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# GETTING READY FOR DIGITAL MONEY: A ROADMAP

In a pervasively electronic world, the flow of money can interconnect cities, energize economies and galvanize communities. As online, mobile and network advances continue to rapidly integrate digital money into our socioeconomic fabric, we are presented with attractive opportunities to open digital commerce to one and all. But how ready are we?


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# Forward

*"We must never be afraid to go too far, for success lies just beyond"*
*~ Marcel Proust*

Citi and Imperial College London are working together to identify and address opportunities emerging from major economic and societal trends. The forces shaping the economy include globalization, urbanization, and digitization. The burgeoning use of the Internet and mobile technology has already begun to influence the way people live and work. A key impact area is the 'digitization of money'. We are witnessing a significant drive by governments and businesses to digitize money and move towards cashless economies.

While the profound impacts of digital money are just beginning to make their presence felt in the global economy, Citi has witnessed the transformational impact of digital money adoption first hand. Over the last few years we have deployed mobile wallets, implemented a digital collections service for corporations in emerging markets, and continued to innovate and enhance corporate engagement through mobile and tablet devices.

Digital money holds the promise of reducing the size of informal economies, driving transparency in money flows, increasing financial inclusion, stimulating economic growth and creating more efficient business and consumer financial flows in emerging and developed economies alike. As business and leisure are increasingly conducted on a global stage, citizens continue to experience 'friction' when exchanging currencies and withdrawing cash. With the digitization of money, these challenges can be smoothed, reducing associated delays and time lost. Enhanced accountability and traceability, and improved management of transactions can also be achieved with digital money, tackling problems such as tax avoidance and fraud. The seamless, 'borderless' flow of money and the enhanced transparency in money flows are two practical examples of the transformative potential digital money presents.

With digital money adoption varying significantly across economies, cash remains the preferred medium of transactions even in many developed markets, and certainly in emerging ones. Further, the benefits of digital money adoption remain unclear. The vast new technical, social, and legal challenges associated with realizing adoption at scale also invite new types of digital fraud, and valid privacy, security and identity fears.

A partnership of Citi and Imperial College London have come together and developed a Digital Money Readiness Index. Our work was motivated by two objectives. Firstly, we wanted to better understand the linkage between digital money adoption and socio-economic outcomes. Secondly, if a linkage was found, then it was important to examine strategies on a country over country basis that governments, policy makers and private sector firms could implement and execute on, to increase digital money readiness and drive adoption.

We recognize this is a journey and this work is a starting point for a much broader dialogue and set of associated actions. If we agree that the economic growth of nations is linked to a prevalent factor: the adoption of digital technology, then we must agree that leaders of government, policy-makers and private sector entities must decide how to promote and structure the digitization of the economies they influence.

The Digital Money Readiness Index finds that when executed properly, digital money does in fact hold real promise. Bolstered by this, we hope that the Digital Money Readiness Index provides the platform for incremental research, facilitates a global dialogue on this topic and enables Governments and Corporations to deliver on the promise of digitization.

This is a journey; we invite you to join.

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# Introduction

The digitization of money has emerged as one of the top items in governments' agendas all over the planet. About half the world's adult population - almost 2.5 billion working-age people - has no access to formal financial services. There is evidence that financial inclusion can help improve individual lifestyles, support small enterprise growth and thereby indirectly help a country's economy. At the same time, consumers in more mature economies are experiencing the benefits of a growth in digital commerce applications and payment choice. The adoption of digital money - credit/debit cards, stored-value schemes and other non-paper-based value transfer mechanisms – improves transaction speed, user experience and convenience, in emerging and developed economies alike. These benefits flow to governments, corporations as well as individuals.

There are several examples of successful digital money usage. Some are country-specific, like M-Pesa in Kenya, while some are multi-national, like Visa, MasterCard and PayPal. Of course, there are many examples of failures also, which are not as well-publicized.

The Citi-Imperial team felt that a scientific approach to the issue of digital money adoption was worthwhile. In our view, it was important to gather evidence and analyze the topic on a reasonably global basis, in order to answer the following questions.

- **The "Why Bother" Question** – Does digital adoption make a difference? Is it possible to quantify the benefit to governments, corporations and individuals?

- **The "What Matters" Question** – What are the factors that affect the outcome of a digital money initiative? Why are there varying degrees of success across digital money initiatives in some countries and jurisdictions?

To answer the above questions in a scientific manner, we felt it was important to set up a baseline. Further, we believed that digital money readiness is a necessary (albeit not always sufficient) pre-condition to digital money adoption, and this led to our decision to measure digital money readiness.

We believe that the resulting baseline, which we call the ***Digital Money Readiness Index***, is a multi-functional tool that will help us analyze digital money success factors, across countries and over time.

The process of creating this Digital Money Readiness Index that spanned 90 countries was statistically complex and (we believe) analytically rigorous – however, the index is a means to an end, and not an end in itself. We acknowledge this is a work in progress, but can share two insights so far.

- A deeper understanding of the underlying factors that affect digital money readiness across 90 countries – It is possible to provide a reasonably customized country-level roadmap to help each country achieve better readiness. Such an analysis will draw largely from our work related to the index, but cultural and other factors can also impact adoption.

- Quantification of the benefit of digital money adoption; for governments, corporations and individuals, in aggregate (not at a country level).

# Does digital money adoption make a difference?

## Benefits to Government*


Estimated increase in tax collections[1]

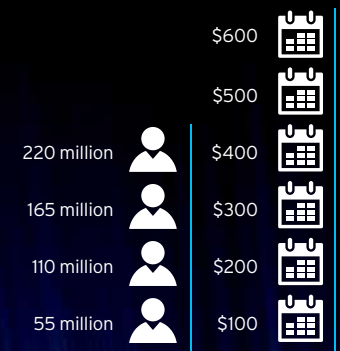
Reduction in the informal economy[1]

## Benefits to Business*


Associated increase in loans[2]

Associated increase in deposits[2]

## Benefits to Consumer*




Additional interest from savings per individual[5]

Lower annual cost of financing per individual[4]

Number of individuals likely to enter the formal financial sector[3]

The adoption of digital money can have tangible benefits for government, business and consumer. Doing nothing simply means allowing the system to develop dysfunctionally and delaying the tremendous socioeconomic benefits that adoption can bring.

* Based on an average 10% increase in digital money readiness score and commensurate increase in adoption.

1 Based on regression against GNI across 90 countries, which is estimated to be $81Tn (source: World Bank, 2012).

2 Size of deposits and loans estimated using average savings and loan sizes in microfinance; average MF deposit across 90 countries: $620; average MF loan value across 90 countries: $2,500 (source: MixMarket).

3 Based on regression against 15+ population across 90 countries, estimated to be 4.6Bn (source: Global Findex database, World Bank, 2012).

4 Average loan rate for informal sector: 41%; average loan rate for formal sector: 8% (source: World Bank); cost of financing estimated assuming 60% reduction in loan rate on moving to formal FI sector.

5 Interest from savings computed using average savings rate (4.45%, source: World Bank) and assuming that current savings outside formal FI does not attract any interest.

# What factors affect the outcome of a digital money initiative?


## Foster

Facilitate market innovation and investment towards innovative and ubiquitous digital money solutions.

Focus on fostering a favorable regulatory, business, and innovation environment to capitalize on consumer and business propenstity to adopt.

## Drive

Improve ease of doing business (e.g. secure property rights, market-friendly business norms).

Educate consumers on benefits, provide incentives for adoption.

Implement government and corporate digital money solutions as accelerators.

## Enable

Build enabling ICT and payments infrastructure.

Address availability and affordability of basic financial services.

Address regulatory gaps.

Source: Citi-Imperial Digital Money Readiness Index.

# Digital Money Readiness Index

## Measuring Digital Money Readiness

We believe that the following four factors ("pillars") explain, for the most part, how ready a given country is to adopt digital money. We further disaggregated each pillar into attribute "indicators" that help quantify country-level readiness. There are cultural and other country-specific factors that can be qualitatively used to explain what the index does not.

1. **Institutional Environment:** This pillar considers the national institutional characteristics within which digital money needs to operate – this includes factors like property rights and the government's support for innovation.

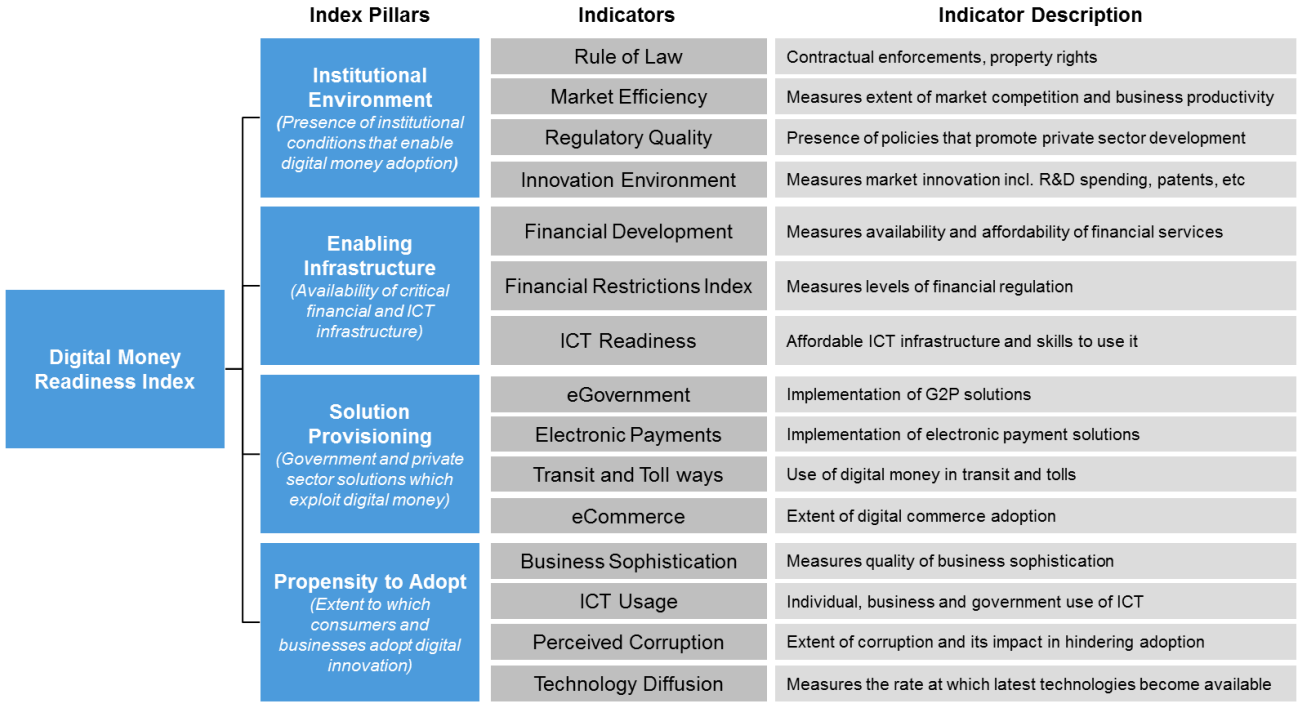
2. **Enabling infrastructure:** This pillar considers technological and financial infrastructure which underpins the deployment and operation of digital money. Both regulatory and operational aspects are considered.

3. **Solution Provisioning:** This pillar consists of the industries and functions that drive the provision of digital money solutions (and the most frequent use cases).

4. **Propensity to adopt:** This pillar captures the rate at which consumers and corporates adopt new innovation.

Each of the above four pillars can be reasonably explained by the indicators that are shown in the figure below. To measure digital money readiness, we created a composite score consisting of the four pillars that drive readiness and measured these with data collected across 15 different indicators.

Figure 1. Framework to Measure Digital Money Readiness




| Index Pillars | Indicators | Indicator Description |
|---|---|---|
| **Institutional Environment** *(Presence of institutional conditions that enable digital money adoption)* | Rule of Law | Contractual enforcements, property rights |
| | Market Efficiency | Measures extent of market competition and business productivity |
| | Regulatory Quality | Presence of policies that promote private sector development |
| | Innovation Environment | Measures market innovation incl. R&D spending, patents, etc |
| **Enabling Infrastructure** *(Availability of critical financial and ICT infrastructure)* | Financial Development | Measures availability and affordability of financial services |
| | Financial Restrictions Index | Measures levels of financial regulation |
| | ICT Readiness | Affordable ICT infrastructure and skills to use it |
| **Solution Provisioning** *(Government and private sector solutions which exploit digital money)* | eGovernment | Implementation of G2P solutions |
| | Electronic Payments | Implementation of electronic payment solutions |
| | Transit and Toll ways | Use of digital money in transit and tolls |
| | eCommerce | Extent of digital commerce adoption |
| **Propensity to Adopt** *(Extent to which consumers and businesses adopt digital innovation)* | Business Sophistication | Measures quality of business sophistication |
| | ICT Usage | Individual, business and government use of ICT |
| | Perceived Corruption | Extent of corruption and its impact in hindering adoption |
| | Technology Diffusion | Measures the rate at which latest technologies become available |

Source: Citi

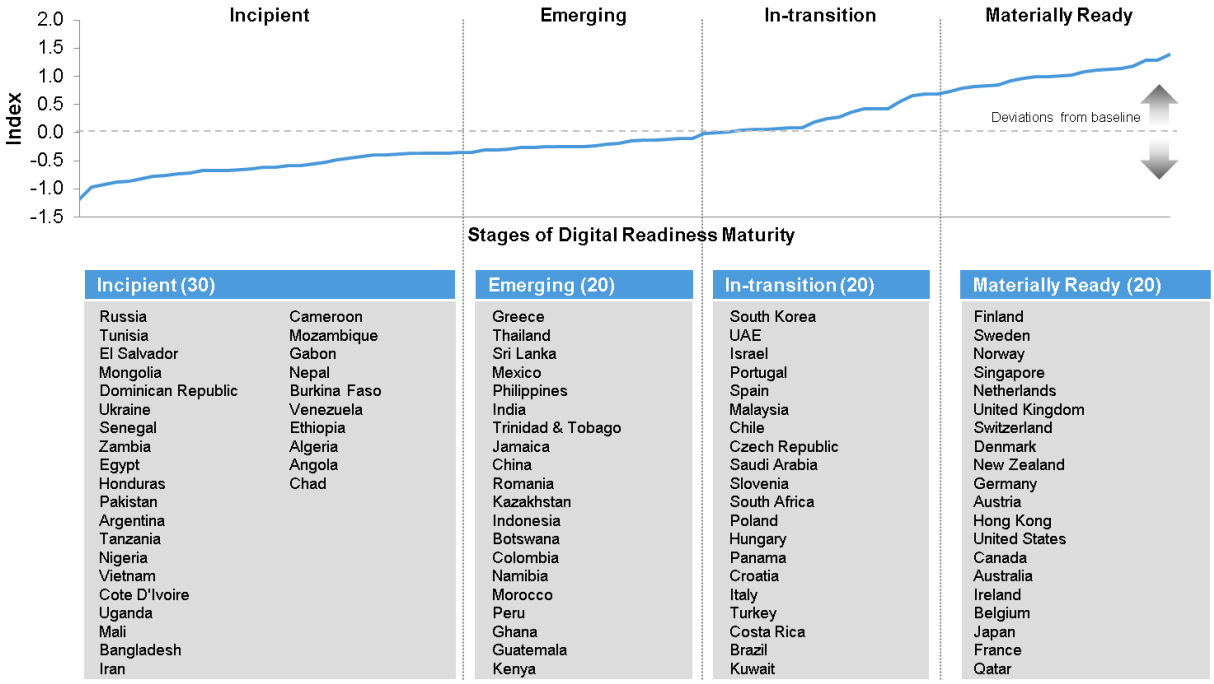
A specific index score as well as detailed breakdown is available for each of the 90 countries we studied. (The statistical techniques used are explained in more detail later in the report.)

## Understanding Digital Money Readiness

Our analysis of the readiness scores of the 90 countries in our study yielded four distinct clusters – we call them stages of readiness – based on characteristics exhibited by underlying pillars and indicators. These four stages –Incipient; Emerging; In-transition; Materially Ready – and the countries in each stage are shown in the chart below.

These groupings will allow stakeholders including governments and policymakers to recognize their nation's current level of Digital Money Readiness and provide a perspective on how to move up to the next stage or move higher within the same stage.

Figure 2. Digital Money Readiness Index




Source: Citi Imperial Digital Money Readiness index

Source: Citi Imperial Digital Money Readines Index

## Attributes of Each Readiness Stage

Analyzing the indicator-level scores within the index sheds light on the general attributes of each stage.

1. **Incipient stage:** Often characterized by a lack of affordable (and basic) ICT infrastructure and expensive / limited financial services.

2. **Emerging stage:** Basic ICT infrastructure and financial services do exist. Relevant regulation is on the books. The challenges here tend to be one or more of the following: the presence and size of the informal economy; (perceived) lack of enforcement of existing regulation, both for consumers and corporates; lack of ICT ubiquity and affordability; and consumer preference for cash.

3. **In-Transition stage:** The challenges of the Incipient and Emerging stages have been largely resolved. Often, these countries have successfully deployed accelerators such as social disbursements via Digital Money. But they may need to make investments in Solution Provisioning, i.e., digital payments for transit or the seeding of e-commerce initiatives. Sometimes, it may be a matter of lowering restrictions on financial investments so that a healthy system of private enterprises can take root.

4. **Materially Ready stage:** Characterized by ubiquitous ICT diffusion coupled with familiarity of digital solutions. They also exhibit a market friendly business and regulatory environment that facilitates private sector investment and innovation in digitally enabled solutions. The challenge at this stage is to create compelling use cases and ecosystems that drive increased digital money usage and ubiquity.

### Comparison with Other Indices

There are, of course, other indices on this topic; most focused more broadly on digitization, while a select few attempt to measure cashlessness or the readiness of a country for the adoption of digital money. Our Citi-Imperial index focuses on developing the ability to provide a transparent country-level view of the factors that hurt (i.e., the bottlenecks) and helped each country's readiness score, with a view to providing a roadmap to becoming more ready for digital money over time. Further, there is a future ambition to drill down into local jurisdictions (perhaps at a city-level) so that local digital money initiatives can be supported. Moreover, our goal is to foster an ongoing dialogue on how to best measure and accelerate the adoption of digital money, and its socio-economic impact.

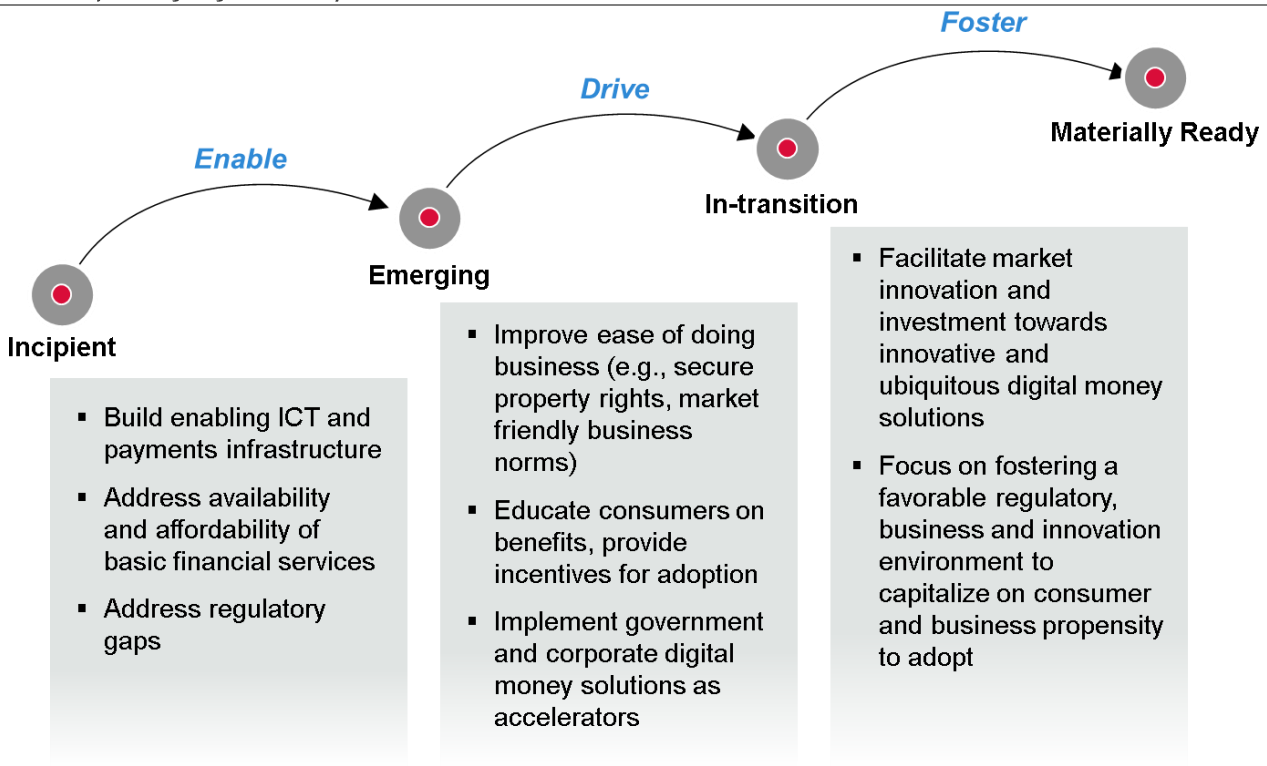
## Moving Up on the Readiness Scale

Our analysis helps identify "typical" bottlenecks at each stage of the digital money readiness evolution. Resolving these bottlenecks increases the likelihood that a country will move up on the Readiness Index. But beyond these stage-level bottlenecks, it is important to consider that each country has its own character and culture – in other words, it would be folly to blindly give two countries in the same readiness stage similar advice. In this section, we illustrate both the common and country specific aspects of the readiness journey.

### Digital Money Readiness Roadmap

The diagram below outlines key strategies that a government can implement to improve its digital readiness and move from one stage of readiness maturity to another.

Figure 3. Improving Digital Money Readiness




Source: Citi

## Moving from Incipient to Emerging

A government at this stage can craft enabling financial and market-related regulation; invest in ICT infrastructure such as basic mobile and broadband availability; and address availability and affordability of basic financial services.

Consumers in these countries will continue to prefer cash as a medium of transaction, partly because it is accepted everywhere. The exceptions are likely to be either high-fee situations like payroll check cashing or high-convenience situations like bill payment or remittances (where time and travel may be involved in the legacy case). Governments can attempt to digitize B2C (Business to Consumer) flows while recognizing that several C2B (Consumer to Business) flows, such as retail payments, are likely to remain cash heavy. Given the critical need to be able to "Cash in / Cash out" easily, Governments must carefully craft regulation that on the one hand provides sufficient controls to protect consumers and on the other hand allows for market innovation where an established market does not exist. In most developed countries there are well established "Cash in / Cash out" services provided by the financial services industry (e.g. ATM's, branches, cash-back). However, in some emerging markets this not the case. In these markets, it may be beneficial to include permission for non-financial entities to deliver limited mobile money services. Such entities can then use their existing distribution network to run "Cash in / Cash out" locations, which are crucial for digital money services to succeed. Done in

combination with regulated financial entities, this allows a regulated and graduated progression towards full financial inclusion, and access to robust and regulated financial services and products.

Kenya and Ghana provide examples of having recognized these realities; Kenya and Ghana have made progress, not only due to significant investments in mobile infrastructure but also due to regulation that enabled MNO-led mobile money initiatives. These initiatives have led to a proliferation of 'cash out points', which in-turn increases the attractiveness and viability of the mobile money initiative.

**India – National Standards to Drive Mobile Payments**

India supplemented growth in mobile penetration by implementing a national standard for mobile payment transfers. The Government of India launched Interbank Mobile Payment Service (IMPS) in 2010, dedicated to integrating multiple disparate payment systems (e.g. ATMs, point-of-sale machines) into a standardized nationwide system for retail payments. Nationwide ubiquity, affordability and wide bank acceptance have paved the way for wide government and business acceptance. Select state governments (e.g., Karnataka) allow tax and bill payments via IMPS; the Indian railway allows for ticket purchases via IMPS. IMPS adoption has been growing steadily and currently processes over USD $200 million dollars in transfers every month.

## Moving from Emerging to In-Transition

Emerging countries can help their standing by improving the ease of doing business and providing incentives and education for digital money adoption.

Countries with a stronger institutional environment - more secure property rights and market-friendly business norms – are better positioned to attract investment, participate in trade and utilize physical and human capital more efficiently. This encourages investment and exploitation of digitization more broadly, and digital commerce more specifically. Regional and local differences in business environment quality are a part of the challenge faced by countries at this stage.

Implementing a digital benefits-disbursement process can serve as a key accelerator. A number of countries in the Middle East have improved their digital money readiness by making significant investments in ICT infrastructure and transitioning to e-Government service delivery. These regions have also focused on driving consumer awareness and adoption - bandwidth usage in the MENA region increased by over 80% per annum, making it one of the fastest growing regions for international connectivity in the world[1]. Also, Latin American countries such as Brazil and Argentina have benefited from transitioning to digital government disbursements.

[1] International bandwidth usage growth based on statistics provided by Telegeography

**UAE: Digitization, One Sector at a Time**

UAE has embarked on a steady liberalization of connectivity services including local, international calling and Voice-over-IP (VoIP) services. In addition, they have focused on increasing the use of digitization by industry sectors via incentives; development of sector specific smart cities or zones such as Dubai Media City and Dubai International Finance Center, and investments in other accelerators such as eGovernment and Transit solutions.

Consequently, enterprise spend on ICT has increased to 4% of GDP – comparable to 4.6% of GDP in Germany and approximately 5% of GDP in Canada[2].

## Moving from In-Transition to Materially Ready

In-transition countries differ from Materially Ready countries mainly by the degree of Solution Provisioning and the level of financial restrictions. Materially Ready countries are characterized by more vibrant and competitive private enterprise – efficient markets, ability of the private sector to capture innovation rents and provide goods/services to the consumer. In such an environment, the private sector provides innovative, convenient and accessible digital money solutions which drive consumer adoption.

While we recognize the progress, it is also worth noting cash still constitutes a high proportion of overall consumer spending in these countries. The next phase for these countries is to work out innovative digital money usage such as retail innovation including proximity payments and location based offers, low fee payment products, vibrant and growing electronic and mobile commerce and digital transit/toll solutions. One example of such innovation has been the introduction of mPoS (mobile Point of Sale) solutions. Using a smart phone as a point of sale terminal has enabled small retailers and individual service providers (e.g., taxi drivers) to accept card payments thus unlocking new revenue while increasing convenience for the end-user.

*Progress will require tailoring the roadmap to suit each country's unique circumstance*

[2] Digital Planet, 2010

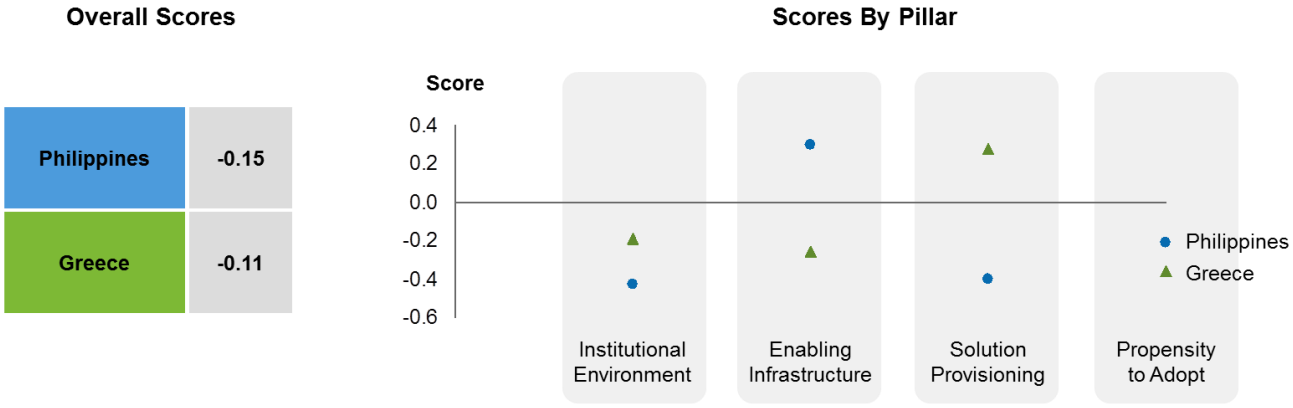
The role of the government is to create an environment, with regards to regulatory, monetary and public safety, that encourages investment and maximizes the potential of the private sector. There must be sufficient controls to ensure that consumers have confidence in the safety and security of the ecosystem, and their rights and protections (this can help drive adoption). This must be coupled with adequate guidelines that create a clear regulatory framework and level playing field which clarifies the respective roles and responsibilities of corporations, and therefore encourages corporate investment.

## Customizing the Roadmap

Countries within the same stage can face challenges, and may have to improve, in vastly different areas. Investments in enabling infrastructure may be a priority for some countries. For others, lack of a strong private sector may be a far bigger barrier. Cultural and other factors can also come into play.

By analyzing indicator-level scores in our index, we can customize a roadmap for each country. We illustrate this in the chart below, using the Philippines and Greece as examples. Both countries are at the "Emerging" stage in our index.

Figure 4. Importance of Country Level Recommendations: Philippines vs. Greece




**Philippines**

- Philippines has done well in terms of building the necessary ICT infrastructure and providing affordable access to basic financial services (ranked 23rd out of 90 countries)
- However, Philippines may require immediate focus on creating a more facilitating regulatory environment and driving market efficiency.
- Government and Business solutions can serve as critical accelerators

**Greece**

- Greece, in comparision, appears to have a facilitating institutional environment; They also have made investments in solutions (e.g., transit) which in turn has contributed to readiness
- The immediate focus for Greece should be to drive investments in building the right technological infrastructure, and improving access to affordable financial services

Source: Citi

Both countries are at a similar stage, but require a clear difference in priorities, with the Philippines needing to focus on market efficiency and corporate use-case accelerators, and Greece needing to focus on improving the ICT infrastructure and adoption.

A set of specific actions can be identified for a country to make structured progress on the path to higher digital money adoption. The existence of a path should not, however, diminish the difficulty of making progress.

1. **Not every bottleneck is created equal** – it is clearly more difficult to affect a "Rule of Law" or "Market Efficiency" indicator than it is to change an "ICT Readiness" indicator or launch an e-Government initiative. There is nothing wrong with solving relatively "simpler" issues first – it still helps you move up. The key is that if these tougher challenges are not resolved, they do eventually hold back the overall score.

2. **Readiness does not imply adoption** – It is clear that even the countries at the "Materially Ready" stage must continue to push adoption. Also, country-level differences can come into play vis-à-vis adoption, even when readiness scores are similar. There are examples of developed markets that still have a cultural preference for using cash while there are emerging markets that have adopted digital money solutions due to government intervention or environmental factors such as security concerns. The next section provides some examples of outliers and the underlying reasons.

## Relationship between the Index and Cashless Intensity

Our Digital Money Readiness Index attempts to measure how ready the individuals and businesses in a country are to adopt or use electronic forms of monetary value. The key question is: does readiness drive adoption?

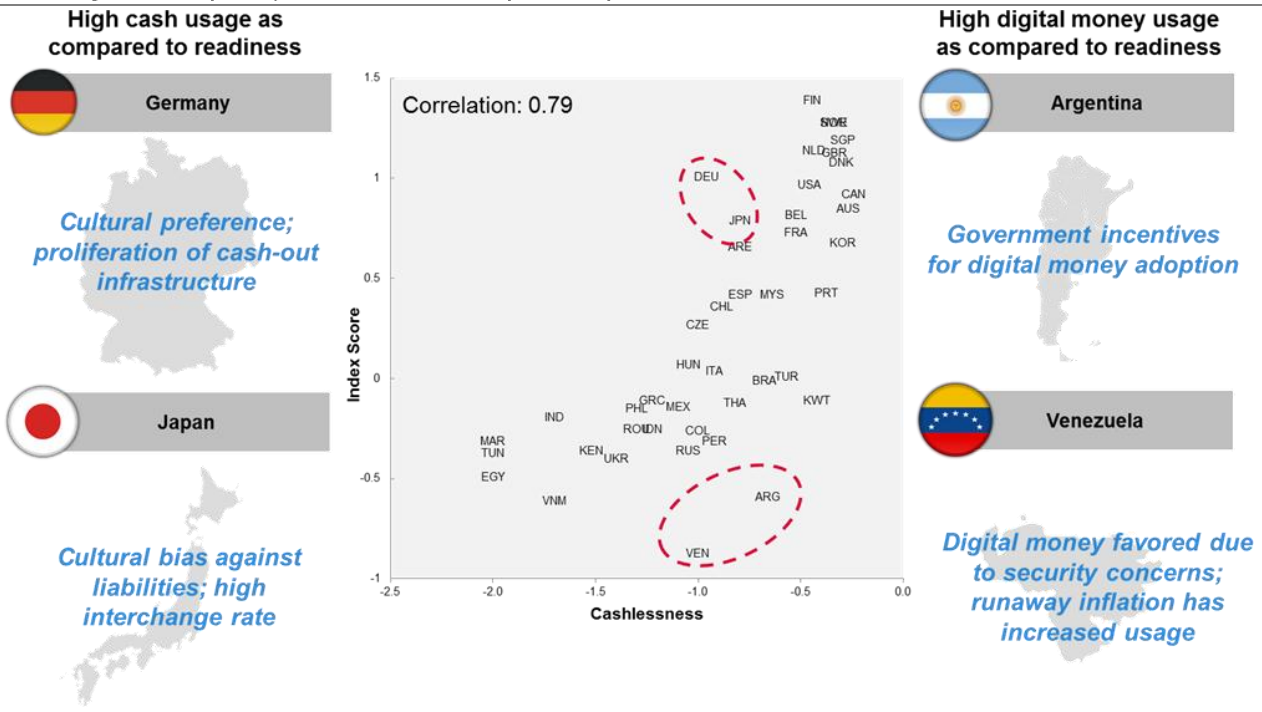
To answer this question, we plotted the relationship between our Index values and a Citi-developed indicator of digital money adoption (i.e., "cashlessness"), called "Cashless Intensity" which calculates consumer spending via digital channels as a percentage of the total consumer spend. We found a reasonable relationship between the digital money readiness index and Citi's cashless intensity rankings – about 60%-65% of adoption can be explained by the index variables.[3] Further research is required to better understand the factors that explain the remainder.

As with all indices, our index is static, i.e., it cannot account for situations where investments in digitization have been made but the benefits are yet to accrue and be measured. For example, consider the impact of the two ICT indicators, readiness and usage. The International Telecommunications Union (ITU) acknowledges country-level variability in the timing and extent of ICT investment benefits for the following reasons. (i) Countries dependent on transactional services (e.g., financial services) and high labor content (e.g., tourism) may benefit to a greater extent than countries dependent on resource industries (e.g., mining). (ii) Investment returns depend on people being trained and business processes being changed. (iii) Businesses must be incentivized to use the infrastructure. Improving affordability is more important than just having the ICT infrastructure.

This exercise also confirms a view we had at the onset of the analysis – the index can only provide guidelines to increase readiness. Actual adoption is influenced by the unique characteristics of each individual country as we have highlighted in the exhibit below.

[3] $R^2$ of 0.62; $R^2$ is obtained by regressing cashlessness over our index

Figure 5. Digital Money Adoption Is Influenced by Country Characteristics




Source: Citi

# Quantifying the Benefits of Digital Money Adoption

There is ample anecdotal evidence on the benefits of digital money adoption. One of our primary objectives was to establish a more concrete correlation between digital money adoption and the associated benefits.

We have attempted to provide a perspective on benefits to Government, the Private Sector and to individual consumers.

## Benefits for Government

Digital money holds the promise of several benefits for Governments including financial inclusion and its broader social and economic advantages, but also efficiencies and cost savings in government disbursements.

According to our estimates, a 10% increase in the digital money readiness score and commensurate increase in adoption for the countries included in the index, can translate to USD $1 trillion moving from the informal economy to the formal economy. This can translate to USD ~$100 billion in increased tax collections for the government.

And this may only be the tip of the iceberg. Studies indicate that significant benefits can be realized from arresting leakage and increasing the efficiency of government disbursements. Several programs such as Bolsa Escola in Brazil and Plan Jefes y Jefas program in Argentina have adopted electronic distribution of benefits and witnessed material benefits. In Argentina, the share of participants who admit to paying bribes to local officials in order to access their benefits fell from 3.6% to 0.3% after the Ministry of Social Development moved to electronic payment cards[4]. A study by the World Economic Forum indicates that leakage affects 5%-25% of total benefits and accounts for 75% of total losses[5]. Government disbursement through digital money, arguably, has the potential for higher social impact.

## Benefits for Business

Digital money adoption provides the opportunity for efficiency gains in terms of the reduced costs of handling cash along with new revenue upside due to higher spending from existing consumers and access to new customers.

A recent study by The Fletcher School at Tufts University[6] estimates the cost of cash to U.S. businesses – as a result of theft, transit, security costs – to be USD $55 billion

[4] Financial Services for the Poor: Welfare, Savings and Consumption. IADB, 2007

[5] Galvanizing Support: The Role of Government in Advancing Adoption of Mobile Financial Services, WEF, 2012

[6] The Cost of Cash in the United States, Bhaskar Chakravorti and Benjamin D. Mazzotta, Tufts University's Institute for Business in the Global Context, 2013

annually; McKinsey estimates the efficiency gains from digitization to be approximately USD $340 billion in the U.S. That amounts to anywhere from 0.4% to 2.3% of United States GDP. Anecdotally, the cost of the end-to-end cash collections cycle to a corporation can be 2%-5%, based on internal studies that Citi has done.

Revenue gains can also be substantial. Earlier in the report, we discussed innovations such as mPoS (mobile Point of Sale) that allow smaller retailers to accept card payments thus unlocking higher revenues. According to a recent survey by WorldPay[7], the uplift can be 20% or higher increase in sales for small and medium retailers if they accept electronic card payments. Moody's Analytics studied 56 countries that make up 93% of world gross domestic product, over a five-year span–2008 to 2012 and found that greater usage of electronic payment products added $983 billion in real (U.S.) dollars to GDP in the countries studied[8].

Within the broader purview of 'Benefits for Business', we analyzed the specific benefits for Financial Services institutions. According to our estimates, a 10% increase in digital money readiness score and commensurate increase in adoption for the countries included in the index, can help [up to] an estimated 220 million individuals enter the formal financial sector. As these individuals start to formulate banking relationships, we estimate that the financial services industry stands to witness an USD $80–$100 billion increase in deposits and a USD ~$70-$90 billion increase in loans.

*Digital money adoption could enable as many as 220 million individuals to enter the formal financial sector, resulting in over USD 1 trillion moving to the formal economy*

Once a mobile money account is seeded, it often converts into a formal bank account down the road.

*Colombia witnessed a massive enrollment drive, taking the proportion paid into bank accounts from around 24 percent in 2009 to 91 percent by 2011. Similar uptake has been observed in Brazil, Mexico and South Africa where governments have undertaken electronic government disbursement initiatives. – "Social cash transfer and financial inclusion: Evidence from four countries", CGAP , 2012*

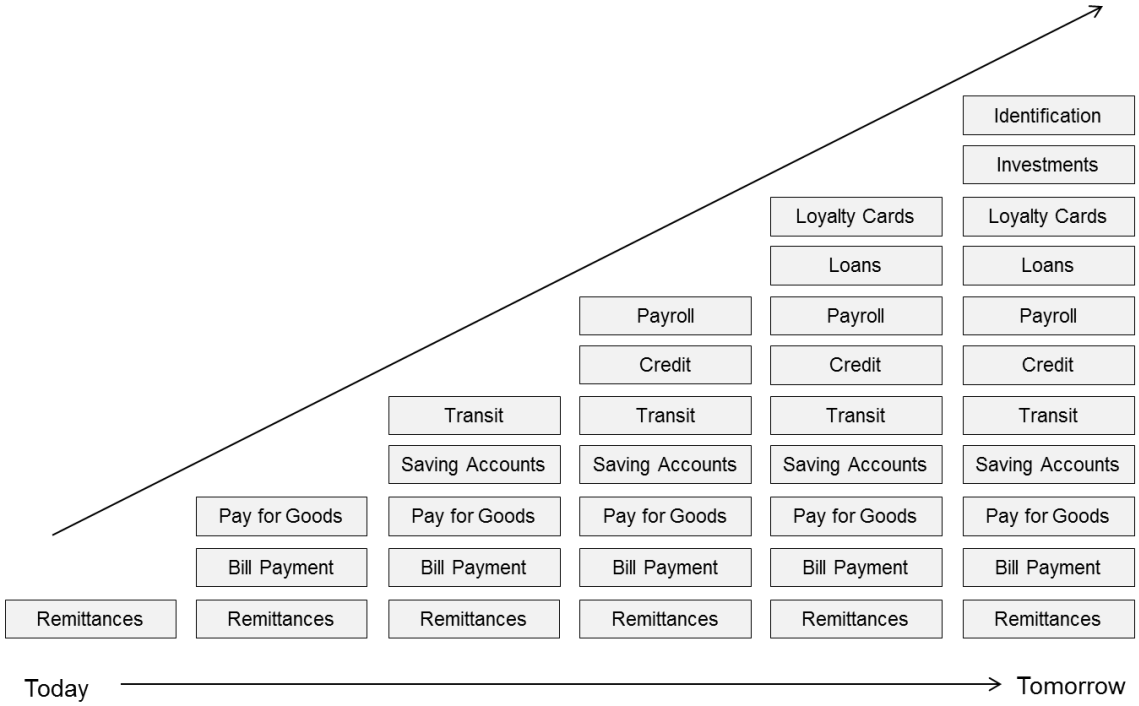
[7] Based on a survey of 5000 consumers in the U.K by WorldPay

[8] The Impact of Electronic Payments on Economic Growth, Moody's Analytics, 2013

Beyond this, it is possible for Financial Institutions to sell incremental services to the beneficiaries of digital money. According to work done by the Gates Foundation, revenue from such incremental services can be sizable – almost 2-5 times the core financial services revenue.

The illustration below, from Citi's "Upwardly Mobile" report published in March 2012, shows how the digital money opportunity can grow into something more substantial.

Figure 6. Opportunity from Incremental Services is Sizable for Formal Accounts




Source: Citi Research

## Benefits for the Consumer

It makes intuitive sense that the citizens of a jurisdiction that is implementing a digital money initiative should benefit if the initiative succeeds. Many individuals in the informal economy have to pay high rates for credit; they lack safe means of savings and investment and many face security concerns in handling cash. Access to financial services can be a key element in overcoming these stubborn realities. Not only does it help consumers accumulate, increase, and protect their money, it also allows them to weather financial shocks. At a minimum their life has become more convenient as some of the friction associated with a transaction is eliminated. There are several examples of the citizens of a country benefiting from mobile money due to reduced corruption.

*"In Afghanistan, over 1,200 Afghan national police receive salaries via Roshan's M-Paisa service, Afghanistan's first mobile money transfer service. When the employees first received their salary through mobile phones, a number of employees were prompted to think they had received a nearly 30 percent raise, however, in actuality they were paid the correct amount for the first time. When they were being paid in cash, 30 percent of their salary was being "taken off the top." – USAID, Oct-2011)*

As a corollary to the scenario analysis we used in the previous section, the ~220 million individuals that enter the formal economy could lower their cost of financing by USD ~$600 annually. For many, this amounts to a substantial proportion of their income.

# Conclusion

Over the past few years, anecdotal evidence of the benefits of digital money adoption has grown. We believed there was an opportunity to formally quantify what the full impact of this trend could be, for Governments, corporations and individual consumers. According to our estimates, digital money adoption could enable as many as 220 million individuals to enter the formal financial sector. This could result in over USD $1 trillion moving to the formal economy from the informal economy.

However, realizing these benefits requires a clear strategic intent and sustained execution, often at a local level, against a clearly understood roadmap. Our work provides a platform to develop actionable plans that enable progress against the digitization journey. It is also clear that there are several complex, interrelated factors at play and unique situations will require tailored solutions.

We will be the first to acknowledge that this is an arduous process and we do not have all the answers. However, our findings thus far support our conviction that a scientific approach to the problem of digital money readiness (and adoption) is not only possible, but also necessary in order to drive actionable solutions. Some areas of future work are to:

1. Continue to do an annual survey so that we build a trend-line of information that can be analyzed.

2. Drill down from a country-level to a local jurisdiction level, so we can work with cities, counties and states on their digital agenda.

3. Analyze further the relationship between our index and cashless intensity, so we can explain the 35%-40% of the variability that is currently unexplained.

4. Continue to explore the quantification of benefits associated with digital money specifically on improving business productivity and enabling new commerce flows both in developed and emerging markets.

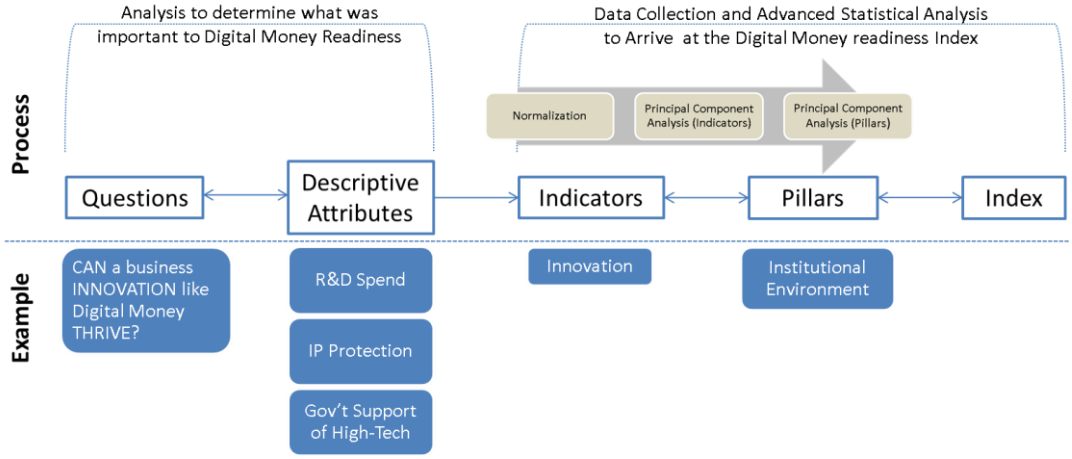
We hope you will leverage this work, as you explore your own solutions. As you do, we encourage you to contact us to continue the dialogue, debate alternate contributing factors, share solutions that work and those that don't, or simply provide us with feedback.

Digitization in general and adoption of digital money solutions in particular, is not a question of 'if', but 'when'. Doing nothing simply means allowing the system to develop dysfunctionally, in fits and starts. It also means delaying the tremendous socio-economic benefits that adoption can bring. Inaction is not an option. There is too much at stake.

# Appendix I: Index Construction and Calculation

**Figure 7** below provides an outline of the process we used to arrive at our Index. The first step was the analytical process of determining the factors that were important in terms of being able to measure Digital Money Readiness. We settled on four factors – Institutional Environment; Enabling Infrastructure, Solution Provisioning and Propensity to Adopt. These four factors formed the "Pillars" of our analysis. We then disaggregated each Pillar into its component "Indicators" – essentially a group of attributes that described each Pillar. Each group of indicators seeks to answer questions about Digital Money Readiness.

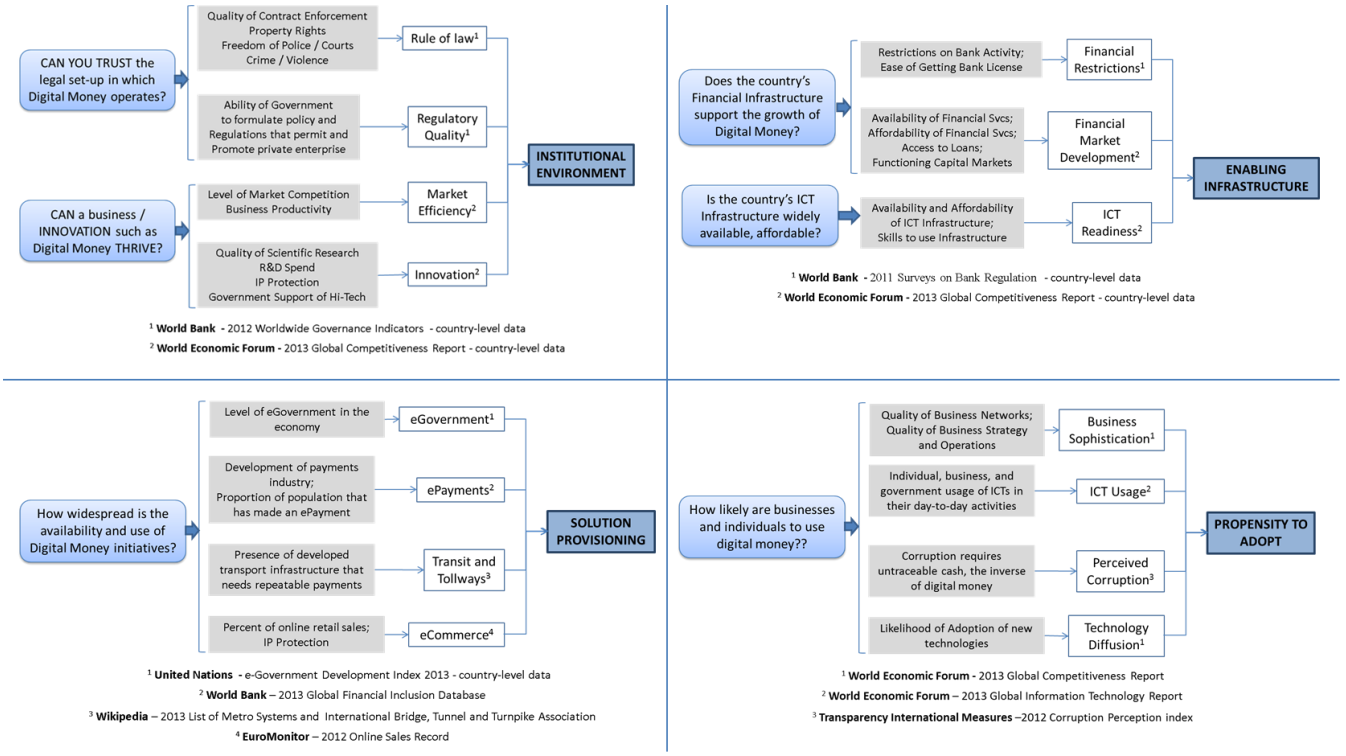
Figure 7. Index Construction Approach




Source: Citi, Imperial College

**Figure 8** shows the disaggregation of each Pillar into Indicators.

Figure 8. Disaggregation of Index Pillars into Indicators




Source: Citi, Imperial College

Once we had a group of indicators that sufficiently described readiness, the next step was to determine how to reliably measure each (set of) attribute(s) – for example, R&D Spend, IP protection and Government support of High Tech are attributes that describe the level of Innovation in a country and this is measured by the World Economic Forum's 2013 Global Competitiveness report. The list of data sources is listed in **Figure 8** above.

Following the analytical and data collection steps described above, we used several statistical techniques, briefly illustrated in the upper-right portion of **Figure 7** above.

1. Since our index is a composite index and the underlying data for each variable was often measured in different ways and on different scales, we had to normalize the data to ensure that the indicators could be meaningfully combined. As a part of this process, we transformed all indicators into z-scores, where each indicator has its mean set to zero and a variance of 1;

2. We capped outliers at the 95% percentile so that they would not skew the results;

3. We used Principal Component Analysis (PCA), a statistical procedure that converts a set of observations (indicators) of possibly correlated variables into a set of linearly uncorrelated variables. Weightings were applied at two stages. The first adjusted the individual impact of an indicator on a pillar. The second weighting adjusted the individual impact of a pillar on the overall index;

4. Following the application of the weighting, the final value of each pillar and overall score was calculated. Our ranking is a relative ranking;

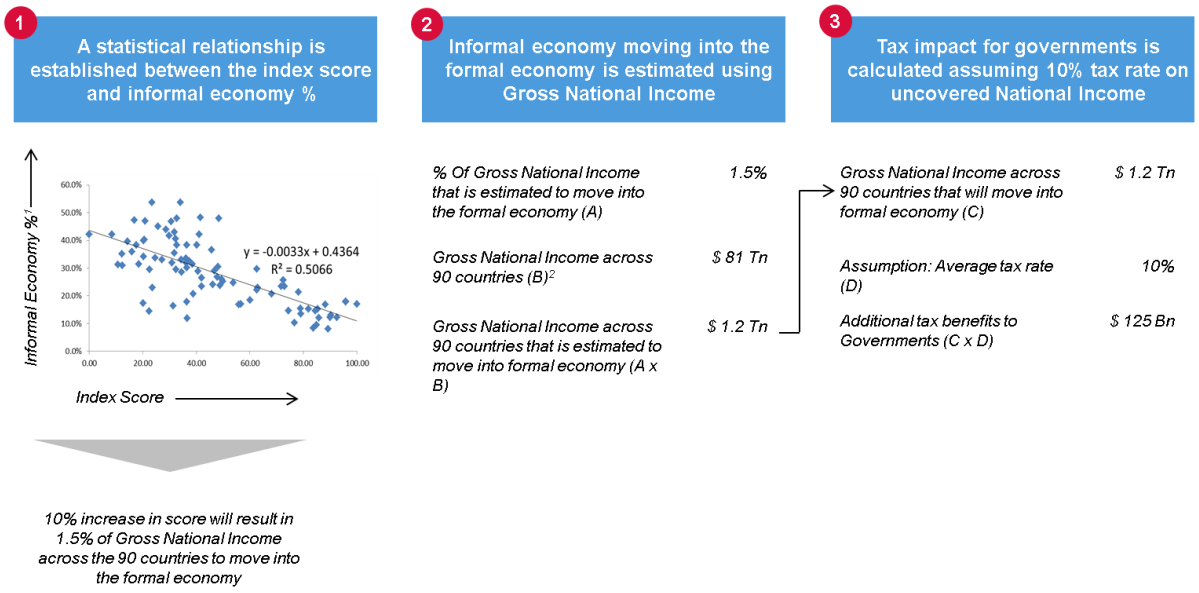
5. In addition to the ranked index, we also highlighted groups of countries that have achieved similar level of maturity in terms of being ready to adopt digital money. To do this we used a hierarchical clustering technique, which had the advantage of being well-integrated with PCA procedures;

6. Lastly, we ran regressions of our index values against several other sets of values, in order to arrive at incremental insights about the benefits of digital money adoption. These are described in subsequent Appendices.

# Appendix II: Estimating the Economic Impact of Digital Money Adoption

While we could take this analysis in multiple different directions, we focused on calculating the cumulative benefit to governments, businesses and to individual consumers from a reduction in the informal economy as this metric can be directly tied to the digital money readiness Index.

Figure 9. Benefits to Government

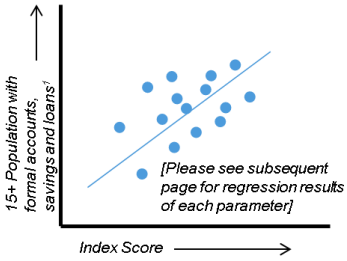



1) Institute of Economic Affairs, UK (Informal economy measured as % of Gross National Income- 2007)
2) World Bank (2012)

Source: Citi, Institute of Economic Affairs UK, WorldBank

## Figure 10. Benefits to Business

**1** A statistical relationship is established between the index score and % of 15+ population with formal accounts, savings and loans%




*10% increase in score will result in 4.8% increase in 15+ population with accounts at formal FIs; 2.8% increase in 15+ population with savings at formal FIs and 0.6% increase in 15+ population with loans from formal FIs*

**2** Incremental 15+ population with formal accounts, savings and loans is estimated using population data

| | |
|---|---|
| *15+ population across 90 countries (A)[2]* | *4.6 Bn* |
| *Incremental % of 15+ population with accounts at formal FIs (B)* | *4.8%* |
| *Incremental 15+ population with accounts at formal FIs (A x B)* | *220 MM* |
| *Incremental % of 15+ population with savings at formal FIs (C)* | *2.8%* |
| *Incremental 15+ population with savings at formal FIs (A x C)* | *130 MM* |
| *Incremental % of 15+ population with loans from formal FIs (D)* | *0.6%* |
| *Incremental 15+ population with loans from formal FIs (A x D)* | *30 MM* |

**3** Value of incremental savings and loans in formal FIs is estimated using average value of savings and accounts

| | |
|---|---|
| *Incremental 15+ population with savings at formal FIs (E)* | *130 MM* |
| *Weighted average savings value across 90 countries (F)[3]* | *$620* |
| *Value of incremental savings (E x F)* | *$ 80 Bn* |
| *Incremental 15+ population with loans from formal FIs (G)* | *30 MM* |
| *Weighted average loan value across 90 countries (H)[3]* | *$2,500* |
| *Value of incremental loans (G x H)* | *$ 70 Bn* |

*[Note: It is assumed that average savings value and loan value for the population moving into the formal financial sector will be similar to the ones currently serviced by MicroFinance institutions]*

1) Global Findex Database, World Bank (2011)
2) World Bank (2012)
3) MixMarket (2012); Citi Analysis

Source: Citi, WorldBank, MixMarket

## Figure 11. Benefits to the Consumer

**Additional interest from savings is estimated using average deposit rate**

| | |
|---|---|
| *Incremental 15+ population with savings at formal FIs (A) [Estimation methodology described in previous page]* | *130 MM* |
| *Value of incremental savings (B) [Estimation methodology described in previous page]* | *$ 80 Bn* |
| *Weighted average deposit rate across 90 countries (C)[1]* | *4.45%* |
| *Interest benefit to consumers from savings (B x C)* | *$4 Bn* |
| *Interest benefit to consumers from savings per individual (B x C) / A* | *$28* |

*[Note: It is assumed that savings made informally do not benefit from interest. Therefore, interest income that consumers will make from these savings in formal FIs is entirely an incremental benefit to them.]*

**Benefit from reduction in loan costs is estimated using average lending rate**

| | |
|---|---|
| *Incremental 15+ population with loans from formal FIs (D) [Estimation methodology described in previous page]* | *30 MM* |
| *Value of incremental loans (E) [Estimation methodology described in previous page]* | *$ 70 Bn* |
| *Weighted average loan rate across 90 countries (F)[2]* | *8.19%* |
| *Average interest rate charged by informal sector for loans[3] (G )* | *41%* |
| *Assumption: Average interest rate for loans made to consumers entering the formal economy[4] (H)* | *16.4%* |
| *Interest benefit to consumers from reduction in loan costs (E x (G-H))* | *$18 Bn* |
| *Interest benefit to consumers from reduction in loan cost per individual [E x (G-H)] / D* | *$630* |

1) World Bank (2012); Citi analysis
2) World Bank (2012); Citi analysis
3) Anecdotal evidence suggests that informal financial services are at least 5-10 times more costly than formal ones; source: Access to Financial Services and the Financial Inclusion Agenda around the World, World Bank; for the purpose of this analysis it is assumed that interest rate will be 5 times the average interest rate
4) Assumed to be 2 times the average interest rate charged by commercial banks, accounting for lower credit worthiness of the population migrating from informal to formal sector [Global average interest rate for microcredit is 35%(Source: CGAP) i.e. ~4 times of global average interest rate charged by commercial banks]

Source: Citi, WorldBank

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