FinTech via the lens of Theory

Objectives:

- Students will be able to define institutional theory
- Students will be able to describe the three sources of influence for institutional behavior

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Institutional theory has long been used to study the creation of new ways of doing things, as well as the preservation and perpetuation of existing ones. The first generation of institutional theorists claimed that rational bureaucracies were responsible for structuring and, hence conducting business. As rational actors, these rational bureaucracies would reach the same conclusions about how—and why—businesses should be governed.

Any useful new technology introduced under this philosophy would be quickly embraced and disseminated throughout all organizations. Since a result, there would be little or no room for entrepreneurship, as established firms would rapidly and efficiently absorb any potentially revolutionary technology. The truth of organizations, however, is that not only are the people who manage them not entirely logical, but also new technology, especially those with unknown benefits, may take time to embrace.

As a result, a new generation of institutional theorists, known as neo-institutional theorists, began to look at institutionalization through a different lens: one that focused on an actor's cognition and the impacts of micro, meso, and macro-level norms on individuals and organizations. These thinkers emphasized the significance of cognitive processes in constructing organizations, particularly those involving norms and informational exchanges.

Eventually, when it came to perpetuating—and perhaps possibly reshaping—institutionalized behaviors, these new institutional theorists identified three sources of influence. Not only were there the necessary legislation, but also cognition and norms. Furthermore, these theorists highlighted the importance of many players in generating field changes.

Initial research highlighted the role of peripheral actors in driving change inside an institutional field, but more recent research has demonstrated how incumbent actors, particularly in economic activities, may be the ones to begin change. These four forces—regulations, cognition, norms, and external and internal actors—can be combined to better comprehend and investigate institutional change and industry transformation.

What is FinTech?

Objectives:

- Students will be able to provide a basic definition of FinTech
- Students will be able to describe common pathways for financial innovation to alter the market structure in financial services

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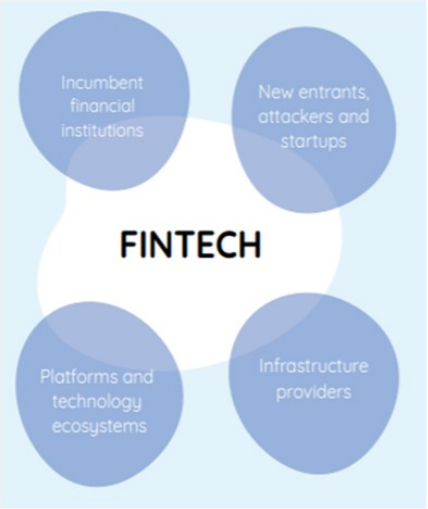
Fintech Defined

"A technologically enabled innovation in financial services that could result in new business models, applications, processes or products with a material effect on financial institutions and provision of financial services"

Finance + Technology = Fintech



The application of technology for the provision of financial services is referred to as "financial technology" (or FinTech). FinTech is a term used to describe technology startups that are emerging to compete with traditional banking and financial market players, offering a variety of services ranging from mobile payment solutions and crowdfunding platforms to online portfolio management and international money transfers. FinTech businesses are gaining the attention of both customers of financial services and investment corporations, who regard them as the financial sector's future. FinTech can be defined as "technologically enabled financial innovation that may result in new business models, applications, procedures, or products

that have a significant influence on financial markets and institutions, as well as the provision of financial services." In view of the present fluidity of FinTech advances, such a wide-angle description is considered helpful.

The above-mentioned understanding of FinTech can also give fresh perspectives on company models. Uber is a real-world example. According to the definition, Uber is a FinTech firm since it offers non-traditional (i.e., creative ideas) transportation services via the use of technology (i.e., mobile applications) to enhance taxi ordering (financial services). In reality, Uber offers “upfront pricing” in most locations, which means that the rider is given an estimate of how much the journey would cost before requesting it.

In other words, the proposed definition and extension of FinTech may be used as a creative reference in assisting firms in rethinking existing business models or even proposing new ventures. In the parts that follow, we'll go through how to use FinTech to produce commercial value.

FinTech can be considered as a regime change in terms of financial stability thinking. Its impact on financial stability could be so massive, that would alter the financial services market structure. Market structure refers to the interrelationships among firms in a market that influence their behavior and capacity to profit. The quantity and scale of market players, the obstacles to entry and departure, and the accessibility of information and technology to

all participants are all aspects that define market structure. In some speculative circumstances, this might have an influence on the financial system's stability. Financial innovation has the potential to alter market structure in financial services through a variety of avenues, including:

1. The rise of bank-like service providers, such as FinTech credit or payments, which might have an influence on markets and bank behavior. In the long run, the increased efficiency of new players may improve the efficiency of financial services. The lack of legacy systems may also advantage newcomers. These changes may have an influence on banks' and other incumbent financial institutions' income sources, making them possibly more lucrative in certain cases, but also potentially more sensitive to losses and lowering retained earnings as a source of internal capital in others. This may have an influence on financial industry risk-taking and resilience. The rate at which new suppliers enter the market might have a big impact on how effectively incumbents react.
2. BigTech refers to the introduction of large, well-established technology companies into financial services. In several countries, non-traditional institutions with established networks and collected big data have gained a foothold in the financial services market, notably in payments, but also in credit, insurance, and wealth management. Increased rivalry with existing financial institutions might be a result of this as well. Because companies may utilize the data collected through these services for a range of industries, new BigTech firms could provide lower-cost (or even free) services. This, in turn, might have a variety of consequences for current markets.
3. Third-party supply of critical services. For data provision, physical connection, and cloud services, financial institutions rely on third-party service providers. Traditional financial institutions and FinTech businesses may become more reliant on third-party service providers over time. If systemically significant institutions or markets do not properly manage risks connected with third-party outsourcing at the

company level, systemic operational and cyber security concerns may develop.

In this context, market actors must innovate and offer interactive solutions on par with their FinTech counterparts if they want to attract lucrative clientele. This phenomenon has been further fueled by a nonstop increase in worldwide FinTech investment, mostly deriving from venture capital and private equity firms. London, San Francisco/Silicon Valley, and Additional York have already established themselves as significant financial innovation centers, with new hubs springing up all over the world, including Amsterdam, Berlin, Dublin, and Paris, which serve as the hubs for the European FinTech ecosystem.

History of FinTech

Objectives:

- Students will be able to identify the timelines for each of the three phases of the evolution of FinTech
- Students will be able to describe the key events and innovations within each of the three phases of the evolution of FinTech

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FinTech has become a popular subject in recent years, although the concept is not new. The first communication via the Trans-Atlantic transmission line occurred on August 16, 1958 and may be dated back to July 1866. The connection not only cut communication time between North America and Europe in half, from 10 days to 17 hours (when a message was sent by ship), but it also aided the creation of the global telex and subsequent financial services, which is also known as FinTech 1.0.

In essence, the advancement of FinTech is inextricably linked to the advancement of supporting technology. The Trans-Atlantic transmission line and mainframe computers, for example, were significant enabling technology during FinTech 1.0. These technologies give rise to financial technology products like SWIFT and ATMs. The Internet and the Internet of Things were among the associated technologies created during FinTech 2.0, but more and more data technologies will be developed during FinTech 3.0. We are currently in a time of transition between FinTech 2.0 and FinTech 3.0.

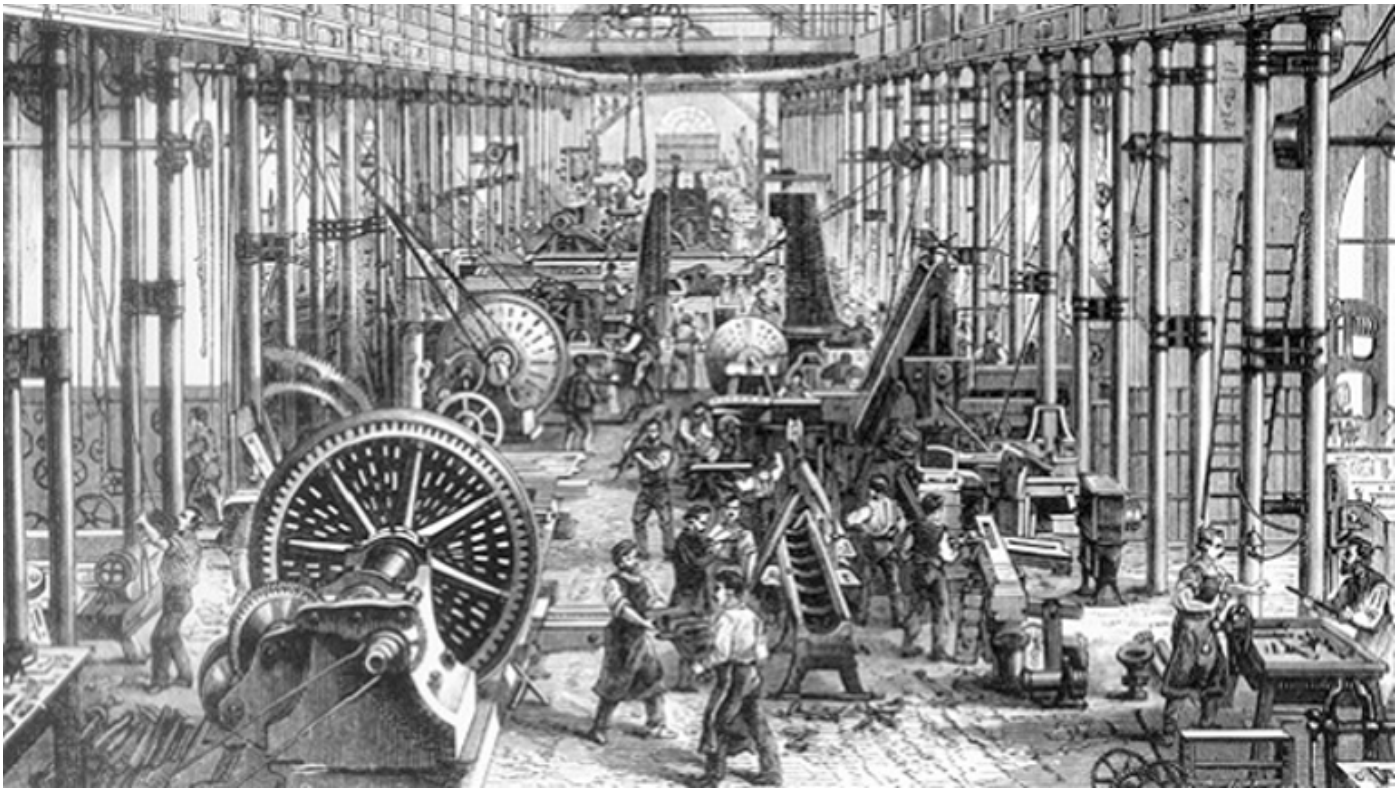
FinTech 1.0 (1866-1967)

Finance and technology, as previously stated, have long been intertwined and mutually reinforcing since their inception. Finance has its roots in administrative systems for state administration that were required throughout the shift from hunter-gatherer societies to established agricultural nations, such as in Mesopotamia, where some of the oldest examples of written records document financial transactions.

Thus, there has been a clear relationship between finance and technology, in this case stemming from the mutually reinforcing process of money and written records, one of the oldest kinds of information technology. Similarly, the evolution of money and finance are inextricably linked, with fiat currency (a technology that demonstrates transferable values) serving as one of the fundamental characteristics of the contemporary economy. The evolution of early tools for computation, such as the abacus, follows a similar pattern. Finance evolved from an early stage both to assist commerce (e.g., financing, and insuring ships and infrastructure such as bridges, railways, and canals) and to support the manufacture of products for that trade. The interwoven growth of banking and trade in the late Middle Ages and Renaissance gave rise to double entry accounting, another technology essential to a modern economy.

Many historians today believe that the late-1600s financial revolution in Europe, which included joint stock firms, insurance, and banking, was critical

to the Industrial Revolution. Finance aided the development of technology that aided industrial progress in this setting.



Finance and technology came together in the late 1800s to create the first phase of financial globalization, which lasted until the outbreak of World War I. Technology such as the telegraph, railways, canals, and steamships supported financial interlinkages across boundaries at this time, allowing for the quick transfer of financial information, transactions, and payments throughout the world. At the same time, the financial industry had given the essential resources for the development of these technologies. In a 1920 article, J.M. Keynes painted a clear picture of the interconnection between finance and technology in this early era of financial globalization:

"*The inhabitant of London could order by telephone, sipping his morning tea in bed, the various products of the whole earth, in such quantity as he might see fit, and reasonably expect their early delivery upon his door-step; he could at the same moment and by the same means adventure his wealth in the natural resources and new enterprises of any quarter of the world, and share, without exertion or even trouble.*"

While financial globalization was slowed for several decades after WWII, technological advances, particularly those resulting from the conflict, advanced quickly, notably in communications and information technology. In the area of information technology, code-breaking techniques were commercially created and integrated into early computers by companies such as International Business Machines (IBM), while Texas Instruments introduced the portable financial calculator in 1967. The 1950s also saw the introduction of credit cards to the United States (Diners' Club in 1950, Bank of America and American Express in 1958). The founding of the Interbank Card Association (now MasterCard) in the United States in 1966 aided this consumer revolution. By 1966, a worldwide telex network had been established, providing the foundational communications on which the next stage of FinTech growth could be built. Long Distance Xerography was the first commercial version of the successor to the telex, the fax machine, launched by the Xerox Corporation in 1964. (LDX). As previously stated, Barclays launched the first ATM in the UK in 1967, and the combined impact of these innovations, in our opinion, marks the start of the FinTech 2.0 era.

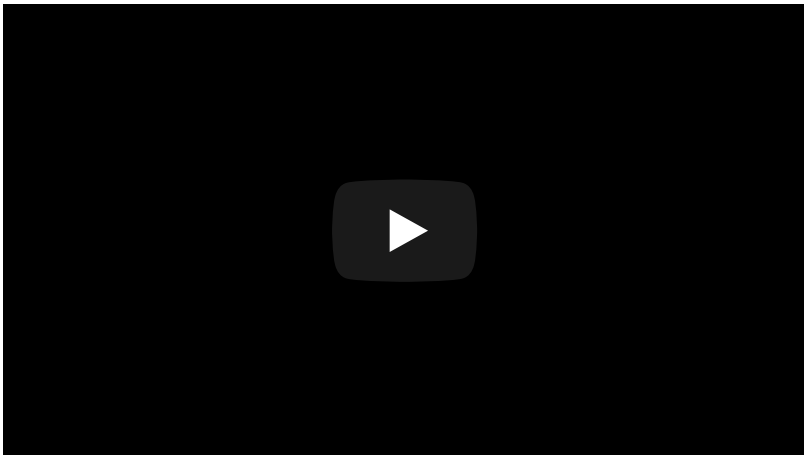
FinTech 2.0 (1967-2008)

In 1967, the calculator and the ATM were introduced, ushering in the contemporary era of FinTech 2.0. From 1967 through 1987, the financial services sector transitioned from analogue to digital. The Inter-Bank Computer Bureau, which formed the basis of today's Bankers' Automated Clearing Services (BACS), was established in the UK in 1968, and the US Clearing House Interbank Payments System (CHIPS) was founded in 1970. Fedwire, which initially began in 1918 as a telegraphic system, transitioned to an electronic system in the early 1970s. The Society of Worldwide Interbank Financial Telecommunications (SWIFT) was founded in 1973 to address the need to connect domestic payments systems across borders, and the collapse of Herstatt Bank in 1974 highlighted the dangers of increasing international financial interlinkages, particularly through new payments system technology. This crisis prompted the first major regulatory emphasis

on FinTech concerns, in the shape of a series of international soft law agreements on the development of reliable payment systems and related regulation.

The founding of NASDAQ in the United States in 1971, the abolition of fixed securities commissions, and the ultimate construction of the National Market System signaled the shift from physical securities trading, which dates back to the late 1600s, to entirely electronic securities trading today. Online banking was initially offered in the consumer sector in the United States in 1980 (before being abandoned in 1983) and in the United Kingdom in 1983 by the Nottingham Building Society (NBS).

On “Black Monday”, 1987, stock markets all across the world collapsed. The crash's consequences demonstrated how digitally interconnected global markets were through technology in a level not seen since the 1929 catastrophe. The worldwide reaction to the 1987 stock market crisis in the United States plainly foreshadowed key developments that laid the groundwork for the second phase of financial globalization. The hazards of cross-border financial linkages and their confluence with technology were brought to the attention of regulators for the first time. The picture of an investment banker brandishing an early mobile phone (first released in the US in 1983) is one of the most famous images from this time, as depicted in Oliver Stone's 1987 film Wall Street. As a result of the reaction, “circuit breakers” were introduced to regulate the pace of price fluctuations, and securities authorities throughout the globe developed procedures to encourage collaboration. In addition, the Single European Act of 1986 went into effect, establishing the framework for the European Union's (from 1992) establishment of a single financial market, and the UK's Big Bang financial liberalization process in 1986, combined with the 1992 Maastricht Treaty and an ever-increasing number of financial services Directives and Regulations from the late 1980s, set the foundation for the European Union's (from 1992) establishment of a single financial market.



The advent of the Internet, through the mid-1990s with Wells Fargo leveraging the World Wide Web (WWW) to enable online account checking, laid the foundation for the next phase of growth. By 2001, eight United States banks had at least one million customers online, and other major jurisdictions across the world were quickly establishing comparable systems and regulatory frameworks to manage risk. Banks' internal operations, communications with outsiders, and a rising number of interactions with retail consumers had all been fully digitized by the turn of the century, as seen by the financial services industry's significant IT expenditure. The internet supplied the underlying shift that made Fintech 3.0 feasible a decade later in the late 1990s. The new internet age gave birth to e-banking and all of Fintech 3.0's innovations.

Fintech 3.0 (2008–present)

The 2008 global financial crisis had a catalyzing effect on the growth of the FinTech sector. Around that time, a number of variables came together to provide developed nations the push for Fintech 3.0. Banks' reputations were severely tarnished at this time, particularly in the United Kingdom and the United States. According to the results of a recent poll, Americans trust technology companies more than banks with their money. The same phenomenon appears to occur in China, where numerous peer-to-peer (P2P) lending platforms chose to operate outside of a clear and well-defined regulatory framework. Nevertheless, this does not seem to deter millions of moneylenders and money-borrowers who are attracted to this choice,

mainly due to the lower cost, and the possibility for ostensibly higher returns.

The regulation framework enacted after the 2008 world crisis, raised banks' compliance responsibilities/expenses along with imposing limitations in credit. Banks' incentives and capabilities to originate low-value loans have altered as a result of ring-fencing responsibilities and increasing regulatory capital. The new need to develop recovery and resolution plans as well as perform stress testing increased bank expenses even further.

"Silicon Valley is coming: There are hundreds of startups with a lot of brains and money working on various alternatives to traditional banking [...] They are very good at reducing the "pain points" in that they can make loans in minutes, which might take banks weeks.

Jamie Dimon CEO, JP Morgan

Fintech 3.0 distinguishes itself in two ways: first, who is providing financial services, with start-ups and technology corporations displacing banks in offering specialty services to the public, businesses, and banks; and second, the rate of development. In many countries, particularly in developing nations, there has been a shift in client perceptions of who has the resources and legitimacy to provide financial services, paired with an altogether new rate of evolution.

Fintech 3.0 is leveraging emerging technologies to drive innovation and massive digital transformation. The 2008 financial crisis was also an inspiration for the first decentralized, peer-to-peer, digital currency. Bitcoin was invented by an entity known as Satoshi Nakimoto in 2008. Since then, it has become a multi-trillion dollar digital asset. Bitcoin was the first global financial asset to enable completely decentralization and democratization. No government, bank, or individual could control it and that way was very powerful. Years later as blockchain technologies developed, the world of decentralized finance has more than $50 billion in assets locked in distributed platforms--giving individuals access to financial services without

a central authority. The movement toward financial services democratization and an uncoupling of centralized financial institution monopolies is now becoming inevitable.

Bitcoin: A Peer-to-Peer Electronic Cash System

Satoshi Nakamoto
satoshin@gmx.com
www.bitcoin.org

Abstract. A purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another without going through a financial institution. Digital signatures provide part of the solution, but the main benefits are lost if a trusted third party is still required to prevent double-spending. We propose a solution to the double-spending problem using a peer-to-peer network. The network timestamps transactions by hashing them into an ongoing chain of hash-based proof-of-work, forming a record that cannot be changed without redoing the proof-of-work. The longest chain not only serves as proof of the sequence of events witnessed, but proof that it came from the largest pool of CPU power. As long as a majority of CPU power is controlled by nodes that are not cooperating to attack the network, they'll generate the longest chain and outpace attackers. The network itself requires minimal structure. Messages are broadcast on a best effort basis, and nodes can leave and rejoin the network at will, accepting the longest proof-of-work chain as proof of what happened while they were gone.

History of Fintech

	1866-1967 FinTech 1.0	1967-2008 FinTech 2.0	2008-current FinTech 3.0	2008-current FinTech 3.5
GEOGRAPHY	Global / Developed	Global / Developed	Developed	Emerging / Developing
KEY ELE-MENTS	Infrastructure / computerisation Developed	Traditional / Internet	Mobile / Start-ups / New entrants	Mobile / Start-ups / New entrants
SHIFT ORIGIN	Linkages	Digitalization	2008 financial crisis / smartphone	Last mover advantatges

Fintech 1.0 (1866-1967) Infrastructure

1958: Credit cards - American Express Company

1967: Introduction of ATM by Barclays bank

Fintech 2.0 (1968-2008) Banks

Shift from analog to digital and is led by traditional financial institutions

Key Events

1967: Launch of the first handheld calculator

1971: Establishment of NASDAQ

1973: SWIFT was established

Fintech 2.0 (1968-2008) Banks

1980: Online Banking was introduced

1990: Internet and e-commerce business models

"Banks' internal processes, interactions with outsiders and retail customers had become fully digitized, beginning of the 21st century"

Fintech 3.0 (2008-Current) Start-ups

- With the GFC the general public developed a distrust of the traditional banking system which led to a shift in mindset and paved a way to a new industry, Fintech 3.0
- This era is marked by the emergence of new players alongside the already existing ones (such as banks)

Key Events

2009: Release of Bitcoin v0.1

2011: Google wallet was introduced

2014: Apple pay launched

Fintech 3.5 (2008-Current) Emerging Markets

- As of 2019, the countries with the highest Fintech usage are China (87%) and India (87%)
- China, India and other emerging markets never had time to develop Western levels of physical banking infrastructure, which has left them more open to new solutions

Key Events

2007: M-Pesa introduced in Kenya

2010: Alibaba introduces loans to SMEs on its e-commerce platform

2011: LuFax, an online Internet finance marketplace, is created

The Evolution of Fintech - Paper Highlights

The following are a few short paragraphs from a seminal paper by Key Opinion Leaders in the FinTech Industry. The three contributing authors to this 2015 paper have gone on to publish and present these ideas in many more follow up articles and lectures in many respected journals. It has been cited nearly 1,000 times, and prompted many responses.

While it would be too much to read the entire 44 page article, we hope the following few paragraphs help to answer "What is FinTech" and better appreciate why these authors made the distinction between 3 separate eras.

1. Introduction "Financial technology" or "FinTech" refers to the use of technology to deliver financial solutions. The term's origin can be traced to the early 1990s and referred to the "Financial Services Technology Consortium", a project initiated by Citigroup to facilitate technological cooperation efforts. However, it is only since 2014 that the sector has attracted the focused attention of regulators, industry participants and consumers alike. The term now refers to a large and rapidly growing industry representing between US$12 billion and US$197 billion in investment as of 2014, depending on whether one considers start-ups (FinTech 3.0) only or the full spectrum of applications, including traditional financial institutions (FinTech 2.0). This rapid growth has attracted greater regulatory scrutiny, which is certainly warranted given the fundamental role FinTech plays in the functioning of finance and its infrastructure. FinTech today is often seen as a uniquely recent marriage of financial services and information technology. However, the interlinkage of finance and technology has a long history. In fact, financial and technological developments have long been intertwined and mutually reinforcing. The Global Financial Crisis (GFC) of 2008 was a

watershed and is part of the reason FinTech is now evolving into a new paradigm. This evolution poses challenges for regulators and market participants alike, particularly in balancing the potential benefits of innovation with the potential risks. The challenge of this balancing act is nowhere more acute than in the developing world, particularly Asia.

… …
(page 4)

It is important to distinguish three main eras of FinTech evolution. From around 1866 to 1967, the financial services industry, while heavily interlinked with technology, remained largely an analogue industry, at least in public perception, a period which we characterize as FinTech 1.0. From 1967, the development of digital technology for communications and processing of transactions increasingly transformed finance from an analogue to a digital industry. By 1987 at the latest, financial services at least in developed countries had become not only once again highly globalized, but also digitalized. This period, which we characterize as FinTech 2.0, continued until 2008. During this period, FinTech was dominated primarily by the traditional regulated financial services industry that used technology to provide financial products and services. However, since 2008 (the period we characterize as FinTech 3.0) this is no longer necessarily the case. New start-ups and established technology companies have begun to deliver financial products and services directly to businesses and the general public.

… …
(page 15)

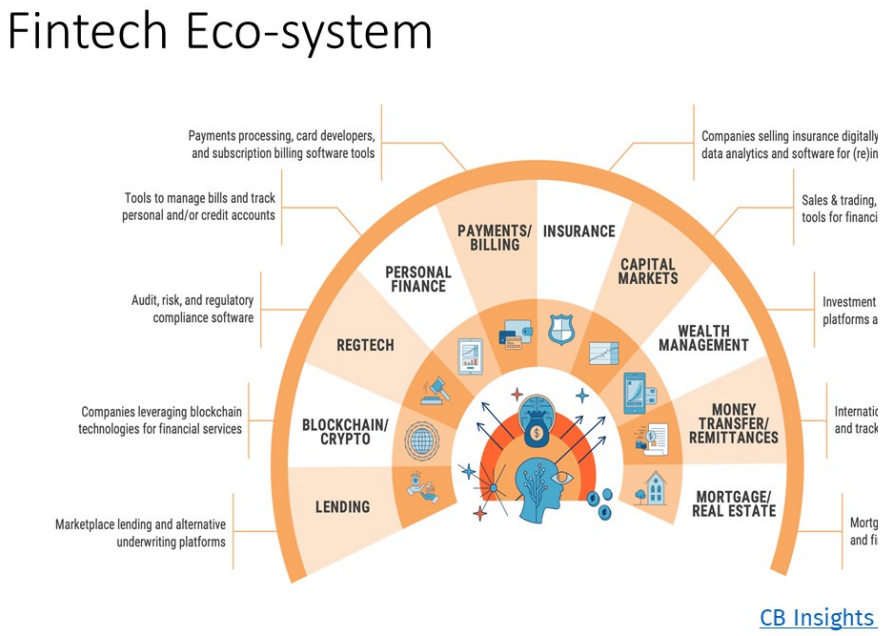
FinTech today comprises five major areas: (1) finance and investment, (2) operations and risk management, (3) payments and infrastructure, (4) data security and monetization, and (5) customer interface.

A, Douglas, et al. (2015). **The Evolution of Fintech: A New Post-Crisis Paradigm?**. UHK Faculty of Law Research Paper No. 047. http://dx.doi.org/10.2139/ssrn.2676553

Understanding the FinTech Ecosystem

Objective:

- Students will read and understand the myriad actors involved in the FinTech Ecosystem



PREVIOUS (/M/329/8921/67903)

Why do we need FinTech?

Objective:

- Students will understand the concept of social impact
- Students will understand how FinTech can serve as an enabler for financial inclusion

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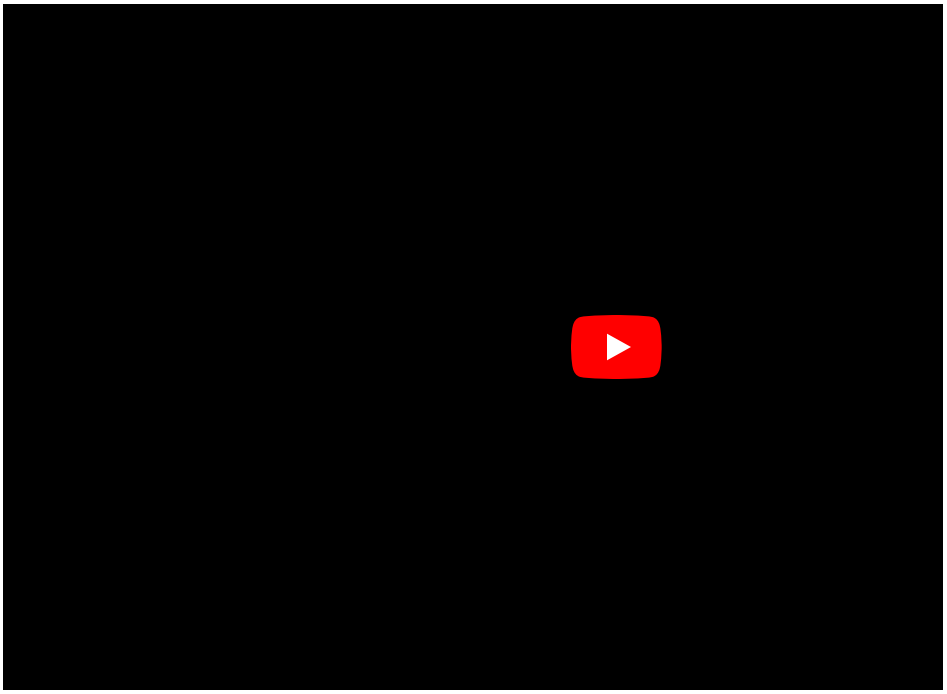
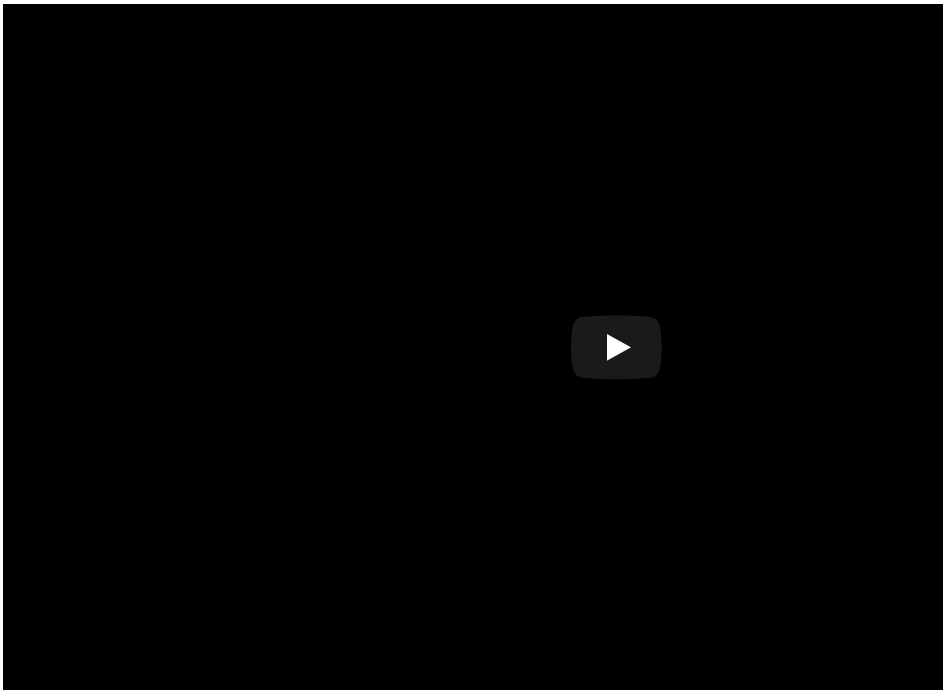
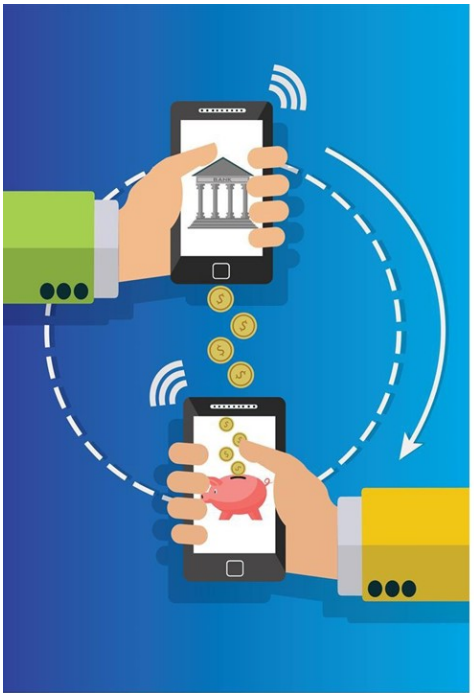
Economic Instability in Lebanon



The Social Disease of Financial Exclusion





Financial Inclusion

- It is an effort to make everyday
  available to more of the world's
  reasonable cost. A key enab
  poverty and boosting prosperity.
- Advancements in fintech, s
  transactions, are making financia
  to achieve

**"World Bank estimates tha
billion adults worldwide still
even a basic bank acc**

Why Fintech ?

Financial Inclusion : 1.4 billion people unbanked, M-PESA

Cost Effectiveness: No Physical Branches, No Middle Man,

Empowers small business: Faster to market , Stripe

PREVIOUS (/M/329/8921/67981)

How Technologies Impact the Adoption of FinTech

Objective:

- Students will define what a digital currency is
- Students will be able to describe the impact of mobile phone technology on both FinTech in ger

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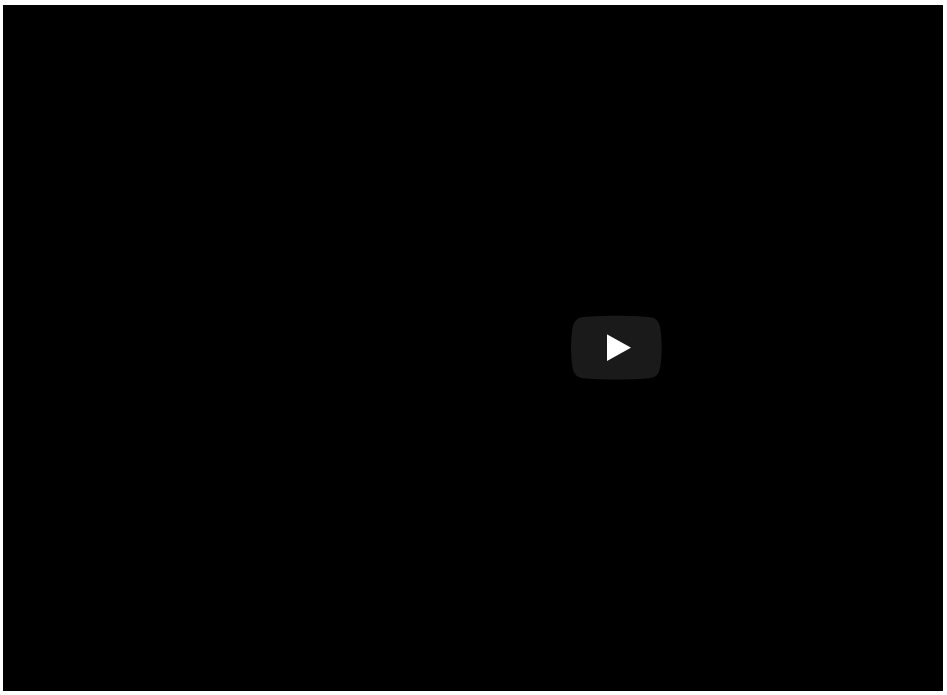
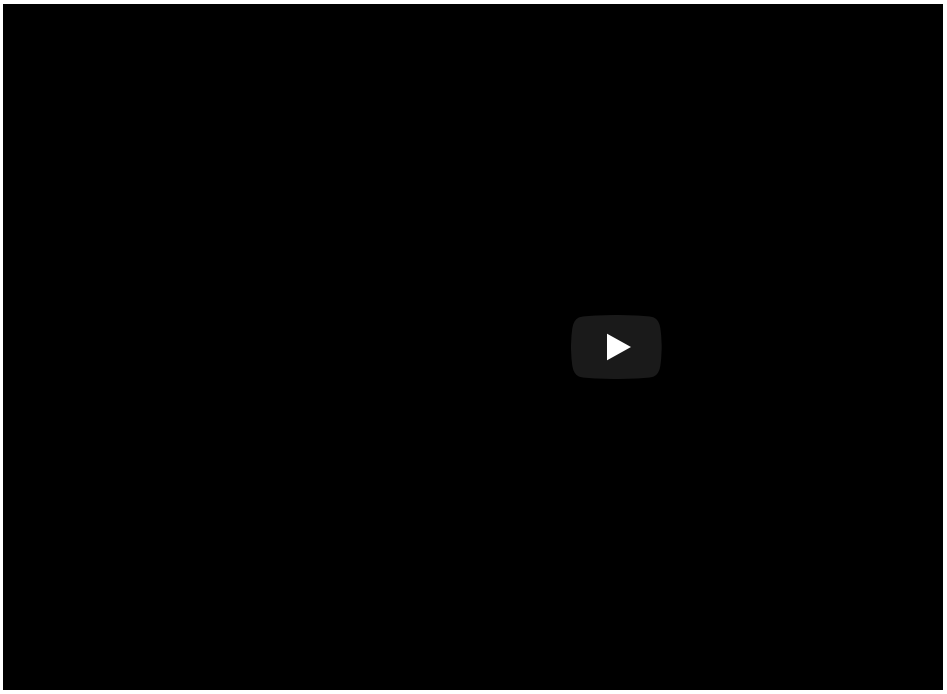
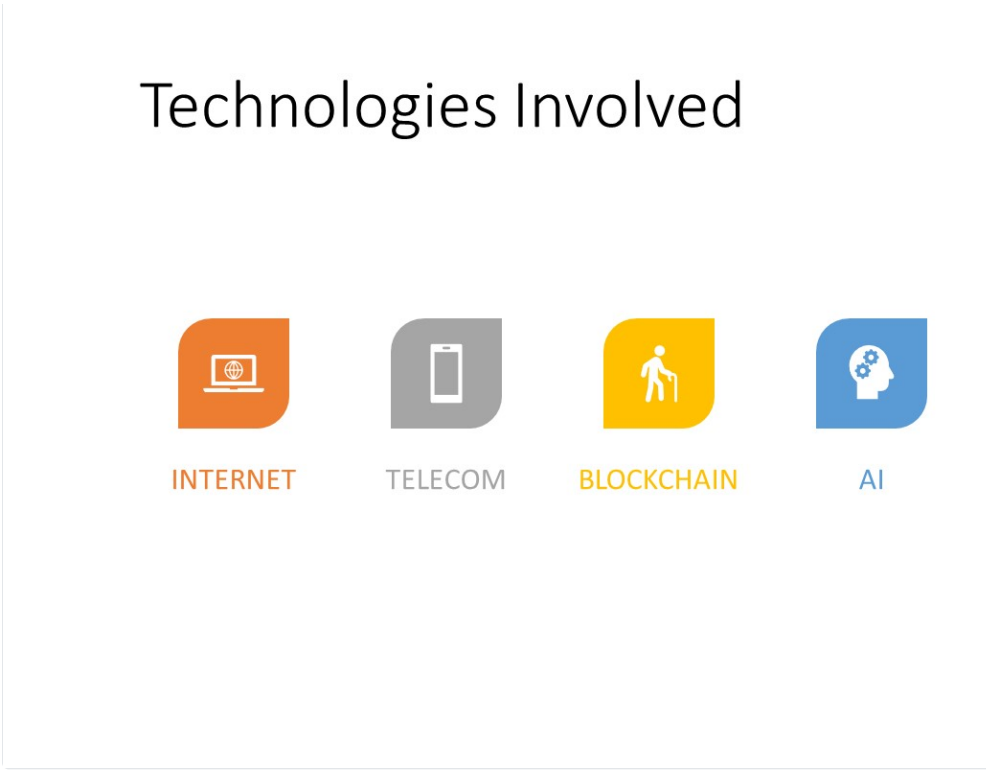
Digital Currency in the Bahamas



How M-Pesa enables Financial Inclusion in Africa





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Innovative Forces in Finance

Objectives:

- Students will be able to identify the most important aspects of financial services
- Students will be able to discuss the eight forces have the potential to shift the competitive landscape of financial services

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Systems design, performance analysis and productivity, forecasting, inventory and cash management, waiting line analysis for capacity planning, staff scheduling, operational risk management, and pricing and revenue management are all important aspects of financial services. High volumes and substantial client heterogeneity (differences), frequent service contacts, and the use of technology in the service encounter are all key components of financial services operations. All of these things are changing dramatically as a result of new FinTech approaches: by creating a new basis for harmonizing investments across business partners and competitors; by making new products and services available that have a different operational basis, with reduced human involvement on purely transactional aspects, supported by machine intelligence where that is appropriate; and by making new products and services available that have a different operational basis, with diminished human involvement on purely transactional aspects, supported by machine intelligence where that is appropriate.

source:https://images.app.goo.gl/xh1CvsGZimhywibE9

Based on these insights, eight forces have been identified by the related literature to have the potential to shift the competitive landscape of financial services:

1. **Cost commoditization -** Operating costs are becoming less of a differentiator in the marketplace. Firms are experimenting with new technologies and collaborating with other organizations, including rivals and new entrants, to expedite the commoditization of their cost basis so that profits may be preserved, and more viable strategies can be pursued. In some cases, this may mean operating at a loss to promote churn in a competitor, and/or to grow the number of users on a platform quickly.

1. **Profit redistribution -** As the cost of bypassing intermediaries them to reach the final consumer decreases as a result of technological advancements, these intermediaries will need to discover new ways to financially offer value. Meanwhile, FinTech firms will have access to a growing pool of potential partners who can help them build and increase their client base. Regulators will have to figure out how changing fortunes are altering the value chain, with long-regulated

businesses giving way to new ones. Consumers' demands are also shifting in regard to Fintech firms' profits, with requests of equity issuance and pre-IPO offerings.

1. **Experience ownership -** Many financial firms have traditionally distributed their own products. However, with the growth of platforms and other channels, savvy incumbents are preparing for situations when distribution is beyond their control. Recognizing that those who control the client experience have the upper hand, financial service providers are debating whether to pursue methods that need great size or concentration.

1. **Platforms rising -** Customers want more options in financial services, and they're increasingly expecting one-stop shopping. Institutions are trying to adapt, relying on digital platforms that allow them to offer services across various areas, frequently in collaboration with other suppliers.

1. **Data monetization -** Faced with an increasingly crucial future, businesses are beginning to gather data in flows rather than snapshots —for example, through location data obtained through consumer phones rather than transactions. Customers' databases are also being expanded by businesses.

1. **Bionic workforce -** On the front end, AI is emulating the devices that have come to dominate client interactions with many technological companies. Internally, employees are collaborating with AI to improve their efforts, drastically lowering the time and resources needed to finish major projects with well-defined, repetitive duties.

1. **Systemically important techs -** Major technological firms have showed little interest in providing financial services thus far. Financial organizations, on the other hand, are increasingly reliant on cloud-based infrastructure and use online data storage and processing tools.

The result is that financial services must strike a balance: on the one hand, they risk becoming too reliant on huge digital companies, while on the other, they risk falling behind their competitors. To prevent either scenario, financial institutions will need to figure out how to collaborate with technology businesses without losing sight of their core value proposition, as well as tolerate a loss of control over expenses and data.

1. **Financial regionalization -** Financial globalization looked inevitable a decade ago, when the movement of capital across borders was at its topmost. The tendency is now in the opposite direction, with financial services models tailored to local requirements. Divergent governmental agendas, technology capabilities, and customer conditions are complicating the story of expanding globalization, forcing industry participants to take alternative courses in different parts of the globe.

Disruption in Financial Intermediation

Objectives:

- Students will be able to describe the concept of disruption
- Students will be able to describe the role of intermediaries in financial transactions

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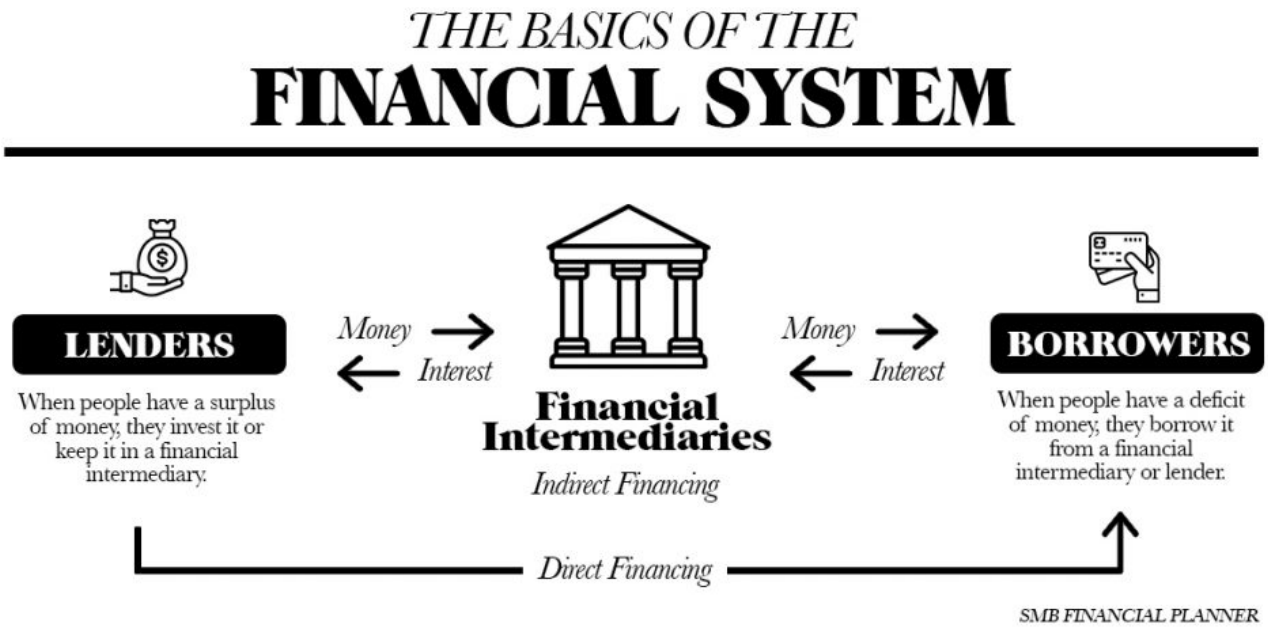
Disruption in Fintech refers to innovation that significantly changes the way that consumers, industries, or businesses operate or use financial services. A disruptive Fintech company sweeps away the systems or standards it replaces because it has attributes that provide superior service, access, quality, etc. Much of FinTech disruption occurs within the "legacy" financial service industry often seen as “ripe for disruption.”

Financial systems will undoubtedly need to adapt at a faster or slower pace, but at this point, it is unclear if some of the underlying rationales for the existence of financial intermediaries will be challenged by the FinTech innovations we are experiencing. The presence of financial intermediaries, like any other institution, is justified by the role they play in the process of resource allocation, particularly capital allocation.

Financial intermediates are experts in buying and selling financial contracts and securities at the same time. The presence of frictions in transaction technology, such as transaction costs, is a first reason for the existence of financial intermediaries. FinTech applications will challenge this logic by significantly decreasing transaction costs, if we think of financial intermediaries as other merchants (maybe brokers and dealers working on financial markets are a better illustration). Internet merchants and e-commerce provide a better comparison for determining the possible influence on this type of intermediation.

It's possible that new technology may at least partially replace the complete

range of services presently provided by brokers and dealers. It's also feasible that new entrants will enhance competition in specific areas and perhaps supplant incumbents. Other financial intermediaries' operations, on the other hand, are often more complicated.



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For starters, financial institutions such as banks and insurance firms often deal with financial transactions that cannot be readily resold, such as loans and deposits. As a result, these intermediaries must keep these contracts on their books until they expire. Recent applications of securitization and structured products, on the other hand, have resulted in an originate and distribute business model, in which illiquid assets may be moved off of financial intermediaries' balance sheets. Secondly, the features of borrowers' contracts differ significantly from those of depositors' contracts. As a result, financial intermediaries vary from ordinary shops in that they also alter financial contracts in terms of denomination, quality, and maturity.

The simplest approach to justify financial intermediaries' existence is to stress the difference between their inputs and outputs, and to consider their

primary activity as financial securities transformation. As a result, financial intermediaries may be thought of as groups of economic agents who take advantage of transaction technology's economies of size and breadth.

Disintermediation of Capital and Payments

Objectives:

- Students will be able to define disintermediation
- Students will be able to discuss the benefits of disintermediation

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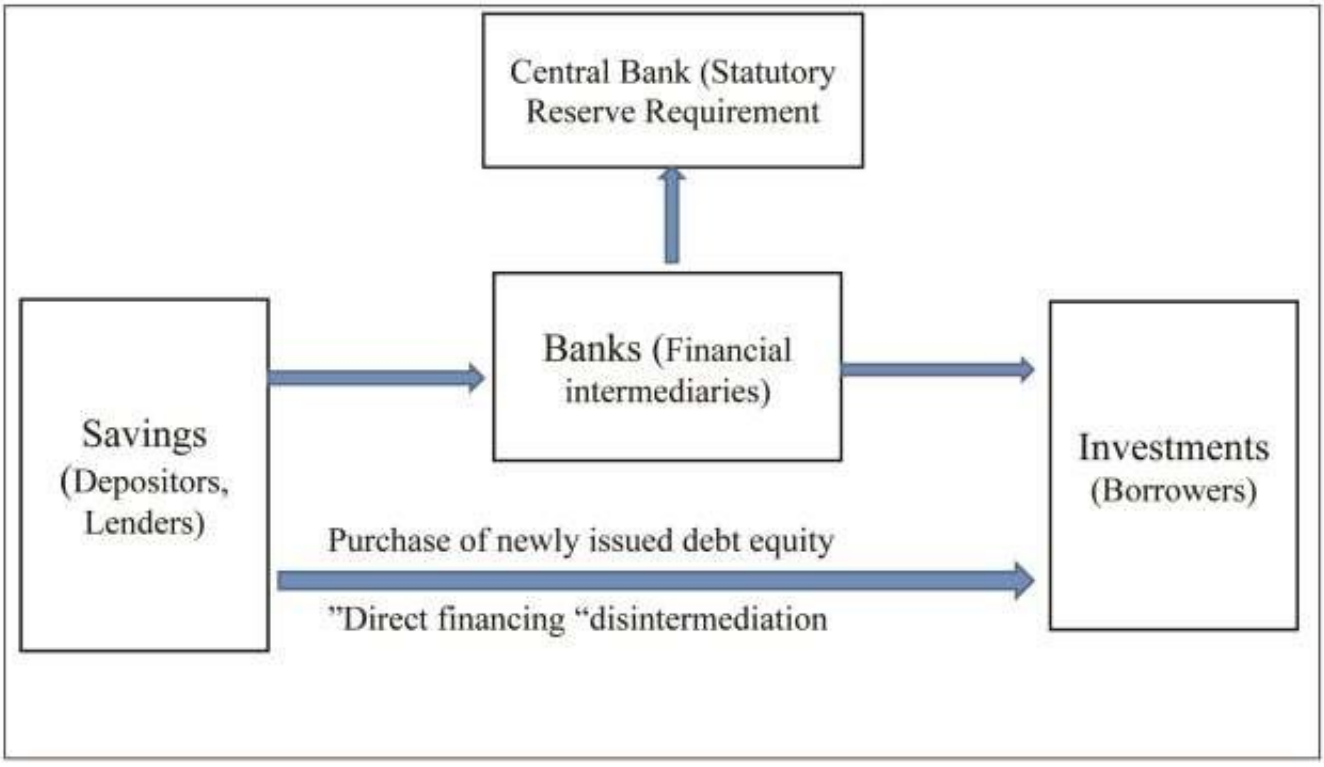
Disintermediation in Fintech refers to innovation that significantly removes or reduces intermediaries in providing financial services. This often leads to competitive advantages, increased profits and superior user experience by “cutting out the middle-man.”



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The existence of transaction costs may be the source of these economies of size and scope. Banks, for example, begin by managing deposits in close proximity to the more basic process of money changing. Old age bankers

may readily provide the service to merchants and traders since they already have a need for safeguarding facilities for their own money; that is, there are economies of scale between money-changing and safekeeping deposits. Because of constant transaction costs or, more broadly, growing returns in transaction technologies, economies of scale may exist. While transaction costs associated with physical technology may have played a part in the formation of financial intermediaries in the past, advances in digital technologies may call into question this justification for their existence. However, there are other types of transaction costs, maybe more basic, that are unlikely to be lowered to the point of disrupting financial intermediation by FinTech innovation.

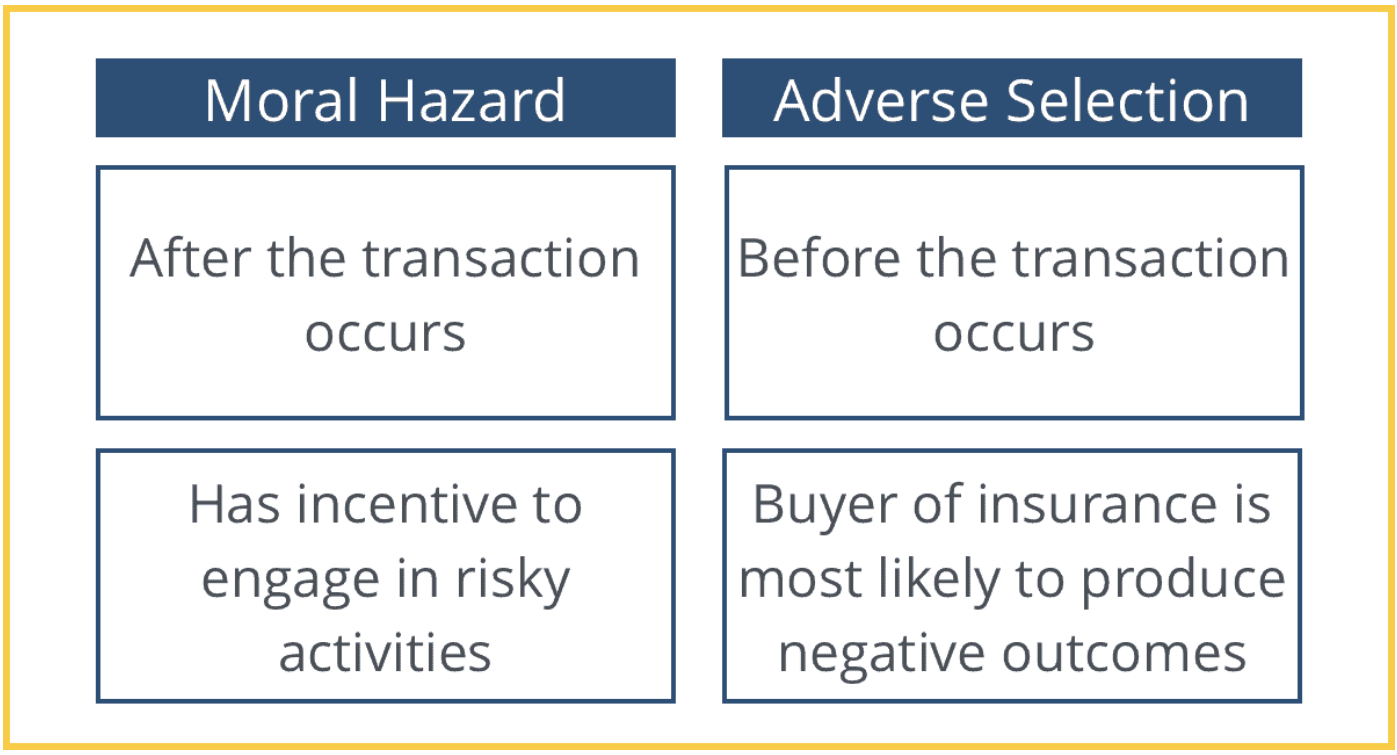
Specific types of transaction costs, such as adverse selection, moral hazard, and costly state verification, may arise in finance as a result of market inefficiencies caused by informational asymmetries. Financial intermediaries can offset these costs, at least in part, by taking advantage of economies of size and scope in information sharing, monitoring, and offering liquidity insurance.

Adverse selection, or instances in which borrowers are better informed than investors about the quality of the project they are trying to fund, can lead to lending-borrowing economies of scale. Borrowers can mitigate the problem of adverse selection by self-financing a portion of the project. If borrowers are risk averse, however, this signaling is expensive since they must keep a significant portion of the risk. In this instance, a financial intermediary in the shape of a coalition of borrowers is able to secure better financing terms than individual borrowers by taking advantage of economies of scale in information sharing: the signaling cost rises more slowly than the coalition's size. Still, in the case of adverse selection, coalitions of diverse borrowers can enhance market outcomes by allowing cross-subsidization within the coalition and taking use of economies of scope in screening operations.

Some of the FinTech advances we've seen so far may actually support,

rather than contradict, this perspective of financial intermediation by lowering the costs of communication, information exchange, and data verification in terms of both time and money. At the same time, it's difficult to see how the new technologies mentioned in the preceding section might be used to solve the adverse selection problem on their own. When considering other basic rationales for financial intermediation, a similar conclusion may be drawn.

Moral hazard and expensive ex post verification, for example, may be an issue when borrowers are opportunistic. Monitoring may be an option in this scenario. Monitoring operations generally entail economies of scale, implying that such tasks are more efficient when carried out by specialized companies. As a result, individual investors would prefer to entrust monitoring to such a specialist organization.



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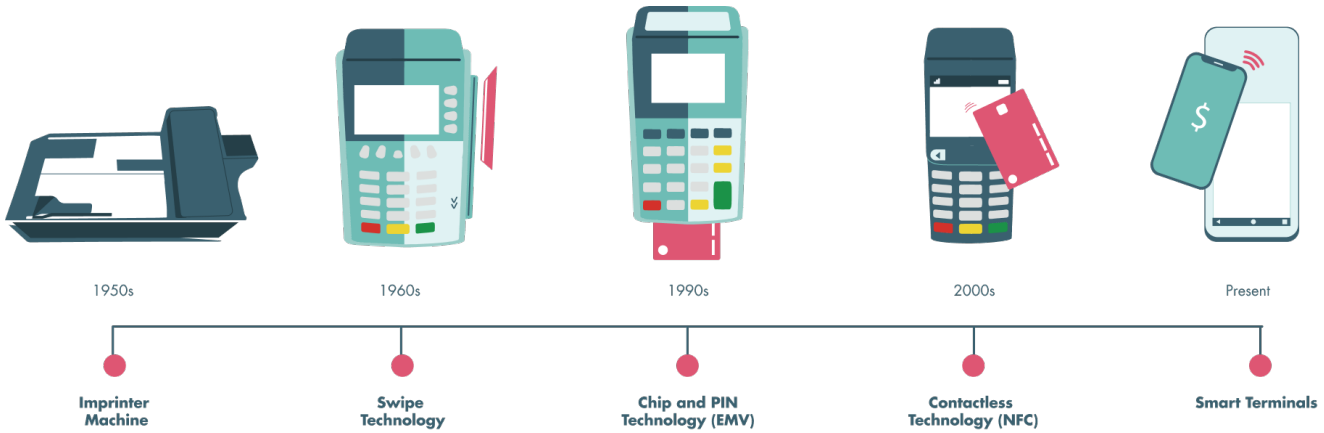
The current worry is that if monitors are self-interested, they must be provided incentives to do their duties appropriately. Financial intermediaries, according to several interpretations, give answers to this motivation

dilemma. One argument is that the ideal arrangement will resemble a bank deposit contract, and that by diversifying the loan portfolio, the financial intermediary will be able to reduce the cost of monitoring as much as feasible, approaching riskless deposits. Another point of view is that the ability to remove demand deposits is an acceptable tool for punishing bankers. There are also informational economies of scope between monitoring and lending activities, which explains the need of bank capital. Finally, in an economy where agents are individually susceptible to separate liquidity shocks, deposit contracts issued by a financial intermediary have the potential to exceed market allocation. FinTech advancements may make it easier for businesses, particularly small businesses, and consumers to fund themselves directly, putting more pressure on financial intermediaries.

It may also be used to bring in agents who were previously barred from financial circles. This might be attributed to lower transmission and data processing costs, as well as better record keeping. Big data and the internet of things aid in the provision of tailored and differentiated financial products, enhancing the attractiveness and effectiveness of offerings. However, opportunistic behavior factors that prohibit businesses with insufficient assets or reputation from obtaining direct financing will continue to exist, and intermediate finance appears to be the only viable option.

Financial intermediation is expected to coexist alongside direct finance in the future, notwithstanding FinTech advancements. The majority of FinTech innovations to date have been in the areas of payment systems, electronic money and wallets, and peer-to-peer lending. The massive reduction in transmission costs, the massive networks of social network users (where users are more fans than customers), and the image generated by some IT businesses place them in a strategic position to provide these types of financial solutions.



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Money transfers via Facebook Messenger, electronic payments via Amazon Pay, and Alibaba's electronic wallet are all examples. Clearly, these services compete directly with similar services formerly offered by banks and other traditional financial institutions. However, the latter have the benefit of being perceived as safer and more trustworthy – due in part to massive expenditures in cybersecurity–, whilst the former must continue to emphasize this problem, particularly because they would be a lucrative target for hackers. FinTech advancements are also being used by banks to lower the cost of money transfers. For example, Barclays utilizes Bitcoin subsidiaries to transfer money between countries, significantly decreasing transaction time and cost. Financial resources and information are required for other financial intermediation operations such as deposit and lending.

Both conventional banks and internet firms, such as Google, have both sorts of resources; one group may have different forms of perhaps complimentary information than the other. Google now offers payment services through Google Wallet and Android Pay, but it also owns bank licenses in a number of countries. If Google begins banking operations, it will significantly boost competition for traditional banking. Certainly, the way information is received, processed, and utilized to make financial decisions would alter, as would the procedures for mitigating the asymmetric information issues that necessitate financial intermediation, as well as the channels through which financial goods are commercialized. The rationales for fundamental banking

operations, on the other hand, do not appear to be challenged by this change in banking practices and the use of technology and information.

Democratization in Financial Services

Objective:

- Students will be able to define democratization as it applies to FinTech

---

Democratization in FinTech refers to significantly increasing access to financial services making them “open to all.” This is often by providing new financial services that weren’t traditionally available to disenfranchised, unqualified and underserved consumers, business and industries.

source:https://images.app.goo.gl/Kk32DtdZdvwMYz3L9

New technologies have spawned the so-called platform economy, which has permitted the most efficient contact between customers and service providers, including financial ones, in recent years. Technological convergence, the result of the coexistence of various technologies as well as the development of the Internet of Information, has now evolved into the Internet of Value (with distributed ledger technology - DLT) in a union of

innovative collaborative economy systems that is arming individuals with tools that are posing a threat to the status quo.

The FinTech boom of the last decade has ushered in the most significant shift in the financial industry, in terms of business models, distribution channels, and financial service offering. For various reasons, technology is driving an accelerated process of financial democratization by increasing competition in the sector, thanks to the collapse of many conventional entry barriers in banking, which are now available to FinTechs and bigtechs (big technology businesses).

Banking is being heavily digitized as a result of technology and its disruptive use in the financial industry. This benefits consumer of financial services, who can profit from collaborative economy platforms in some situations, such as crowdfunding in its various forms. In other situations, it's for improved access to financial data and the ability to utilize comparators. It should be emphasized that the new rule mandating banks to expose their data to third parties approved by consumers is also a kind of deregulation (as is the case with the PSD2 law).

In the field of financial analysis and planning, several technologies are particularly beneficial. In-depth study of the behavior of users of financial services is feasible because to the ability to utilize information (e.g., big data). These technologies handle massive amounts of data, which may be easily exploited by new rivals, such as FinTech disruptors and major technology firms that specialize in big data collection. Furthermore, many of the tasks of conventional bank intermediation must be reassessed as new players enter the FinTech sector, as well as the well-known presence of big technology corporations with financial operations (conceptualized as techfin).

The empowerment that technology provides individuals necessitates a shift in the relationship between financial institutions and their customers. Parallel to the digital revolution, the banking system has recovered from the

profound economic and financial crisis. There has been a Darwinian quasi-extinction in some parts of the financial industry, favoring the creation of new, more suited and nimble species, such as FinTech businesses, or the discovery of new functions by extremely powerful species, such as major technology corporations or bigtechs.

In addition, there has been a process of sociocultural change in the new digital society with the inclusion of new generations: the already active millennials; and the more recent centennials, who have a different orientation in their means of relationship for the purposes of consumption, leisure, communication, as well as savings and investment.

In many financial operations, the notion that dramatic alterations necessitate restarting or raising procedures in their entirety begins to make sense. As a result, the early but growing use of blockchain technology will reshape financial intermediation and eliminate well-established actors like clearing houses, settlement systems, centralized order and transaction management, transfer systems, and even the currency's own configuration and future digitization via cryptoactives. Due to the pace of change and its global scope, it is an unparalleled shift; one that appears to be assimilated to the notion of deconstruction.

Financial service users will be more volatile and less loyal; therefore, no company will be willing to fall behind in terms of change adaption. These clients are increasingly demanding high-quality services, operational agility, and a new economic culture that includes distinct purchasing patterns and technological behavior. All of this will need striking an appropriate balance between conventional and new financial procedures, as well as the establishment of a transition system that will keep customers on track and add new clients to ensure the digital transformation process is viable.

In short, the financial sector is undergoing multiple and rapid developments, all of which are serving as catalysts for further financial democratization. To summarize--Disruption, disintermediation and democratization come

together to form a trifecta and are core principles for fintech innovation today.

Python Data Types

Objectives:

- Understand common data types we'll encounter as we learn Python
- Review the syntax for common data types
- Understand basic type casting

Name	Type	Description
Integers	int	Whole numbers, such as: 3 300 200
Floating Point	float	Numbers with a decimal point: 2.3 4.6 100.0
Strings	str	Ordered sequence of characters: 'hello" 'Sammy' "2000" "Ally"
Lists	list	Ordered sequence of objects: [10, "hello", 200.3]
Dictionaries	dict	Unordered Key:Value pairs: ("mykey" : "value" , "name" , : "Frankie")
Tuples	tup	Ordered immutable sequence of objects: (10,"hello",200.3)
Sets	set	Unordered collection of unique objects: {"a", "b"}
Booleans	bool	Logical value indicating **True** or **False**

A **Data Type** refers to how a given value is classified. Here's a list of the data types that you will likely be using in Data Science and Data Governance applications:

Primitive data types

These are the basic building blocks of a language. Most languages have these in common:

- **Boolean Values** - Assesses the truth value of something. It has only two values: *True* and *False* (note the uppercase T and F)

```
is_hungry = True
has_freckles = False
```

- **Numbers** - Integers (whole numbers), floating point numbers (commonly known as decimal numbers), and complex numbers

```
age = 35
weight = 160.57
```

- **Strings** - literal text

```
name = "Joe Blue"
```

Composite types

These are collections composed of the above primitive types.

- **Tuples** - A type of data that is **immutable** (can't be modified after its creation) and can hold a group of values. Tuples can contain mixed data types.

```
dog = ('Bruce', 'cocker spaniel', 19, False)
print(dog[0])
dog[1] = 'dachshund'
```

- **Lists** - A type of data that is mutable and can hold a group of values.

Usually meant to store a collection of related data.

```
empty_list = []
ninjas = ['Rozen', 'KB', 'Oliver']
print(ninjas[2])
ninjas[0] = 'Francis'
ninjas.append('Michael')
print(ninjas)
ninjas.pop()
print(ninjas)
ninjas.pop(1)
print(ninjas)
```

- **Dictionaries** - A group of key-value pairs. Dictionary elements are indexed by unique keys which are used to access values. When you're ready, you can find more built-in dictionary methods here.

```
empty_dict = {}
new_person = {'name': 'John', 'age': 38, 'weight': 160.2,
'has_glasses': False}
new_person['name'] = 'Jack'
new_person['hobbies'] = ['climbing', 'coding']
print(new_person)

w = new_person.pop('weight')
print(w)
print(new_person)
```

Common Functions

If we're ever unsure of a value or variable's data type, we can use the `type`

function to find out. For example:

```
print(type(2.63))
print(type(new_person))
```

For data types that have a length attribute (eg. lists, dictionaries, tuples, strings), we can use the `len` function to get the length:

```
print(len(new_person))
print(len('Coding Dojo'))
```

Type Casting or Explicit Type Conversion

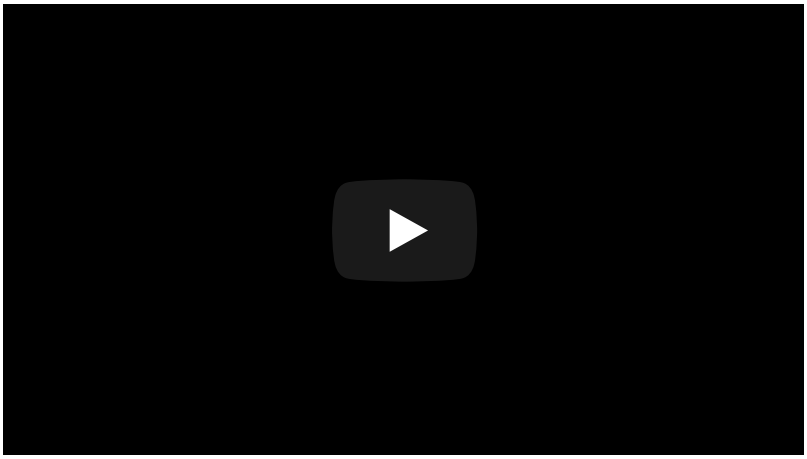
We may find ourselves wanting to change a value's data type from one type to another. For example, in the Hello World assignment, trying to print a string *plus* a number resulted in a TypeError. Python doesn't know how to add a string and a number, but it can add two strings together, so if we can **cast** the number *as a string*, then we will be able to "add" the two values together, like so:

```
print("Hello" + 42)
print("Hello" + str(42))
```

Another example may be receiving a string input from a user that we want to treat as a number:

```
total = 35
user_val = "26"
total = total + user_val
total = total + int(user_val)
```

Python Tutorial for Beginners: Understand Python Data Types in 10 minutes (9 minutes)



Working with Strings in Python

Objectives:

- Recognize various methods for combining variables with literal strings
- Be aware of commonly used string methods and where to go for more information

---

Method	Description
strip()	Removes any whitespace form the beginning or the end
lower()	Returns a string in lower case characters.
upper()	Returns a string in uppercase characters.
replace()	Replaces a string with another string.
split()	Splits the string into sub strings.
capitalize()	Capitalizes the first character in the string.
count()	Returns no. of occurrences in the string.
index()	Returns the index of the character.
find()	Gives the index value of the string specified.
isalpha()	Returns true if the string has only alphabets.
islanum()	Returns true if the string has both alphabets and numbers.
isdigit()	Returns true if the string has only numbers.
islower()	Returns true if the string has only lower case characters.
isupper()	Returns true if the string has only upper case characters.

String Literals

Strings are any sequence of characters (letters, numerals, special characters, ~($/}\#, etc.) enclosed in single or double quotes. We can display a string like this:

```
print("this is a sample string")
```

Concatenating Strings and Variables with the print function

There are multiple ways that we can print a string containing data from variables.

The first way to print a string containing data from variables is by adding a comma after the string, followed by the variable. Note that the comma is *outside* the closing quotation mark of the string. The `print()` function inserts a space between elements separated by a comma.

```
name = "Zen"
print("My name is", name)
```

The second is by concatenating the contents into a new string, with the help of **+**.

```
name = "Zen"
print("My name is " + name)
```

There is one other difference between concatenating using a plus versus using a comma, can you find out what it is?

Hint: try concatenating a string with an integer using each method.

String Interpolation

We can also inject variables into our strings, which is known as **string interpolation**. There are a few different ways this can be done.

F-Strings (Literal String Interpolation)

Python 3.6 introduced f-strings for string interpolation. To construct an f-string, place an `f` right before the opening quotation. Then within the string, place any variables within curly brackets.

```
first_name = "Zen"
last_name = "Coder"
age = 27
print(f"My name is {first_name} {last_name} and I am {age}
years old.")
```

string.format()

Prior to f-strings, string interpolation was accomplished with the `.format()` method. If you're searching online, you will likely find code snippets using this method. To use it, type out the full string, replacing any words that will get their values from variables with `{}`. Then call the `format` method on the string, passing in arguments in the order in which they should fill the {} placeholders.

Here's an example:

```
first_name = "Zen"
last_name = "Coder"
age = 27
print("My name is {} {} and I am {} years
old.".format(first_name, last_name, age))

print("My name is {} {} and I am {} years old.".format(age,
first_name, last_name))
```

The two example print statements are provided to demonstrate that the

format method reads the string from left to right, replacing the {} with the value of the arguments provided, in order. This means there should be the same number of sets of {} as there are arguments passed into the function.

%-formatting

There is an even older method of string interpolation that you may come across when troubleshooting or researching, so you should know about it. Rather than curly braces, the `%` symbol is used to indicate a placeholder, a `%s` for a string and `%d` for a number. After the string, a single `%` separates the string to be interpolated from the values to be inserted into the string, like so:

```
hw = "Hello %s" % "world"
py = "I love Python %d" % 3
print(hw, py)

name = "Zen"
age = 27
print("My name is %s and I'm %d" % (name, age))
```

Built-In String Methods

We've seen the format method, but there are several more methods that we can run on a string. Here's how to use them:

```
x = "hello world"
print(x.title())

"Hello World"
```

The following is a list of commonly used string methods:

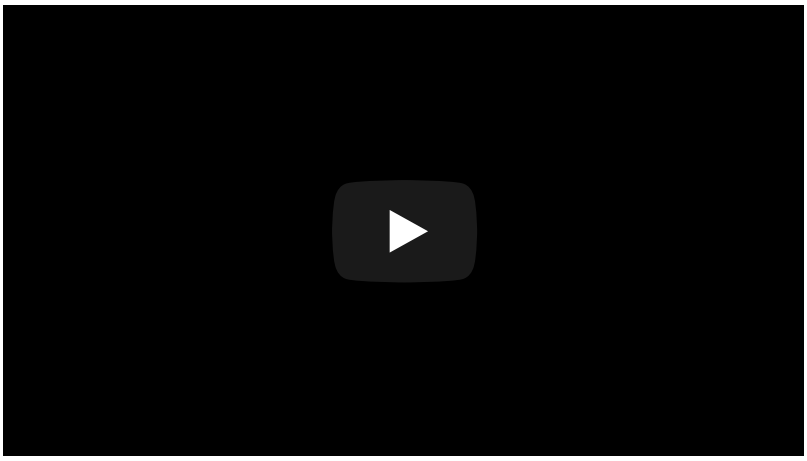
Note everywhere you see the word `string`, you need to replace this with an actual instance of a string. For example `"hello world".upper()` will return a transformed copy of the "hello world" string to look like "HELLO WORLD".

- `string.upper()`: returns a copy of the string with all the characters in uppercase. Example: `print("hello world".upper())`
- `string.lower()`: returns a copy of the string with all the characters in lowercase.
- `string.count(substring)`: returns number of occurrences of substring in string.
- `string.split(char)`: returns a list of values where string is split at the given character. Without a parameter the default split is at every space.
- `string.find(substring)`: returns the index of the start of the first occurrence of substring within string.
- `string.isalnum()`: returns a boolean depending on whether the string's length is > 0 and all characters are alphanumeric (letters and numbers only). Strings that include spaces and punctuation will return False for this method. Similar methods include `.isalpha()`, `.isdigit()`, `.islower()`, `.isupper()`, and so on. All return booleans.
- `string.join(list)`: returns a string that is all strings within our set (in this case a list) concatenated
- `string.endswith(substring)`: returns a boolean based upon whether the last characters of string match substring.

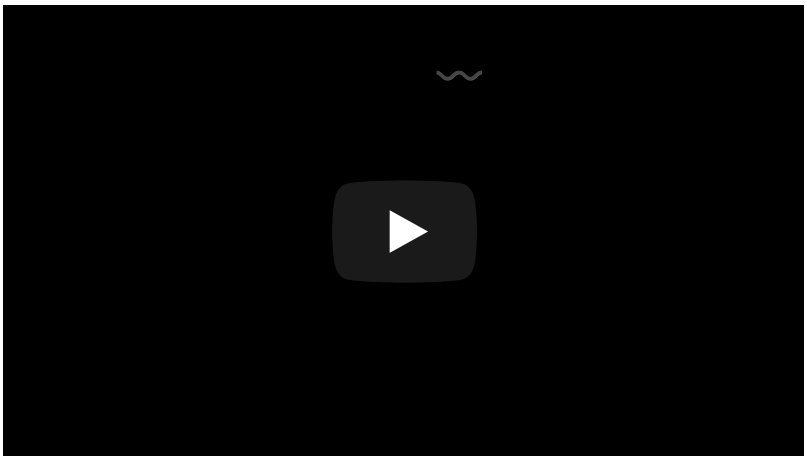
It's important to know that we have only introduced you to the basics of what we can do with strings. There is a lot more you can do with string interpolation, and every data type has numerous built-in methods. The Python documentation is the best place to look for more information. For example, "String Methods" can be found in the Python docs. Get a general idea of the tools we have available to us and try experimenting with them in the shell to see what they can do, but don't spend time trying to memorize

them, though. You can always look up whatever you need to use.

Quick Intro to F-Strings in Python for String Formatting: (4 minutes)



Python string methods 〰️: (5 minutes)



Working with Loops in Python

Objectives:

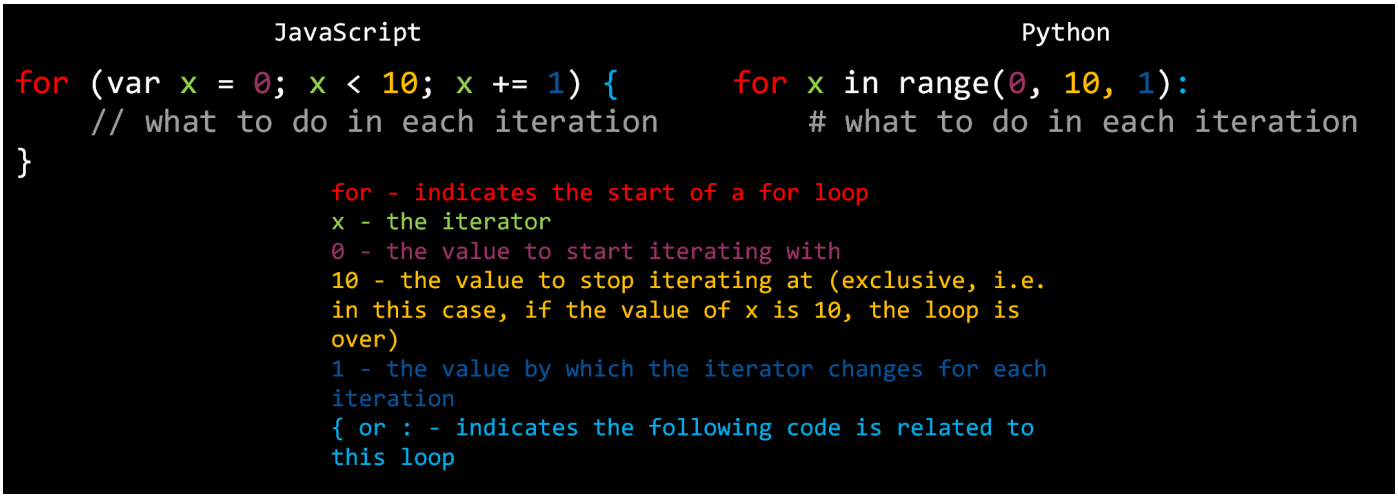
- Understand how to loop through a range of numbers
- Understand how to loop through a list
- Understand how to loop through a dictionary
- Understand how to use a while loop
- Understand break and continue statements within loops

In [17]:
```
i = 0
while i < 5:
    print('Iteration number '+str(i)+'!' )
    i += 1
print('i = ' + str(i))
```

```
Iteration number 0!
Iteration number 1!
Iteration number 2!
Iteration number 3!
Iteration number 4!
i = 5
```

For Loops with Range

If we want to iterate through numbers, we can use Python's `for` loop and `range()` function. Let's learn how this works by comparing how for loops work in JavaScript:



Notice that the `range()` function takes 3 arguments. The first value is where the loop should begin, the second value is where the loop should end (exclusive), and the third value is how to increment the iterator.

The range function actually comes with a few shortcuts. If we know the increment is going to be plus one, we can actually just ignore the third argument. Furthermore, if we know the increment is going to be positive one *and* the loop starts at 0, we can also leave off the first argument. In other words, each of the following will result in exactly the same loop:

```
for x in range(0, 10, 1):
for x in range(0, 10):
for x in range(10):
```

Note that if you need to specify an increment other than +1, all three arguments are required.

```
for x in range(0, 10, 2):
    print(x)

for x in range(5, 1, -3):
    print(x)
```

For Loops through Lists

If we want to iterate through a list, we could use the range function and send in the length of the list as the stopping value, but if we are not interested in the index values and want to just see the values of each item in the list in order, we can actually loop to get the values of the list directly!

```
my_list = ["abc", 123, "xyz"]
for i in range(0, len(my_list)):
    print(i, my_list[i])


for v in my_list:
    print(v)
```

For Loops through Dictionaries (Optional)

Dictionaries are also iterable. When we iterate through a dictionary, the iterator is each of the *keys* of the dictionary.

```
my_dict = { "name": "Noelle", "language": "Python" }
for k in my_dict:
    print(k)
```

That means if we want the *values* of our dictionary, we might do something like this:

```
my_dict = { "name": "Noelle", "language": "Python" }
for k in my_dict:
    print(my_dict[k])
```

Dictionaries also have a few additional methods that allow us to iterate through them and have the keys and/or values as the iterator. Test these out to get a better understanding:

```
for key in capitals.keys():
    print(key)

for val in capitals.values():
    print(val)

for key, val in capitals.items():
    print(key, " = ", val)
```

While Loops

While loops are another way of looping *while* a certain condition is true.

Remember this **for loop**?

```
for count in range(0,5):
    print("looping - ", count)
```

We can rewrite it as a **while loop**:

```
count = 0
while count < 5:
    print("looping - ", count)
    count += 1
```

The basic syntax for a **while loop** looks like this:

```
while <expression>:
```

Else

There are certain conditions that we give for every loop that we have, but what if the condition was not met and we still would like to do something if that happens? We can then use an **else** statement with our while loop. Yes, that is right, **else** in a **loop**.

```
y = 3
while y > 0:
    print(y)
    y = y - 1
else:
    print("Final else statement")
```

The output would be:

Note that this **else** code section is only executed if the **while loop** runs normally and it's **conditional** is false (whether we never entered the **while loop**, or we did but eventually the conditional changed from true to false). If instead our **while loop** is exited prematurely because of a *break* or *return* statement, then the **else** code section will never be executed.

Loop Control

We were introduced to control flow in the previous tabs with if and else statements. *Loops*, *breaks*, and *continues* are all a part of control flow as well. Control flow is the cornerstone of most programming languages.

When you want finer control over your loops, use the following statements to do so.

Break

The **break** statement exits the current loop prematurely, resuming execution at the first post-loop statement. The *break* statement can be used in both **while** and **for** loops. The most common use for the *break* is when some external condition is triggered, requiring a hasty exit from a loop. When loops are nested, a *break* will only exit from the innermost loop.

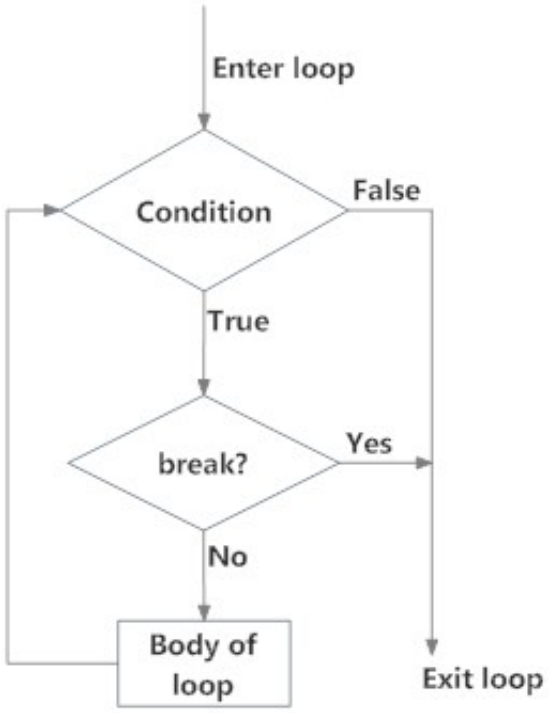


Fig: flowchart of break

```
for val in "string":
    if val == "i":
        break
        print(val)
```

Notice that when the loop got to the letter "i", we stopped looping.

Continue

The **continue** statement immediately returns control to the beginning of the loop. In other words, the *continue* statement rejects, or skips, all the

remaining statements in the current iteration of the loop, and continues normal execution at the top of the loop. The *continue* statement is very useful when you want to skip specific iteration(s), but still keep looping to the end.

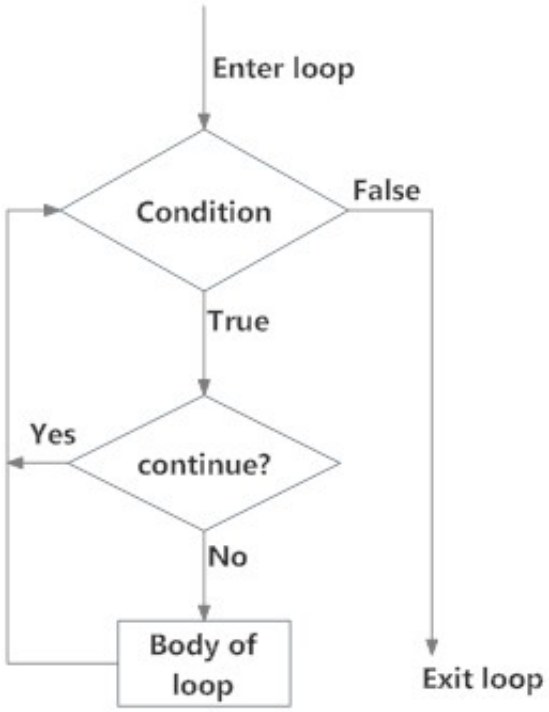
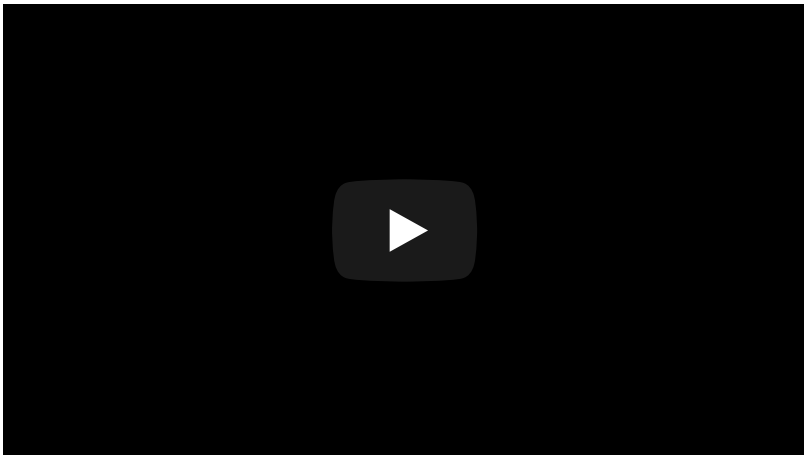


Fig: flowchart of continue

```
for val in "string":
    if val == "i":
        continue
    print(val)
```

```
y = 3
while y > 0:
    print(y)
    y = y - 1
    if y == 0:
        break
    else:
        print("Final else statement")
```

While Loops and For Loops in Python | Learning Python for Beginners | Code with Kylie #6: (11 minutes)



Working with Conditional Statements in Python

Objectives:

- Know the syntax of conditional statements
- Understand when to use a conditional statement

Conditional statements allow us to run certain lines of code depending on whether certain conditi keywords for conditional statements are `if`, `elif`, and `else`. Here are some examples:

```
x = 12
if x > 50:
    print("bigger than 50")
else:
    print("smaller than 50")
# because x is not greater than 50, the second print statement is the only one that w

x = 55
if x > 10:
    print("bigger than 10")
elif x > 50:
    print("bigger than 50")
else:
    print("smaller than 10")
# even though x is greater than 10 and 50, the first true statement is the only one t
ill only see 'bigger than 10'

if x < 10:
    print("smaller than 10")
# nothing happens, because the statement is false
```

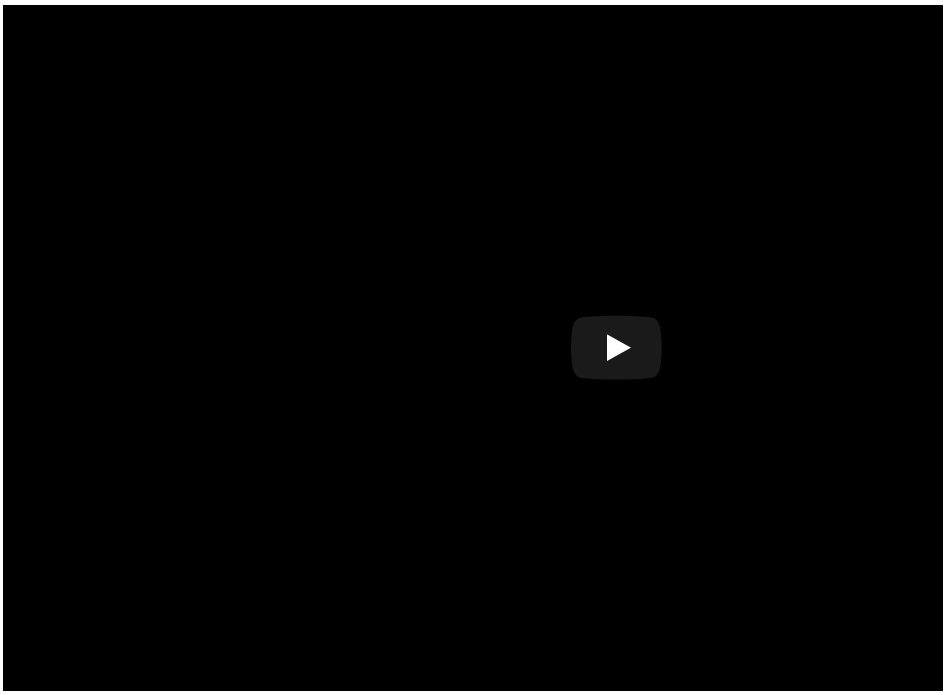
Comparison and Logic Operators

Here is a table of the comparison operators you can use in your Python programs.

Operator	Description	
==	Checks if the value of two operands are equal	1 == 2 => False 1 == 1 => True

!=	Checks if the value of two operands are not equal	1 != 2 => True 1 != 1 => False
>	Checks if the value of left operand is greater than the value of right operand	1 > 2 => False 2 > 1 => True
<	Checks if the value of left operand is less than the value of right operand	1 < 2 => True 2 < 1 => False
>=	Checks if the value of left operand is greater than or equal to the value of right operand	1 >= 2 => False 2 >= 2 => True
<=	Checks if the value of left operand is less than or equal to the value of right operand	1 <= 2 => True 2 <= 2 => True
and	Checks that each expression on the left and right are both True	(1 <= 2) and (2 (1 <= 2) and (2 (1 >= 2) and (2
or	Checks if either the expression on the left or right is True	(1 <= 2) or (2 > (1 <= 2) or (2 < (1 >= 2) or (2 >
not	Reverses the true-false value of the operand	not True => Fal not False => Tr not 1 >= 2 => T not 1 <= 2 => F not (1 <= 2 and not 1 <= 2 and

Python Programming #8 - Conditional Statements: (8 minutes)



FinTech 3.5

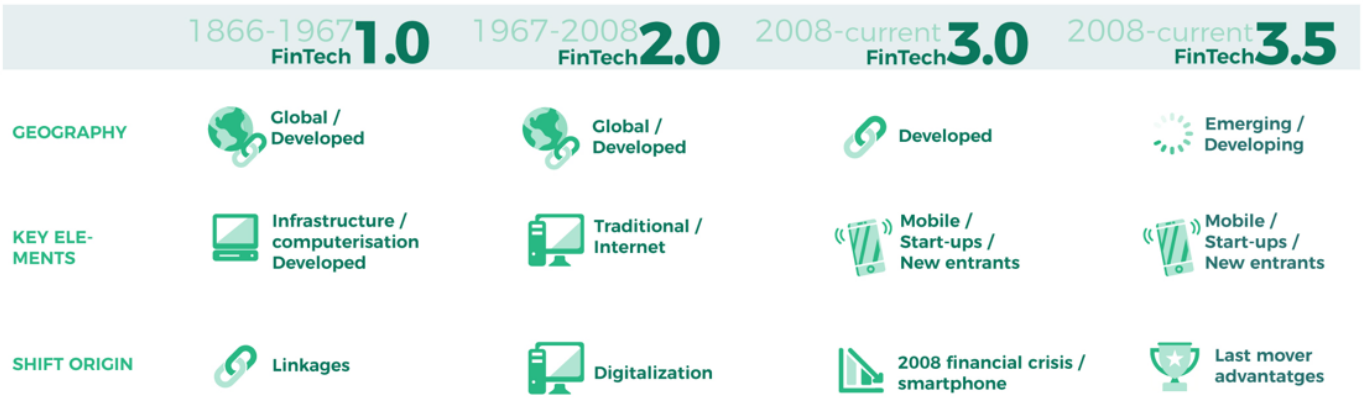
Objectives:

- Students will be able to describe the key attributes of FinTech 3.5
- Students will be able to discuss the the role of the mobile phone in the emergence of FinTech in the developing world

---

Because of the way mobile phones have transformed consumer behavior and how people use the internet. Recent FinTech advances in Asia and Africa have been mostly driven by intentional government policy choices in the pursuit of economic development. FinTech 3.5 is how we describe the current age in these areas.&

For over one billion unbanked people in these countries, “reputational” elements that foster the impression that only banks can provide banking services are unimportant, because banking may be supplied by any entity, whether licensed or not: banking is essential, banks are not.



We tend to think of banks and FinTech firms as antagonistic forces battling for market share as technology becomes increasingly essential in the banking industry. The truth is that both sides require each other just as much as they require competition.

FinTech firms, on the one hand, have received bank investment and

frequently rely on banking, insurance, and back-office partners to offer their main goods. Banks, on the other hand, have bought or invested in FinTech firms to improve their existing operations and products by using new technologies and methods of thinking.

APAC

Objectives:

- Students will be able to describe the unique factors driving the rapid expansion of FinTech in APAC
- Students will be able to discuss the underlying rational of FinTech 3.5

The expansion of the APAC FinTech market is due to a number of factors, including APAC traditional banks' slower IT spending, public distrust of the state-owned banking system (due to corruption and mismanagement), narrowly defined branch network delivery, and very high internet and smartphone penetration rates. To understand Asian FinTech trends, one needs go beyond stated investment statistics. According to major point data providers, just almost one billion dollars out of the nineteen billion in new FinTech investment in 2019 was invested in the Asia-Pacific (APAC) area.

FinTech accelerators for start-ups have opened in Hong Kong and Singapore, as well as Brisbane, Sydney, and Melbourne, with more on the way in Korea. For example, Stone & Chalk, a specialized co-working facility in Australia, got over 350 applications for 150 spots. Korea is planning to extend Level 39 (London's well-known FinTech co-working facility). The majority of Asian regulators have also begun to develop a FinTech policy. This tendency is aided by China's market reforms, which have shifted the country from a mono-banking to a highly commercialized financial sector. Since 2009, China has seen the emergence of over 3000 peer-to-peer lending platforms, and we should not anticipate this trend to cease, especially after the government’s decisions through the internet Finance Guidelines.

FinTech 3.5 has a strong underlying rationale, which includes the following characteristics:

1. young digitally savvy populations with mobile devices,
2. a rapidly growing middle class,
3. inefficient financial markets creating openings for informal options,
4. a lack of physical banking infrastructure,
5. a behavioral predisposition in favor of convexity. In addition, there are a huge number of engineering and technology graduates, notably in India and China,
6. untapped market opportunities (1.2 billion people without bank accounts),
7. less stringent data protection and competition.

The combination between a vibrant private sector eager to expand into financial services and a public sector encouraging market reform and diversification to boost economic development is further reinforcing these tendencies. All of this implies that FinTech development in Asia is a result of a combination of entrepreneurial and regulatory factors, rather than a new post-crisis paradigm.

The possibility for profit must be weighed against the market's and region's unique obstacles. In comparison to established Western markets, APAC investors and networks are less sophisticated. In market action, there exist significant knowledge asymmetries. Second, finance is difficult to get through due to the high hurdles to entry into retail banking (e.g., regulatory capital requirements, ownership structures, and market restrictions). Furthermore, when businesses grow, the fragmented regulatory environment puts B2C FinTech firms at a disadvantage relative to B2B firms, particularly those that sell to banks, because they partially shift the compliance responsibility to the client.

While the APAC area offers enormous potential, it also faces unique problems. Investors, networks, and financial engineering are less sophisticated in APAC than in the EU and the US, resulting in information gaps and restrictions for FinTech firms. With significant hurdles to entry in retail banking, financing is also difficult to come by. Furthermore, when companies grow in size, the fragmented regulatory environment disadvantages business-to-consumer FinTech firms compared to business-to-business (B2B) firms, as B2B firms partially pass compliance cost to their clients. When compared to the harmonized European market, the fragmentation in APAC, which consists of 24 nations, is clearly visible.

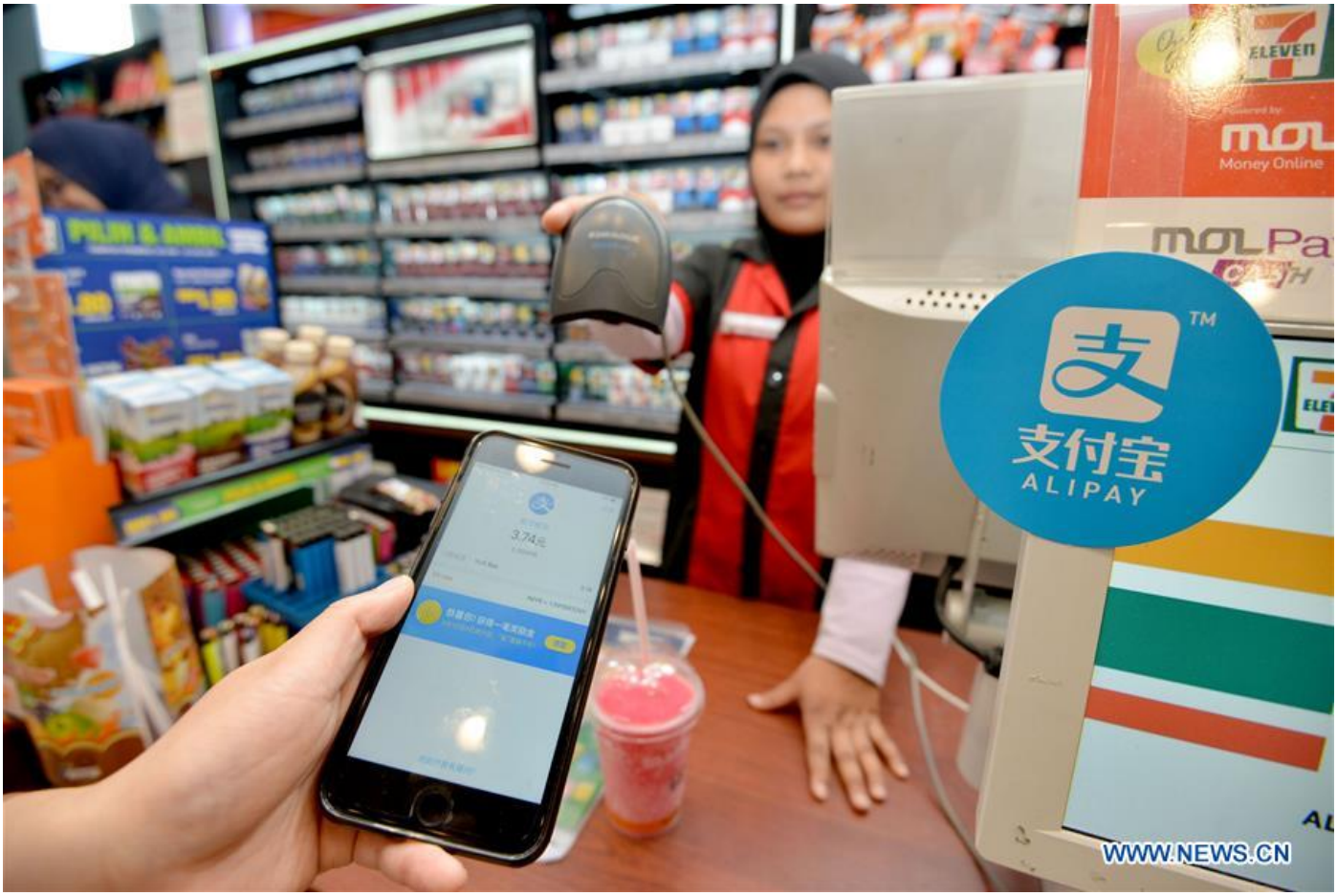
Despite these restrictions, it is apparent that governments are beginning to adjust their laws and regulatory frameworks to encourage the growth of FinTech businesses. Financial markets that are efficient are directly related to increased economic production, which is a significant incentive for both developed and developing countries.

China

Objectives:

- Students will be able to describe the unique factors driving the rapid expansion of FinTech in China
- Students will be able to discuss the underlying rational of FinTech 3.5

Customers' ideas of who can provide a financial service in China have already been distorted by technology. Money deposits for payments are no longer confined to bank deposit accounts. Holding customer deposits has traditionally identified an institution as a bank, triggering the associated licensing and regulatory requirements. AliPay handles over one million transactions each day using technology, and although such a figure resembles that of a regular bank, AliPay is not one. By creating almost three million direct and indirect job opportunities and supplying almost half a million SMEs with loans, Alibaba has also met two major government policy objectives. Banks should be permitted to respond to the competitive threats provided by less regulated firms that might acquire significant market share by delivering near alternatives for services in the interests of a fair playing field.



Since 1978, China has been steadily modernizing its financial system. The Great Financial Crisis of 2008, on the other hand, dampened politicians' and regulators' appetites for additional large-scale change, as the crisis shattered public perceptions of what makes an effective financial system and how institutions should be governed. Indeed, since 2008, legislation in China has tightened the regulatory environment for banks, reversing the trend toward a free market. This is mirrored in the West by rising compliance costs as a result of newly enacted national legislation (like as Dodd-Frank) or international norms.

In China's technology-driven financial transformation, there is a once-in-a-lifetime chance. China may surpass financial regulation norms by developing a regulatory framework that encourages and regulates FinTech and internet finance businesses, in addition to learning from Western regulatory failures. China's FinTech leadership is already visible in numerous ways. In March 2015, AliPay introduced face recognition payment, which was quickly

followed by MasterCard in July 2015. Similarly, Alibaba's SME financing, which began in 2010 using alternative credit-scoring data, is now employed in the United States and Japan, as well as in Europe by Amazon.

Certain aspects of the Chinese market, notably its limited physical banking infrastructure and strong technological penetration, make it an ideal field for FinTech. There have been over a hundred million new internet banking clients in the last three years, a 24% rise in new personal bank accounts, and a 29% increase in online payments. By 2025, there are anticipated to be 1.3 billion digital banking users, and by 2022, over one billion Chinese citizens will have their credit scores based on alternative data sources (Sesame Credit Management).

The tension between traditional digital financial services and FinTech 3.0 providers is expected to be highest in the following three sectors in the future: (1) payments, (2) financing, and (3) deposits, with the last being the most contentious (and perhaps the main threshold for strong regulation).

To aid this digital transformation, banks should be able to compete on a level

playing field with start-ups that provide near alternatives for regulated goods in terms of regulatory burden. Simultaneously, start-ups should be allowed to operate within a regulatory framework that permits them to grow their business without incurring high compliance expenses. As a result, setting threshold levels at which institutions must comply with legislation may be the way ahead.

As a result, the path forward may not necessarily rest in defining regulations for financial products, but rather in establishing threshold levels for when institutions must comply with small-actor conduct standards or prudential rules for bigger players. This might save time and money by avoiding onerous regulations with high compliance costs and minimal benefits to financial stability. This would also aid in defining the operational border between banks and internet finance firms, as well as determining if the distinction is made on the basis of goods or transaction size.

China's present standards appear to be heading to a two-tiered market characterized by transaction values. This is an unsatisfactory solution since it restricts the expansion of internet finance companies, but it may bring some regulatory consistency between banks and startups. This is reflected in Asia's development of tiered licensing systems, with governments creating "light license" models to reduce regulatory and compliance costs for businesses wanting to provide specialized banking services to specified demographic groups. South Korea, for example, is developing a special regime for online-only banks, India has created a new license type for payment banks and recently issued 11 new banking licenses, and China is introducing new private banks to serve market sectors that have traditionally been underserved by state-owned banks.

These developments are significant because they reflect the region's FinTech dynamics and show a regulatory strategy that encourages the growth of certain sub-sectors in order to achieve national policy goals.

Africa

Objectives:

- Students will be able to describe the unique factors driving the rapid expansion of FinTech in Africa
- Students will be able to discuss the underlying rational of FinTech 3.5

FinTech arose in Africa around the dawn of the twenty-first century, owing to two factors: a lack of sophisticated banking and financial institutions, and the fast proliferation of mobile phones. In terms of FinTech development, Africa shares many similarities with the APAC region; nevertheless, the type and direction of the major advances in this field in Africa have been rather different.

In comparison to 64% of Asian families, just 22% of African households have access to formal or semi-formal financial services. As a result, telecoms firms have been at the forefront of FinTech innovation. Mobile money, which provides basic payment and savings services using e-money stored on a mobile phone, has been most successful in Kenya and, more recently, Tanzania. By allowing users to save money, send money safely to their relatives, pay bills, and receive government payments securely, mobile money has substantially boosted economic development.

M-Pesa, Safaricom's mobile money product, which was introduced by Vodafone in 2007, is Africa's most well-known success story. Payments made through the network have already exceeded 47% of Kenya's GDP in less than five years, and the central bank is now required to closely oversee the provider since the payments platform has become systemically critical.

Undeniably, the phenomenal success of M-Pesa has caused problems elsewhere, with screen savers on every corporate computer warning – “Be aware – we are not in Kenya now” – because providers in many other countries have had to learn that simply replicating what was done in Kenya will not necessarily lead to similar customer take-up of digital financial services. For digital financial services (DFS) to thrive, the services provided must be precisely suited to local requirements. Meeting the requirements of local customers, whatever they may be, is a fundamental prerequisite for success in delivering DFS – yet this is not the starting point for many of the individuals creating DFS solutions, who come from an IT background, as they most frequently do.

Thus far, Africa's FinTech journey has primarily consisted of the supply of mobile money services that enable the fundamental functions of payments and savings, as well as the more recent addition of higher-order services such as credit and micro-insurance.

Why Scientific Libraries?

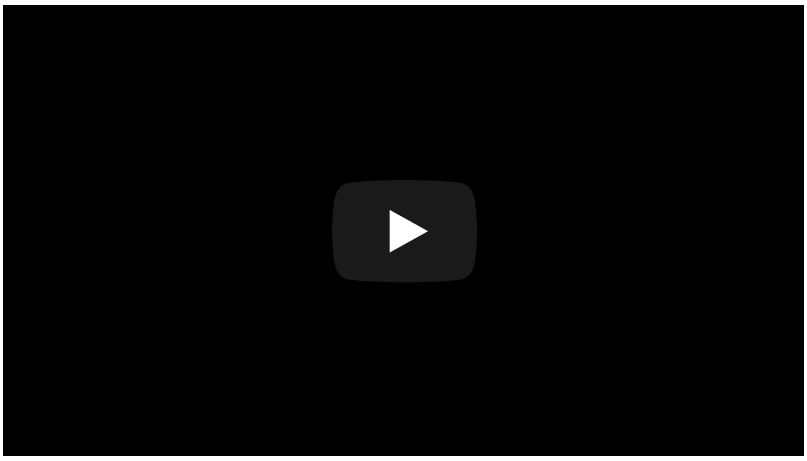
Objective:

- Students will be able to describe the benefits of scientific libraries for FinTech programming

---

The original use of programming languages was to make mathematical computations more efficient and automated. The earliest algorithms were designed to compute logarithms, which help turn multiplication problems into addition problems. The concepts of efficient computation are still an important application of any programming language. However, the most advanced and efficient methods to are often not built in base general-purpose languages such as Python.

A large amount of data science and machine learning is built on a few specific branches of mathematics. Specifically, Linear Algebra and Statistics. Linear Algebra deals with computation involving matrices. The Python libraries used to conduct efficient matrix calculations are called Numpy and Scipy.



NumPy

Objective:

- Students will be able to describe the role of NumPyFinTech programming

---

NumPy is a library for Python that supports large multidimensional arrays and matrices. Later on, we will manipulate datasets using the Pandas library which is built around NumPy. NumPy has a lot of utility and is able to perform complex mathematical operations quickly and efficiently. In Machine Learning using Python, these arrays will be the data structure used for handing off our transformed data to our Machine Learning algorithm with the help of Scikit-Learn.

Learning the basics of NumPy will help you become a data manipulation master and is a fast way to perform large amounts of matrix operations locally.

Additional Resources:

- Documentation
- NumPy Reference PDF
- Wikipedia
- Chapter 2: Introduction to NumPy

Introduction to Regulation & Supervision

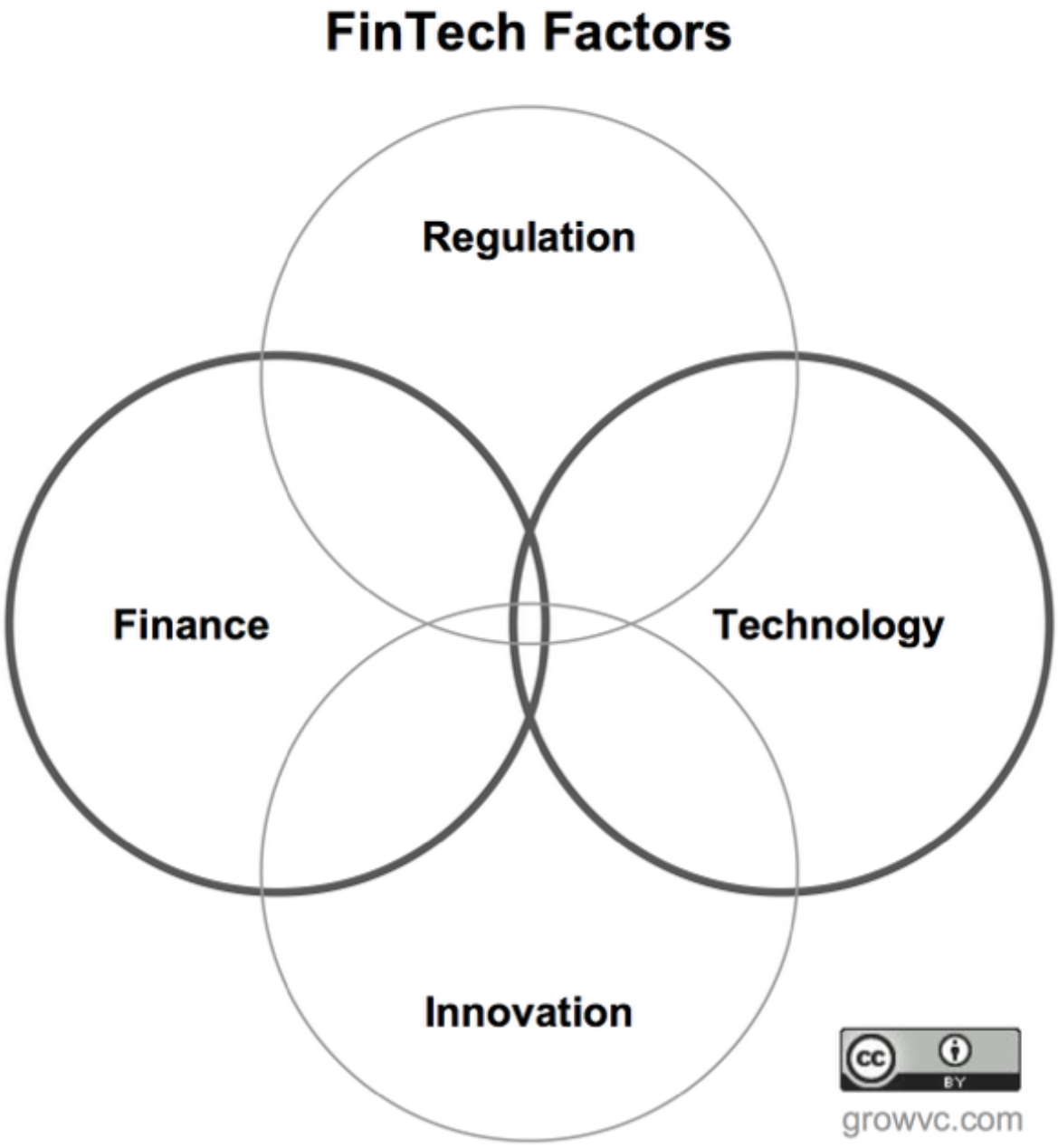
Objectives:

- Students will be able to discuss the broad regulatory response to FinTech
- Students will be able to identify and describe the four FinTech Factors presented in this lesson
- Students will be able to describe the stage to innovation diagram and its underlying concepts

---

The regulatory response to FinTech is shifting away from high-level principles – such as the ten "considerations" for banks and supervisors outlined in the Basel Committee's February 2018 sound practices paper on the implications of FinTech developments – or reliance on existing legislation and rules, and toward a more detailed application of new rules and guidance to the specifics of FinTech-related activities.

Although there isn't currently a one-to-one mapping of regulatory actions to each identified risk, based on historical performance, we may expect regulators to get close. Despite the rising number of sets of international FinTech principles and standards, national implementation of these concepts and standards is still uneven and inconsistent, with some nations enacting highly comprehensive rules in certain sectors.



Sandboxes, incubators, and accelerator programs are where start-ups develop their solutions, and here is where FinTech 3.0 breakthroughs emerge. Graduating from one of these accelerators indicates that the firm has matured to some level as a result of its involvement in a structured program. These firms are then partnered with, invested in, or acquired by banks.

There are also benefits for regulators, since the FinTech 3.0 model challenges their old practice of just looking at existing financial institutions

that begin to deploy goods or services on a large scale. Regulators used to be able to rest easy knowing that regulated financial institutions with which they already had a relationship would manage innovations appropriately; however, this is no longer the case.

A good example is money market funds (MMF). Vanguard, Fidelity, and Schwab, three of the industry's biggest companies, were founded in 1975, 1946, and 1971, respectively. Alibaba launched a new MMF in 2014 that was completely online and open to its existing client base. Yu'E Bao surpassed decade-old players like Vanguard and Fidelity as the world's fourth largest MMF in just nine months.

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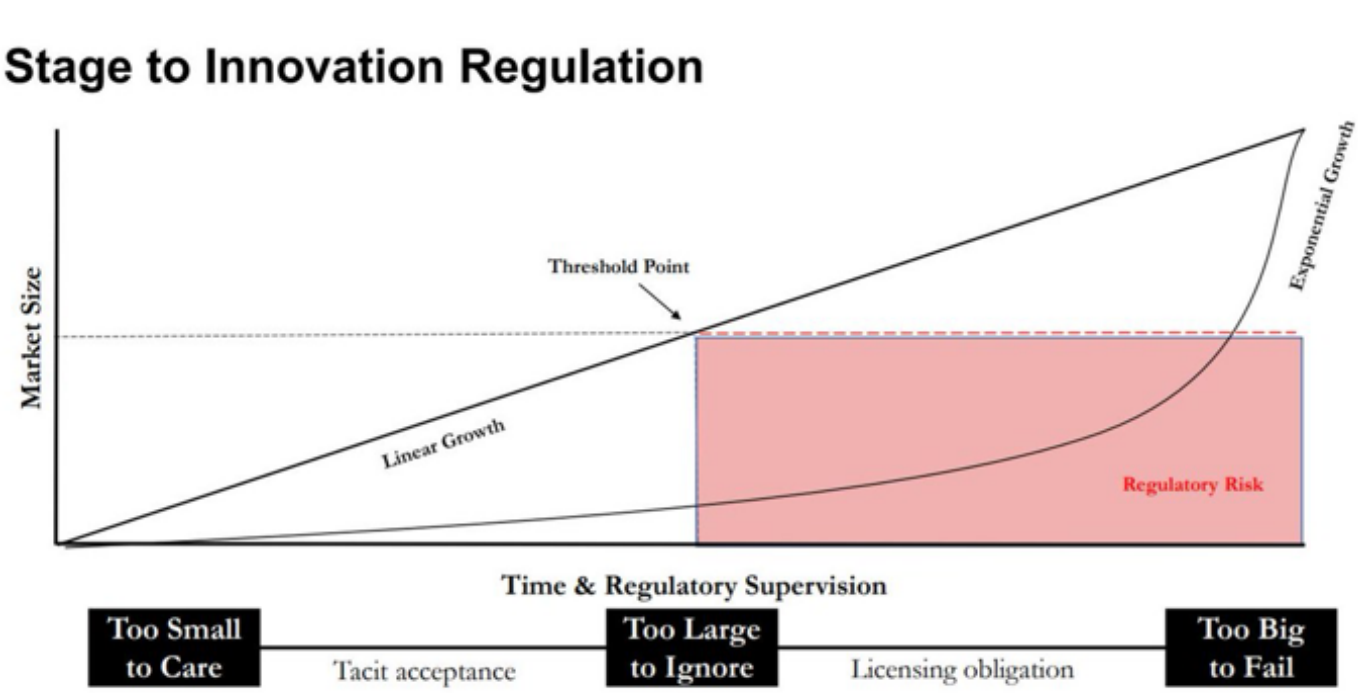
Yu'E Bao demonstrates how, in just nine months, a non-traditional financial institution moved from "too tiny to care" to "too large to fail." This exponential expansion poses a direct threat to the otherwise more progressive method of regulating innovations and stakeholders, skipping the "too-big-to-ignore" phase where regulators would have begun to contact and require compliance from such organization.



In other words, if the proper strategy of mainly regulating actors having a large influence on financial markets remains the correct approach, which we believe it is, what may need to alter in exceptional situations are the tools used to detect future systemically important actors in time.

Given the magnitude of the investment and the competitive consequences of these new participants in the financial services sector, regulators in various jurisdictions must examine the best approaches to supporting FinTech and modify their regulatory methodologies (e.g., rule or principle-based).

Regulation

Objectives:

- Students will be able to discuss the myriad ways in which regulators respond to FinTech

---

FinTech regulators respond in a variety of ways.

1. Regulatory edge

Some FinTech developments, such as the use of crypto currencies, cloud computing outsourcing, and the expansion of some non-financial services firms into the provision of specific products and services, such as lending to SMEs and retail payment systems, raise questions about where the regulatory boundary should be drawn. The regulatory net is spreading, and some companies that are now outside the perimeter may soon find themselves regulated.

The severity of regulation may grow as the regulatory net spreads. Regulatory standards for loan-based and investment-based crowdfunding, for example, have evolved to broaden from their early focus on clear disclosures and risk warnings to funders. These criteria have changed to an emphasis on service providers having capital-type resources to safeguard funders in certain scenarios, as well as putting in place sufficient credit risk assessment, governance, systems and controls, and complaints handling processes. This is mirrored in FinTech credit license application guidelines, which emphasizes governance, internal controls, operations, capital, and liquidity.

2. Retail conduct

In the FinTech age, regulators are using a combination of

(a) transparency in order to raise the awareness of the consumer regarding the nature and risks of products and services,

(b) prohibiting or limiting the sale of certain products and services to retail customers, and

(c) rewriting detailed conduct of business requirements to adapt them to FinTech developments.

3. Data & AI

Some of the data privacy problems raised by FinTech are already covered by current data protection laws, such as the EU General Data Protection Regulation (GDPR). However, FinTech developments are constantly highlighting new areas where additional or revised regulation may be required, such as the use of artificial intelligence and distributed ledger technology, as well as the general trend toward the collection of an ever-larger range of financial and non-financial data from, and sharing across, a wider set of parties. A more heated debate is expected over whether suitable frameworks for data collection, storage, sharing, and usage, both domestically and cross-border, are in place.

4. Governance of regulated firms

Regulators are progressively enacting regulations or recommendations aimed at ensuring that boards of directors and senior management have a sufficient grasp of the FinTech applications utilized by the firm in order to properly manage risks. Some authorities are also demanding firms to define specific senior management duties and accountability for addressing FinTech-related risks.

Some authorities are concentrating on board and senior management duties in specific risk areas, including as algorithmic trading, cyber security, outsourcing to third-party service providers, and operational resilience in

general, as part of this strategy.

5. Risk management

Despite the fact that most FinTech innovations are covered by current risk management regulatory standards, some FinTech advancements have prompted regulatory reactions requiring regulated businesses to handle particular FinTech-related developing risks within their risk management framework. This has included the risks of money laundering and market manipulation associated with the use of crypto assets; the risks associated with the use of distributed ledger technology in payment, clearing, and settlement systems, and more broadly in the storing and validation of transaction data; the application of outsourcing principles to specific FinTech applications such as cloud computing and artificial intelligence; and the application of outsourcing principles to specific FinTech applications such as cloud computing and artificial intelligence.

6. Cyber Security

In the key areas of governance, workforce skills and capabilities, identification (risk analysis and assessment), protection and detection (access management, information security, security controls, expertise and training, monitoring and testing, and information sharing), and incident response, regulators are focusing on the national implementation of international standards (crisis management, recovery and learning lessons).

Supervision

Objectives:

- Students will be able to provide the common FinTech-related areas that supervisory decisions a

---

Supervisors are increasingly considering FinTech-related concerns while making supervisory decisions areas like as cyber security, outsourcing, operational resilience, and anti-money laundering (AML). The "basics" of how regulated businesses identify, analyze, and manage the risks posed by FinTech. Super companies address these risks in their strategic and business planning, new product approval and out management practices in general; and how companies monitor and review the impact of FinTech on t applicable regulatory requirements, such as consumer protection and data protection.

Supervisors are concentrating (to varied degrees in different nations) on:

1. Business models and viability

If a company has a well-thought-out strategy and business model that takes FinTech advancements ir solid foundation for the company's long-term profitability and sustainability.

2. Governance

how effectively boards and senior management understand FinTech and the dangers it poses, and ho analyzed, and mitigated these threats.

3. Risk management function

Whether firms (and, more importantly, their supervisors) have reshaped their internal organization in r developments, with adequate resources and clear reporting lines across all three lines of defense; and technical capabilities required to manage technological innovation, including hiring for appropriate sk mathematicians, and statisticians.

4. Conduct

If firms are adopting a broader perspective of how FinTech may be affecting the risks faced by custon be managed, in addition to complying with specific precise legal criteria

5. Outsourcing

Whether businesses have enough control over third-party providers, including access and audit rights outsourcing for business continuity, recovery, and resolution planning.

6. Cyber Security

Whether businesses can show they have strong governance, risk identification, security controls (inclu incident management, network security, and end-user computing), detection and prevention, testing, information sharing in place.

Furthermore, major corporations are likely to move beyond meeting basic requirements to implement as technology and risk management tools) to better manage cyber risks and to drive innovation in pe and information sharing to improve cyber resilience.

7. AI & ML

How successfully companies manage and mitigate the risks that arise when they utilize AI and machin extensively, particularly in terms of governance, knowledge, and partnerships with third-party supplier are being challenged to show that they understand and can successfully manage the dangers that inc may bring.

PREVIOUS (/M/329/8924/67822)

Regulatory Barriers

Objectives:

- Students will be able to describe how regulatory barriers can impede innovation in FinTech
- Students will be able to identify common regulatory barriers
- Students will be able to discuss ways in which the UK government is addressing regulatory barriers for FinTech

---

A number of analyses have been released that address regulatory impediments to innovation, the need for regulatory toolkits, and the need of putting innovation at the center of regulation. The majority of these are concerned with financial technology and regulatory support for innovation. The Financial Conduct Authority (FCA) has responded positively by creating Project Innovate and soliciting feedback, as detailed below. "Financial sandboxes" to test innovative financial concepts with the broader public are among the FCA's initiatives under consideration.

The time and expense of registering and complying with laws, as well as the possible repercussions if they don't, deter many financial institutions and FinTech businesses from innovation and entrepreneurship. This is particularly difficult for FinTech start-ups, who must register before they have fully established and proven their business strategy. As a result, the FCA is offering “fast-track” registration to start-ups with which it is working.

In a broader sense, as part of its Digital Transformation Project, the UK government has released a number of digital services and is presently developing others. HM Treasury is working on a bank-specific open standard API. The European Commission launched a Digital Single Market Strategy in May 2015.

RegTech

Objectives:

- Students will be able to define RegTech
- Students will be able to describe the impact of technology on regulatory authorities
- Students will be able to discuss how PayPal is supporting smart governance

Rapid technological advancements are allowing financial services businesses to operate in ways that were just not conceivable 15 to 20 years ago. However, these financial innovations take place inside a regulatory framework that is straining to keep up. Regulatory authorities may now access a degree of granularity in risk assessments that was previously unavailable due to the growing use of technology in the financial services industry.

This idea of a data-driven regulatory structure isn't entirely new. Regulators, business, and academics have all been paying more attention to this since 2007. Peppet released a study on "smart mortgages," which utilize data to reduce default risks, in 2009, when the SEC formed the division for Economic and Risk Analysis to look at leveraging data insights for improved regulation. However, one must weigh the advantages of technology against the practical hurdles to real and successful application, which are described further below.

The emergence of regulatory attention in the FinTech sector marks a watershed moment. Regulators are no longer focused only on preventing the last catastrophe; instead, they are considering how to promote future market growth while ensuring financial stability. Even if they are not yet big or capable of (now) complying with the regulations, early contact with emerging FinTech start-ups has advantages for regulators. This gives authorities the ability to understand the business models of FinTech 3.0 start-ups and the people driving them from the outset (so as to see whether they are fit and proper for that role). Various jurisdictions have used this method. For example, the Financial Conduct Authority (FCA) in the United Kingdom not only launched a survey to better understand the regulatory challenges that FinTech 3.0 businesses face, but it also added an innovation hub to interact with and encourage creative start-ups at an early stage.

The amount of work and resources authorities are devoting to studying the

FinTech industry is probably unexpected, especially given that they are revisiting some of the same concerns and dangers that were discovered with e-banking over a decade ago. Furthermore, except from specialized products (such as robo-advisory), FinTech businesses' business models are not much different from those of their conventional equivalents (e.g., P2P lending emanating from shadow banking in China). Lower overhead expenses, or disintermediation, are the most important factors driving efficiency. FinTech is, in some ways, going full circle and only delivering modest changes, both from an industry and regulatory standpoint.

Example: PayPal

PayPal supports the implementation of a new decision-making model known as SMART Governance to better achieve the aims of (payments) regulation in a way that benefits the government, customers, and business. To assess the performance of covered companies, SMART Governance combines the use of technology and data with a collaborative and iterative approach, resulting in a more informed regulation formulation process.

“Technology and data power this new model,” PayPal says, “but cooperation, creativity, and experimentation are the keys to unlocking insights from the data; it is the application of these insights that will result in better regulation.” We advocate for the implementation of Dynamic Performance Standards, which are regulatory rules that evaluate outcomes and iterate depending on fresh data and insights gleaned via a collaborative approach. Performance standards have failed to become the dominant regulatory paradigm in part because industry considered them to be excessively rigid and risky in terms of regulatory risk vs real-world adaptability. Dynamic Performance Standards utilize modern data analytics techniques, iteration and collaboration to overcome the traditional shortcomings of performance standards.”