246,998
Alaska	$8,315,593,970	$4,726,392,499	$2,847,192,773	$3,171,655,987	61,857
Arizona	$51,117,379,448	$28,154,497,258	$16,813,843,881	$18,617,668,252	364,879
Arkansas	$20,426,795,818	$11,516,521,774	$6,913,901,542	$7,851,533,107	151,786
California	$446,395,537,082	$251,486,654,459	$150,538,323,102	$169,727,627,274	3,307,952
Colorado	$57,780,741,601	$32,257,600,256	$19,273,600,489	$21,759,339,302	422,425
Connecticut	$45,439,870,111	$25,541,313,572	$15,335,100,443	$17,109,122,628	333,675
Delaware	$9,419,658,762	$5,326,244,050	$3,197,821,226	$3,653,577,930	69,777
District of Columbia	$20,759,236,720	$11,660,365,406	$6,977,377,451	$7,888,382,159	152,942
Florida	$150,808,597,978	$84,788,276,376	$50,691,788,010	$57,508,740,778	1,110,950
Georgia	$89,305,261,555	$50,085,400,239	$29,958,536,985	$33,951,616,622	660,342
Hawaii	$13,197,070,501	$7,512,730,975	$4,496,126,516	$5,099,717,084	98,722
Idaho	$10,660,945,166	$6,066,377,167	$3,650,642,882	$4,139,474,889	80,005
Illinois	$148,199,987,324	$82,902,760,946	$49,702,989,382	$55,998,848,420	1,091,132
Indiana	$55,404,852,826	$31,251,542,712	$18,801,099,047	$21,364,503,875	413,891
Iowa	$29,231,142,201	$16,581,128,025	$9,998,257,149	$11,413,100,251	220,619
Kansas	$26,354,302,439	$14,866,406,550	$8,915,441,462	$10,182,655,860	196,742
Kentucky	$31,665,005,452	$17,980,753,647	$10,829,664,054	$12,308,866,170	237,111
Louisiana	$41,641,635,691	$23,581,846,449	$14,128,857,039	$16,131,120,340	310,178
Maine	$9,285,369,328	$5,293,756,620	$3,182,942,060	$3,599,866,717	69,653
Maryland	$63,286,031,121	$35,636,081,402	$21,312,623,894	$24,189,136,856	467,108
Massachusetts	$84,199,790,976	$47,557,798,859	$28,561,691,541	$31,883,444,635	622,859
Michigan	$73,898,297,422	$42,282,712,387	$25,628,598,972	$29,035,499,369	561,830
Minnesota	$59,420,615,201	$33,527,699,218	$20,118,873,265	$22,865,628,640	444,114
Mississippi	$17,272,596,285	$9,779,247,158	$5,887,562,961	$6,639,081,541	129,380
Missouri	$51,213,155,101	$28,545,516,525	$17,108,442,314	$19,343,431,107	377,234
Montana	$7,050,301,935	$4,027,394,453	$2,423,220,204	$2,740,811,782	52,961
Nebraska	$19,010,957,224	$10,757,693,774	$6,456,230,808	$7,378,390,290	142,064
Nevada	$19,946,117,667	$11,420,587,760	$6,856,509,200	$7,716,989,684	149,186
New Hampshire	$12,466,831,379	$7,097,329,535	$4,263,591,711	$4,803,970,774	92,939
New Jersey	$105,881,836,091	$59,525,833,073	$35,711,164,849	$40,005,604,922	781,781
New Mexico	$14,920,543,456	$8,506,006,372	$5,111,989,044	$5,783,642,784	111,762
New York	$235,390,570,373	$133,908,300,412	$80,393,174,346	$90,308,547,177	1,761,298
North Carolina	$84,127,084,810	$47,289,619,947	$28,410,195,899	$31,991,538,200	623,362
North Dakota	$8,854,052,418	$5,025,656,000	$3,021,565,889	$3,431,578,203	66,316
Ohio	$105,101,981,630	$59,200,187,086	$35,660,624,872	$40,260,476,158	783,017
Oklahoma	$30,916,934,886	$17,590,601,650	$10,556,936,927	$12,032,063,861	231,988
Oregon	$37,658,339,141	$21,349,216,021	$12,848,986,672	$14,668,364,468	283,098
Pennsylvania	$121,166,861,924	$68,456,670,478	$41,166,731,826	$46,413,010,930	903,085
Rhode Island	$9,185,133,115	$5,226,206,962	$3,150,146,976	$3,556,129,973	68,789
South Carolina	$32,015,890,429	$17,861,547,890	$10,706,985,037	$11,961,452,079	233,990
South Dakota	$7,432,635,536	$4,244,355,891	$2,558,595,876	$2,934,862,899	56,490
Tennessee	$56,294,764,977	$31,157,572,418	$18,649,245,978	$20,895,016,748	409,372
Texas	$306,264,970,149	$171,396,605,543	$102,361,335,235	$115,737,537,970	2,252,164
Utah	$25,527,380,273	$14,445,651,920	$8,664,922,228	$9,811,098,412	189,992
Vermont	$4,666,125,478	$2,680,228,519	$1,617,493,734	$1,812,863,992	35,288
Virginia	$84,433,745,075	$47,309,874,337	$28,324,475,021	$31,899,690,447	620,940
Washington	$79,307,284,866	$44,660,578,962	$26,744,995,204	$30,441,440,522	588,794
West Virginia	$10,857,721,965	$6,217,782,178	$3,754,682,194	$4,304,712,557	82,098
Wisconsin	$51,786,657,355	$29,409,257,950	$17,756,510,608	$20,251,626,520	392,625
Wyoming	$6,512,492,566	$3,749,606,577	$2,258,711,324	$2,568,173,878	49,413
United States Total	**$3,124,990,376,675**	**$1,760,211,689,481**	**$1,055,581,234,042**	**$1,191,884,204,965**	**23,166,967**

NOTE: Scenario I compares the effects of the electronic payments system in 2014 to a simulation of the US economy in which no such mechanism existed and evolved since the 1970s. Results reflect the overall (direct, indirect, and induced) effects of both the stimulus to real personal consumption and the efficiency gains that are observed across the entire economy.

SOURCE: US Multi-Regional Impact Assessment System, The Perryman Group

The Cumulative Impact (1970-2014) of the Electronic Payments System on Business Activity in the United States: Results by State

Category	Total Expenditures (2009 Dollars)	Gross Product (2009 Dollars)	Personal Income (2009 Dollars)	Retail Sales (2009 Dollars)	Employment (Person-Years)
Alabama	$652,057,493,382	$366,250,442,656	$219,850,907,835	$251,040,789,904	4,131,617
Alaska	$161,791,944,006	$92,137,058,535	$55,488,227,220	$62,492,496,871	1,034,696
Arizona	$994,562,772,478	$548,848,315,582	$327,680,794,430	$366,831,894,658	6,103,449
Arkansas	$397,432,945,527	$224,504,935,009	$134,743,296,420	$154,702,120,939	2,538,978
California	$8,685,272,754,216	$4,902,521,448,886	$2,933,803,695,015	$3,344,216,163,116	55,333,225
Colorado	$1,124,208,149,627	$628,834,867,940	$375,618,375,221	$428,733,585,458	7,066,038
Connecticut	$884,098,592,047	$497,906,490,856	$298,861,933,737	$337,108,373,855	5,581,499
Delaware	$183,273,126,196	$103,830,661,522	$62,321,537,373	$71,988,011,393	1,167,188
District of Columbia	$403,901,065,544	$227,309,046,001	$135,980,362,506	$155,428,173,597	2,558,311
Florida	$2,934,200,049,757	$1,652,876,350,207	$987,919,566,963	$1,133,119,360,233	18,583,236
Georgia	$1,737,563,417,558	$976,372,879,418	$583,854,427,856	$668,963,249,493	11,045,765
Hawaii	$256,768,151,414	$146,454,390,690	$87,623,884,172	$100,481,910,780	1,651,352
Idaho	$207,424,153,910	$118,258,936,023	$71,146,465,275	$81,561,847,365	1,338,271
Illinois	$2,883,445,745,214	$1,616,119,807,956	$968,649,118,035	$1,103,369,304,159	18,251,734
Indiana	$1,077,981,786,836	$609,222,619,720	$366,409,912,890	$420,953,973,868	6,923,293
Iowa	$568,734,276,763	$323,235,187,030	$194,853,530,743	$224,877,204,404	3,690,371
Kansas	$512,761,185,791	$289,808,129,720	$173,750,806,865	$200,633,231,358	3,290,965
Kentucky	$616,088,617,079	$350,519,714,904	$211,056,611,778	$242,526,864,110	3,966,229
Louisiana	$810,198,431,356	$459,708,322,373	$275,353,757,983	$317,838,375,730	5,188,456
Maine	$180,660,330,438	$103,197,346,313	$62,031,561,022	$70,929,716,362	1,165,110
Maryland	$1,231,321,543,691	$694,695,524,915	$415,356,391,928	$476,608,927,763	7,813,472
Massachusetts	$1,638,229,081,002	$927,099,409,988	$556,631,656,658	$628,213,170,697	10,418,766
Michigan	$1,437,798,579,655	$824,266,022,543	$499,469,349,813	$572,098,884,870	9,397,926
Minnesota	$1,156,114,269,460	$653,594,382,188	$392,091,684,749	$450,531,278,292	7,428,853
Mississippi	$336,063,417,855	$190,638,223,128	$114,741,240,731	$130,812,668,236	2,164,180
Missouri	$996,426,226,748	$556,470,908,303	$333,422,149,538	$381,131,911,154	6,310,114
Montana	$137,173,851,926	$78,510,677,761	$47,225,531,948	$54,003,388,896	885,893
Nebraska	$369,885,751,737	$209,712,219,445	$125,823,866,050	$145,379,585,286	2,376,344
Nevada	$388,080,654,780	$222,634,781,838	$133,624,791,432	$152,051,154,231	2,495,479
New Hampshire	$242,560,289,944	$138,356,487,933	$83,092,071,564	$94,654,694,501	1,554,622
New Jersey	$2,060,084,722,570	$1,160,406,201,391	$695,965,952,241	$788,247,574,918	13,077,109
New Mexico	$290,300,817,979	$165,817,461,651	$99,626,274,804	$113,957,591,884	1,869,484
New York	$4,579,865,024,684	$2,610,430,030,044	$1,566,762,450,183	$1,779,387,999,396	29,461,830
North Carolina	$1,636,814,477,069	$921,871,486,964	$553,679,196,009	$630,342,984,522	10,427,182
North Dakota	$172,268,434,252	$97,970,949,550	$58,886,541,224	$67,613,855,663	1,109,295
Ohio	$2,044,911,522,716	$1,154,058,005,940	$694,980,991,294	$793,269,412,084	13,097,786
Oklahoma	$601,533,819,015	$342,914,028,878	$205,741,501,071	$237,072,909,621	3,880,537
Oregon	$732,697,618,458	$416,185,064,311	$250,410,684,799	$289,017,070,054	4,735,474
Pennsylvania	$2,357,477,073,946	$1,334,505,387,804	$802,288,131,377	$914,495,440,859	15,106,214
Rhode Island	$178,710,089,514	$101,880,522,385	$61,392,425,837	$70,067,952,553	1,150,649
South Carolina	$622,915,593,328	$348,195,898,626	$208,665,751,125	$235,681,615,415	3,914,035
South Dakota	$144,612,706,775	$82,740,159,073	$49,863,834,543	$57,826,861,190	944,921
Tennessee	$1,095,296,318,728	$607,390,747,647	$363,450,486,435	$411,703,467,844	6,847,704
Texas	$5,958,829,288,903	$3,341,233,103,396	$1,994,894,438,522	$2,280,426,300,507	37,672,710
Utah	$496,672,215,460	$281,605,871,028	$168,868,500,227	$193,312,275,752	3,178,054
Vermont	$90,786,240,254	$52,248,807,510	$31,522,930,487	$35,719,635,998	590,272
Virginia	$1,642,780,997,387	$922,266,329,324	$552,008,603,279	$628,533,268,885	10,386,670
Washington	$1,543,038,277,132	$870,620,537,500	$521,226,516,510	$599,800,745,810	9,848,949
West Virginia	$211,252,731,987	$121,210,449,742	$73,174,061,375	$84,817,595,936	1,373,276
Wisconsin	$1,007,584,545,088	$573,308,823,117	$346,052,190,295	$399,026,474,504	6,567,571
Wyoming	$126,709,990,469	$73,095,436,042	$44,019,459,578	$50,601,830,297	826,542
United States Total	**$60,801,221,161,649**	**$34,313,850,891,308**	**$20,571,958,428,963**	**$23,484,205,175,268**	**387,521,699**

NOTE: This analysis examines the benefits of the electronic payment system relative to a simulation of the US economy in which no such mechanism existed an evolved over an extended period (1970-2014). Results reflect the overall (direct, indirect, and induced) effects of both the stimulus to real personal consumption and the efficiency gains that are observed across the entire economy. Results are fully adjusted for gains in productivity over the relevant time horizon.

SOURCE: US Multi-Regional Impact Assessment System, The Perryman Group

The Annual Impact (as of 2014) of the Electronic Payments System on Business Activity in the United States—Scenario II: Results by State

Category	Total Expenditures (2009 Dollars)	Gross Product (2009 Dollars)	Personal Income (2009 Dollars)	Retail Sales (2009 Dollars)	Employment (Permanent Jobs)
Alabama	$8,259,722,563	$4,620,869,889	$2,775,381,564	$3,097,870,311	60,265
Alaska	$2,049,445,922	$1,162,465,106	$700,479,267	$771,164,123	15,092
Arizona	$12,598,294,867	$6,924,651,440	$4,136,618,059	$4,526,744,980	89,026
Arkansas	$5,034,350,346	$2,832,510,144	$1,700,989,386	$1,909,040,788	37,034
California	$110,017,819,075	$61,853,614,648	$37,036,120,377	$41,267,986,642	807,101
Colorado	$14,240,534,789	$7,933,817,323	$4,741,778,526	$5,290,618,493	103,067
Connecticut	$11,199,026,409	$6,281,934,008	$3,772,810,898	$4,159,953,541	81,413
Delaware	$2,321,551,690	$1,309,999,720	$786,742,468	$888,339,793	17,025
District of Columbia	$5,116,283,116	$2,867,888,756	$1,716,606,017	$1,918,000,356	37,316
Florida	$37,168,008,345	$20,853,835,703	$12,471,423,384	$13,982,814,609	271,059
Georgia	$22,010,009,716	$12,318,598,188	$7,370,535,019	$8,255,078,349	161,116
Hawaii	$3,252,525,606	$1,847,770,283	$1,106,157,419	$1,239,957,571	24,087
Idaho	$2,627,476,843	$1,492,036,850	$898,147,704	$1,006,481,957	19,520
Illinois	$36,525,094,984	$20,390,089,645	$12,228,154,665	$13,615,695,722	266,223
Indiana	$13,654,977,632	$7,686,375,582	$4,625,531,580	$5,194,617,251	100,984
Iowa	$7,204,253,284	$4,078,159,557	$2,459,816,529	$2,775,008,856	53,828
Kansas	$6,495,232,673	$3,656,420,592	$2,193,417,307	$2,475,835,624	48,003
Kentucky	$7,804,098,723	$4,422,400,105	$2,664,363,022	$2,992,807,552	57,852
Louisiana	$10,262,920,574	$5,799,999,392	$3,476,045,430	$3,922,159,694	75,680
Maine	$2,288,454,964	$1,302,009,376	$783,081,828	$875,280,318	16,995
Maryland	$15,597,358,270	$8,764,761,102	$5,243,428,303	$5,881,405,359	113,969
Massachusetts	$20,751,724,872	$11,696,929,885	$7,026,876,773	$7,752,218,000	151,970
Michigan	$18,212,837,809	$10,399,512,467	$6,305,264,049	$7,059,761,686	137,080
Minnesota	$14,644,695,006	$8,246,200,547	$4,949,736,364	$5,559,604,364	108,359
Mississippi	$4,256,972,158	$2,405,224,192	$1,448,484,918	$1,614,242,376	31,567
Missouri	$12,621,899,558	$7,020,823,363	$4,209,096,501	$4,703,208,720	92,041
Montana	$1,737,604,385	$990,545,224	$596,171,615	$666,407,619	12,922
Nebraska	$4,685,405,383	$2,645,874,973	$1,588,391,158	$1,793,999,697	34,662
Nevada	$4,915,883,297	$2,808,914,993	$1,686,869,462	$1,876,327,574	36,400
New Hampshire	$3,072,552,221	$1,745,601,519	$1,048,948,152	$1,168,049,097	22,676
New Jersey	$26,095,441,640	$14,640,490,361	$8,785,822,592	$9,727,059,737	190,745
New Mexico	$3,677,289,565	$2,092,068,231	$1,257,674,708	$1,406,248,924	27,269
New York	$58,013,924,943	$32,934,997,802	$19,778,693,035	$21,957,839,030	429,736
North Carolina	$20,733,805,845	$11,630,970,778	$6,989,605,129	$7,778,500,132	152,093
North Dakota	$2,182,153,396	$1,236,069,525	$743,379,331	$834,362,241	16,180
Ohio	$25,903,240,151	$14,560,397,119	$8,773,388,518	$9,789,029,747	191,047
Oklahoma	$7,619,730,634	$4,326,441,490	$2,597,265,459	$2,925,505,168	56,602
Oregon	$9,281,204,667	$5,250,879,748	$3,161,165,923	$3,566,501,687	69,073
Pennsylvania	$29,862,560,859	$16,837,046,582	$10,128,025,901	$11,284,971,963	220,342
Rhode Island	$2,263,750,932	$1,285,395,411	$775,013,433	$864,646,060	16,784
South Carolina	$7,890,577,186	$4,393,081,226	$2,634,180,975	$2,908,336,448	57,091
South Dakota	$1,831,833,618	$1,043,907,297	$629,477,351	$713,589,678	13,783
Tennessee	$13,874,303,737	$7,663,263,412	$4,588,172,000	$5,080,465,013	99,882
Texas	$75,481,498,527	$42,155,316,806	$25,183,399,520	$28,140,705,480	549,501
Utah	$6,291,430,964	$3,552,935,201	$2,131,783,429	$2,385,494,246	46,356
Vermont	$1,150,004,662	$659,207,234	$397,943,138	$440,784,145	8,610
Virginia	$20,809,384,767	$11,635,952,383	$6,968,515,690	$7,756,168,046	151,502
Washington	$19,545,926,858	$10,984,353,214	$6,579,924,908	$7,401,605,626	143,659
West Virginia	$2,675,974,089	$1,529,275,196	$923,743,927	$1,046,658,244	20,031
Wisconsin	$12,763,243,864	$7,233,262,187	$4,368,537,199	$4,924,029,553	95,796
Wyoming	$1,605,056,882	$922,222,775	$555,698,395	$624,432,021	12,056
United States Total	**$770,179,352,868**	**$432,927,368,551**	**$259,698,878,306**	**$289,797,614,209**	**5,652,464**

NOTE: Scenario II examines the economic benefits observed in 2014 resulting from growth in the use of the electronic payment system over that past 10 years (2004-2014). Results reflect the overall (direct, indirect, and induced) effects of both the stimulus to real personal consumption and the efficiency gains that are observed across the entire economy.

SOURCE: US Multi-Regional Impact Assessment System, The Perryman Group

Appendix C: About The Perryman Group

- The Perryman Group (TPG) is an economic research and analysis firm based in Waco, Texas. The firm has more than 30 years of experience in assessing the economic impact of corporate expansions, regulatory changes, real estate developments, public policy initiatives, and myriad other factors affecting business activity. TPG has conducted hundreds of impact analyses for local areas, regions, and states throughout the United States. Impact studies have been performed for hundreds of clients including many of the largest corporations in the world, governmental entities at all levels, educational institutions, major health care systems, utilities, and economic development organizations.
- The Perryman Group has conducted a number of studies related to the financial services industry. Dr. Perryman has been analyzing the financial system for almost 40 years and developed one of the first comprehensive econometric models of the financial sector. He has also conducted extensive academic work related to the Federal Reserve System and is the author of *The Measurement of Monetary Policy*. He is a frequent consultant and advisor to the Federal Reserve System, the Federal Deposit Insurance Corporation, the Office of the Comptroller of the Currency, and other regulatory bodies. Dr. Perryman has also served on state and federal task forces related to monetary and financial issues and testified before Congress and state legislative and regulatory bodies on associated matters on numerous occasions.
- TPG has conducted studies for the Financial Services Roundtable relating to the renewal of the Fair Credit Reporting Act and the effects of more efficient regulation of the insurance sector on the US economy. Another study focused on the impact of inadequate bank credit and its effect on the economy. TPG has also provided 50-state forecasts of key credit factors to a major financial enterprise and provides regional modeling support to a large financial services firm on an ongoing basis. The firm has also provided litigation and regulatory services to dozens of large financial entities in a variety of contexts. In addition, Dr. Perryman developed and maintains a large-scale econometric model that embodies a wide range of efficiency measures.

M. RAY PERRYMAN

President & CEO, The Perryman Group
Institute Distinguished Professor of Economic Theory and Method,
International Institute for Advanced Studies

ACADEMIC BACKGROUND

Ph.D. in Economics, Rice University
B.S. in Mathematics, Baylor University

SELECTED ACADEMIC/PROFESSIONAL POSITIONS AND ACTIVITY (Current and Former)

Business Economist-in-Residence, Cox School of Business, Southern Methodist University
University Professor and Economist-in-Residence, Baylor University
Herman Brown Professor of Economics, Baylor University
Founder and Director, Center for the Advancement of Economic Analysis, Baylor University
President, Southwestern Economics Association
President, Southwestern Society of Economists
Editor, The Southwestern Journal of Economic Abstracts
Editor, International Series in Economic Modeling (book series)
Editor and Author, The Perryman Report & Texas Letter (monthly economic newsletter)
Editor and Author, The Perryman Report (monthly economic newsletter)
Editor and Author, The Perryman Economic Forecast (subscription forecasting service)
Author, "The Economist" (syndicated weekly newspaper column)
Editorial Advisor and Author, The Perryman Texas Letter
Host, The Perryman Report, daily radio broadcast on the Texas State Network
Assistant Editor, The Journal of Economics
Author, The Perryman Permian Basin Oil Report
Contributing Economist, "Marketplace Radio," National Public Radio
Published or presented 400 academic papers
Authored or edited 5 books

SELECTED ADVISORY/CONSULTING ACTIVITY (Current and Former)

Advisor or Member for more than 50 governmental entities at the international, federal, state, and regional levels including: Federal Task Force on the Savings and Loan Crisis, Congress of the United States; Joint Economic Committee, Congress of the United States; United States Senate Academic Advisory Committee on the North American Free Trade Agreement; and Governor's Task Force on Economic Growth
Economic Advisor, United States Senate
Economic Advisor, United States House of Representatives
Economic Advisor, Office of the President
Economic Advisor, US Departments of the Treasury, Labor, Agriculture, the Interior, Commerce, Energy, and Housing and Urban Development
Economic Consultant, Federal Communications Commission
Economic Advisor, Office of the Governor, State of Texas

Economic Advisor, Committees on Finance, State Affairs, and Economic Development, Texas Senate
Economic Advisor, Office of the Speaker, Texas House of Representatives
Economic Advisor, Committees on Ways and Means, Business and Industry, Economic Development, Transportation, Healthcare, Appropriations, and Science and Technology, Texas House of Representatives
Economic Advisor, Interim Committee on NAFTA and GATT, Texas House of Representatives
Economic Advisor, Texas Higher Education Task Force
Economic Advisor, Joint Select Committee on Public School Finance, Texas Legislature
Economic Advisor, Ministry of Economic Affairs, Republic of China
Chairman of the Board and President, Texas Manufacturing Technology Center
Chairman, Blue Cross & Blue Shield of Texas Local Affiliate Board
Member, Board of Directors, Texas Health Care Services Corporation
Member, Board of Directors, Real Estate Council of Dallas
Chairman, Texas Legislative Conference
President, Board of Directors, Texas Leadership Institute
Member, Board of Visitors, Scott & White Hospital
Director, Women's Financial Services, Southern Methodist University
Advisory Director, Texas Association of Business and Chambers of Commerce
Advisory Director, Chase Bank
Director of projects, studies, and analyses for more than 2,000 clients, including major corporations, public utilities, government agencies, and financial services groups
Published more than 2,000 trade articles and columns

SELECTED HONORS AND AWARDS

Doctoris Honoris Causa degree, International Institute for Advanced Studies
Lifetime Achievement Award, International Institute for Advanced Studies
Citation for Outstanding Initiative in Promoting World Trade, China External Development and Trade Administration
Citation for Meritorious Efforts in Promoting World Capitalism (including the People's Republic of China), The Democracy Foundation
Citation for Promoting International Academic Exchange, The Asia and World Institute
Citation for Outstanding Advisory Contributions, Congress of the United States
Presidential Medal of Merit
Award for Outstanding Research Achievement in Economic Modeling, Systems Research Foundation
Outstanding Texas Leader (John Ben Shepperd Memorial Award)
Named the Outstanding Young Person in the World in the Field of Economics and Business Innovation, one of five Outstanding Young Texans, one of ten Outstanding Young Americans, and one of ten Outstanding Young Persons in the World
2012 Texan of the Year, Texas Legislative Conference