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The Impact of Payment Cards on Economic Growth

INTRODUCTION

We have come a long way from the days when most consumer transactions were done with cash. Since the advent of payment cards in the late 1950s, consumers have shifted more of their spending away from cash and checks to payment cards. The digital transformation of commerce that began in the 1950s is rapidly becoming a global phenomenon. Although cash is still the dominant payment method in much of the world, retailers of all sizes are embracing digital payments.

The proliferation of card-based electronic payments has dramatically changed how consumers pay for goods and services, how merchants manage their businesses, and how governments make and accept payments. Payment cards provide consumers with convenient and secure access to their funds, reduce cash and check handling for merchants, and expand the pool of customers. They also promote greater financial inclusion, giving those without access to the formal banking system an introduction to formal financial services. Card-based electronic payments also provide governments a greater ability to collect additional tax revenue by reducing the number of unreported transactions in the gray economy.

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Part 1: Executive Summary

The steady migration to payment cards spurs economic growth

We have come a long way from the days when most consumer transactions were done with cash. Since the advent of payment cards in the late 1950s, consumers have shifted more of their spending away from cash and checks to payment cards. The digital transformation of commerce that began in the 1950s is rapidly becoming a global phenomenon. Although cash is still the dominant payment method in much of the world, retailers of all sizes are embracing digital payments.

The proliferation of card-based electronic payments has dramatically changed how consumers pay for goods and services, how merchants manage their businesses, and how governments make and accept payments. Payment cards provide consumers with convenient and secure access to their funds, reduce cash and check handling for merchants, and expand the pool of customers. They also promote greater financial inclusion, giving those without access to the formal banking system an introduction to formal financial services. Card-based electronic payments also provide governments a greater ability to collect additional tax revenue by reducing the number of unreported transactions in the gray economy.[1]

The global public health crisis triggered by the COVID-19 pandemic has reinforced the trend toward the use of payment cards. In 2020, 48.5% of all global consumer spending took place using payment cards—an increase of 12% in card penetration during the year. This comes after even stronger growth in the period leading up to the pandemic. Between 2015 and 2019, consumer spending using payment cards grew at a robust average annual pace of 16%.

The objective of this study is to determine the impact of increased card penetration on the global economy. More specifically, we estimate the impact on GDP, private consumption and employment for 70 countries, which collectively account for 95% of the world's GDP. In summary, we found that increased worldwide card use supports meaningfully stronger economic growth. More specifically:

» **Greater usage of payment cards added $245 billion to real GDP in the 70 countries studied between 2015 and 2019.** Card usage raised consumption by an average of 0.14% across the 70 countries. That consumption contributed to average additional growth in GDP of 0.08% for this group of countries. That is, if not for greater card usage, global GDP would have grown by an average of only 2.9% a year, instead of actual growth of 3%. That growth supported the creation of about 2.1 million jobs on average per year, or about 0.3% of total employment in the 70 countries.

» **The expansion of payment cards will have a significant, positive effect on future economic growth.** Across the 70 countries in the study, we found that each 1% increase in usage of payment cards produces, on average, an annual increase of approximately $67 billion in the consumption of goods and services, or a 0.01% increase in GDP, assuming all other factors remain the same.

» **Countries with the largest increases in card usage experienced the biggest contributions to growth.** For example, big increases in GDP were recorded in Greece (0.31%), Uruguay (0.25%), Puerto Rico (0.24%), Russia (0.16%), and South Korea (0.15%). In all countries except Belgium, card usage increased regardless of economic performance. Belgium is among the top five card-using countries in the world, but Belgium's card usage declined in this period because of higher ACH payments. As a result, consumption growth attributed to an increase in card penetration was weaker than it would have been had card penetration increased.

» **Increased usage of payment cards added 0.1% to GDP across developed markets and 0.05% for emerging markets.** We also found that when card usage increases by 1% across countries, developed countries experience a larger percentage increase in GDP (0.03%) than emerging markets (0.01%). A plausible explanation for the smaller increase in emerging markets is that card usage as a percentage of personal consumption is still low, so even rapid growth did not increase GDP significantly.

This study marks the fourth time that Moody's Analytics has conducted this analysis and provides a comprehensive look at the impact of payment cards on economic growth between 2015 and 2019. The study also provides the analysis of the macroeconomic benefits of card usage and penetration for specific countries. In particular, the paper explores the differing effects that card penetration had in developed versus emerging economies. For example, the relatively high growth rate, yet low starting point, for card penetration seems to have driven card us-

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1   https://www.bbvaresearch.com/wp-content/uploads/mult/140520_Financial_Inclusion_EW_tcm348-451643.pdf

age's contribution to GDP in emerging economies such as Uruguay and Russia. Conversely, the high starting penetration rate, yet relatively low growth rate, in more developed economies such as Canada drove the contribution to GDP growth there.

The study does not consider a number of factors that could impact the results, including a country's fiscal policies, stability of the banking sector, or prevalence of financial infrastructure such as ATMs. The study also does not analyze the effects of noncard-based mobile phone payments—that is, payments through cell phone apps that are not directly tied to a credit, debit or prepaid card—due to data availability challenges. The economic benefits would have been larger if noncard-based mobile payments were included.[2]

Regardless, the findings of this study demonstrate that the migration from physical cash to payment cards is providing a boost to the global economy and thus supports the adoption of policies that encourage and accelerate this shift.

Part II: Macroeconomic Impact of Payment Card Usage

Since their inception in the mid-20th century, payment cards have allowed consumers and businesses to buy and sell with greater convenience and thereby have grown in popularity (see Chart 1).[3] In 2015, 37.4% of worldwide consumer spending was card-based. However, this figure varies significantly, from 91% in South Korea to around 1% in Ghana and Myanmar. Card penetration has grown by an annual average of 16% since 2015, more than three times the rate of personal consumption growth. Cash usage as a percentage of total consumer spending has fallen by an average 17% per year since 2015. And as COVID-19 became a global pandemic, card usage became more widespread. Governments around the globe imposed lockdowns with various degrees of limitations; the immediate consequence was a steep reduction in consumer spending along with a reduction in the use of cash.

What is the economic impact of the shift from cash to payment cards? How has this changed over time? What has been the impact on GDP and employment, and has this impact differed between developed and emerging markets?

Moody's Analytics attempted to answer this question by analyzing macroeconomic data for 70 countries between 2015 and 2019. The impact of card usage on GDP is tied to private consumption: Increases in private consumption that are attributable to card usage drive corresponding increases in GDP. Essentially, the impact of card usage on GDP is a function of three factors:

» Card penetration as a percent of total personal consumption expenditures;

» Growth of card usage year over year relative to personal consumption; and

» Actual percentage of GDP that is represented by personal consumption.

Historically, there is a positive relationship between card penetration and usage and economic growth. This relationship did not hold in 2020, as consumption fell but card penetration continued to soar, mainly because of government-imposed lockdowns and a preference toward contactless shopping. The analysis does not control for changes in consumer behavior due to the pandemic or fear of contacting the virus. Therefore, we excluded 2020 from our analysis given the impact of the pandemic on the operating conditions.

Based on the methodology developed, Moody's Analytics estimated that higher card usage contributed an additional $245 billion (2015 U.S. dollars) to consumption across 70 countries between 2015 and 2019 (see Chart 2). Moody's Analytics estimates that 0.08% of the 3% growth in real GDP over the sample period was attributable to increased card penetration. Real consumption grew at an average of 2.9% in the same

Chart 1: Card Usage More Than Cash

Global personal consumption expenditure, $ tril
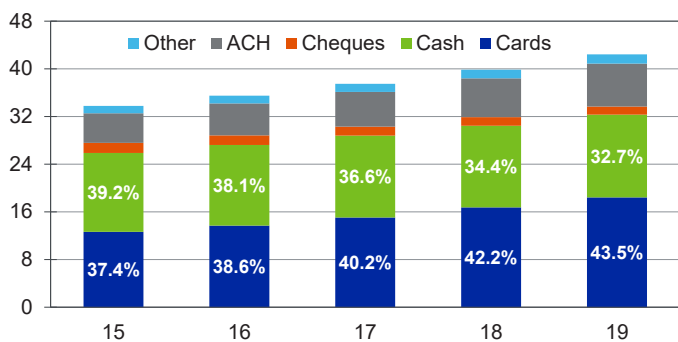
Sources: Euromonitor, Moody's Analytics

Chart 2: Contribution to Consumption

$ bil
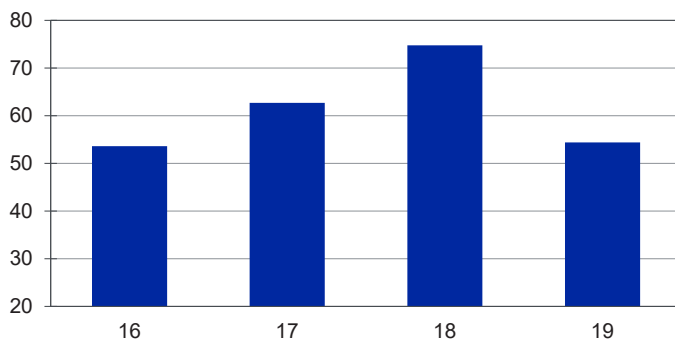
Source: Moody's Analytics

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2   For insights into the impact of mobile money in in Kenya, see: https://www.moodys.com/research/Moodys-Kenyan-banks-grow-via-mobile-products-in-broader-market--PBC_1170845

3   All countries reported by Euromonitor were used to calculate percentage i.e. it was not restricted to the 70 countries that are used in this study.

period, of which 0.14 percentage point is attributable to increased card penetration. That supports the addition of about 2.1 million jobs globally on average per year.

The impact varied considerably from country to country because of differing growth rates, larger penetration in some countries, and the consumer reaction to a more robust card infrastructure in some countries. Card usage increased consumption the most in Greece (0.31%), Uruguay (0.25%), Puerto Rico (0.24%), Russia (0.16%), the U.K. (0.15%) and South Korea (0.15%). Card penetration rates increased by more than 9 percentage points in each of these countries between 2015 and 2019. This compares with barely any change in consumption in Switzerland, Ghana and Jordan on the low end. The small impact in these countries is because of no change in card penetration. In Belgium, card penetration of personal consumption decreased by 1 percentage point between 2015 and 2019—from 68% to 67%. Declining card usage decreased consumption by 0.02%. Conversely, in India and Indonesia, where card volume grew rapidly over the period, card usage added only 0.05% to GDP in India and 0% in Indonesia. A plausible explanation is that card usage as a percentage of personal consumption in these two countries was still so low that even rapid growth did not increase GDP significantly.

Additionally, the report includes a hypothetical study of the impact of a 1% increase per year in the card penetration rate in each country. Every 1% increase in card usage across the 70 countries produces an annual increase of approximately $67 billion in the consumption of goods and services, or a 0.01% increase in GDP, assuming all other factors remain the same. The estimated GDP elasticity, or responsiveness of GDP to increases in card penetration, for developed countries is much higher than it is for emerging markets, because the card penetration rate is more than two times the size for developed countries, where it averages almost 49%, as it is for emerging economies, where penetration averages 20%. This is not surprising considering that developed countries have more established payment networks, consumers who are more comfortable using cards, and environments where cards are accepted by most merchants. By comparison, cash payments are still more prevalent in emerging economies. Analyzing the impact of future card usage on GDP is not simply an academic exercise. As more consumers around the world shift their spending from paper to payment cards, these results quantify the positive macroeconomic impact of this secular trend.

Part III: Value of Card-Based Electronic Payments: Less Friction, More Efficiency

Card-based electronic payments benefit all parties involved in numerous ways

Within the card-based electronic payment ecosystem, there are two main end-parties: buyers and sellers. The evolution to card-based electronic payments from cash and checks has changed the behavior of consumers and merchants.

Although the study does not specifically explore the reasons for the incremental

Consumption → Decline in Inventory → Increased Production → More Jobs → Greater Income

growth in GDP attributable to card usage, there are a number of plausible explanations: The advent of card-based electronic payments has greatly aided consumers' ability to optimize consumption decisions by giving them secure and immediate access to all of their funds on deposit (debit cards) or a line of credit (credit cards). Merchants also benefit because there is less cash and check handling in the system, and they have access to a large pool of customers with guaranteed payment. Card-based electronic payments play a critical role in the rapidly expanding e-commerce environment where payment by cash or check is not usually an option.

Cards not only are convenient but also play a crucial role in stimulating economic growth in countries around the world. The availability of card-based electronic payment systems leads to a virtuous economic cycle whereby increased consumption leads to increased production, more jobs and greater income and, ultimately, stronger economic growth. Numerous examples around the world illustrate how cashless payments are economic propellers. For example, China experienced exponential growth in card usage during 2008 to 2012 leading to a 4.9% increase in consumption, while consumption increased by 1.3% in Chile and 1.2% in Brazil with higher card usage, as discussed in a 2013 Moody's Analytics study. Similarly, card usage increased consumption in Russia (0.64%), the United Arab Emirates (0.52%), Qatar (0.47%), Ireland (0.42%), and Hungary (0.4%) during 2011 and 2015, as discussed in a 2016 Moody's Analytics study.

Benefits to consumers and merchants

» **Card-based electronic payments provide access to financial resources.** Consumers using cash or checks may be limited in the amount of funds they have for particular transactions. With cash, consumers are limited to the funds they have on hand. Merchants may be reluctant to accept checks for bigger transactions because of the risk of nonpayment. Card-based electronic payments address both of these issues: They provide consumers with access to all available funds or lines of credit for a given transaction and they give merchants peace of mind about payment guarantees, provided they follow appropriate payment procedures.

- » **Access to credit helps calibrate periodic income with continuous consumption.** Wages and salaries are typically paid weekly, biweekly or monthly. Consumer spending, however, has no time profile. Putting food on the table or fixing a broken-down vehicle should not have to wait for the next paycheck. Credit smooths out the consumption of durable and nondurable goods by lessening the need to wait for paydays. In obtaining credit, consumers generally have three options: bank loans, store credit or credit cards. Credit cards are more convenient and offer lower consumer transaction costs, as the former two involve paperwork, hassle, and a potential transaction-by-transaction waiting period.

- » **Cards provide consumers the means to participate in the digital economy.** In most cases, online shopping sites require the of use cards for purchases. And more recently, consumers moved to card-based electronic payments for everyday purchases during quarantines and lockdowns to complete contactless purchases. Cardholders thereby have a larger variety of goods and vendors to choose from as well as access to a broader international marketplace, whereas consumers using cash have limited opportunities. Since online shopping is also completed with the click of a button, the economy immediately receives a jolt to consumption and GDP.

Security
- » **Trust in electronic transactions further drives consumption.** With card-based electronic payments, consumers have recourse for fraudulent transactions. The peace of mind that merchants have with guaranteed payment also extends to consumers, who feel more comfortable making purchases when they can pay with a card. This trust in the payment system eases friction, bolstering consumption and thereby GDP growth.

Convenience
- » **Cards provide convenience and lower business costs.** Consumers cite the convenience of payment cards, whether it means not having to visit the ATM to obtain cash or not having to count out the cash at the point of transaction. This convenience benefits merchants as well. For instance, when consumers use their own cards at the self-service gasoline pump or supermarket, it lowers labor costs for merchants. Each small portion of friction that payment cards eliminate from the system contributes to higher consumption and GDP.

Transparency
- » **Payment cards reduce central bank costs of providing currency.** By reducing paper transactions, payment cards can reduce the cost to central banks of handling, printing, transporting and safeguarding notes and coins or to treasury or finance departments of processing paper money, thereby improving overall efficiency in commerce and the economy.

- » **Card-based electronic transactions eliminate a substantial portion of the gray economy.** Retailers who do not report some or all of their transactions to avoid paying certain taxes usually prefer cash transactions. Card-based electronic transactions, on the other hand, are "above board" and create an audit trail that greatly reduces unreported transactions, thereby raising tax revenues.

Part IV: The Model

The model we developed to capture the relationship between card payments and consumer spending is based on 70 countries over a five-year period of 2015-2019. We excluded 2020 from our analysis given the impact of the pandemic on the operating conditions.

Real per capita private consumption was modeled as a function of real per capita disposable income, real interest rates, and card penetration—defined as spending using cards as a percentage of total consumer expenditure. The data were pooled for all countries to create a dataset with 360 observations, and a statistical technique called "pooled cross-section time series estimation" was used. To estimate the model parameters, we used least squares with fixed effect with cross-section weights to reduce heteroscedasticity.[4] A trend term is also included for emerging economies to account for catch-up technology adoption and trade expansion in emerging markets. To capture the varying effect of card penetration due to wealth of an economy in this study, as well as in previous reports, countries were divided into two groups—developed and emerging—based on International Monetary Fund status. We create interaction terms between the country group and card usage, disposable income, and interest rates, to isolate the effect of each variable on a specific group. (See the Appendix for the exact specification used and the results of the estimation.)

Those results were used to estimate the impact that the changes in consumption had on job creation and economic growth, as measured by GDP. To measure the impact of card usage on GDP, the consumption figure was multiplied by the portion of GDP that is represented by consumer spending in each country. The model can therefore estimate the impact of card usage on the overall economy.

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4 Heteroscedasticity occurs in datasets that have a large range between the largest and smallest observed values. Weighted regression assigns each datapoint a weight based on the variance of its fitted value and minimizes the sum of the weighted squared residuals.
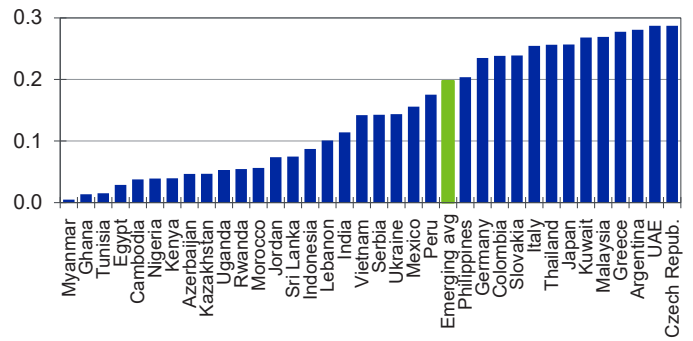
Chart 3: Developed Markets Use More

Payment cards as a share of total payments, 2019
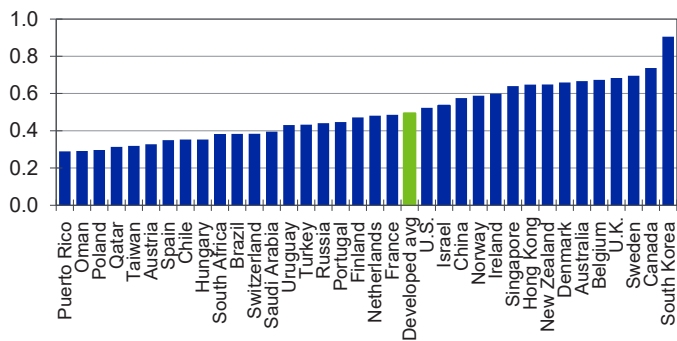
Sources: Euromonitor, Moody's Analytics

Chart 4: Emerging Markets Use Less

Payment cards as a share of total payments, 2019

Sources: Euromonitor, Moody's Analytics

Part V: Payment Cards, Consumption and GDP

It has long been clear that card-based electronic payments offer benefits to all parties—consumers, merchants and financial institutions. As more cards are issued and more merchants accept cards, transaction volume grows. That is because consumers feel more comfortable using their cards for a larger percentage of their overall transactions once a critical mass of merchant locations is reached. At the same time, merchants want access to the growing pool of cardholders with guaranteed payment. In other words, a more robust payment ecosystem produces a multiplier effect that can result in significant increases in consumption.

In this study, Moody's Analytics estimates the impact of increased card-based electronic payments on consumption in 70 countries. These countries included large, developed economies such as the U.S. and U.K. and emerging economies such as China and India. What is apparent is that there is wide divergence in card penetration (see Charts 3 and 4). The variance of adoption rates across countries, shown in the charts, is striking and suggests that the global economy has to travel a bit further down the digital road to fully capture the benefits of card-based electronic payments.

Card penetration increased around 6 percentage points on average across the 70 sampled countries between 2015 and 2019 and led to the positive contribution to GDP. This corresponds to an average 0.14% increase in consumption per year and a a 0.08% increase in GDP per year between 2015 and 2019. Payment cards added $245 billion in real U.S. dollars to GDP in the 70 countries studied over the five-year period. That is equivalent to the creation of about 2.1 million jobs on average per year, or about 0.3% of total employment in the 70 countries over the five-year period.

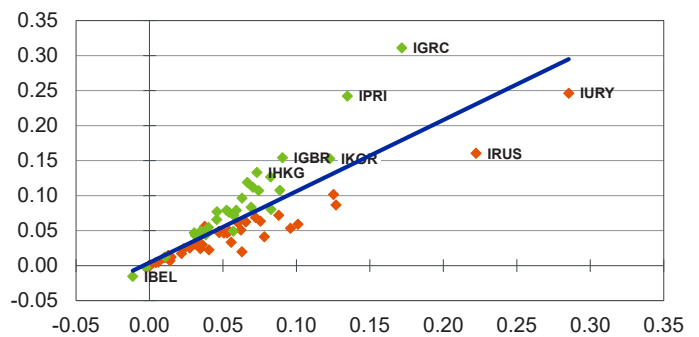### Results differ for emerging and developed markets

In general, a higher percentage of consumers in wealthier, more developed countries use cards and use them more often than consumers in lower-income, emerging economies. The assumption is that increased penetration and more frequent usage of cards result in significantly different results from the two groups because of a variety of factors—including the penetration rate, the growth rate over the course of the study (2015-2019), and the overall size of a given economy.

Both emerging markets and developed countries experienced gains in consumption due to higher card usage. The graph in Chart 5 shows that there is a strong correlation between larger increases in card usage and card contribution to GDP. This correlation held for emerging markets (orange) and developed countries (green). However, the increase in consumption levels and GDP growth attributed to higher card usage was stronger for developed markets. Increased card usage added 0.11% to consumption in emerging markets, compared with 0.16% in developed countries between 2015 and 2019. The corresponding figures for GDP were 0.05% for emerging economies and 0.1% for the developed countries.

The increase in consumption levels and GDP growth in developed countries attributed to higher card usage was also stronger than in the previous study conducted in 2016 by Moody's Analytics.[5] There

Chart 5: Developed Countries' GDP Boost

Change in card penetration (X-axis) vs. card contribution to GDP

Sources: IMF, VISA, Moody's Analytics

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5   https://usa.visa.com/content/dam/VCOM/download/visa-everywhere/global-impact/impact-of-electronic-payments-on-economic-growth.pdf
    https://usa.visa.com/dam/VCOM/download/corporate/media/moodys-economy-white-paper-feb-2013.pdf

Table 1: Card Usage's Contribution to GDP

% avg between 2015-2019 weighted by GDP

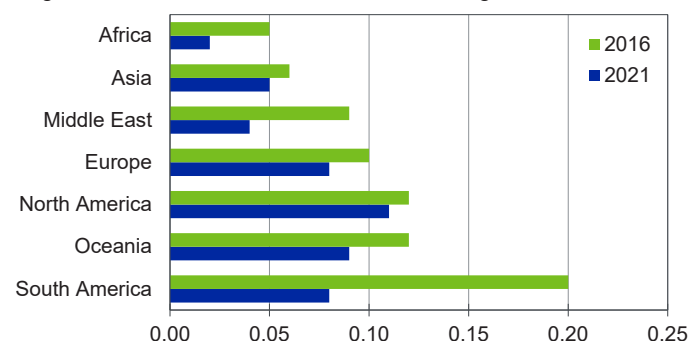| Country	%
Argentina	0.05
Australia	0.08
Austria	0.05
Azerbaijan	0.01
Belgium	0.00
Brazil	0.05
Cambodia	0.01
Canada	0.05
Chile	0.05
China	0.05
Colombia	0.06
Czech Republic	0.07
Denmark	0.11
Egypt	0.01
Finland	0.08
France	0.05
Germany	0.04
Ghana	0.00
Greece	0.31
Hong Kong	0.13
Hungary	0.09
India	0.05
Indonesia	0.00
Ireland	0.05
Israel	0.06
Italy	0.11
Japan	0.07
Jordan	0.00
Kazakhstan	0.01
Kenya	0.01
Kuwait	0.03
Lebanon	0.04
Malaysia	0.03
Mexico	0.03
Morocco	0.01
Myanmar	0.00
Netherlands	0.04
New Zealand	0.10
Nigeria	0.02
Norway	0.01
Oman	0.02
Peru	0.03
Philippines	0.05
Poland	0.10
Portugal	0.08
Puerto Rico	0.24
Qatar	0.02
Russia	0.16
Rwanda	0.05
Saudi Arabia	0.06
Serbia	0.03
Singapore	0.08
Slovakia	0.11
South Africa	0.06
South Korea	0.15
Spain	0.13
Sri Lanka	0.02
Sweden	0.08
Switzerland	0.00
Taiwan	0.08
Thailand	0.02
Tunisia	0.00
Turkey	0.07
Uganda	0.01
Ukraine	0.06
United Arab Emirates	0.04
United Kingdom	0.15
United States	0.12
Uruguay	0.25
Vietnam	0.07
Developed	**0.10**
Emerging	**0.05**
Total	**0.08**

are two reasons for the stronger growth in developed countries in this study. First, developed countries grew at a faster pace in this study compared with the previous study. Second, card usage rose at a much faster pace among developed countries; card penetration increased around 6 percentage points on average, compared with 3 percentage points in the previous study. Consequently, the increase in consumption due to increased card usage for developed countries was larger compared with the previous study. However, in emerging countries, the increase in consumption levels and GDP growth attributed to higher card usage was far smaller than in the previous study, mainly because emerging markets grew at a much slower pace in countries such as Brazil, Peru and Chile. See Table A in the Appendix for details on contribution to GDP in previous studies.

Regional impact

Results were not uniform across regions of the world (see Chart 6).[6] North America and Oceania (Australia and New Zealand) experienced the largest gains in GDP due to increased card usage. Specifically, North America's GDP grew by an average of 0.11% per year because of increased card usage, while Oceania experienced an average GDP growth of 0.09% per year over the five-year period. Increased card usage contributed 0.08% per year in South America and Europe. Because of the somewhat lower penetration, card usage added 0.04% to GDP in the Middle East and 0.05% to GDP per year in Asia. Africa experienced the smallest gains in GDP, mainly because of low card penetration and a slow rate of card adoption.

Chart 6: Regional Impacts

Avg increase in GDP from increased card usage, %

Source: Moody's Analytics

North American countries, with an average GDP increase of 0.11% from increased card usage, outperformed all other regional averages. This was entirely due to the U.S., which had a 0.12% increase in GDP as card usage increased by 7 percentage points. Existing infrastructure to adapt to fast-changing technology provides one likely explanation for the increased card usage.[7]

Canada, for its part, experienced a more modest 0.05% increase in GDP even though Canada's overall economy grew at a similar pace. Card penetration increased by just 3 percentage points, as card penetration is much higher in Canada than in the U.S. Oceania had the second-largest average increase in GDP due to increased card usage, at 0.09%. Both Australia and New Zealand experienced a similar increase in GDP due to an increase in card usage. This region stands out because it is predominantly made up of developed countries and because of its extremely high card usage rate, which at more than 60% is higher than the card usage rate in any other region.

South American countries experienced, on average, a 0.08% increase in GDP due to increased card penetration. The increase in GDP due to increased card penetration was much smaller in all South American countries except Uruguay compared with the last study. Uruguay's GDP increased by 0.25%, compared with 0.18% in the previous

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6   See Table B in the Appendix for the list of countries included in each region discussed in this section.

7   https://www.worldbank.org/en/publication/wdr2016/Digital-Adoption-Index

study, even though Uruguay's economy grew at a smaller pace. Higher contribution was mainly because of a large increase in card penetration; card penetration increased by 29 percentage points in this study, compared with 6 percentage points in the previous study. The Financial Inclusion Law passed in 2014, which requires wages and pensions to be paid into an account, provides one likely explanation for the increased card usage. Meanwhile, Argentina's contribution to GDP decreased from 0.23% to 0.05% in this study. The decrease in contribution was due to economic deterioration as well as a smaller change in card penetration. Similarly, Chile, Colombia and Peru experienced smaller contributions in this study because of weaker economic recoveries and smaller changes in card penetration.

African countries experienced, on average, a 0.02% increase in GDP due to increased card penetration. Many African countries are in the early stages of developing their financial systems with appropriate infrastructure to support card-based electronic payments. In the coming years, the increase in the use of mobile phone technologies to make payments is expected to increase electronic payment penetration. We note that South Africa, one of the most developed economies on the African continent and with a much higher card penetration compared with other African countries, recorded an average 0.06% increase in GDP from additional card usage, three times the regional average. This illustrates the strong benefits of card-based electronic payments that accompany a developed financial services system.

There are notable success stories and some markets where there is clearly room for improvement. A subset of the results can be found in Table 1, and more details regarding the amount of GDP added per year by country due to increased card penetration in relation to consumption and GDP can be found in Tables 1A, 1B and 1C in the Appendix.
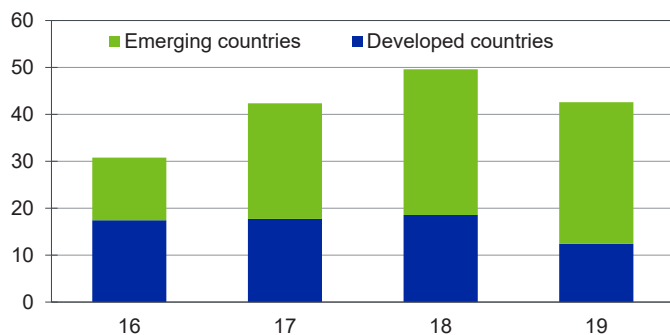
Greece recorded the biggest percentage rise in GDP of around 0.31% as a result of increased credit card penetration. Card penetration rates in Greece increased by more than 17 percentage points between 2015 and 2019 and led to an additional $2.5 billion in consumption for the country during that period. Greece introduced capital control in 2015, which restricted the amount of money an individual could withdraw in a day; this law provides one likely explanation for the increased card usage. Other top performers include Puerto Rico, Russia, Uruguay, South Korea, Spain, Hong Kong and Singapore. Of this group, it is worth noting that emerging countries such as Uruguay and Russia experienced large increases in GDP. As these results show, countries in all regions benefited from increased card usage, but it was the developing countries primarily that had the largest increases.

Part VI: Contribution of Card Usage on Employment

As consumers spend more, firms increase hiring to accommodate the additional demand for goods and services. Consequently, we can calculate the number of jobs created as a result of the additional GDP from payment card usage. Increased card usage added almost 2.1 million jobs per year across the countries sampled between 2015 and 2019 (see Chart 7). That corresponds to 0.3% of total employment in the 70 countries between 2015 and 2019.

Countries with the largest number of job gains per year were also the largest countries. Notably, the two countries with the greatest average job increases were China (398,370 jobs added) and India (239,240 jobs added), which both had large gains in employment because of the combination

Chart 7: More Card Usage Boosts Jobs

Avg number of jobs added in a country, ths

Source: Moody's Analytics

Table 2: Jobs Added Due to Increased Card Penetration

Avg between 2015-2019, ths

Country	Avg
Argentina	8.63
Australia	9.80
Austria	2.34
Azerbaijan	0.61
Belgium	0.13
Brazil	42.52
Cambodia	1.04
Canada	8.62
Chile	4.25
China	398.37
Colombia	13.87
Czech Republic	3.74
Denmark	2.93
Egypt	3.04
Finland	1.89
France	13.41
Germany	18.28
Ghana	0.56
Greece	11.78
Hong Kong	5.05
Hungary	4.01
India	230.24
Indonesia	6.05
Ireland	1.10
Israel	2.14
Italy	25.69
Japan	43.25
Jordan	0.07
Kazakhstan	0.58
Kenya	3.30
Kuwait	0.76
Lebanon	0.93
Malaysia	4.30
Mexico	13.38
Morocco	1.24
Myanmar	0.10
Netherlands	3.82
New Zealand	2.52
Nigeria	13.11
Norway	0.33
Oman	0.56
Peru	4.93
Philippines	19.20
Poland	16.58
Portugal	3.57
Puerto Rico	2.38
Qatar	0.41
Russia	115.67
Rwanda	2.91
Saudi Arabia	7.77
Serbia	0.88
Singapore	2.90
Slovakia	2.74
South Africa	10.30
South Korea	41.40
Spain	24.13
Sri Lanka	1.44
Sweden	4.20
Switzerland	0.21
Taiwan	9.04
Thailand	9.19
Tunisia	0.16
Turkey	20.04
Uganda	1.92
Ukraine	10.00
United Arab Emirates	2.71
United Kingdom	49.71
United States	183.62
Uruguay	3.96
Vietnam	38.16
Developed	**483.81**
Emerging	**1118.80**
Total	**2095.01**

of fast-growing labor productivity and increasing card usage. Led by these emerging markets, the emerging markets group averaged a greater number of jobs added per year (24,800) than did developed countries (16,530).

As was the case with GDP gains, job gains were not uniform across regions in the world. North America had the highest average job gains per year (52,000), followed closely by Asia (47,700). Africa had the second-lowest average number of jobs added per year from increased card usage (4,090), which is not surprising given the region's low usage rates and developing financial infrastructure to allow for payment cards to be more widely accepted. The Middle East had the fewest average jobs added per year (3,830), but this was likely a result of the relatively smaller population than in the other regions. A subset of the results can be found in Table 2, and more details regarding job additions can be found in Table 2A and Table 2B in the Appendix.

The additional GDP-accompanied increases in employment depend on the labor productivity of the country. Some emerging economies have also experienced notable increases in productivity. For example, increased card penetration raised GDP in Poland by 0.1%. Poland's labor productivity also rose by 17% between 2015 and 2019, resulting in a total impact of around 16,580 jobs gained per year. Argentina, another emerging market, which had an estimated 0.05% increase in GDP due to increased card penetration, experienced an 8% decline in labor productivity between 2015 and 2019. As a result, job gains were lower by around 8,600 on average each year.

Part VII: Ongoing Effects on GDP of Greater Card Penetration: Measuring Elasticity by Country

The steady migration from paper to payment cards around the world raises another interesting question: What effect would continued growth in card penetration have on overall consumption and, ultimately, economic growth across countries?

The simulation yields the following table that measures consumption elasticity, or the impact that a 1% increase in card usage rates has on private consumption and GDP, assuming that all other variables are held constant.

Overall, a 1% increase in card usage in every country:
» Produced about a $67 billion, or 0.03%, increase in consumption between 2015 and 2019.

» Accounted for a 0.012% increase in GDP between 2015 and 2019.

For developed countries, a 1% increase in card usage:
» Produced about a $57 billion, or a 0.05%, increase in consumption between 2015 and 2019.

» Accounted for a 0.03% increase in GDP between 2015 and 2019.

For emerging markets, a 1% increase in card usage:
» Produced about a $10 billion, or a 0.01%, increase in consumption between 2015 and 2019.

» Accounted for a 0.01% increase in GDP between 2015 and 2019.

This is a powerful result because it implies that as the adoption of payment cards becomes more widespread, its frequency of use for transactions will likely also increase, and more channels will become available for a wider range of goods and services. The estimated elasticity also shows wide variation across countries (see Table 3). In general, developed countries have higher elasticities than emerging markets because consumers in developed countries use payment cards much more (49%) than consumers in emerging economies (20%). This is not surprising, because developed countries are places that have well-established payment networks, consumers who are more comfortable using payment cards, and environments where payment cards are likely more readily accepted by merchants. Cash, on the other hand, is still more prevalent in emerging economies. Table 3 provides a summary of our findings. More details regarding the estimated consumption elasticity and GDP elasticity can be found in Tables 3A, 3B and 3C in the Appendix.

Notably, Hong Kong, the U.K., South Korea and Canada recorded the three highest percentage increases in GDP following a 1% increase in card penetration and are among the highest users of cards across the 70 countries. Myanmar, Rwanda and Ghana displayed the lowest percentage increase in GDP due to a 1% increase in card penetration and were also among the least-frequent card users. Such countries, mostly emerging markets, should, however, anticipate a steady increase to the responsiveness of GDP to card penetration as penetration grows and deepens. That is, markets with very low card penetration rates could see sizable returns to GDP from rapid adoption of cards, provided that the proper financial infrastructure were in place.

In light of this, there are significant implications for policymakers. Notably, as a country becomes wealthier and capital infrastructure improves, benefits from deepening card usage compound. Knowing this, public-private coordination can encourage widespread use of card-based electronic payments. Measures such as tax incentives to use electronic payments, using electronic payments for government disbursements, and government support for lower-cost card readers that can be used with mobile phones or tablets could also play a role in increasing card us-

Table 3: GDP Elasticity With Respect to Card Penetration (Percent)

% increase in GDP due to a 1% increase in card usage, weighted avg 2015-2019

Country	%
Argentina	0.0094
Australia	0.0391
Austria	0.0170
Azerbaijan	0.0013
Belgium	0.0367
Brazil	0.0128
Cambodia	0.0013
Canada	0.0447
Chile	0.0118
China	0.0113
Colombia	0.0080
Czech Republic	0.0131
Denmark	0.0312
Egypt	0.0012
Finland	0.0248
France	0.0265
Germany	0.0122
Ghana	0.0004
Greece	0.0160
Hong Kong	0.0438
Hungary	0.0088
India	0.0030
Indonesia	0.0027
Ireland	0.0200
Israel	0.0300
Italy	0.0146
Japan	0.0139
Jordan	0.0032
Kazakhstan	0.0008
Kenya	0.0014
Kuwait	0.0063
Lebanon	0.0042
Malaysia	0.0077
Mexico	0.0054
Morocco	0.0017
Myanmar	0.0001
Netherlands	0.0218
New Zealand	0.0391
Nigeria	0.0013
Norway	0.0268
Oman	0.0065
Peru	0.0059
Philippines	0.0073
Poland	0.0080
Portugal	0.0300
Puerto Rico	0.0169
Qatar	0.0037
Russia	0.0103
Rwanda	0.0021
Saudi Arabia	0.0079
Serbia	0.0049
Singapore	0.0237
Slovakia	0.0128
South Africa	0.0115
South Korea	0.0445
Spain	0.0189
Sri Lanka	0.0021
Sweden	0.0323
Switzerland	0.0206
Taiwan	0.0161
Thailand	0.0068
Tunisia	0.0005
Turkey	0.0129
Uganda	0.0015
Ukraine	0.0052
United Arab Emirates	0.0056
United Kingdom	0.0445
United States	0.0358
Uruguay	0.0104
Vietnam	0.0044
Emerging	**0.0019**
Developed	**0.0284**

Experiment on GDP Elasticity Using Mexico and Spain as an Example

The impact of different hypothetical card penetration rates on a country's economy is measured using Mexico and Spain. In 2019, Mexican card usage rates were below average among the emerging markets in the sample. Similarly, Spain's card usage rate was below average among developed economies in the sample. In this experiment, we examine the effect on GDP of a 1% increase in card usage. In order to do this, we replace actual card penetration rates in Mexico and Spain with the median and maximum card usage rates across countries for every year of the sample. All other economic variables such as consumption, GDP, and real disposable income per person for Mexico and Spain are unchanged from their actual values. The table below shows the resulting GDP elasticity, including the results obtained using the actual card usage rates for Mexico and Spain for reference.

For instance, the second row states that if Mexico or Spain consistently had the median observed card penetration rate in each year, a 1% increase in card penetration each year would raise GDP by about 0.003% for Mexico or 0.005% for Spain. This corresponds to a $0.13 billion increase in GDP in Mexico and a $0.23 billion increase in GDP for Spain over the sample period. The final row shows that if Mexico or Spain consistently had the highest observed card penetration rate, GDP would receive a 0.009% boost for Mexico and a 0.014% boost for Spain were penetration to increase by 1% each year. This translates to a $0.42 billion increase in GDP for Mexico over the sample period and a $0.72 billion increase in GDP for Spain.

Experiment Table: Increase in GDP From a 1% Increase in Card Usage

	Mexico		Spain	
Card penetration	%	US$ bil, change	%	US$ bil, change
Actual	0.00	0.07	0.01	0.28
Sample median	0.00	0.13	0.01	0.23
Sample maximum	0.01	0.42	0.01	0.72

age. Such technology would reduce the need to invest in costly cash registers and the relevant software and limit financial costs associated with cash.

This could be achieved by developing the retail payment infrastructure of emerging economies to match that of developed countries, such as making electronic payment mechanisms more prevalent and available by giving merchants ways to accept electronic payments.

Part VIII: Conclusion

Card usage makes the economy more efficient, increasing GDP by a statistically significant amount year after year through a multitude of factors, including transaction efficiencies, consumer access to credit, and consumer confidence in the payment system overall. This usage and penetration increased personal consumption in aggregate across economies. The Moody's Analytics model documents this benefit.

Due to varying degrees of card penetration and growth rates over the period analyzed, the efficiencies affected different players in the payment environment in different ways, but for most economies and markets analyzed, there is a positive correlation between card penetration and usage and economic growth. This correlation does not hinge upon access to credit. In various markets where debit is the predominant form of card payment, such as Denmark, Hungary and Portugal, the correlation still exists. In markets such as Singapore and New Zealand, where debit represents a greater percentage of card transactions and dollar volume, the correlation persists.

The study, therefore, supports the adoption of policies that encourage the use of cards. Increased usage of cards boosts consumption and GDP. The growth benefits increase as

penetration rises. In the sample of 70 countries, which make up 95% of global GDP, card usage added $245 billion cumulatively to real GDP between 2015 and 2019. This amounts to 0.08% of total GDP per year for the 70 countries over this period. For all economies and markets analyzed, there is a positive correlation between card penetration and usage and economic growth.

Increased use of payment cards makes the economy more efficient as well. Increased usage reduces transaction costs and thus improves the flow of goods and services.[8] It helps consumers by making purchasing more convenient and efficient. Merchants in turn can manage their businesses better and benefit from higher sales. Payment card usage also promotes consumer confidence and improves access to credit for the population. It also promotes financial inclusion for the most vulnerable by enabling those without access to the formal banking system a safe and efficient payment alternative to cash. Payment card usage also benefits governments, which can potentially collect more tax revenue thanks to a clear electronic trail and more transparent transactions that can be taxed more readily.

In this study, emerging economies such as Uruguay and Russia have experienced higher increases in GDP due to increases in card usage. That being the case, emerging markets can have a larger impact on GDP by further increasing their card penetration rates. This could be achieved by developing the retail payment infrastructure of emerging economies to match that of developed countries, such as making electronic payment mechanisms more prevalent and available by giving merchants ways to accept electronic payments.

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8   https://wol.iza.org/articles/how-digital-payments-can-benefit-entrepreneurs/long

Appendix: Chart Descriptions

Chart 1 shows global personal consumption expenditure from 2015 to 2019. Consumers spent $33.8 trillion in 2015, $35.5 trillion in 2016, $37.5 trillion in 2017, $39.9 trillion in 2018, and $42.4 trillion in 2019. The chart also shows that card usage increased from 2015 to 2019 while cash usage decreased over this period. The share of card purchases increased from 37.4% in 2015 to 43.5% in 2019 while cash usage decreased from 39.2% in 2015 to 32.7% in 2019—which is less than card usage.

Chart 2 shows the increase in consumption due to higher card usage in the 70 countries analyzed. Consumption increased by $53.6 billion in 2016, $62.7 billion in 2017, $74.8 billion in 2018, and $54.4 billion in 2019.

Chart 3 shows card usage in the top 35 countries out of the 70 countries analyzed. Most of the countries in this list are developed countries. See Table C in the Appendix for card usage of each country.

Chart 4 shows card usage in the bottom 35 countries out of the 70 countries analyzed. Most of the countries in this list are emerging countries. See Table C in the Appendix for card usage of each country.

Chart 5 shows change in card penetration (X-axis) versus card contribution to GDP (Y-axis) in the 70 countries analyzed. See Table D in the Appendix for each country.

Chart 6 compares the average increase in GDP due to increased card usage in the seven regions. In our last study, GDP increased by 0.2% in South America, 0.12% in Oceania, 0.12% in North America, 0.1% in Europe, 0.09% in the Middle East, 0.06% in Asia, and 0.05% in Africa. In this study, GDP increased by 0.08% in South America, 0.09% in Oceania, 0.11% in North America, 0.08% in Europe, 0.04% in the Middle East, 0.56% in Asia, and 0.02% in Africa.

Chart 7 shows the increase in jobs due to increased card usage. Developed countries added 17,500 jobs in 2016; 17,800 jobs in 2017; 18,600 jobs in 2018; and 12,400 jobs in 2019. Emerging countries added 13,400 jobs in 2016; 24,700 jobs in 2017; 31,100 jobs in 2018; and 30,200 jobs in 2019.

Appendix: The Model

Dependent variable: Log(Real consumption per capita)
Method: Pooled Least Squares
Sample: 2015 2019
Included observations: 5
Cross-sections included: 72
Total pool (balanced) observations: 360

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	0.211	0.048	4.381	0.000
Card penetration, developed countries	0.105	0.039	2.691	0.008
Card penetration, emerging markets	0.055	0.047	1.162	0.246
Log(Real disposable income per capita), developed countries	0.733	0.035	20.918	0.000
Log(Real disposable income per capita), emerging markets	0.861	0.019	45.774	0.000
Real interest rate, developed countries	-0.000	0.001	-0.292	0.770
Real interest rate, emerging markets	-0.001	0.000	-2.096	0.037
Trend, emerging markets	0.000	0.001	0.064	0.949
Fixed effects (cross)				
Effects specification				
Cross-section fixed (dummy variables)				
R-squared	1.00	Mean dependent var		5.39
Adjusted R-squared	1.00	S.D. dependent var		5.48
S.E. of regression	0.02	Sum squared resid		0.15
F-statistic	61,449.69	Durbin-Watson stat		1.57
Prob(F-statistic)	0.00			
Unweighted statistics				
R-squared	1.00	Mean dependent var		2.06
Sum squared resid	0.16	Durbin-Watson stat		1.45

Appendix: A

	Contribution in 2012 study	Contribution in 2015 study	Contribution in 2020 study
Argentina	8.08	5.30	1.17
Australia	20.84	11.93	4.16
Austria	4.67	1.55	0.88
Azerbaijan		0.07	0.01
Belgium	11.53	0.83	0.00
Brazil	51.30	18.04	3.35
Cambodia		0.03	0.01
Canada	9.66	7.50	3.06
Chile	6.41	2.60	0.50
China	374.50	17.79	27.61
Colombia	0.69	1.59	0.78
Czech Republic	1.61	0.95	0.59
Denmark	1.93	1.88	1.39
Egypt	0.04	0.10	0.17
Finland	5.10	-0.23	0.76
France	52.75	3.06	5.04
Germany	16.05	11.99	6.11
Ghana		0.05	0.00
Greece	0.64	-0.02	2.47
Hong Kong	2.85	0.92	1.75
Hungary	9.06	1.41	0.47
India	1.45	6.08	5.07
Indonesia	6.42	2.17	0.19
Ireland	5.07	2.01	0.66
Israel		0.04	0.73
Italy	11.38	10.17	8.48
Japan	24.50	10.74	11.93
Jordan		0.04	0.00
Kazakhstan	0.82	0.21	0.05
Kenya		0.07	0.04
Kuwait	1.22	0.30	0.15
Lebanon		0.08	0.08
Malaysia	4.24	0.49	0.41
Mexico	7.77	7.84	1.24
Morocco		0.17	0.05
Myanmar		0.04	0.00
Netherlands	13.25	2.77	1.43
New Zealand	3.48	0.42	0.75
Nigeria		0.64	0.48
Norway	3.22	1.11	0.19
Oman		0.29	0.07
Peru	1.73	1.61	0.25
Philippines	2.04	0.10	0.68
Poland	7.94	4.30	2.15
Portugal	2.56	0.84	0.66
Puerto Rico	0.23	0.35	0.95
Qatar	0.39	0.51	0.13
Russia	35.96	25.93	9.08
Rwanda	0.01	0.01	0.02
Saudi Arabia	4.71	3.43	1.58
Serbia	0.27	0.23	0.05
Singapore	3.32	1.17	1.08
Slovakia		0.46	0.41
South Africa	7.80	3.11	0.82
South Korea	22.98	2.23	9.63
Spain	5.73	0.37	6.49
Sri Lanka		0.12	0.06
Sweden	0.78	0.71	1.78
Switzerland	3.18	1.65	0.00
Taiwan	2.99	1.87	1.82
Thailand	1.82	3.18	0.43
Tunisia		-0.00	0.01
Turkey	15.38	7.51	2.77
Uganda			0.02
Ukraine	1.78	0.46	0.24
United Arab Emirates	4.16	3.70	0.62
United Kingdom	67.97	12.42	18.82
United States	127.40	81.55	91.46
Uruguay		0.38	0.59
Vietnam	1.21	0.88	0.62

Appendix: B

Country	Geocode	Group	Region
United Arab Emirates	IARE	E	Middle East
Argentina	IARG	E	South America
Australia	IAUS	D	Oceania
Austria	IAUT	D	Europe
Azerbaijan	IAZE	E	Asia
Belgium	IBEL	D	Europe
Brazil	IBRA	E	South America
Canada	ICAN	D	North America
Switzerland	ICHE	D	Europe
Chile	ICHL	E	South America
China	ICHN	E	Asia
Colombia	ICOL	E	South America
Czech Republic	ICZE	D	Europe
Germany	IDEU	D	Europe
Denmark	IDNK	D	Europe
Egypt	IEGY	E	Middle East
Spain	IESP	D	Europe
Finland	IFIN	D	Europe
France	IFRA	D	Europe
United Kingdom	IGBR	D	Europe
Ghana	IGHA	E	Africa
Greece	IGRC	D	Europe
Hong Kong	IHKG	D	Asia
Hungary	IHUN	E	Europe
Indonesia	IIDN	E	Asia
India	IIND	E	Asia
Ireland	IIRL	D	Europe
Israel	IISR	D	Middle East
Italy	IITA	D	Europe
Jordan	IJOR	E	Middle East
Japan	IJPN	D	Asia
Kazakhstan	IKAZ	E	Asia
Kenya	IKEN	E	Africa
Cambodia	IKHM	E	Asia
South Korea	IKOR	D	Asia
Kuwait	IKWT	E	Middle East
Lebanon	ILBN	E	Middle East
Sri Lanka	ILKA	E	Asia
Morocco	IMAR	E	Africa
Mexico	IMEX	E	North America
Myanmar	IMMR	E	Asia
Malaysia	IMYS	E	Asia
Nigeria	INGA	E	Africa
Netherlands	INLD	D	Europe
Norway	INOR	D	Europe
New Zealand	INZL	D	Oceania
Oman	IOMN	E	Middle East
Peru	IPER	E	South America
Philippines	IPHL	E	Asia
Poland	IPOL	E	Europe
Puerto Rico	IPRI	D	North America
Portugal	IPRT	D	Europe
Qatar	IQAT	E	Middle East
Russia	IRUS	E	Europe
Rwanda	IRWA	E	Africa
Saudi Arabia	ISAU	E	Middle East
Singapore	ISGP	D	Asia
Serbia	ISRB	E	Europe
Slovakia	ISVK	D	Europe
Sweden	ISWE	D	Europe
Thailand	ITHA	E	Asia
Tunisia	ITUN	E	Africa
Turkey	ITUR	E	Middle East
Taiwan	ITWN	D	Asia
Uganda	IUGA	E	Africa
Ukraine	IUKR	E	Europe
Uruguay	IURY	E	South America
United States	IUSA	D	North America
Vietnam	IVNM	E	Asia
South Africa	IZAF	E	Africa

Note: D=Developed country, E=Emerging market

Appendix: C

Country	Payment cards as a share of total payments
United Arab Emirates	0.29
Argentina	0.28
Australia	0.67
Austria	0.33
Azerbaijan	0.05
Belgium	0.67
Brazil	0.38
Canada	0.74
Switzerland	0.38
Chile	0.35
China	0.58
Colombia	0.24
Czech Republic	0.29
Germany	0.23
Denmark	0.66
Egypt	0.03
Spain	0.35
Finland	0.47
France	0.49
United Kingdom	0.68
Ghana	0.014
Greece	0.28
Hong Kong	0.65
Hungary	0.35
Indonesia	0.09
India	0.11
Ireland	0.6
Israel	0.53
Italy	0.25
Jordan	0.07
Japan	0.26
Kazakhstan	0.05
Kenya	0.04
Cambodia	0.04
Kuwait	0.27
South Korea	0.91
Lebanon	0.1
Sri Lanka	0.07
Morocco	0.06
Mexico	0.16
Myanmar	0.005
Malaysia	0.27
Nigeria	0.04
Netherlands	0.48
Norway	0.59
New Zealand	0.65
Oman	0.29
Peru	0.18
Philippines	0.2
Poland	0.3
Puerto Rico	0.29
Portugal	0.45
Qatar	0.31
Russia	0.44
Rwanda	0.05
Saudi Arabia	0.4
Singapore	0.64
Serbia	0.14
Slovakia	0.24
Sweden	0.7
Thailand	0.26
Tunisia	0.02
Turkey	0.43
Taiwan	0.32
Uganda	0.05
Ukraine	0.14
Uruguay	0.43
United States	0.52
Vietnam	0.14
South Africa	0.38
Developed avg	**0.49**
Emerging avg	**0.2**

Appendix: D

Country	Change in card penetration	Card contribution to GDP
United Arab Emirates	0.08	0.04
Argentina	0.05	0.05
Australia	0.05	0.08
Austria	0.04	0.05
Azerbaijan	0.01	0.01
Belgium	-0.01	0.00
Brazil	0.05	0.05
Canada	0.03	0.05
Switzerland	0.00	0.00
Chile	0.05	0.05
China	0.10	0.05
Colombia	0.07	0.06
Czech Republic	0.06	0.07
Germany	0.03	0.04
Denmark	0.09	0.11
Egypt	0.01	0.01
Spain	0.08	0.13
Finland	0.05	0.08
France	0.04	0.05
United Kingdom	0.09	0.15
Ghana	0.00	0.00
Greece	0.17	0.31
Hong Kong	0.07	0.13
Hungary	0.13	0.09
Indonesia	0.01	0.00
India	0.06	0.05
Ireland	0.06	0.05
Israel	0.04	0.06
Italy	0.07	0.11
Jordan	0.00	0.00
Japan	0.05	0.07
Kazakhstan	0.01	0.01
Kenya	0.01	0.01
Cambodia	0.01	0.01
Kuwait	0.12	0.15
South Korea	0.06	0.03
Lebanon	0.03	0.04
Sri Lanka	0.02	0.02
Morocco	0.01	0.01
Mexico	0.03	0.03
Myanmar	0.00	0.00
Malaysia	0.04	0.03
Nigeria	0.02	0.02
Netherlands	0.04	0.04
Norway	0.01	0.01
New Zealand	0.06	0.10
Oman	0.04	0.02
Peru	0.03	0.03
Philippines	0.05	0.05
Poland	0.13	0.10
Puerto Rico	0.13	0.24
Portugal	0.05	0.08
Qatar	0.06	0.02
Russia	0.22	0.16
Rwanda	0.05	0.05
Saudi Arabia	0.10	0.06
Singapore	0.08	0.08
Serbia	0.03	0.03
Slovakia	0.07	0.11
Sweden	0.07	0.08
Thailand	0.03	0.02
Tunisia	0.00	0.00
Turkey	0.09	0.07
Taiwan	0.06	0.08
Uganda	0.01	0.01
Ukraine	0.06	0.06
Uruguay	0.29	0.25
United States	0.07	0.12
Vietnam	0.07	0.07
South Africa	0.08	0.06

Appendix 1A: Card Usage's Contribution to GDP, Constant 2015 US$ Bil

Country	2016	2017	2018	2019	Total
United Arab Emirates	0.21	0.09	0.14	0.17	0.62
Argentina	0.11	0.32	0.39	0.35	1.17
Australia	1.11	0.93	1.31	0.80	4.16
Austria	0.14	0.29	0.28	0.16	0.88
Azerbaijan	0.00	0.00	0.01	0.01	0.02
Belgium	0.05	0.00	0.00	0.00	0.05
Brazil	0.84	0.82	0.85	0.84	3.35
Canada	0.78	0.98	0.53	0.76	3.06
Switzerland	0.03	0.00	0.08	0.02	0.14
Chile	0.05	0.14	0.20	0.12	0.50
China	0.35	6.83	8.91	11.52	27.61
Colombia	0.13	0.17	0.26	0.20	0.78
Czech Republic	0.08	0.17	0.16	0.18	0.59
Germany	0.64	1.60	2.09	1.77	6.11
Denmark	0.37	0.74	0.14	0.13	1.39
Egypt	0.05	0.05	0.04	0.04	0.17
Spain	0.21	1.88	2.44	1.95	6.49
Finland	0.06	0.12	0.31	0.28	0.76
France	0.96	0.92	1.66	1.50	5.04
United Kingdom	4.96	5.15	5.38	3.33	18.82
Ghana	0.00	0.00	0.01	0.00	0.00
Greece	0.61	0.79	0.61	0.45	2.47
Hong Kong	0.08	0.48	0.68	0.51	1.75
Hungary	0.14	0.16	0.11	0.06	0.47
Indonesia	0.01	0.02	0.09	0.07	0.19
India	1.10	1.28	1.16	1.52	5.07
Ireland	0.20	0.14	0.15	0.17	0.66
Israel	0.00	0.38	0.30	0.19	0.87
Italy	2.03	2.48	2.23	1.74	8.48
Jordan	0.00	0.00	0.00	0.00	0.01
Japan	4.57	2.09	2.93	2.36	11.93
Kazakhstan	0.00	0.01	0.03	0.01	0.05
Kenya	0.00	0.00	0.02	0.02	0.04
Cambodia	0.00	0.00	0.00	0.00	0.01
South Korea	4.13	3.66	0.97	0.87	9.63
Kuwait	0.03	0.10	0.02	0.00	0.15
Lebanon	0.01	0.02	0.02	0.03	0.08
Sri Lanka	0.00	0.02	0.02	0.02	0.06
Morocco	0.02	0.01	0.01	0.01	0.05
Mexico	0.31	0.29	0.36	0.29	1.24
Myanmar	0.00	0.00	0.00	0.00	0.00
Malaysia	0.02	0.02	0.14	0.23	0.41
Nigeria	0.07	0.21	0.16	0.05	0.48
Netherlands	0.70	0.23	0.22	0.28	1.43
Norway	0.12	0.00	0.12	0.00	0.24
New Zealand	0.27	0.15	0.20	0.13	0.75
Oman	0.03	0.04	0.00	0.00	0.07
Peru	0.03	0.07	0.07	0.07	0.25
Philippines	0.10	0.15	0.26	0.16	0.68
Poland	0.41	0.50	0.64	0.60	2.15
Puerto Rico	0.32	0.10	0.25	0.29	0.95
Portugal	0.27	0.33	0.02	0.03	0.66
Qatar	0.04	0.05	0.03	0.02	0.13
Russia	1.72	2.17	3.62	1.57	9.08
Rwanda	0.01	0.00	0.00	0.00	0.02
Saudi Arabia	0.20	0.11	0.54	0.74	1.58
Singapore	0.32	0.11	0.40	0.25	1.08
Serbia	0.00	0.01	0.02	0.02	0.06
Slovakia	0.14	0.14	0.04	0.08	0.41
Sweden	0.50	0.31	0.64	0.32	1.78
Thailand	0.09	0.09	0.17	0.07	0.43
Tunisia	0.00	0.00	0.00	0.00	0.01
Turkey	0.36	0.60	1.31	0.50	2.77
Taiwan	0.50	0.53	0.48	0.31	1.82
Uganda	0.00	0.00	0.01	0.01	0.02
Ukraine	0.06	0.06	0.06	0.06	0.24
Uruguay	0.15	0.05	0.13	0.26	0.59
United States	22.69	23.73	29.44	15.60	91.46
Vietnam	0.15	0.09	0.21	0.16	0.62
South Africa	0.05	0.13	0.46	0.18	0.82
Developed countries	46.74	48.01	53.94	34.39	183.09
Emerging countries	6.86	14.68	20.51	20.00	62.04
Total	**53.60**	**62.69**	**74.45**	**54.40**	**245.14**

Appendix 1B: Card Usage's Contribution to Consumption, %

Country	2016	2017	2018	2019	Avg weighted by consumption, %
United Arab Emirates	0.17	0.07	0.10	0.10	0.11
Argentina	0.03	0.07	0.09	0.09	0.07
Australia	0.15	0.12	0.17	0.10	0.14
Austria	0.07	0.14	0.13	0.08	0.11
Azerbaijan	0.00	0.00	0.05	0.03	0.02
Belgium	0.02	0.00	0.00	0.00	0.01
Brazil	0.08	0.07	0.07	0.07	0.07
Canada	0.09	0.10	0.05	0.08	0.08
Switzerland	0.01	0.00	0.02	0.01	0.01
Chile	0.03	0.08	0.12	0.07	0.08
China	0.01	0.14	0.17	0.21	0.14
Colombia	0.06	0.08	0.12	0.09	0.09
Czech Republic	0.09	0.17	0.16	0.17	0.15
Germany	0.04	0.09	0.11	0.09	0.08
Denmark	0.26	0.50	0.09	0.09	0.23
Egypt	0.02	0.02	0.01	0.01	0.01
Spain	0.03	0.25	0.32	0.26	0.22
Finland	0.04	0.09	0.23	0.21	0.14
France	0.07	0.07	0.12	0.11	0.09
United Kingdom	0.25	0.26	0.27	0.16	0.24
Ghana	0.00	0.00	0.02	0.01	0.01
Greece	0.46	0.58	0.44	0.32	0.45
Hong Kong	0.04	0.22	0.29	0.22	0.20
Hungary	0.22	0.24	0.15	0.09	0.17
Indonesia	0.00	0.00	0.02	0.01	0.01
India	0.08	0.09	0.08	0.09	0.09
Ireland	0.19	0.13	0.13	0.15	0.15
Israel	0.00	0.21	0.16	0.10	0.12
Italy	0.18	0.22	0.19	0.15	0.18
Jordan	0.01	0.00	0.00	0.01	0.00
Japan	0.19	0.08	0.12	0.09	0.12
Kazakhstan	0.00	0.01	0.04	0.02	0.02
Kenya	0.01	0.00	0.04	0.03	0.02
Cambodia	0.01	0.01	0.02	0.02	0.02
South Korea	0.56	0.49	0.12	0.11	0.32
Kuwait	0.07	0.20	0.04	0.00	0.08
Lebanon	0.03	0.05	0.04	0.06	0.05
Sri Lanka	0.01	0.04	0.03	0.04	0.03
Morocco	0.03	0.01	0.02	0.02	0.02
Mexico	0.04	0.04	0.04	0.03	0.04
Myanmar	0.00	0.00	0.00	0.00	0.00
Malaysia	0.01	0.01	0.07	0.11	0.05
Nigeria	0.02	0.06	0.04	0.01	0.03
Netherlands	0.20	0.06	0.06	0.08	0.10
Norway	0.07	0.00	0.07	0.00	0.04
New Zealand	0.25	0.14	0.17	0.11	0.16
Oman	0.09	0.12	0.01	0.00	0.06
Peru	0.03	0.05	0.05	0.05	0.05
Philippines	0.04	0.06	0.10	0.06	0.07
Poland	0.14	0.17	0.20	0.18	0.17
Puerto Rico	0.47	0.15	0.37	0.43	0.35
Portugal	0.20	0.24	0.01	0.02	0.12
Qatar	0.11	0.12	0.07	0.04	0.09
Russia	0.24	0.30	0.48	0.20	0.31
Rwanda	0.19	0.03	0.04	0.00	0.07
Saudi Arabia	0.08	0.04	0.19	0.25	0.14
Singapore	0.27	0.09	0.32	0.19	0.22
Serbia	0.00	0.04	0.05	0.08	0.04
Slovakia	0.29	0.28	0.07	0.15	0.19
Sweden	0.21	0.13	0.26	0.13	0.18
Thailand	0.04	0.04	0.07	0.03	0.05
Tunisia	0.00	0.00	0.01	0.01	0.01
Turkey	0.07	0.10	0.23	0.09	0.12
Taiwan	0.18	0.18	0.16	0.10	0.15
Uganda	0.01	0.00	0.04	0.03	0.02
Ukraine	0.10	0.08	0.08	0.07	0.08
Uruguay	0.41	0.14	0.34	0.68	0.39
United States	0.18	0.18	0.22	0.11	0.17
Vietnam	0.11	0.06	0.13	0.09	0.10
South Africa	0.03	0.07	0.23	0.09	0.10
Developed countries	0.17	0.17	0.19	0.12	0.16
Emerging countries	0.05	0.10	0.14	0.13	0.11
Total	**0.13**	**0.15**	**0.17**	**0.12**	**0.14**

Appendix 1C: Card Usage's Contribution to GDP, %

Country	2016	2017	2018	2019	Avg weighted by GDP, %
United Arab Emirates	0.06	0.02	0.04	0.04	0.04
Argentina	0.02	0.05	0.06	0.06	0.05
Australia	0.09	0.07	0.10	0.06	0.08
Austria	0.04	0.07	0.07	0.04	0.05
Azerbaijan	0.00	0.00	0.03	0.02	0.01
Belgium	0.01	0.00	0.00	0.00	0.00
Brazil	0.05	0.05	0.05	0.05	0.05
Canada	0.05	0.06	0.03	0.05	0.05
Switzerland	0.00	0.00	0.01	0.00	0.00
Chile	0.02	0.05	0.08	0.04	0.05
China	0.00	0.05	0.07	0.08	0.05
Colombia	0.04	0.06	0.08	0.06	0.06
Czech Republic	0.04	0.08	0.08	0.08	0.07
Germany	0.02	0.05	0.06	0.05	0.04
Denmark	0.12	0.23	0.04	0.04	0.11
Egypt	0.01	0.01	0.01	0.01	0.01
Spain	0.02	0.15	0.19	0.15	0.13
Finland	0.02	0.05	0.12	0.11	0.08
France	0.04	0.04	0.06	0.06	0.05
United Kingdom	0.17	0.17	0.17	0.11	0.15
Ghana	0.00	0.00	0.01	0.01	0.00
Greece	0.32	0.40	0.31	0.22	0.31
Hong Kong	0.02	0.15	0.20	0.15	0.13
Hungary	0.11	0.12	0.08	0.04	0.09
Indonesia	0.00	0.00	0.01	0.01	0.00
India	0.05	0.05	0.04	0.06	0.05
Ireland	0.07	0.04	0.04	0.05	0.05
Israel	0.00	0.12	0.09	0.06	0.07
Italy	0.11	0.13	0.12	0.09	0.11
Jordan	0.01	0.00	0.00	0.01	0.00
Japan	0.10	0.05	0.06	0.05	0.07
Kazakhstan	0.00	0.00	0.02	0.01	0.01
Kenya	0.00	0.00	0.03	0.02	0.01
Cambodia	0.01	0.01	0.02	0.01	0.01
South Korea	0.27	0.23	0.06	0.05	0.15
Kuwait	0.03	0.09	0.02	0.00	0.03
Lebanon	0.02	0.05	0.04	0.06	0.04
Sri Lanka	0.00	0.02	0.02	0.02	0.02
Morocco	0.02	0.01	0.01	0.01	0.01
Mexico	0.03	0.02	0.03	0.02	0.03
Myanmar	0.00	0.00	0.00	0.00	0.00
Malaysia	0.01	0.00	0.04	0.06	0.03
Nigeria	0.01	0.04	0.03	0.01	0.02
Netherlands	0.09	0.03	0.03	0.03	0.04
Norway	0.03	0.00	0.03	0.00	0.02
New Zealand	0.15	0.08	0.10	0.06	0.10
Oman	0.04	0.05	0.00	0.00	0.02
Peru	0.02	0.03	0.03	0.03	0.03
Philippines	0.03	0.04	0.07	0.04	0.05
Poland	0.08	0.10	0.12	0.10	0.10
Puerto Rico	0.32	0.10	0.25	0.30	0.24
Portugal	0.13	0.16	0.01	0.01	0.08
Qatar	0.02	0.03	0.02	0.01	0.02
Russia	0.13	0.16	0.25	0.11	0.16
Rwanda	0.15	0.02	0.03	0.00	0.05
Saudi Arabia	0.03	0.02	0.08	0.11	0.06
Singapore	0.10	0.03	0.12	0.07	0.08
Serbia	0.00	0.03	0.04	0.05	0.03
Slovakia	0.16	0.15	0.04	0.08	0.11
Sweden	0.10	0.06	0.12	0.06	0.08
Thailand	0.02	0.02	0.04	0.02	0.02
Tunisia	0.00	0.00	0.01	0.01	0.00
Turkey	0.04	0.06	0.13	0.05	0.07
Taiwan	0.09	0.09	0.08	0.05	0.08
Uganda	0.00	0.00	0.02	0.02	0.01
Ukraine	0.07	0.06	0.06	0.06	0.06
Uruguay	0.25	0.09	0.22	0.43	0.25
United States	0.12	0.13	0.15	0.08	0.12
Vietnam	0.07	0.04	0.09	0.06	0.07
South Africa	0.02	0.04	0.14	0.06	0.06
Developed countries	0.10	0.10	0.11	0.07	0.10
Emerging countries	0.03	0.05	0.07	0.06	0.05
Total	**0.07**	**0.08**	**0.10**	**0.07**	**0.08**

Appendix 2A: Labor Productivity, Constant 2015 US$ Bil per Worker

Country	2015	2016	2017	2018	2019
United Arab Emirates	55,189.80	56,718.30	57,986.97	57,870.88	58,217.05
Argentina	35,513.11	34,825.76	35,181.65	33,720.15	32,745.31
Australia	104,955.29	105,959.07	106,038.61	106,175.77	105,789.63
Austria	92,109.92	92,336.93	93,754.63	94,814.27	95,395.16
Azerbaijan	10,971.36	6,990.38	6,494.26	6,510.54	6,634.74
Belgium	101,947.98	102,118.80	102,935.90	102,314.73	101,809.80
Brazil	19,860.76	19,528.91	19,777.65	19,827.08	19,719.12
Canada	87,556.05	87,846.72	88,691.23	89,452.71	89,150.86
Switzerland	154,725.32	155,532.26	157,000.76	160,434.00	161,171.98
Chile	29,467.80	29,589.21	29,297.18	29,751.63	29,386.93
China	14,137.79	15,076.48	16,119.49	17,221.01	18,301.95
Colombia	13,421.64	13,615.88	13,661.35	13,965.14	14,533.29
Czech Republic	37,306.83	37,504.48	38,895.69	39,572.86	40,655.05
Germany	82,049.27	82,693.34	84,097.58	83,800.15	83,146.07
Denmark	115,419.25	117,200.64	119,123.75	119,686.88	120,437.65
Egypt	13,020.00	13,234.69	13,931.23	14,560.73	15,108.20
Spain	66,940.07	67,180.94	67,401.11	67,243.69	66,997.92
Finland	97,672.95	99,947.42	102,057.72	100,604.14	100,793.66
France	91,463.29	91,902.44	93,329.96	94,158.94	95,678.85
United Kingdom	93,793.67	94,030.33	94,731.17	94,787.52	95,093.17
Ghana	4,587.73	4,717.98	4,710.16	5,091.45	5,446.56
Greece	54,120.02	52,932.51	52,478.48	52,192.61	51,928.58
Hong Kong	81,948.96	83,517.58	85,906.53	87,287.46	86,175.25
Hungary	28,678.22	28,319.17	29,151.30	30,350.67	31,499.28
Indonesia	7,309.43	7,528.29	7,700.45	7,790.80	8,040.76
India	4,694.95	5,059.56	5,371.98	5,680.32	5,860.01
Ireland	142,070.88	139,762.68	148,762.88	157,683.84	162,234.64
Israel	82,482.92	83,283.53	84,359.37	85,639.41	87,084.95
Italy	82,394.44	82,205.84	82,782.56	82,637.05	82,436.24
Jordan	19,045.21	19,146.80	19,010.57	18,944.04	18,952.42
Japan	69,453.94	69,270.96	69,749.68	68,736.24	68,134.92
Kazakhstan	21,139.88	21,439.41	22,440.86	23,272.96	24,237.99
Kenya	3,168.89	3,215.56	3,268.67	3,374.42	3,452.76
Cambodia	2,124.33	2,183.83	2,283.19	2,417.32	2,550.65
South Korea	56,045.38	57,192.12	58,303.59	59,779.86	60,445.62
Kuwait	53,498.15	53,269.96	49,263.50	48,889.33	48,271.39
Lebanon	23,997.32	23,561.69	23,232.30	22,402.82	20,548.41
Sri Lanka	9,777.98	10,006.29	10,190.51	10,842.53	11,076.28
Morocco	9,457.94	9,569.80	9,996.57	10,149.80	10,247.80
Mexico	23,164.82	23,271.48	23,473.51	23,369.89	22,781.52
Myanmar	2,596.12	2,790.82	3,022.28	3,151.39	3,297.36
Malaysia	21,351.25	22,016.37	22,832.76	23,344.16	23,977.09
Nigeria	9,472.88	9,470.66	9,248.34	9,017.23	8,829.00
Netherlands	92,354.32	93,114.81	93,936.00	93,983.94	93,870.08
Norway	146,480.05	147,375.51	151,119.46	150,455.05	149,998.20
New Zealand	74,342.31	73,896.84	73,773.00	74,804.33	76,070.58
Oman	30,126.14	29,943.55	28,828.23	28,868.91	27,457.97
Peru	12,011.23	12,269.61	12,344.35	12,624.47	12,830.70
Philippines	7,867.13	8,064.47	8,695.06	9,061.04	9,404.85
Poland	29,640.49	30,345.81	31,404.09	32,953.95	34,550.22
Puerto Rico	106,024.38	103,001.24	98,941.94	100,636.82	96,586.68
Portugal	45,862.00	45,940.11	45,883.43	45,911.44	46,487.41
Qatar	82,987.32	82,533.44	82,117.80	81,763.96	80,119.49
Russia	18,940.95	18,949.59	19,364.91	19,811.24	20,336.58
Rwanda	1,532.08	1,440.77	1,377.32	1,403.68	1,429.00
Saudi Arabia	52,565.44	51,827.84	50,826.61	51,514.30	50,413.64
Singapore	85,644.65	88,668.29	93,009.87	95,481.41	95,896.60
Serbia	15,541.49	14,805.03	15,151.77	16,749.09	16,185.61
Slovakia	36,521.67	36,283.40	36,799.65	37,607.19	38,299.08
Sweden	104,386.30	104,760.48	105,329.65	105,869.95	107,334.25
Thailand	10,500.45	10,965.58	11,493.14	11,845.36	12,194.41
Tunisia	12,684.31	12,813.53	12,954.78	13,227.56	13,221.24
Turkey	32,761.02	33,105.37	34,395.08	34,693.09	35,792.84
Taiwan	47,989.43	48,725.67	49,965.54	50,985.92	52,195.30
Uganda	2,148.08	2,129.73	2,183.52	2,215.87	2,301.15
Ukraine	5,493.39	5,687.07	5,871.41	5,997.58	6,111.23
Uruguay	35,866.10	36,577.63	37,248.11	37,573.62	37,597.40
United States	122,532.44	122,496.52	123,801.60	125,527.39	126,793.45
Vietnam	3,505.97	3,706.74	3,917.49	4,123.73	4,430.82
South Africa	20,364.28	20,287.49	20,076.57	19,957.62	20,041.95
Developed countries	93,149.66	93,430.60	94,470.70	95,146.77	95,601.78
Emerging countries	12,443.47	12,892.65	13,450.55	13,976.51	14,441.57
Total	**27,743.14**	**28,257.38**	**28,981.65**	**29,610.85**	**30,122.30**

Appendix 2B: Jobs Added Due to Increased Card Penetration, Ths

Country	2016	2017	2018	2019	Avg
United Arab Emirates	3.79	1.60	2.46	2.99	2.71
Argentina	3.06	9.04	11.71	10.73	8.63
Australia	10.47	8.79	12.35	7.60	9.80
Austria	1.56	3.11	2.99	1.69	2.34
Azerbaijan	0.00	0.00	1.57	0.87	0.61
Belgium	0.52	0.00	0.00	0.00	0.13
Brazil	43.04	41.50	43.03	42.54	42.52
Canada	8.93	11.05	5.93	8.58	8.62
Switzerland	0.21	0.00	0.51	0.12	0.21
Chile	1.65	4.71	6.68	3.97	4.25
China	22.94	423.64	517.44	629.46	398.37
Colombia	9.79	12.74	18.95	14.00	13.87
Czech Republic	2.26	4.26	4.06	4.37	3.74
Germany	7.75	19.04	25.00	21.34	18.28
Denmark	3.19	6.24	1.19	1.11	2.93
Egypt	3.42	3.59	2.54	2.60	3.04
Spain	3.20	27.92	36.34	29.08	24.13
Finland	0.56	1.17	3.06	2.75	1.89
France	10.40	9.88	17.64	15.73	13.41
United Kingdom	52.73	54.37	56.75	35.01	49.71
Ghana	0.00	0.39	1.23	0.64	0.56
Greece	11.58	15.08	11.78	8.66	11.78
Hong Kong	0.92	5.63	7.76	5.90	5.05
Hungary	4.96	5.58	3.49	2.00	4.01
Indonesia	0.97	2.55	11.85	8.85	6.05
India	217.39	239.19	204.54	259.86	230.24
Ireland	1.44	0.96	0.95	1.05	1.10
Israel	0.00	4.46	3.51	2.22	2.55
Italy	24.73	29.90	27.03	21.10	25.69
Jordan	0.17	0.00	0.00	0.11	0.07
Japan	65.94	29.92	42.56	34.57	43.25
Kazakhstan	0.11	0.23	1.36	0.61	0.58
Kenya	0.91	0.00	6.58	5.73	3.30
Cambodia	0.77	0.74	1.51	1.15	1.04
South Korea	72.16	62.80	16.17	14.46	41.40
Kuwait	0.62	2.01	0.47	0.00	0.76
Lebanon	0.49	1.01	0.88	1.33	0.93
Sri Lanka	0.29	2.04	1.64	1.79	1.44
Morocco	1.62	0.90	1.19	1.26	1.24
Mexico	13.18	12.37	15.31	12.66	13.38
Myanmar	0.13	0.06	0.09	0.13	0.10
Malaysia	0.76	0.69	6.16	9.57	4.30
Nigeria	7.08	22.17	17.64	5.53	13.11
Netherlands	7.56	2.41	2.34	2.96	3.82
Norway	0.82	0.00	0.81	0.00	0.41
New Zealand	3.67	2.08	2.62	1.70	2.52
Oman	0.86	1.26	0.13	0.00	0.56
Peru	2.77	5.42	5.79	5.76	4.93
Philippines	12.89	17.25	29.20	17.47	19.20
Poland	13.60	16.07	19.39	17.24	16.58
Puerto Rico	3.14	0.97	2.45	2.97	2.38
Portugal	5.93	7.20	0.45	0.71	3.57
Qatar	0.49	0.61	0.32	0.20	0.41
Russia	90.74	111.95	182.74	77.26	115.67
Rwanda	8.55	1.30	1.91	-0.12	2.91
Saudi Arabia	3.88	2.18	10.39	14.64	7.77
Singapore	3.65	1.15	4.21	2.58	2.90
Serbia	0.00	0.89	1.07	1.54	0.88
Slovakia	3.90	3.90	0.97	2.19	2.74
Sweden	4.80	2.93	6.09	2.99	4.20
Thailand	8.50	8.06	14.35	5.83	9.19
Tunisia	0.07	-0.05	0.30	0.25	0.14
Turkey	11.03	17.31	37.76	14.05	20.04
Taiwan	10.35	10.51	9.44	5.86	9.04
Uganda	0.70	-0.14	3.76	3.21	1.88
Ukraine	11.32	9.93	9.60	9.16	10.00
Uruguay	4.00	1.44	3.48	6.90	3.96
United States	185.20	191.69	234.54	123.07	183.62
Vietnam	40.73	24.09	51.43	36.39	38.16
South Africa	2.52	6.45	23.14	9.07	10.30
Developed countries	500.28	508.24	566.96	359.77	483.81
Emerging countries	531.79	1,091.22	1,467.19	1,384.99	1,118.80
Total	**1,896.78**	**2,163.15**	**2,514.29**	**1,805.83**	**2,095.01**

Appendix 3A: Change in Consumption Due to 1% Increase in Card Usage; Constant 2015 US$ Bil

Country	2016	2017	2018	2019	Total
United Arab Emirates	0.02	0.02	0.02	0.03	0.09
Argentina	0.05	0.06	0.06	0.06	0.24
Australia	0.48	0.50	0.53	0.54	2.06
Austria	0.06	0.07	0.07	0.07	0.27
Azerbaijan	0.00	0.00	0.00	0.00	0.00
Belgium	0.17	0.18	0.18	0.18	0.70
Brazil	0.21	0.22	0.24	0.25	0.92
Canada	0.69	0.72	0.75	0.77	2.92
Switzerland	0.15	0.15	0.15	0.15	0.61
Chile	0.03	0.03	0.03	0.03	0.12
China	1.19	1.34	1.54	1.76	5.83
Colombia	0.02	0.02	0.03	0.03	0.10
Czech Republic	0.02	0.03	0.03	0.03	0.11
Germany	0.39	0.42	0.44	0.47	1.73
Denmark	0.09	0.10	0.11	0.11	0.41
Egypt	0.00	0.00	0.00	0.01	0.02
Spain	0.20	0.23	0.26	0.28	0.97
Finland	0.06	0.06	0.06	0.07	0.25
France	0.64	0.66	0.68	0.71	2.70
United Kingdom	1.26	1.33	1.40	1.45	5.43
Ghana	0.00	0.00	0.00	0.00	0.00
Greece	0.02	0.03	0.04	0.04	0.13
Hong Kong	0.13	0.14	0.15	0.16	0.58
Hungary	0.01	0.01	0.01	0.01	0.05
Indonesia	0.02	0.02	0.03	0.03	0.10
India	0.05	0.07	0.08	0.10	0.30
Ireland	0.06	0.07	0.07	0.07	0.27
Israel	0.09	0.10	0.10	0.11	0.39
Italy	0.24	0.27	0.29	0.31	1.11
Jordan	0.00	0.00	0.00	0.00	0.01
Japan	0.59	0.62	0.65	0.67	2.53
Kazakhstan	0.00	0.00	0.00	0.00	0.01
Kenya	0.00	0.00	0.00	0.00	0.00
Cambodia	0.00	0.00	0.00	0.00	0.00
South Korea	0.64	0.69	0.73	0.75	2.81
Kuwait	0.01	0.01	0.01	0.01	0.03
Lebanon	0.00	0.00	0.00	0.00	0.01
Sri Lanka	0.00	0.00	0.00	0.00	0.01
Morocco	0.00	0.00	0.00	0.00	0.01
Mexico	0.06	0.06	0.07	0.07	0.26
Myanmar	0.00	0.00	0.00	0.00	0.00
Malaysia	0.02	0.02	0.03	0.03	0.11
Nigeria	0.00	0.01	0.01	0.01	0.03
Netherlands	0.17	0.17	0.18	0.18	0.71
Norway	0.10	0.11	0.11	0.11	0.43
New Zealand	0.07	0.07	0.08	0.08	0.30
Oman	0.00	0.00	0.00	0.00	0.02
Peru	0.01	0.01	0.01	0.01	0.05
Philippines	0.02	0.02	0.03	0.03	0.11
Poland	0.03	0.04	0.05	0.05	0.17
Puerto Rico	0.01	0.01	0.02	0.02	0.07
Portugal	0.06	0.06	0.07	0.07	0.26
Qatar	0.01	0.01	0.01	0.01	0.02
Russia	0.10	0.13	0.17	0.19	0.59
Rwanda	0.00	0.00	0.00	0.00	0.00
Saudi Arabia	0.04	0.05	0.05	0.06	0.21
Singapore	0.07	0.08	0.08	0.09	0.32
Serbia	0.00	0.00	0.00	0.00	0.01
Slovakia	0.01	0.01	0.01	0.01	0.05
Sweden	0.16	0.17	0.18	0.18	0.69
Thailand	0.03	0.03	0.03	0.03	0.12
Tunisia	0.00	0.00	0.00	0.00	0.00
Turkey	0.11	0.12	0.13	0.14	0.50
Taiwan	0.08	0.09	0.10	0.10	0.37
Uganda	0.00	0.00	0.00	0.00	0.00
Ukraine	0.00	0.00	0.01	0.01	0.02
Uruguay	0.00	0.01	0.01	0.01	0.02
United States	6.27	6.68	7.15	7.48	27.58
Vietnam	0.01	0.01	0.01	0.01	0.04
South Africa	0.03	0.03	0.04	0.04	0.15
Developed countries	13.01	13.80	14.66	15.27	56.74
Emerging countries	2.11	2.38	2.72	3.05	10.26
Total	**15.12**	**16.18**	**17.38**	**18.32**	**67.00**

Appendix 3B: Consumption Elasticity With Respect to Card Penetration, %

Country	2016	2017	2018	2019	Weighted avg
United Arab Emirates	0.01	0.01	0.01	0.02	0.01
Argentina	0.01	0.01	0.01	0.02	0.01
Australia	0.07	0.07	0.07	0.07	0.07
Austria	0.03	0.03	0.03	0.03	0.03
Azerbaijan	0.00	0.00	0.00	0.00	0.00
Belgium	0.07	0.07	0.07	0.07	0.07
Brazil	0.02	0.02	0.02	0.02	0.02
Canada	0.07	0.08	0.08	0.08	0.08
Switzerland	0.04	0.04	0.04	0.04	0.04
Chile	0.02	0.02	0.02	0.02	0.02
China	0.03	0.03	0.03	0.03	0.03
Colombia	0.01	0.01	0.01	0.01	0.01
Czech Republic	0.02	0.03	0.03	0.03	0.03
Germany	0.02	0.02	0.02	0.02	0.02
Denmark	0.06	0.07	0.07	0.07	0.07
Egypt	0.00	0.00	0.00	0.00	0.00
Spain	0.03	0.03	0.03	0.04	0.03
Finland	0.04	0.05	0.05	0.05	0.05
France	0.05	0.05	0.05	0.05	0.05
United Kingdom	0.06	0.07	0.07	0.07	0.07
Ghana	0.00	0.00	0.00	0.00	0.00
Greece	0.02	0.02	0.03	0.03	0.02
Hong Kong	0.06	0.06	0.07	0.07	0.06
Hungary	0.01	0.02	0.02	0.02	0.02
Indonesia	0.00	0.00	0.00	0.00	0.00
India	0.00	0.00	0.01	0.01	0.01
Ireland	0.06	0.06	0.06	0.06	0.06
Israel	0.05	0.05	0.05	0.06	0.05
Italy	0.02	0.02	0.03	0.03	0.02
Jordan	0.00	0.00	0.00	0.00	0.00
Japan	0.02	0.02	0.03	0.03	0.03
Kazakhstan	0.00	0.00	0.00	0.00	0.00
Kenya	0.00	0.00	0.00	0.00	0.00
Cambodia	0.00	0.00	0.00	0.00	0.00
South Korea	0.09	0.09	0.09	0.09	0.09
Kuwait	0.01	0.01	0.01	0.01	0.01
Lebanon	0.00	0.00	0.00	0.01	0.00
Sri Lanka	0.00	0.00	0.00	0.00	0.00
Morocco	0.00	0.00	0.00	0.00	0.00
Mexico	0.01	0.01	0.01	0.01	0.01
Myanmar	0.00	0.00	0.00	0.00	0.00
Malaysia	0.01	0.01	0.01	0.01	0.01
Nigeria	0.00	0.00	0.00	0.00	0.00
Netherlands	0.05	0.05	0.05	0.05	0.05
Norway	0.06	0.06	0.06	0.06	0.06
New Zealand	0.06	0.07	0.07	0.07	0.07
Oman	0.01	0.02	0.02	0.02	0.02
Peru	0.01	0.01	0.01	0.01	0.01
Philippines	0.01	0.01	0.01	0.01	0.01
Poland	0.01	0.01	0.01	0.02	0.01
Puerto Rico	0.02	0.02	0.03	0.03	0.02
Portugal	0.04	0.05	0.05	0.05	0.05
Qatar	0.01	0.02	0.02	0.02	0.02
Russia	0.01	0.02	0.02	0.02	0.02
Rwanda	0.00	0.00	0.00	0.00	0.00
Saudi Arabia	0.02	0.02	0.02	0.02	0.02
Singapore	0.06	0.06	0.07	0.07	0.06
Serbia	0.01	0.01	0.01	0.01	0.01
Slovakia	0.02	0.02	0.02	0.03	0.02
Sweden	0.07	0.07	0.07	0.07	0.07
Thailand	0.01	0.01	0.01	0.01	0.01
Tunisia	0.00	0.00	0.00	0.00	0.00
Turkey	0.02	0.02	0.02	0.02	0.02
Taiwan	0.03	0.03	0.03	0.03	0.03
Uganda	0.00	0.00	0.00	0.00	0.00
Ukraine	0.01	0.01	0.01	0.01	0.01
Uruguay	0.01	0.01	0.02	0.02	0.02
United States	0.05	0.05	0.05	0.05	0.05
Vietnam	0.00	0.01	0.01	0.01	0.01
South Africa	0.02	0.02	0.02	0.02	0.02
Developed countries	13.01	13.80	14.66	15.27	56.74
Emerging countries	2.11	2.38	2.72	3.05	10.26
Total	**15.12**	**16.18**	**17.38**	**18.32**	**67.00**

Appendix 3C: GDP Elasticity With Respect to Card Penetration, %

Country	2016	2017	2018	2019	Weighted avg
United Arab Emirates	0.00	0.01	0.01	0.01	0.01
Argentina	0.01	0.01	0.01	0.01	0.01
Australia	0.04	0.04	0.04	0.04	0.04
Austria	0.02	0.02	0.02	0.02	0.02
Azerbaijan	0.00	0.00	0.00	0.00	0.00
Belgium	0.04	0.04	0.04	0.04	0.04
Brazil	0.01	0.01	0.01	0.01	0.01
Canada	0.04	0.04	0.04	0.05	0.04
Switzerland	0.02	0.02	0.02	0.02	0.02
Chile	0.01	0.01	0.01	0.01	0.01
China	0.01	0.01	0.01	0.01	0.01
Colombia	0.01	0.01	0.01	0.01	0.01
Czech Republic	0.01	0.01	0.01	0.01	0.01
Germany	0.01	0.01	0.01	0.01	0.01
Denmark	0.03	0.03	0.03	0.03	0.03
Egypt	0.00	0.00	0.00	0.00	0.00
Spain	0.02	0.02	0.02	0.02	0.02
Finland	0.02	0.02	0.03	0.03	0.02
France	0.03	0.03	0.03	0.03	0.03
United Kingdom	0.04	0.04	0.05	0.05	0.04
Ghana	0.00	0.00	0.00	0.00	0.00
Greece	0.01	0.01	0.02	0.02	0.02
Hong Kong	0.04	0.04	0.05	0.05	0.04
Hungary	0.01	0.01	0.01	0.01	0.01
Indonesia	0.00	0.00	0.00	0.00	0.00
India	0.00	0.00	0.00	0.00	0.00
Ireland	0.02	0.02	0.02	0.02	0.02
Israel	0.03	0.03	0.03	0.03	0.03
Italy	0.01	0.01	0.02	0.02	0.01
Jordan	0.00	0.00	0.00	0.00	0.00
Japan	0.01	0.01	0.01	0.01	0.01
Kazakhstan	0.00	0.00	0.00	0.00	0.00
Kenya	0.00	0.00	0.00	0.00	0.00
Cambodia	0.00	0.00	0.00	0.00	0.00
South Korea	0.04	0.04	0.05	0.05	0.04
Kuwait	0.01	0.01	0.01	0.01	0.01
Lebanon	0.00	0.00	0.00	0.01	0.00
Sri Lanka	0.00	0.00	0.00	0.00	0.00
Morocco	0.00	0.00	0.00	0.00	0.00
Mexico	0.00	0.01	0.01	0.01	0.01
Myanmar	0.00	0.00	0.00	0.00	0.00
Malaysia	0.01	0.01	0.01	0.01	0.01
Nigeria	0.00	0.00	0.00	0.00	0.00
Netherlands	0.02	0.02	0.02	0.02	0.02
Norway	0.03	0.03	0.03	0.03	0.03
New Zealand	0.04	0.04	0.04	0.04	0.04
Oman	0.01	0.01	0.01	0.01	0.01
Peru	0.01	0.01	0.01	0.01	0.01
Philippines	0.01	0.01	0.01	0.01	0.01
Poland	0.01	0.01	0.01	0.01	0.01
Puerto Rico	0.01	0.02	0.02	0.02	0.02
Portugal	0.03	0.03	0.03	0.03	0.03
Qatar	0.00	0.00	0.00	0.00	0.00
Russia	0.01	0.01	0.01	0.01	0.01
Rwanda	0.00	0.00	0.00	0.00	0.00
Saudi Arabia	0.01	0.01	0.01	0.01	0.01
Singapore	0.02	0.02	0.02	0.03	0.02
Serbia	0.00	0.00	0.00	0.01	0.00
Slovakia	0.01	0.01	0.01	0.01	0.01
Sweden	0.03	0.03	0.03	0.03	0.03
Thailand	0.01	0.01	0.01	0.01	0.01
Tunisia	0.00	0.00	0.00	0.00	0.00
Turkey	0.01	0.01	0.01	0.01	0.01
Taiwan	0.01	0.02	0.02	0.02	0.02
Uganda	0.00	0.00	0.00	0.00	0.00
Ukraine	0.00	0.00	0.01	0.01	0.01
Uruguay	0.01	0.01	0.01	0.01	0.01
United States	0.03	0.04	0.04	0.04	0.04
Vietnam	0.00	0.00	0.00	0.01	0.00
South Africa	0.01	0.01	0.01	0.01	0.01
Developed countries	13.01	13.80	14.66	15.27	56.74
Emerging countries	2.11	2.38	2.72	3.05	10.26
Total	**15.12**	**16.18**	**17.38**	**18.32**	**67.00**

About the Authors

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Dr. Zandi conducts regular briefings on the economy for corporate boards, trade associations and policymakers at all levels. He is on the board of directors of MGIC, the nation's largest private mortgage insurance company, and The Reinvestment Fund, a large CDFI that makes investments in disadvantaged neighborhoods. He is often quoted in national and global publications and interviewed by major news media outlets, and is a frequent guest on CNBC, NPR, Meet the Press, CNN, and various other national networks and news programs.

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Dr. Zandi earned his BS from the Wharton School at the University of Pennsylvania and his PhD at the University of Pennsylvania. He lives with his wife and three children in the suburbs of Philadelphia.

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