

Now, next and beyond: Analysis of the FinTech Ecosystem in the Commonwealth of Massachusetts

October 2020



Report prepared for Massachusetts Technology Park Corporation ("Mass Tech Collaborative" or "MassTech")

Foreword

We define FinTech as organizations combining innovative business models and technology to enable, enhance and disrupt financial services. The sector is in the midst of a rapid growth period and is projected to reach global revenues of over \$500 billion ^a by 2030, driven by technology advances, changing customer expectations, availability of funding and advances in government / regulatory policy.¹

FinTech is seen as a key contributor to the innovation agenda in Massachusetts, and the state is seeking to play an increasingly important role in the sector. In 2018, the Massachusetts Executive Office of Housing and Economic Development (EOHED) initiated a study into several emerging technologies and the opportunities to grow the state's innovation economy. FinTech was evaluated as one of the most promising areas for further support and attention. The Administration of Governor Charlie Baker and Lt. Governor Karyn Polito supported these insights and placed FinTech in its 2019 Economic Development Plan as a key priority. At the same time EOHED Secretary Mike Kennealy joined local leaders to establish a FinTech Working Group, a collaborative group of state, academic, industry, and non-profit leaders working together with notable financial services organizations headquartered in the state.

Consisting of stakeholders across the industry, the FinTech Working Group's objective is to develop a strategic framework and action agenda for the further growth of the FinTech sector, to, in turn, grow the financial services sector in Massachusetts and set the foundation for FinTech in the state for the next three to five years.^b

This report was prepared by Ernst & Young LLP (EY) at the request of the Mass Tech Collaborative, a state economic development agency focused on strengthening the competitiveness of the tech and innovation economy by driving strategic investments, partnerships and insights that harness the talents of Massachusetts, to provide an analysis of the FinTech ecosystem. In preparing this report, we sought to understand the depth and breadth of FinTech activity in Massachusetts, assess its current state through well-defined ecosystem elements and compare it to the activity of select FinTech hubs within the US as well as globally. Based on the results of our work, we propose a series of recommendations that we believe could have the potential for far reaching impact on the growth of the FinTech sector and, more broadly, the financial services industry in Massachusetts.

The analysis, views and recommendations expressed in this report were produced by EY and informed by primary research in the forms of 40+ stakeholder interviews and FinTech Working Group contributions and 25+ startup survey responses, provided by representatives of select hubs, FinTechs, traditional financial institutions, capital providers, academia, policy makers and other ecosystem participants in Massachusetts and around the globe. Additionally, EY conducted secondary research, sourcing relevant data and information through a variety of private and publicly available databases.

^a Note that all currency specified in this report is in USD unless otherwise disclosed

^b The FinTech Working Group includes key players from a broad spectrum of the FinTech community in Massachusetts, ranging from innovation hubs to startups to financial institutions.

This report was completed with input from the FinTech Working Group members listed below:

Co-chairs	Members
Executive Office of Housing and Economic Development (EOHED)	Secretary Mike Kennealy
MassMutual	Mike Fanning
Program leadership team	
Massachusetts Technology Collaborative	Pat Larkin Jasmijn van der Horst - Rompa
MassMutual	Mohammed Dastigir
Citizens Bank	Lamont Young
DCU FinTech Innovation Center	Vasilios Roussos
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John Hancock	Tatyana Zakrevskaya
FinTech Sandbox	Sarah Biller
Vestigo Ventures	Mark Casady
Brandeis University	Debarshi Nandy
FiVerity (fka Coalesce.ai)	Greg Woolf
Executive Office of Housing and Economic Development (EOHED)	Mark Fuller Damon Cox
Fidelity Investments	Sean Belka
Finomial	Meredith Moss
F-Prime	Hannah Arnold
Massachusetts Institute of Technology (MIT)	Fiona Murray
MassChallenge	Siobhan Dullea
Putnam Investments	Sumedh Mehta
Reading Cooperative Bank	Julieann Thurlow
University of Massachusetts Amherst College of Information & Computer Sciences	Jim Flynn
Worcester Polytechnic Institute (WPI)	Rob Sarnie

This report includes input garnered through one-on-one stakeholder interviews, FinTech Working Group discussions, and respondents to an online survey from several participants, including the following:

 FinTechs	 Traditional FIs	 Capital Providers
55ip	Citizens Bank	Bain Capital Ventures
Adjoint Inc.	Fidelity Investments	F-Prime
Andes Wealth Technologies	John Hancock	Great Hill
Annuityratewatch.com, Inc.	MassMutual	Mendoza Ventures
BCube Analytics Inc.	Putnam Investments	New England Venture Capital Association
BodesWell.io	State Street	Vestigo Ventures
Catch Financial		
FiVerity (fka Coalesce.ai)		
Databento		
Everyday Life, Inc.		
Finomial		
Flywire		
HomeTap		
iHuddl		
Till Financial, Inc.		
Surround Insurance		
 Academia	 Policymakers and others	 FinTech hub representatives
Boston College	Boston Fed	Empire Startups
Boston University Questrom School of Business	Commonwealth of Massachusetts	Ferst Capital
Brandeis University	DCU FinTech	Finance Montréal
MIT	FinTech Sandbox	SixThirty
Northeastern University	MassChallenge	The Georgia Fintech Academy of the University System of Georgia
	Wayfair	

Executive Summary



Executive Summary

Financial Technology (FinTech) is transforming the way financial services are being delivered and consumed around the world. Global FinTech investment has increased over 13 times in the past 10 years, from \$8 billion in 2010 to over \$110 billion in 2019.^{1,2} As a result, there has been a significant increase in the number of technology-led entrants innovating to help individuals and businesses make and receive payments, create wealth, access credit, and enhance the management of their financial health securely, seamlessly and in real-time.

The research in this report shows that Massachusetts plays a key role in this transformation and is a strong FinTech hub underpinned by a well-rounded ecosystem. As of August 2020, there are more than 350 FinTechs headquartered in Massachusetts bolstered by a strong presence across all critical stakeholders: incumbent financial institutions, capital providers, academic institutions, regulators and policy makers, incubators and accelerators and coordinating agencies.³ FinTech startups founded in the Commonwealth as a percentage of total new US FinTech startups was approximately 9% in 2019 and rising year-over-year.³ While the COVID-19 pandemic puts pressure on some FinTechs in the near-term, particularly the smaller, less established ones, it is expected to accelerate the digital agenda, not just within financial services but more broadly. The pandemic demonstrates the importance of a robust and sustainable ecosystem that allow FinTechs to navigate economic downturns.

Massachusetts' advantages lie in talent and technology. Massachusetts is home to many of the top academic institutions globally and has a reputation as a technology and Research & Development (R&D) hub. From a capital standpoint, Massachusetts has seen rising interest from investors that has manifested in an increasing flow of capital into the state. However, there may be an opportunity to unlock more capital at the local level, particularly for early-stage startups. This assessment has revealed that while there is significant activity and growth in Massachusetts, the ecosystem may benefit from greater interconnectivity and collaboration amongst stakeholders.

The intent of this report is to provide a set of actionable recommendations that can be undertaken to support the sustainability and growth of the FinTech and financial services industries in Massachusetts. These recommendations take into consideration leading practices from other innovation hubs and strengths and gaps in the Massachusetts ecosystem. The 16 recommendations have been categorized as “potential quick wins”, “potential big bets”, “potential nice to haves”, and “for further consideration”.

Massachusetts may have an opportunity to help shape the broader digital financial services and financial inclusion agendas, raise its profile in the US and internationally and create stronger foundational conditions of FinTechs. Our recommendations refer to the need for stronger coordination and increased engagement and championship from ecosystem participants. At this inflection point, Massachusetts may have a meaningful opportunity to take proactive steps to bolster innovation and resilience in its FinTech ecosystem and chart its path for the future as a premier FinTech hub.

Potential Opportunities within the Massachusetts FinTech ecosystem

Based on the assessment of the state of the FinTech ecosystem in Massachusetts and leading practices observed at other FinTech hubs in the US and globally, we offer 16 recommendations for the Commonwealth's consideration as it strives to become a pre-eminent location for FinTech.

"Potential quick wins"

- 1 Unlock new and varied sources of capital, with an emphasis on early stage financing
- 2 Consider initiatives taken by other FinTech hubs that foster dialogue and information sharing with regulators and policymakers
- 3 Amplify the role of select organizations to act as coordinating and championing agencies
- 4 Create a unifying brand around Massachusetts as a destination for FinTechs and raise the profile in the US and internationally
- 5 Consider initiatives taken by other hubs for policymakers to further contribute to shaping the digital financial services and financial inclusion agendas
- 6 Elevate the FinTech Working Group to be a permanent driver of the Commonwealth's next phase of FinTech growth

"Potential big bets"

- 7 Encourage diversity in the ecosystem through targeted initiatives and campaigns
- 8 Create programs to develop non-traditional sources and locations of talent
- 9 Explore financial incentives from ecosystem participants to de-risk and spur investment in FinTech companies
- 10 Draw successful mid-stage FinTechs to locate employees in Massachusetts
- 11 If promoting a regulatory sandbox, create a structure that can drive commercial outcomes for participants
- 12 Establish an inter-university FinTech body to help Massachusetts build on its advantage as a technology hub

"Potential nice to haves"

- 13 Create initiatives to retain a higher percentage of the university talent in Massachusetts post-graduation

"For further consideration"

- 14 Create targeted initiatives to enhance knowledge of and access to FinTech for experienced talent
- 15 Advance the State's usage of FinTech services
- 16 Consider appointing an individual focused on the FinTech sector ecosystem in Massachusetts

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About the report

I. Framework for a well-functioning ecosystem

EY has developed a framework to assess the Massachusetts FinTech ecosystem. The framework considers a hub's key elements and stakeholders and how they interact to contribute to the proper functioning of the ecosystem.

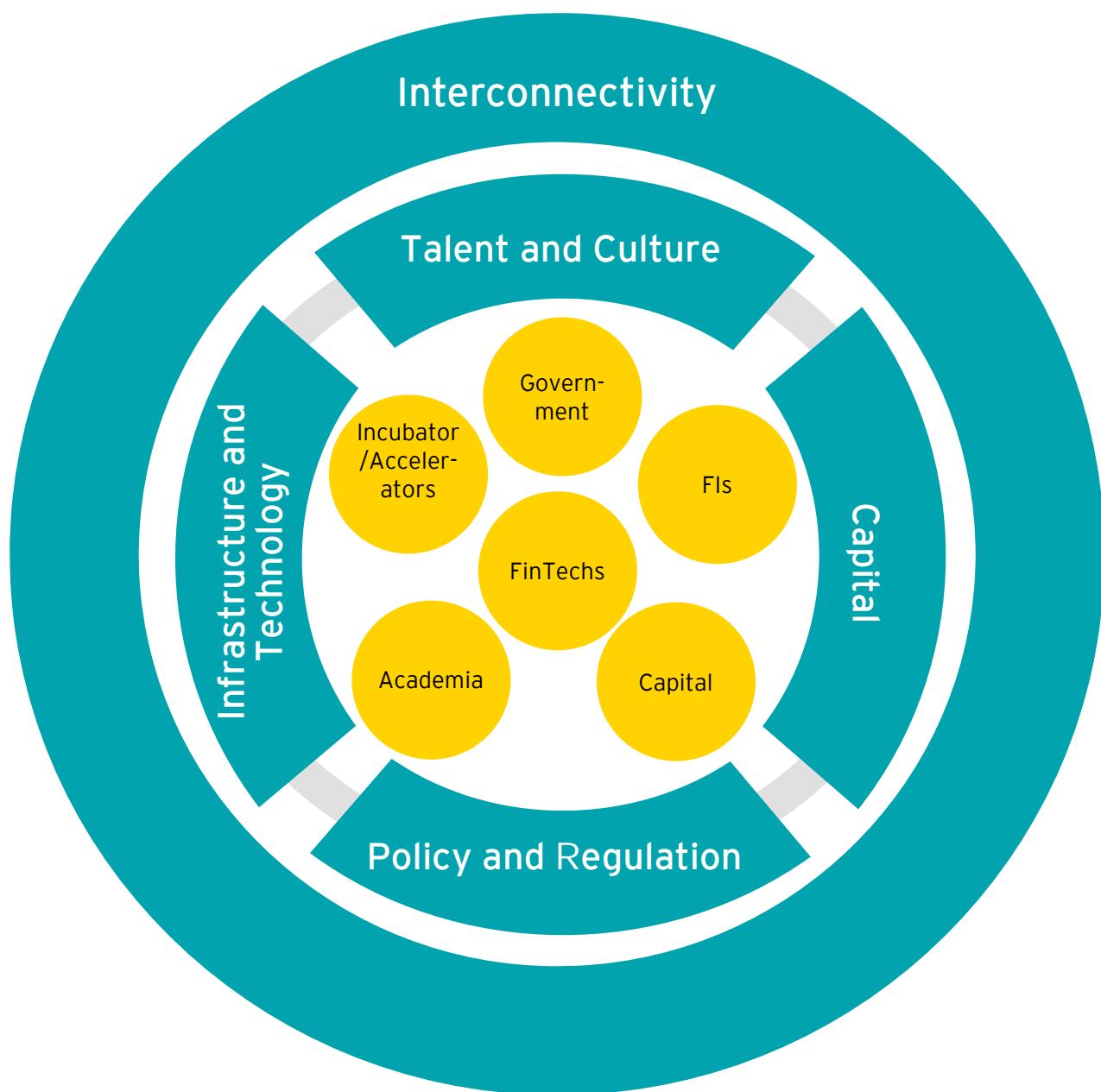
Every FinTech ecosystem has the same stakeholders. It is how they are stitched together that creates a well-functioning ecosystem.



Stakeholders represent the participants and contributors to the ecosystem. While these stakeholders may have different motivations, they are often interdependent and interconnected



Elements represent how the stakeholders contribute to the ecosystem. Each stakeholder may contribute to one or more element. Based on prior experience and interviews, there are five elements that serve as the pillars of a well-functioning ecosystem



Stakeholders	Definition
FinTechs	Organizations (startup, scale up and mature companies) combining innovative business models and technology to enable, enhance and disrupt financial services
Capital Providers	Person/ company providing early stage or later stage funding to the company e.g., Angels, Venture Capitalists, Private Equity, Corporate VCs, etc.
Financial Institutions	Banks, wealth and asset managers and insurance companies offering financial services to customers
Government	Regulatory bodies managing and governing from a local, state, federal, and global perspective, including policymakers that have jurisdiction over the financial services sector of Massachusetts
Academic Institutions	Institutions dedicated to education and research
Incubators/ Accelerators	Collaborative programs, inclusive of innovation labs and trade associations, offering access to capital, mentorship and other legal and organizational support to early-stage companies.

Elements	Definition
Talent and Culture	The availability of technical, financial services and entrepreneurial talent through academia and organizational development. The ability to attract, develop and retain talent, including mature talent and workforce.
Capital	The availability of financial resources for startups from seed round through maturity.
Policy and Regulation	Government policy across regulations, tax, and sector growth initiatives including support for new entrants, innovative business models, and increased competition.
Infrastructure and Technology	The maturity and development of new technologies, and the supporting infrastructure within the state for the academic, entrepreneurial and incumbent communities and stakeholders.
Interconnectivity	The level of collaboration and interaction among ecosystem elements to create opportunities for sustained growth and innovation within the ecosystem.

II. Ecosystem hubs: basis of selection

In this report, we evaluate strengths, key metrics and learnings from six innovation hubs. These hubs were jointly selected by EY and the FinTech Working Group and have relatively mature or fast growing FinTech environments. For the six hubs, we have provided a view on key stakeholders and performed an assessment across the five elements. We have also highlighted characteristics that may make these hubs attractive and have provided examples of notable or unique initiatives.

Type of Hubs	Region	
Global hubs	London	
	Canada (Montreal & Toronto)	
US hubs	New York	
	San Francisco	
	Charlotte	
	Atlanta	

| FinTech Now, Next and Beyond



I. What is FinTech?

Organizations combining innovative business models and technology to enable, enhance and disrupt financial services

FinTech companies (“FinTechs”) operate across a variety of subsectors of the financial services (“FS”) industry, including payments, digital infrastructure, insurance and investing. Some are vertical-specific (for instance, InsurTech), while

others apply their technologies horizontally across the industry (for instance, Blockchain). The business activities of FinTechs are broadly classified under five models: business-to-business (B2B), business-to-business-to-consumer (“B2B2C”), business-to-consumer (“B2C”), peer-to-peer (“P2P”) and offline-to-online (“O2O”).

Sub-sector	Details
Blockchain and crypto	<ul style="list-style-type: none">▸ Leveraging distributed ledger tech for financial services▸ Transactions made in cryptocurrency
Capital markets	<ul style="list-style-type: none">▸ Sales and trading▸ Raising capital by dealing in shares, bonds, and other long-term investments▸ Capital markets infrastructure tools
Infrastructure and security	<ul style="list-style-type: none">▸ Data analytics software for financial services▸ Leveraging cybersecurity for financial services▸ Regulatory and compliance software
InsurTech	<ul style="list-style-type: none">▸ Selling insurance digitally▸ Insurance premium comparison sites▸ Data analytics and software for insurance / re-insurance players
Lending	<ul style="list-style-type: none">▸ Online credit, P2P lending, Crowdfunding▸ Leveraging technological innovations to develop credit models, enhancing credit distribution
Payments	<ul style="list-style-type: none">▸ Platforms enabling B2B, B2C, P2P money transfer▸ Payment processing
Personal finance	<ul style="list-style-type: none">▸ Leveraging technology to help individuals manage their finances and expenditures
Wealth management	<ul style="list-style-type: none">▸ Investment advice and account planning to help an individual grow wealth▸ Robo-advisor platforms

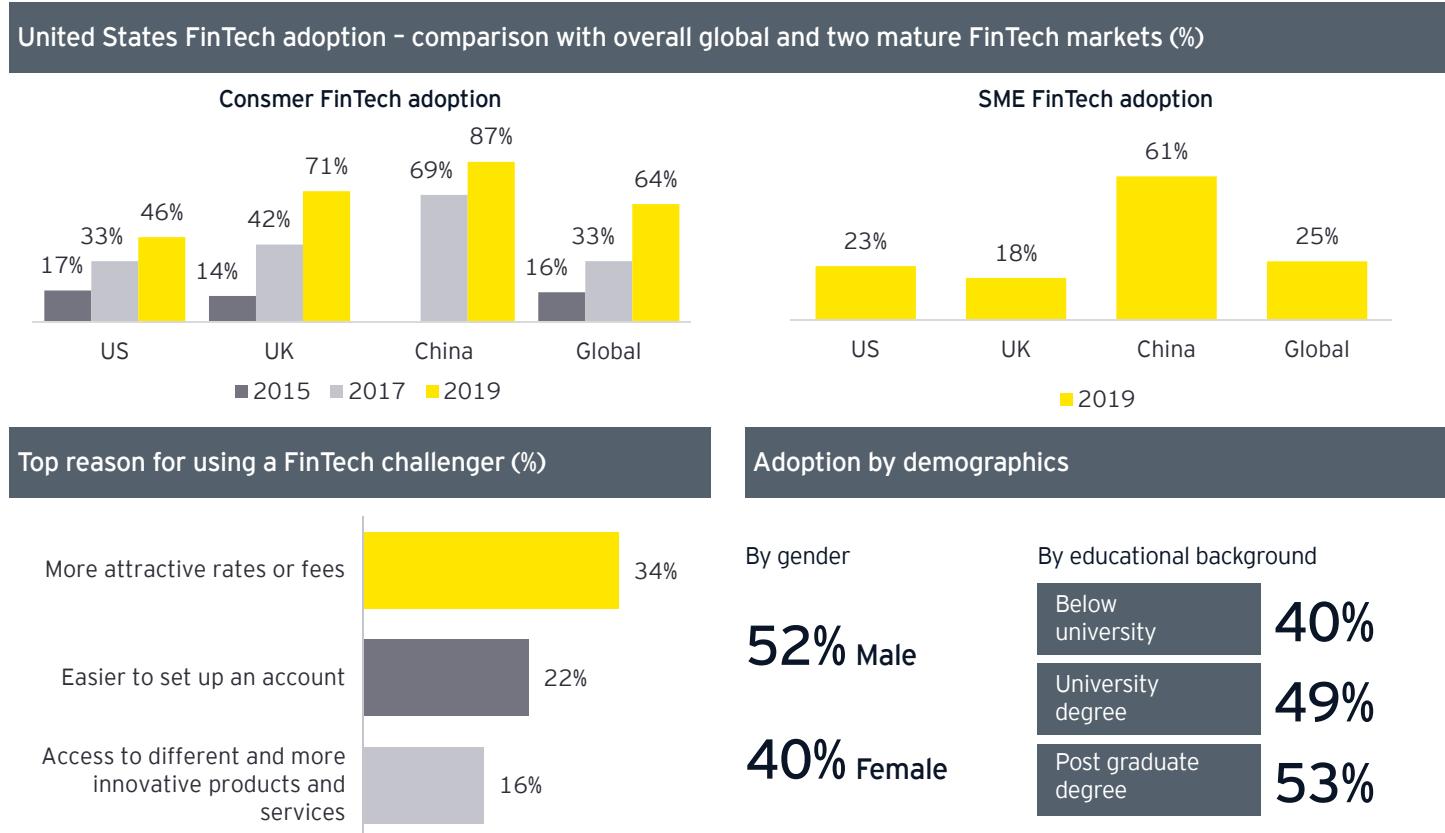
II. Current FinTech trends

Over the past decade, FinTech has taken center stage as a key driver of innovative growth within the financial services (“FS”) sector. Enablers such as exceptional computing power, widespread internet penetration, and increased internet speed and coverage, driven by 4G and 5G-enabled mobile access, are allowing FinTech to penetrate the market more widely than ever before. Increased demand, heightened customer expectations and the need to reduce costs while providing a faster, safer and more reliable service, all underpin the rise of FinTech.

Awareness of FinTech offerings is high across all sub-sectors, however, the payments sector stands out with 69% of consumers in the US using at least one service in this category. InsurTech also shows strong adoption, with 32% of consumers surveyed using a premium comparison site, feeding information into an insurance-linked smart device, or buying products such as peer-to-peer insurance.⁵

Historically, the main allure for adopters was the comparative ease of use and access. But priorities have shifted to a greater focus on fees and rates. This, combined with an increased willingness of customers to purchase

FIGURE 3.1 | Key FinTech adoption stats for the US market^{4,c}



Strong traction in US FinTech adoption and opportunity for growth ...

FinTech has spurred change across the FS industry, by making financial services more accessible for both consumers and businesses. Adoption of FinTech services has moved steadily up, with a 29.5% increase in use of FinTech among consumers between 2015 and 2019. However, the US trails many global markets in terms of FinTech adoption. In 2019, both consumer (46%) and small and medium-sized enterprises (“SME”) (23%) FinTech adoption in the US was below the global adoption levels, indicating strong potential for growth.⁴

products from multiple providers to benefit from price, usage and quality differentials, is broadly indicative that FinTech is now a mature market. Lower costs and a frictionless customer experience are expected as standard. Meanwhile, the building of trust has also played a significant role in FinTech adoption.

The FinTech industry has experienced unprecedented growth and there are currently over 4,000 FinTech players in the US.⁶ A host of startups, along with the major financial institutions, have been attracted to the industry as FinTechs change the way financial services consumers transfer,

^c Note: EY defines a FinTech adopter as someone who has used two or more “buckets” of services. A bucket consists of a major FinTech service, or two or more related services, such as online stockbroking and online investment advice. SME adoption is defined by the engagement of a FinTech company by an SME as an approved vendor of FinTech products or services.

borrow, protect and manage their money. Many of these companies have been through several rounds of fund-raising.

... driving increased investment in the US FinTech industry

The growing adoption of FinTech by both end consumers and businesses has impacted the level of investment in the sector. For 2019, annual FinTech funding in the US reached \$17.7 billion (across 993 deals), more than doubling from the 2015 funding level of \$8.4 billion (across 646 deals). ^{7, d}

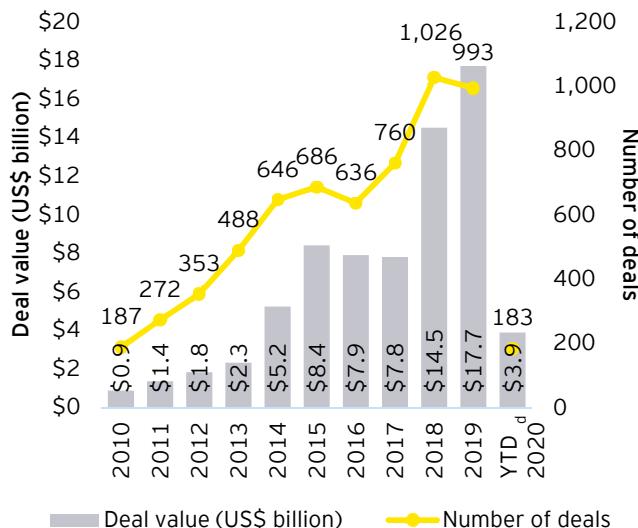
FinTech is an industry that has now evolved beyond its early stages. The rise in capital invested in late-stage companies and the increase in average FinTech deal-size demonstrates the maturation of the sector. Late stage deals, defined as Series D or later, constituted 65.7% of FinTech funding in 2019. Average FinTech deal size jumped from \$14.2 million in 2015 to approximately \$20.9 million in 2019.⁷

In terms of funding received, investors have placed large bets on digital lending, payments and InsurTech, which stood out as the top three FinTech sub-sectors in 2019.

Cases-in-focus:

- ▶ Flywire, focused on digitizing payments across education and healthcare, raised \$120 million in a Series E investment round in February 2020, led by Goldman Sachs, and became a unicorn.

FIGURE 3.2 | Trend in VC funding in the US FinTech⁷



^d YTD data as of 3/31/2020

In their quest for superior customer experience and digital efficiencies, FS incumbents increasingly collaborate with FinTechs

Incumbent financial services players are engaging with FinTechs through partnerships, collaborations, and investments as they look to strengthen their digital customer experience. Many incumbents have active investment arms and have made strategic investments in FinTechs for a few key reasons - to lock-in participation in high-growth, high-return opportunities and to scale up their own digital capabilities that drive a better customer experience and deliver efficiencies among them. In turn, FinTechs benefit from access to the incumbent's large customer base, established risk and compliance infrastructure and a cheaper source of capital while scaling the business.

At a sub-sector level, US incumbents have invested heavily in three major categories - payments (particularly B2C/B2B payments and payment and settlement infrastructure), capital markets (augmenting securities issuance, trading, clearance, and operations) and infrastructure and security (data analytics, AI/ML to understand complex data sets).

Cases-in-focus:

- ▶ Massachusetts-based InsurTech firm **Duck Creek Technologies** offers a suite of SaaS solutions for policy, billing, claims, analytics, distribution, and reinsurance management. The company has also created a partner ecosystem to match users with "specialists" focused on delivery, solutions, or consulting as a value-added service. Duck Creek reported a 32% increase in market share between FY18 and FY19.⁸
- ▶ **BNY Mellon** collaborated with Massachusetts-based **AcadiaSoft** to develop an all-in-one collateral workflow tool for clients with the goal of helping users manage margin calls, calculations, reconciliations and the movement of collateral through a single interface. The tool was developed in an effort to streamline collateral segregation with a custodian, margin calculations, margin calls, reconciliations, instructing counterparties into a single workflow, improving operational efficiency.

III. Overview of COVID-19 impact on FinTech

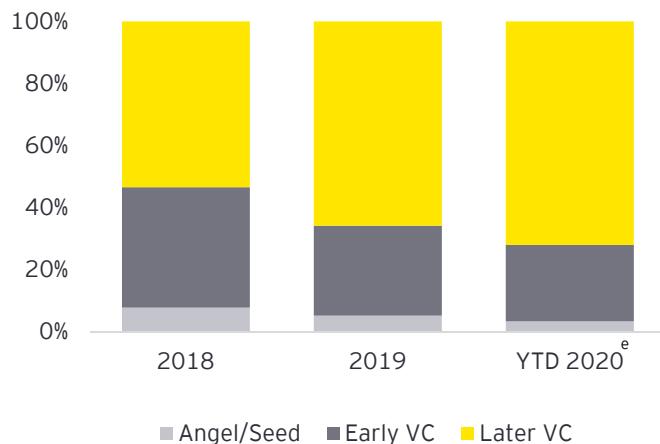
FinTechs need to show resilience in weathering their first major crisis and capitalize on the acceleration of the digital agenda

Resilience moves to the forefront in the face of the first major challenge for FinTechs

For FinTechs, the pandemic likely marks the first major economic shock they've dealt with - testing their businesses as customers retreat to the safety of traditional financial institutions. Incumbent financial services players have weathered different types of crises in the past and have time-tested programs that help safeguard customer assets. This flight-to-safety can be particularly challenging for earlier-stage FinTechs that are yet to gain a strong foothold in the market and remain heavily reliant on outside capital.

FinTech funding has been hindered by the COVID-19 pandemic, as investors increasingly chose to stay on the sidelines in 1Q20.^e With forecasts of a recession, investors pulled back on new investments to focus on fortifying existing portfolios. According to CB Insights, globally, 1Q20 early-stage (seed and Series A funding) FinTech start-ups transacted 228 deals, a 13-quarter low, and \$1.1B in funding, a 9-quarter low. Investors chose to remain liquid and were hesitant to fund early-stage un-tested opportunities.⁸ The share of late stage deals in overall FinTech funding in the US, increased from 65.7% in 2019 to 72% in 1Q20, as investors put money in more mature players with clear unit economics and paths to profitability. Further, there was a marked slow-down in mega-rounds and only two FinTech unicorns emerged in the US (FlyWire, based in Massachusetts and Highradius based in Texas).

FIGURE 3.3 | US VC FinTech deals by stage⁷



^e YTD data as of 3/31/2020

The challenge is real for some of these FinTechs (with the exception of those perceived to have the capital strength and sound operating models to drive through the crisis). In a highly competitive banking market like the United States, it seems that a certain degree of consolidation is imminent. Incumbents may make opportunistic acquisitions if they feel attractive assets can be picked up at relatively lower market prices. As the sector progresses towards maturity, FinTechs will need resilience to manage such challenges - which will likely require investments in technology and risk management. Going forward, resilience will likely become a key determinant to the success of FinTechs.

Acceleration of the digital agenda

While COVID-19 may present a serious challenge to FinTechs, it has also acted as the greatest accelerator of digital adoption among businesses and consumers in the financial services industry's history. This sustained momentum in digital adoption may be an opportunity for FinTechs to step in and thrive. COVID-19 and the associated lockdowns have sped up the rate at which people have reduced usage of cash and physical channels and adopted digital and contactless payment options. According to EY's Future Consumer Index survey, 46% of respondents are using less cash for making purchases, with 48% of the respondents saying they are using contactless payments more now. At the same time, use of credit cards by consumers is up (33%) and smart apps (up 39% net). Also, 73% of the respondents say they are visiting physical stores less and around 38% expect an increase in purchases from online channels.⁹

FinTechs can leverage this catalyst to digital channel adoption and take actions to expand into different consumer segments, meet the digital demand among businesses and look for collaboration opportunities with other FinTechs and financial institutions. The digital nimbleness of FinTech positions the sector well to assist previously technology-averse consumers with adjusting to the new digital landscape. Most respondents to the survey believe that how they banked in the past will change, with 53% seeing greater use of internet and 52% seeing greater use of mobile.⁹ Increased use of digital payment channels coupled with increased online avenues will likely promote integration of services and creation of all-inclusive digital ecosystems. With both small to medium-sized enterprises ("SMEs") and large incumbents trying to keep up with the accelerated demand for digital offerings, B2B and B2B2C FinTechs can play an important role in catalyzing the transformation. The need for speedier go-to-market solutions presents an opportunity for FinTechs to enhance partnerships with financial institutions to spearhead the level of innovation in financial services, while improving consumer experiences and offering digital-focused solutions.

Impact on talent acquisition

In terms of talent, many FinTechs, have paused on hiring as they focus on managing short-term pressures. However, FinTechs (and tech firms) are realizing the benefits of increased remote working as an opportunity to re-consider their hiring and HR strategies more broadly. Several large tech firms in the US have announced permanent work-from-home policies since the COVID-19 outbreak, creating questions around talent acquisition. In an environment where remote working could likely become a new norm, this could create the potential for FinTechs to access a wider talent pool across the country and reduce costs. This may also have an impact on where FinTechs choose to be located, as the necessity to be based in a core FinTech hub potentially diminishes.

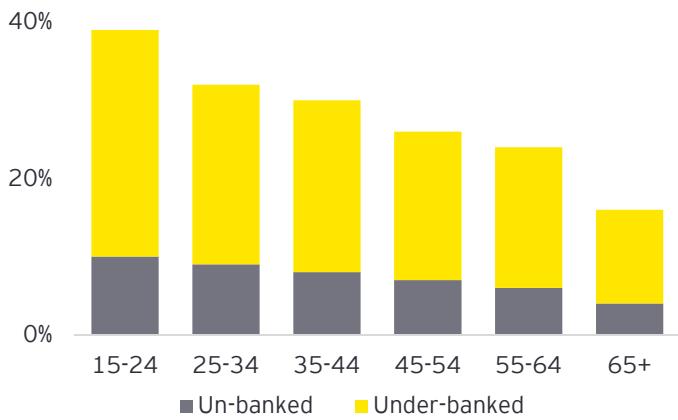
IV. Future trends impacting FinTech

We observe five trends that illustrate strong potential for impacting FinTech and the dynamics of the financial services industry:

I. Opportunity to serve the under-served

- There remains a significant gap in the delivery of financial services to under-served consumer segments, according to estimates by the FDIC and Credit Suisse.¹⁰ Approximately 14 million adults in the United States are unbanked (have no accounts) and an additional 49 million adults are underbanked (have a bank-provided checking or savings account, but utilize alternative service providers for other financial needs). This gap is particularly high for millennials and Gen-Z customers, providing a large opportunity for FinTechs to target the 60-80 million underserved customers and further financial inclusion.
- FinTechs have an opportunity to transform the delivery of digital financial services and access a market that has been traditionally expensive and challenging to reach. By leveraging new technologies to lower transaction costs, automating the customer interface and underwriting processes and by collaborating through various models of interaction with incumbents, we believe a higher percentage of the population can be brought into the financial system.

FIGURE 3.4 | Underserved US customer segment: potential opportunity for FinTechs¹⁰



II. BigTech taking root in financial services

- BigTech has continued to integrate into the financial services ecosystem and is well-positioned to challenge incumbents. The competitive assets available to BigTech include customer reach, massive data pools, agile technology platforms and significant investment capital. While payments was the first sub-sector to

experience the entrance of BigTechs, these tech giants are increasingly making inroads in lending, wealth and insurance businesses.

- However, while their entrance has been impactful, a general aversion by BigTechs to regulation and lack of financial expertise may limit how inclined they are to independently enter the financial sector without the support of partnerships. This leads to a clear opportunity for FinTechs and incumbents to collaborate with BigTech. We have already seen interesting partnerships, including between JPMorgan and Amazon, and speculation around potential future partnerships, including between Citibank and Google. FinTechs and incumbents alike may expect to play a significant role in the "platformification" of financial services as FinTechs, BigTechs and FS incumbents drive the creation of well-connected ecosystems.

III. Examples of regulatory involvement increasing

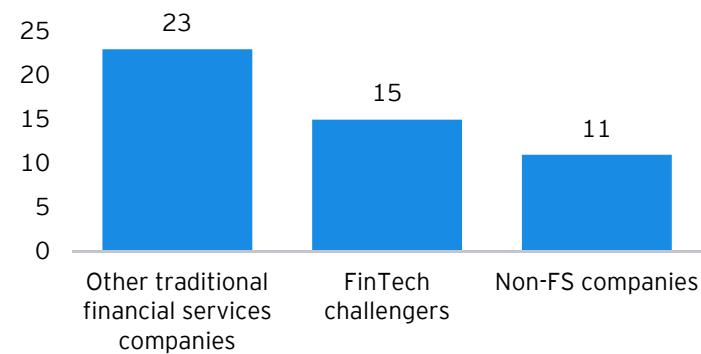
- The posture by some FinTechs that their organizations may displace traditional financial institutions through targeted niches has softened over the years and emerging players have moved increasingly more mainstream in their customer targeting and product portfolios. We've observed early FinTechs expanding from single product companies that attract a narrow audience to more diversified financial services providers.
- Various regulators in the US have begun exploring initiatives with the goal of encouraging FinTech innovation. For instance, the FDIC recently launched a certification program for FinTechs to work with banks, which could facilitate additional FinTech-community bank partnerships, and also proposed new application guidance for Industrial Loan Charter (ILC) applicants, some of which are FinTechs.¹¹ In addition, the Fed and FDIC continue to evaluate new technologies on an ongoing basis, as banks and FinTechs look to collaborate¹²
- There are a number of policy initiatives underway in the UK. In 2018, the UK was the first to take a government-led approach to open banking, requiring big banks to share customer data with authorized FinTechs. Under the EU's Payment Services Directive II framework, banks are required to create application programming interfaces (APIs) that enable customers to share data with third parties, which in turn, can help drive FinTech offerings.

IV. Rise of “as-a-service” platforms and middleware/application programming interfaces (“APIs”)

- ▶ Open banking provides third party applications with access to consumer banking and financial accounts. These initiatives, which create common API standards for data sharing, and increased willingness of consumers to share their data with the FS industry, are shifting the way organizations interact and products / services are brought to market.
- ▶ The past two years have witnessed an increase in digital native banks with platforms looking to monetize their technology and infrastructure by offering digital financial services to other FinTechs and corporates. As a result, the “banking-as-a-service” business model has gained traction.
- ▶ Incumbents are looking to both build their own digital FS ecosystem - enabling the rise of APIs and middleware - or provide their products as content to other digital platforms via APIs. The plug and play method through an API layer has opened the door for large corporates within and outside of the financial services industry that are looking to offer alternative products / services, capitalize on their large customer base and enhance the leveraging of user data.

FIGURE 3.5 | Consumers in the US have become more comfortable with sharing their data⁹

EY's latest FinTech adoption survey, sought responses on the following question: "I would be comfortable with my main bank securely sharing my financial data, if it meant that better offers from ..."



V. Increased digitization can provide a greater focus on resilience

- ▶ As financial service business models become increasingly digital (with the COVID19 pandemic also providing a strong push to digital), cyber vulnerabilities have become more apparent. According to Hiscox's Cyber Readiness Report, more than half of US businesses reported a cyber incident in 2019.¹³
- ▶ There is also a challenge on the customer side: while many customers have adapted to digital, they may not be fully comfortable using digital channels, leading to vulnerabilities on the customer end. All FS players (including FinTechs) are finding it important to not only protect their own cyber vulnerabilities but also work to protect entire ecosystem.
- ▶ Consumer protection, digital identification, and financial/ digital literacy remain high on the regulatory agenda as cybersecurity risk continues to be evaluated.
- ▶ This increased focus on operational resilience and heavy investment from corporates directed to strengthening cybersecurity technologies may create opportunities for FinTechs in the infrastructure and security category.

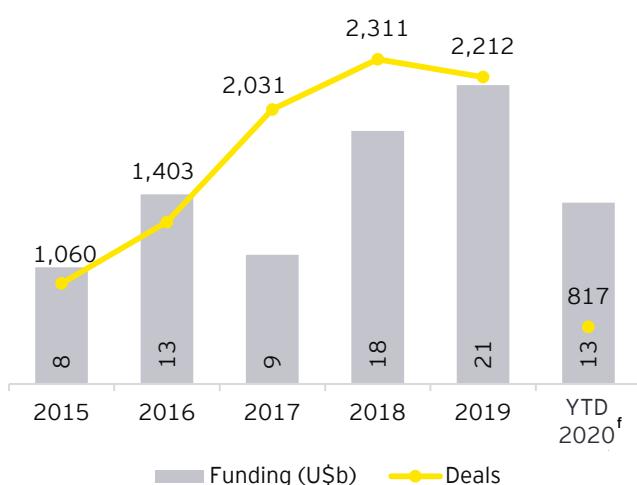
V. Technologies driving the future of FinTech

The digital transformation of financial services is expected to be spurred by a handful of critical technologies, including artificial intelligence, cloud computing, big data and advanced analytics, Internet of Things, blockchain, and quantum computing. For the purposes of this report, we have focused on three of these key technologies which we believe will underpin future innovation in the sector.

I. Artificial intelligence (AI)

AI (which includes machine learning, internet of things and automation) has become a major driver of FinTech innovation as it provides significant opportunity to automate processes across FS verticals as well as the FS value chain. AI-based workflows can discover new client groups, streamline risk management, reduce compliance costs, automate insurance claims and receivable recollection, help underwriting in insurance and generate alpha in investment management. Also, as processing power increase, AI support will likely be critical.

FIGURE 3.6 | Trend in AI funding⁷



AI's growing relevance and impact on the financial sector has resulted in a strong inflow of funding from both later-stage and early stage capital providers. The US deal volume has shown steady growth over the past three years, with average deal size doubling from \$4.4m in 2017 to \$9.5m in 2019.

Use-cases:

- Flywire is focused on automating the identification and reconciliation of complex, cross-border payments in real-time through machine learning techniques. Features of their ML algorithms include, support of new payment methods, confirmation of payment sources, detection of anomalous payments, and escalation of anomalies to Flywire's Compliance and Operations teams for review.¹⁴

- Digital Onboarding has developed an AI-driven customer onboarding platform through which they automate time-consuming marketing tasks in an effort to enhance customer engagement.¹⁵
- FiVerity (fka Coalesce.ai) has developed SynthID™ using artificial intelligence, which seeks to limit exposure to fraud, specifically for credit unions and banks.¹⁶

II. Big data and advanced analytics

Big data and analytics will likely remain critical to the FinTech revolution, as the size of data sets being handled by FS players exponentially increases. Whether it is insurance, wealth management, payments, or lending, FinTechs are leveraging big data analytics to generate customized financial services as "hyper-personalization" is often the focus of the customer experience. Data analytics can enable unlocking of insights to aid consumer behavior predictions, fraud control through detection/prevention via real-time monitoring as well as evaluation of credit risk.

FIGURE 3.7 | Big Data funding by stage⁷

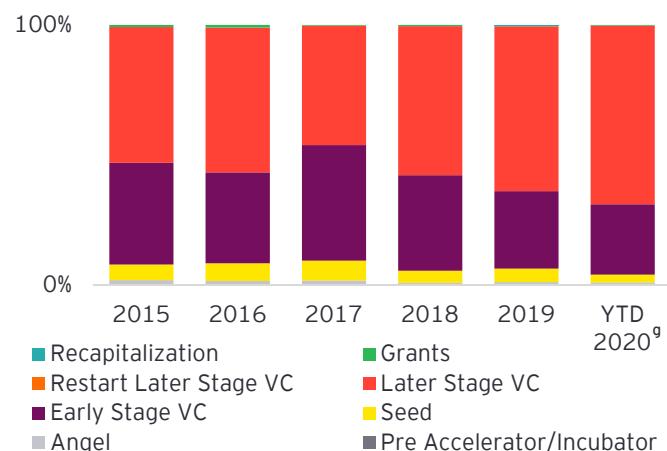
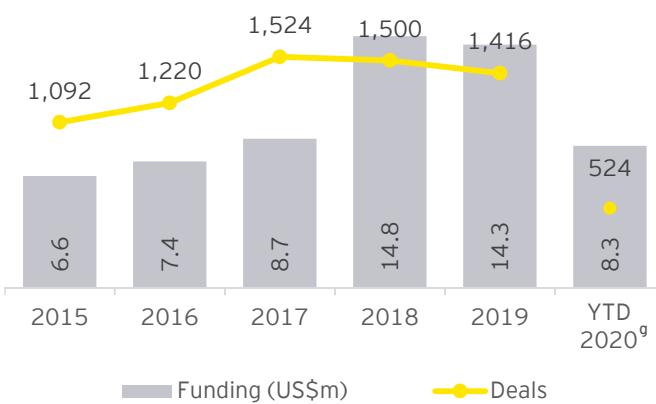


FIGURE 3.8 | Trend in Big Data funding⁷



^f YTD data as of 6/15/2020

^g YTD data as of 6/15/2020

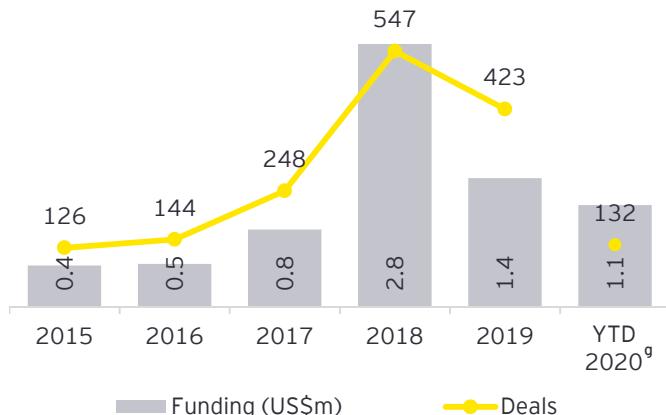
The Post 2018 rise in investor funding for late-stage deals demonstrates the maturity of the sector. Big data and advanced analytics saw an increase in focus and funding in 2017, which was followed by two years of major investment in which the average deal size grew from \$5.7m to \$10.1m in 2019.⁹

Use-cases:

- ▶ **Lendbuzz** looks beyond credit scores and uses Big Data analytics and a suite of alternate data points such as customers' background information including employment, educational, financial or personal history to assess their creditworthiness. It mainly focuses on seeking to improve access to credit for international students and professionals living in the US.¹⁷
- ▶ **Domeyard** uses advances in high-performance computing and data analysis in its hedge fund high frequency trading to develop trading algorithms across assets like equities, futures, fixed income, energy and commodities.¹⁸

Investment has consistently been in early stage funding, as new use cases are developed for the use of blockchain.

FIGURE 3.10 | Trend in Blockchain funding⁷

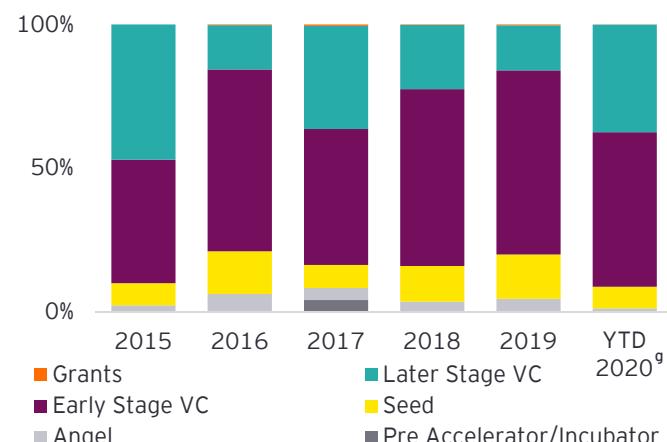


While the blockchain cryptocurrency bust of 2017-2018 ended with a steep drop in funding to the sub-sector in 2019, new use cases for distributed ledger technologies are opening the door for opportunity and investment in the space.

III. Blockchain

As US businesses actively embrace blockchain and distributed ledger technology (DLT), more blockchain-powered products are coming to the market with varied use cases across FS verticals. While the cryptocurrency buzz of 2018 dropped abruptly, there may be a plethora of new opportunities for the applicability of DLT. For instance, recently credit unions across the US have collaborated with FinTech platforms to implement DLT based digital identity services. The platform (which is a KYC-compliant, interoperable decentralized digital credential that uses a P2P network) can improve security by providing credit union members with a lifetime portable digital ID.

FIGURE 3.9 | Blockchain funding by stage⁷



⁹ YTD data as of 6/15/2020

| Massachusetts FinTech ecosystem assessment



To evaluate the state of the FinTech ecosystem in Massachusetts, we relied on both primary and secondary research. We inventoried the stakeholders across categories, assessing their role and impact on the sector. We interviewed key ecosystem stakeholders to gain insight from their experience interacting with the Massachusetts FinTech ecosystem. We considered survey responses from 25 early-stage FinTechs to understand how the ecosystem may be able to foster their growth and help them thrive. Lastly, we incorporated input from the FinTech Working Group. We have included the findings and select quotes from the interviews and survey responses within our analysis for each element.

I. Introducing the Massachusetts FinTech ecosystem

The emergence of FinTech in Massachusetts

Massachusetts has a strong legacy as a prosperous innovation ecosystem. The state continuously ranks as one of the top states in Bloomberg's annual State Innovation Index - assessed across research and development intensity, productivity, clusters of tech companies, STEM jobs, residents with degrees in science and engineering disciplines and patent activity.⁵ Massachusetts' innovation assets include a strong academic system - home to several globally prominent academic institutions - which has helped it build a flourishing technology and digital health-tech hub. The state also has a robust financial services sector, with some of the world's largest asset managers, banks and insurers headquartered in the state.

With its historical position as an innovation ecosystem and the consequent entry of small tech-focused players in the financial services domain, Massachusetts could be considered a natural place for the emergence of FinTech.

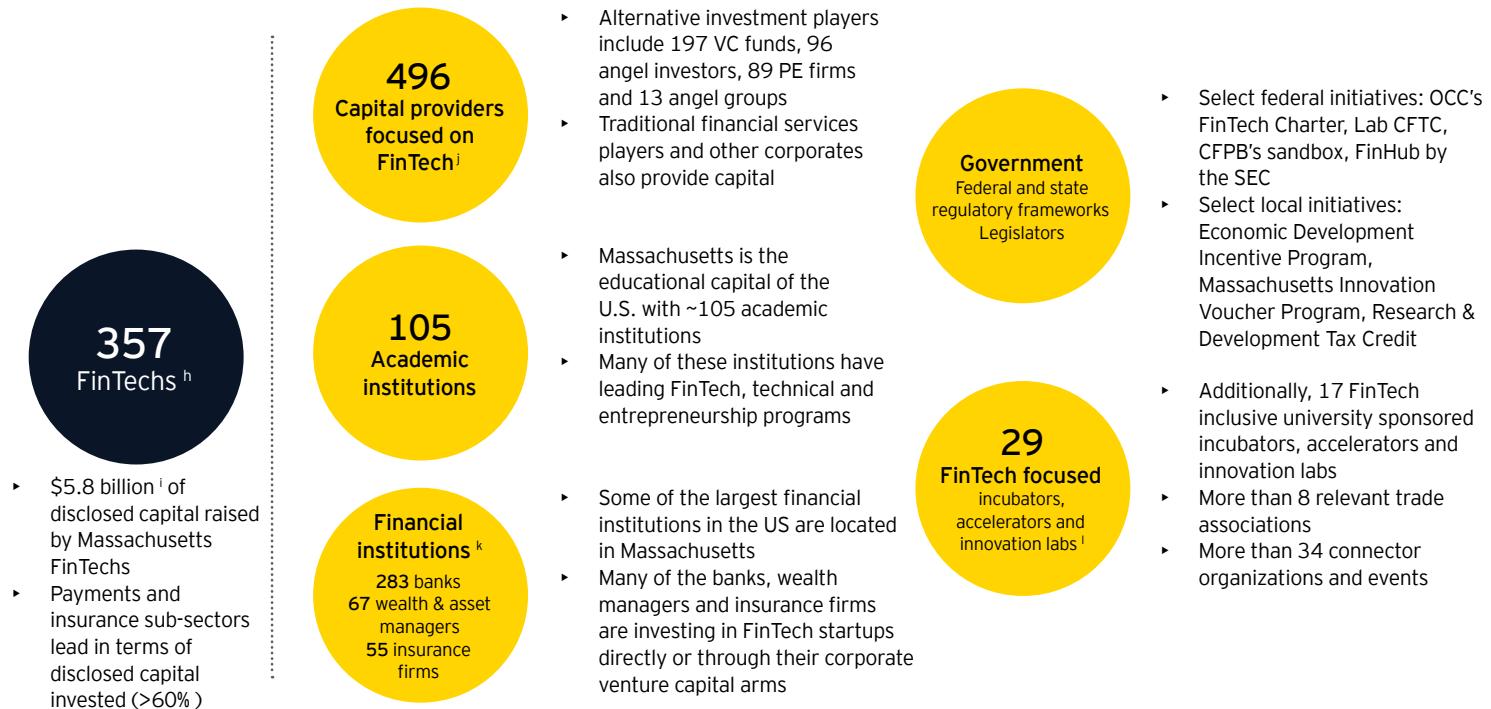
As the FinTech scene continues to emerge in Massachusetts, the roots of innovation have been strong in the state for decades, providing fertile resources and expertise that may allow FinTech to thrive.

Massachusetts stakeholder snapshot

FinTech activity in Massachusetts has been robust and growing. The state has strengths across the stakeholder categories and may be well positioned to become a prominent FinTech hub.

Below is a snapshot of the key attributes associated with the FinTech stakeholders of Massachusetts:

FIGURE 4.1 | Infographic - Snapshot of Massachusetts FinTech ecosystem stakeholders ^{h, i, j, k, l}



Stakeholder spotlight: FinTechs by the numbers

FIGURE 4.2 | FinTech companies in Massachusetts by sub-sector (n=357)⁷

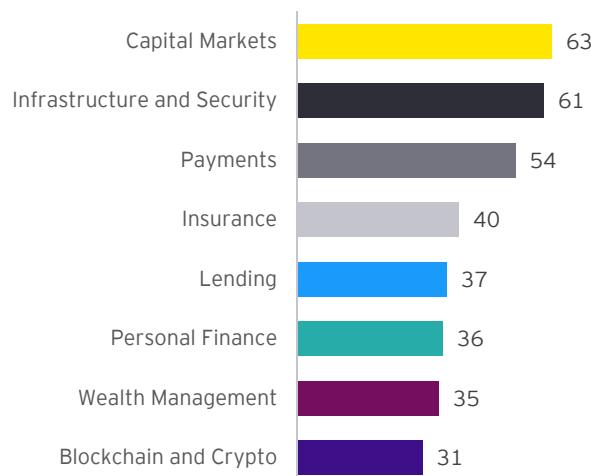
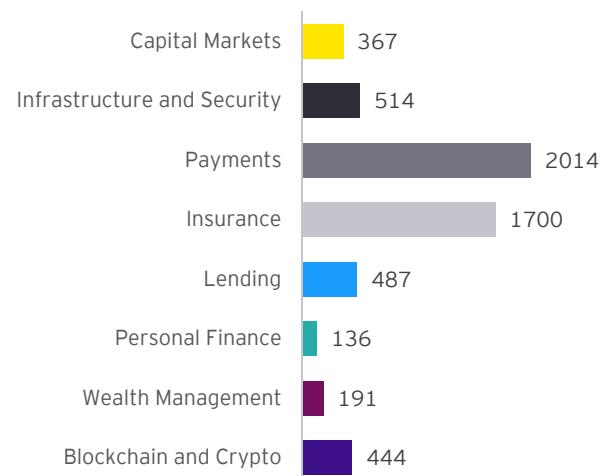


FIGURE 4.3 | Total funding received by FinTechs in Massachusetts (\$ million)⁷



^h Includes FinTechs headquartered in Massachusetts founded post 1/1/1999

ⁱ Represents funding activity through 6/15/2020 for companies founded post 1/1/1999

^j Includes capital providers headquartered in Massachusetts and nine select financial institutions with a strong presence in Massachusetts. Local capital providers may / may not invest in Massachusetts and out of state capital providers could be investing in Massachusetts. Includes 20 select corporates that invest in FinTech

^k Includes financial institutions headquartered in Massachusetts and nine select financial institutions with a strong presence in Massachusetts. Banks include commercial banks, credit unions, community / cooperative / savings banks, development banks, and investment banks

^l Does not include accelerators, incubators and innovation labs at universities and non-FinTech focused accelerators, incubators and innovation labs

In terms of presence of firms in the Massachusetts FinTech ecosystem, payments and insurance have dominated the capital scene, raising over 60% of the disclosed funding for FinTechs in the state (~\$2.0 billion and ~\$1.7 billion, respectively). Personal finance and Wealth management sit on the other end of the range, having raised the least capital among the FinTech sub-sectors.

FIGURE 4.4 | FinTech foundings (2010 - 2019)⁷

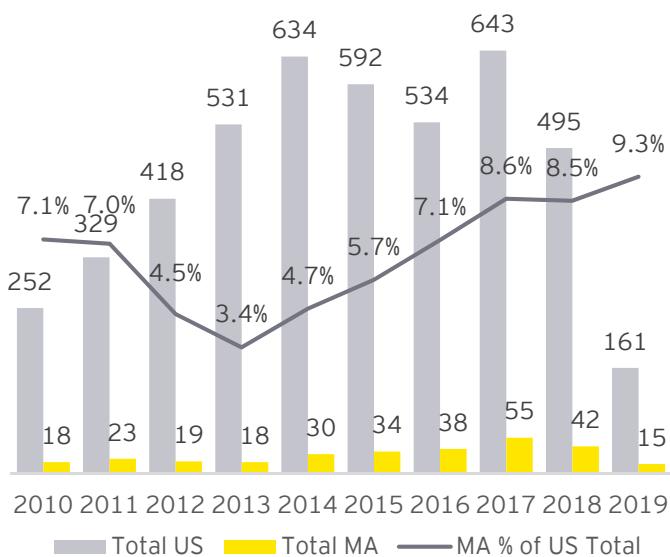
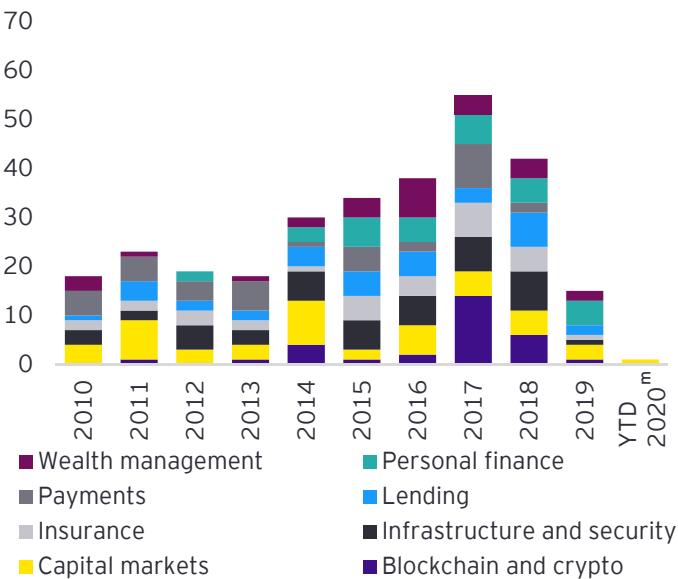


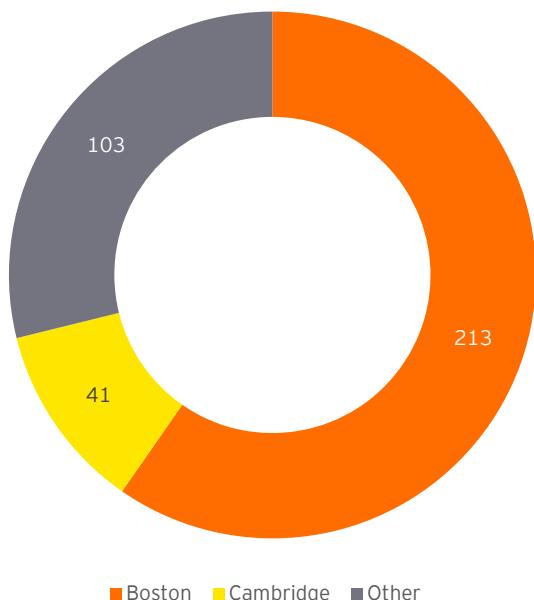
FIGURE 4.5 | FinTech foundings in Massachusetts by sub-sector (2010 - YTD)⁷



Although FinTechs founded in Massachusetts represented only 3% of total FinTechs founded in the US in 2013, that number has risen and remained steady between 7% and 9% of the total through 2019.^m Note, we recognize that there may be a reporting lag in the data that could skew the reported numbers downwards, particularly in more recent periods.

^m YTD data as of 6/15/2020

FIGURE 4.6 | Location of FinTechs in Massachusetts⁷



Boston is a sizeable current FinTech hub within Massachusetts, with over 60% of FinTechs located in the city and another 11% located in neighboring Cambridge. Given the maturity of the city, there may be opportunities to carve out non-traditional, physical centers of innovation for the FinTech community to gather and exchange ideas. Opportunities may also exist to leverage greater Massachusetts, outside of Boston and Cambridge, and its resources to contribute to the growth of FinTech within the state.

Trends in Capital flows to the FinTech sector in Massachusetts

With the emergence of FinTech, Massachusetts has seen rising interest from investors that has manifested in an increasing flow of capital into the state.

FIGURE 4.7 | Funding of Massachusetts FinTechs by stage (2015 - YTD)⁷

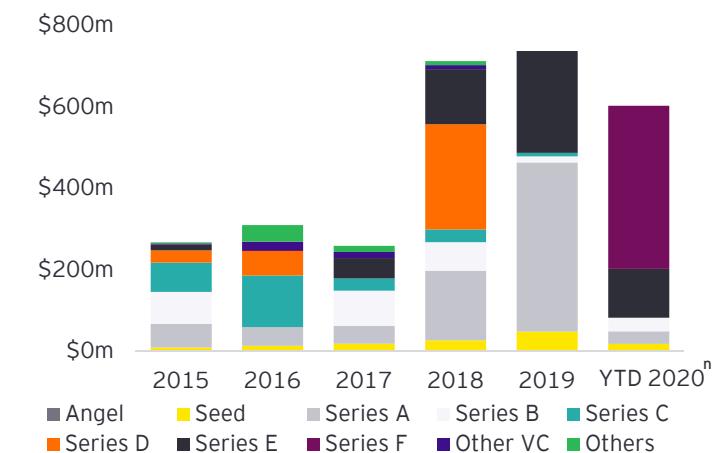
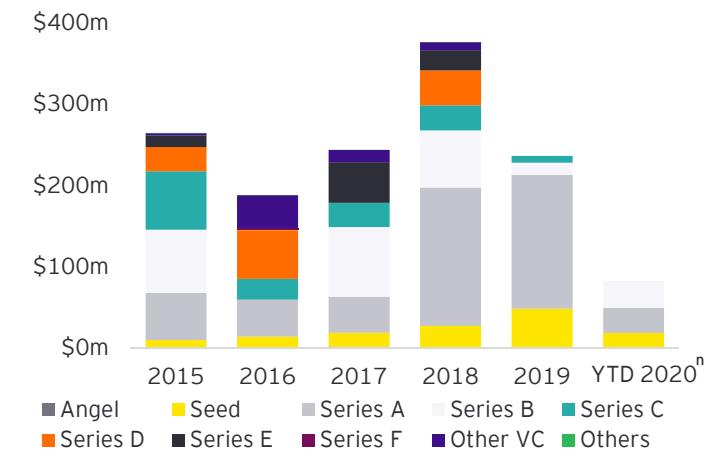


FIGURE 4.8 | Funding (<\$100m) of Massachusetts FinTechs by stage (2015 - YTD)⁷



Mega deals dominated funding rounds for Massachusetts-based FinTechs between 2018 and 2020. Since 2015, Flywire and Toast have received a total of \$1.1 billion in capital, the most cumulatively raised funding rounds in Massachusetts over that period. In 2019, LendBuzz and Hometap each raised mega-A-rounds, inclusive of equity and debt funding, raising \$150 million and \$100 million, respectively.

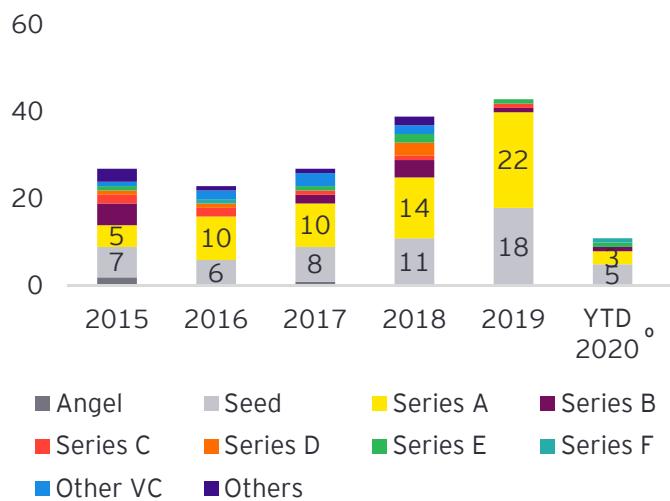
Excluding these and other mega deals (>\$100m), there was meaningful growth in seed and Series A funding from 2015 - 2019 (62% CAGR).

ⁿ YTD data as of 6/15/2020

^o YTD data as of 6/15/2020

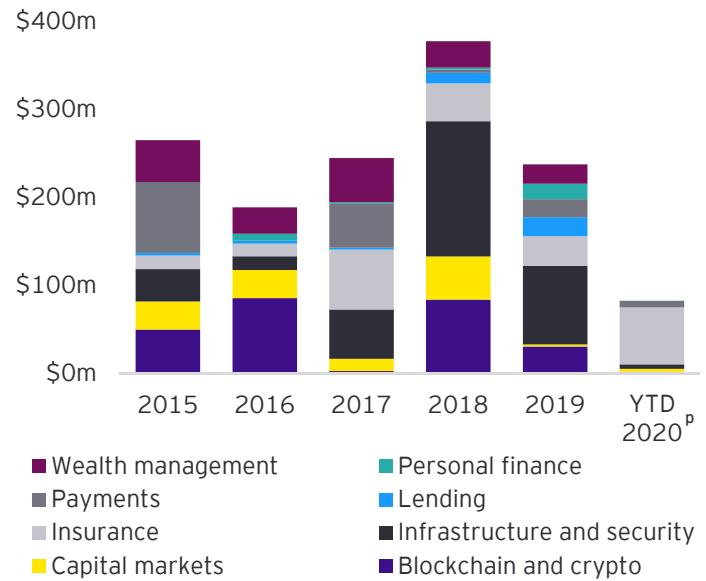
^p YTD data as of 6/15/2020

FIGURE 4.9 | FinTechs funded by stage (2015 - YTD)⁷



From 2015-2017 mid-stage funding was a focal point of Massachusetts FinTech investments, and such investment has generally followed those firms to later stages. The number of early stage funding rounds has increased steadily over the period. Seed and series A funding showed significant growth in both number of deals and round sizes.

FIGURE 4.10 | Funding provided to sub-sectors in Massachusetts (2015 - YTD)⁷



Massachusetts has a well-funded array of sectors, with companies across the payments, capital markets, and insurance sectors (the only notable gap is in the lending sector, which has dominated the FinTech mega-rounds elsewhere in the country). Blockchain and crypto showed significant investment through the 2018 crypto boom but has tailed off since, a similar trend seen across the rest of the country.

Using our ecosystem assessment framework, we have assessed the state of FinTech in Massachusetts across the five ecosystem elements. Each element assesses potential strengths and opportunities for growth which we have outlined through the key themes within each subsection.

i. Talent and Culture

Key themes

- ▶ **Massachusetts is recognized as a leader in academia, however it appears that source of talent is not currently translating into a steady stream of FinTech entrepreneurs in the state:** The state is home to some of the country's prominent academic institutions, providing a multitude of technical, entrepreneurial and FinTech programs. Three of the top ranked entrepreneurial programs across the country are in Boston (Babson College, Harvard University, MIT). There is relatively high export of talent from Massachusetts as competition for top talent is fierce and a large portion of graduating FinTech talent is drawn out of state to launch their careers. For the talent that remains in the state, there exists an obscurity over the FinTech space that may be prompted by some of the specialization and niche areas of expertise. There may be a need for clearer branding of problem statements and opportunities in FinTech for graduating students amongst university leaders.

- ▶ **There appears to be a supply-demand mismatch for talent, particularly technical talent:** There appears to be a need for specialist technical skills in FinTechs e.g., software engineering, systems architecture, data science. However, technical talent tends to be difficult to source. In addition, many early stage FinTechs often look for more experienced talent since they don't have the resources/ capacity to develop inexperienced talent. This shortage is exacerbated by the reliance on specialist technical skills among large financial institutions as well as non-financial corporations, resulting in many employers diversifying their candidate pools to include out-of-industry technical professionals whose skills are transferable to financial services.
Survey data pointed to similar challenges with sourcing talent - main challenges noted include difficulty with finding people with appropriate technical skills, high cost of talent and risk aversion/ lack of a startup mindset.

“

The FinTech sector is very obscure. It's about making it easier and making those career paths and opportunities clear for students. Maybe put interesting challenges to build awareness and generate enthusiasm for the FinTech sector.

Academia

“

Half of my students are foreign born, they bring great perspectives, they have great interest in FinTech. We send home incredibly good talent who wants to stay here because the Optional Practical Training Visa really only lasts one year.

Academia

“

We have really strong universities and great companies. The top technical talent goes to Seattle, San Francisco, they are moving early in their career.

Financial institution

“

Cost of technical talent is high when you are competing with the leading technology firms. Market price for an undergraduate developer is \$250,000.

Innovation hub leader

- **The culture in Massachusetts is perceived to be more risk averse, leading to a slower pace of play:** Compared to the West Coast, Massachusetts investors are perceived to be more risk averse, especially in regards to emerging technologies. Entrepreneurs often like to solve tough technical problems, which in turn can lead to a primarily focus on B2B innovations. While interviewees spoke positively of the state, the pace of play is defined as slow in comparison to that of New York or San Francisco.

“

There is a different mentality and draw to our region. The pace and speed of play is different. You are in the big leagues – it's the best of the best and they have a chip on the shoulder. Late stage FinTechs make a difference to the culture/pace of play.

Innovation hub leader

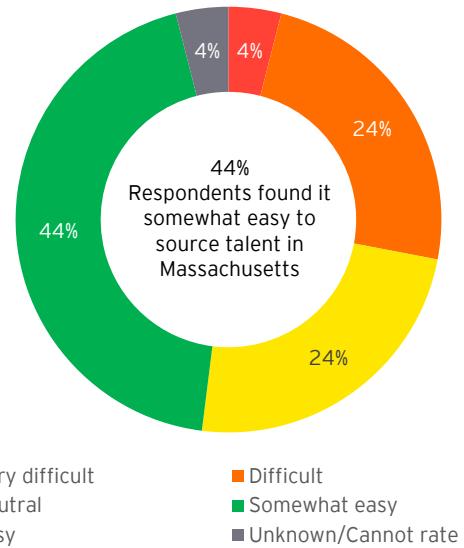
“

In Massachusetts, we tackle hard problems which is not sexy - our mindset isn't consumer based, the problems are institutional and highly regulated.

FinTech founder/leader

- **A serial investor culture and presence of high-profile FinTech personalities/ strong alumni networks is perceived to be lacking:** In prominent hubs, there is often a serial entrepreneur culture where capital from successful FinTechs and from exits is recycled back into the ecosystem. However, there are fewer large exits and alumni networks in Massachusetts. In addition, there appear to be fewer high-profile personalities evangelizing FinTech. This in turn appears to have limited the connection between universities, entrepreneurs and the FinTech community.

FIGURE 4.11 | Experience sourcing talent³



“

Boston has too few FinTech heroes that you want to be when you grow up.

Policymaker/other participant

“

Our region hasn't built a PayPal mafia. PayPal founders made money, stayed around and built new things. The question is how do you groom these founders to be successful and do it in a way that keeps them there.

Innovation hub leader

ii. Capital

Key themes

- There are a healthy number of VC and PE firms in Massachusetts, however these companies are generally location agnostic with respect to investment:

There are 532 VC firms, 419 PE firms and 32 angel investor groups based in Massachusetts. The most active institutional investors in FinTech are PE and VC firms - there are 197 VCs and 89 PE firms that invest in FinTech. While 37% of VCs and 21% of PE firms invest in FinTech, only 11% of VCs and 2% of PE firms invest in FinTech in Massachusetts, evidencing that focus on growth capital is location agnostic and results in investment across the country. In comparison, 41% of angel investor groups invest in FinTech and of that, 25% invest in Massachusetts, demonstrating that the group is less location agnostic and more regional.⁷

“

Compared to five years ago there is a lot of investment in FinTech. There is growth capital and CVC capital, there may be gaps in angel / early stage.

Capital provider

“

Capital is more of a challenge at early stages. Promotion at the seed stage based on informal relationships is key.

FinTech founder/leader

FIGURE 4.12 | Massachusetts based capital providers⁷

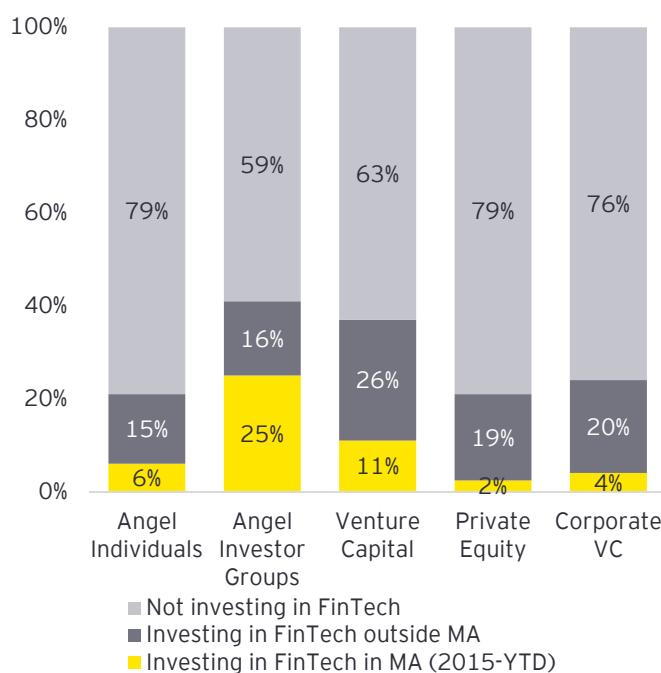
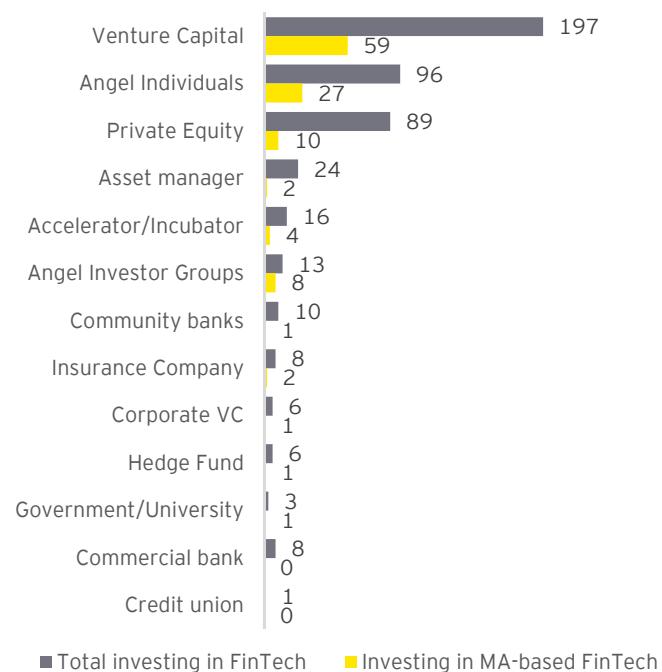
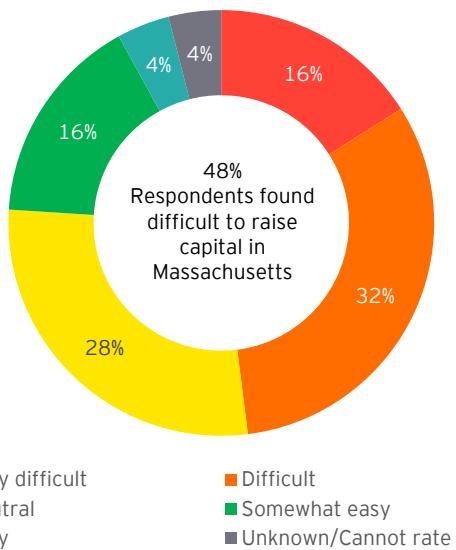


FIGURE 4.13 | Massachusetts based capital providers investing in FinTech (n=477)⁷



- ▶ **Access to capital is challenging for seed and early stage startups where local capital tends to be more important:** While growth and later stage companies can access global/ national capital, local capital tends to be more important for early stage companies. Along the same lines, some early stage investors generally prefer to be close by so they can monitor the company and provide direct mentorship. Based on our interviews, access to local capital is challenging for seed and early stage startups. Barriers to obtaining capital include: few angel investors with FinTech knowledge, lack of informal/ formal networks especially for first time founders and an inability of entrepreneurs to identify/ connect with the right angel investors. This results in many early stage FinTechs looking to New York and San Francisco to connect with investors with an appetite for FinTech.
- ▶ **There may be an opportunity to unlock more capital from investors, including the abundant supply of angel investors not investing in FinTech and non-accredited investors:** Survey data suggests that FinTech founders can benefit from: additional FinTech investors, greater interconnectivity, start-up focused market making activities, and greater risk tolerance from investors. FinTechs perceive that many angel investors do not understand the nuances and risk profile of a FinTech startup. Additionally, angel investors tend to be more risk averse and write smaller checks for FinTech investments. Based on the survey data, there appears to be a need to create platforms that can help cultivate awareness and interest amongst both angel investors and non-accredited investors.

FIGURE 4.14 | Experience in raising capital (n=25)³



“

Angels come from friends and family and not institutional capital. Earlier stage investors like to be close/ monitor the company.

Capital provider

“

In California, everyone wants to be an angel investor, to the benefit and fault of the state. Boston has too few angel investors and the angel network is hard to put your finger on.

Capital provider

“

Boston consists of brilliant people - they are more risk averse, more puritan. There are a lot of people with money to buy mutual funds, ETFs, blue chip funds, hedge funds, real estate. They just get nervous with angel investing and are used to institutional products. They are not comfortable with taking risks with startups.

Capital provider

“

To attract investors, it would help if Massachusetts created a platform - an internet site and host events that bring the startup ecosystem to investors. The events will be online and would allow introductions amongst players.

Capital provider

iii. Policy and Regulation

Key themes

- ▶ While many regulations/policies impacting FinTechs and financial institutions are federal in nature, interviews indicate that the state may be able to accelerate the FinTech sector through policy support and incentives: Some recent national initiatives impacting FinTechs include OCC's FinTech Charter, Lab CFTC, CFPB's sandbox, and FinHub by the SEC. The state may also be able to play a role by providing incentives to accelerate growth in FinTech. Massachusetts' pre-eminence as a biotech hub is attributable in part to state efforts, such as tax incentives and infrastructure grants. Our survey shows 88% of FinTech founders are not aware of any regulatory / policy initiatives available to the FinTech ecosystem in Massachusetts. Across other hubs, we have seen initiatives intended to reduce regulatory hurdles, promote talent and provide tax and financial incentives for companies and investors.

- ▶ Representation, commitment and engagement from state-level agents may be a powerful driver of FinTech exploration: A key factor to a strong ecosystem is champions within and across stakeholder groups. In addition to greater collaboration across regulators/policy makers (e.g., "Meet the Regulators" event in Boston²²), the ecosystem may be able to benefit from collaboration at the state level.

“

Tax incentives are a powerful motivator for corporations, Commonwealth balance sheet can be much more levered.

Policymaker/other participant

“

The regulation in UK benefits investors for taking early risk so write offs become no big deal. Massachusetts could pilot similar tax incentives which is something that has not been done before in the US.

Innovation hub leader

“

State and federal regulators have a strong relationship - there could be more collaboration between the different regulatory bodies if you bring them in the same room.

FinTech founder/leader

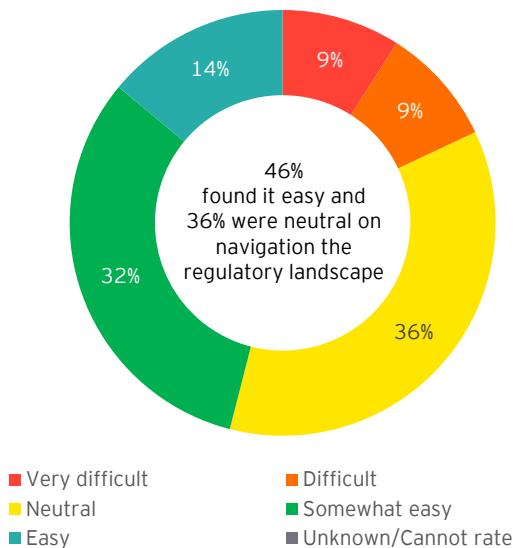
“

Examples of effective state legislature – Wyoming (advantageous for FinTechs), Delaware (corporate law/Board structure), Arizona (jobs program).

Policymaker/other participant

- Based on interviews with ecosystem participants, the feedback received is that regulatory sandboxes are effective when their purpose is clearly articulated and extends beyond state borders: According to interview participants, regulatory sandboxes run the risk of being limited in value for participants due to the regional scope and the how investors view the regulatory risks. Sandboxes may consider focusing on solving the big, global, problems rather than focusing on regional initiatives. In addition, survey participants indicate that there appears to be a need to have a central source that provides a list of regulatory institutions and the regulations impacting FinTech and that can help connect entrepreneurs with the right resources.

FIGURE 4.15 | Experience in navigating the regulatory landscape³



“

There is no single source of truth on who the regulatory institutions are and how they regulate. Any legal/compliance coaching would also be very helpful but there is hesitation to do so.

FinTech

“

The regulatory sandbox in London is good – it is measured and proportionate.

Innovation hub leader

iv. Infrastructure and Technology

Key themes

- ▶ **With the exception of public transport, interviews suggest Boston is a desirable city to live in, with strong infrastructure:** While Boston is a desirable city to live in, the public transport system is perceived to be unreliable and the cost of living in the city is seen as high. Though accelerators provide real estate for some startups, there is opportunity to provide greater relief through a more centralized innovation center for FinTechs whether in the city of Boston or in a neighboring suburb.
- ▶ **Boston is perceived as one of the prominent technology hubs in the US:** Through its top universities and technology research initiatives, Massachusetts is perceived to be among the technology leaders in the US. The reputation stems from top university talent and R&D, including MIT (e.g., MIT Media Lab's Digital Currency), as well as government initiatives, like the Boston Fed's Blockchain research and experiments (e.g., proof of concept ("POC") whitepaper and supervisory node experiment).
- ▶ **Unlike some hubs, there is no clear overarching sub-sector/ technology dominating FinTech in Massachusetts:** While there are a greater number of FinTech startups (~50%) in the infrastructure & security, capital markets and payments segments in Massachusetts, the overall ecosystem consists of a variety of firms across various types of technologies and segments. Although there is a strong asset management and insurance presence in the broader financial sector, there does not appear to be a direct correlation to activity of FinTechs in the same space. According to one ecosystem player interviewed, the diversity of technology and focus areas is beneficial for the ecosystem as it allows for innovation across the sector without any impediment due to driven focus in a single technology.
- ▶ **There may be an opportunity to cross-pollinate innovation across other industries especially healthcare:** One area that has stood out above the rest in regard to technology and innovation in Massachusetts is BioTech. Heavy capital investment, beneficial government incentives, and large incumbent entrances have allowed the healthcare space to thrive in the state. Given this mature expertise, there may be opportunity to cross-pollinate solutions across industries e.g. financial wellness.

“

Technology became a driving element in the second half of the last decade through the open banking initiatives. There is real takeoff in cloud-based systems – genuinely embracing cloud and open source, Python and Java - the big banks are realizing this is serious.

Innovation hub leader

“

New York is a finance hub, whereas Boston has more of a technology focus e.g., Flywire. We can brand ourselves as a payments and identity hub.

FinTech founder/leader

“

You can tell about a city when you get to the airports, and in Massachusetts it's all healthcare, in NY it's all capital markets, in Portland it's the best coffee. Branding around FinTech is cool.

FinTech founder/leader

“

There is a unique opportunity in financial wellness – that's something Boston can be a leader in.

FinTech founder/leader

v. Interconnectivity

Key themes

- ▶ **Every strong ecosystem has third parties/ magnets that can improve interconnectivity and collaboration:** Third parties include incubators/ accelerators, coordination groups. Pillars of the Massachusetts ecosystem include: FinTech Sandbox, DCU and MassChallenge. However, a magnet role can also be played by academia and trade organizations, often viewed as neutral, as well as by the government.

Survey results reveal the greatest improvements in the Massachusetts ecosystem can be made in terms of increasing interconnectivity and collaboration. FinTech founders expressed an interest in gaining greater access to: FIs, entrepreneurs, state officials and networking organizations.

“

There is a lot going on in Massachusetts, there are all these silos. We have tremendous higher education, skilled workforce, technology companies, VC money, incredible small - large traditional financial institution players, entrepreneurs, startups, bunch of regulators and FinTech groups. There is not a commitment to get the dots together.

Policymaker/other participant

“

I could benefit from access to people with a strong network, experienced FinTech entrepreneurs in Boston with successful exits, senior executives in banking, accounting, and insurance actively helping with entrepreneurs - a community that supports the serendipity that happens when you do great matchmaking.

FinTech founder

- ▶ **A strong ecosystem requires champions and commitment across all stakeholders:** These are individuals who are passionate about the space and connect the dots to create the sum that is greater than the parts. The champions commit to the vision/ mission of raising the ecosystem and create a ripple effect.

“

There should be community and connectivity between investors, executives and serial entrepreneurs. You need to link mentorship, capital and real estate. You need a voice - someone linking the value proposition and saying this is the best place.

Innovation Hub leader

- ▶ For successful partnerships, both FinTechs and financial institutions may need to recognize the requirements / constraints of the other party: Challenges we heard from FinTechs include unclear needs articulated by financial services corporations, opaque/ unclear vendor approval processes and slow response time. Challenges we heard from financial services corporations include lack of maturity of FinTech founders, lack of ability to navigate/ understand the workings of a large corporation and lack of sales skills.

“

The challenge is the dynamic - big players have all the time in the world, while small players need to speed up the transaction / implementation of services to succeed. Big corporations don't recognize their speed kills FinTechs. In addition, sometimes incumbents won't admit their problems because they are embarrassed by their speed.

FinTech founder/ leader

“

The innovation folks at the enterprises are the friendliest folks to interact within corporates but the business line owners are the ones that matter more, and getting them on board is challenging sometimes.

FinTech founder

- ▶ Greater human capital and financial investment by financial services corporations may help drive more meaningful connectivity between incumbents and FinTechs: Investments in FinTechs, both financial and in terms of human capital, by financial institutions may be critical to accelerating the growth of the ecosystem. Corporate venture vehicles act as champions for entities they have invested in. Interviews indicate that while financial institutions are actively engaging with FinTechs, few have skin in the game and outcome-based engagements. Moreover, they are mainly focused on the more mature FinTechs that have reached a certain size and scale.

“

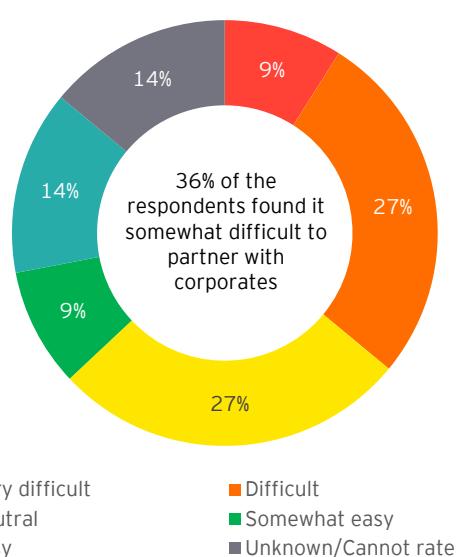
Pull incumbents into the mix and have them put skin in the game to sponsor the growth of the community. There should be senior leadership commitment to have partnerships in the ecosystem.

Policymaker/other participant

“

Too many FIs seem to think that their responsibility ends with funding an accelerator. In many cases, they have not set meaningful goals for their employees, and as a consequence we have wasted a lot of time with employees who aren't prepared to seriously engage.

FinTech founder

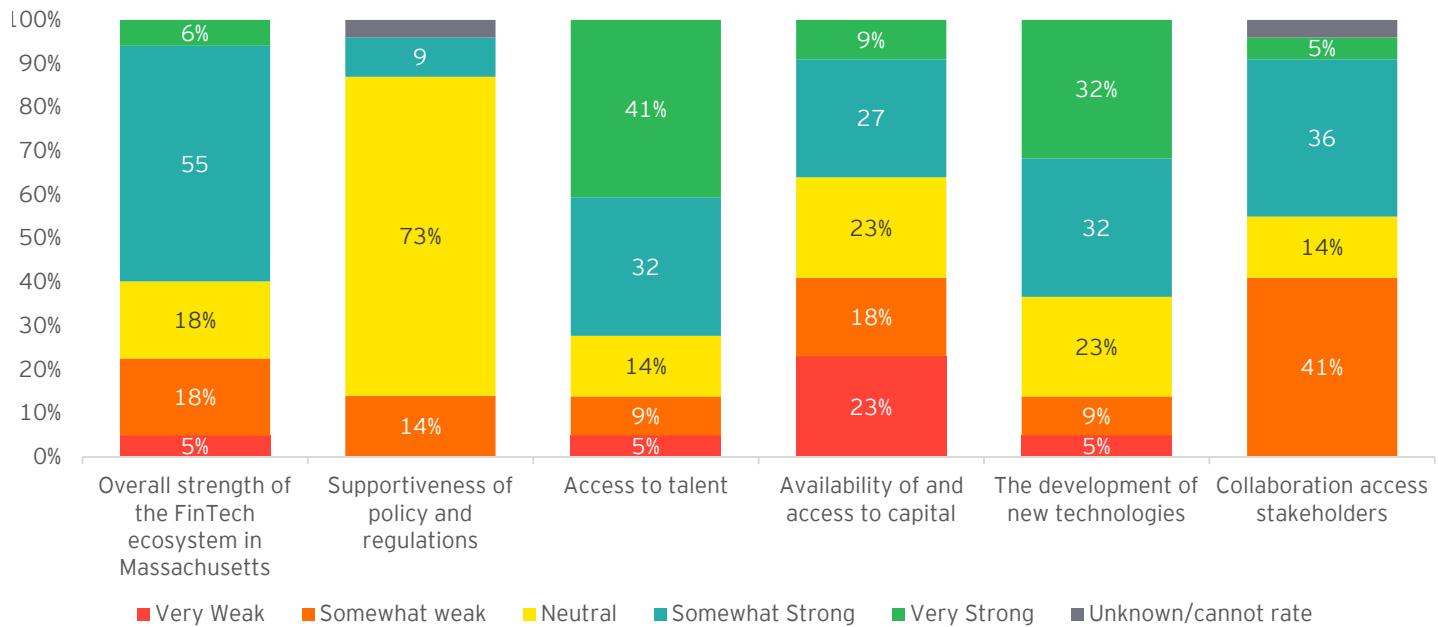


Overall themes of the survey

Overall survey insights have revealed that early stage FinTechs view Massachusetts as a healthy hub for FinTech, with 60% of the respondents believing that the overall Massachusetts FinTech ecosystem is strong. A majority of respondents think access to talent (73%) and development of new technologies (64%) is robust in the

ecosystem. However, 73% of the respondents remain neutral on supportiveness of policy and regulations. And regarding whether access to capital and collaboration across stakeholders can be improved: 38% of respondents believe access to capital is weak; 41% believe it is neutral; and 41% of the respondents believe collaboration among various stakeholders in Massachusetts is weak.

FIGURE 4.17 | Strength of the Massachusetts ecosystem³



| Spotlight on innovation hubs

A close-up photograph of a person's face, wearing glasses, looking intently at a digital screen. The screen displays a futuristic user interface with glowing blue elements: a circular radar-like graphic with lines and dots, a large gear icon, and a grid of circular icons. The overall theme is technology and innovation.

Spotlight on innovation hubs

For the purposes of distinguishing hubs, we have classified them in three categories. For each hub, we have provided a view on key stakeholders/ecosystem participants and performed an assessment across the five elements. We have characterized the hubs as leading, emerging and

up and coming based on the number of FinTechs in each location. We have also highlighted characteristics that may differentiate these hubs. The qualitative view should be read in conjunction with our quantitative assessment to form a holistic view on the FinTech hub ecosystem.

Leading innovation hubs	Emerging innovation hubs	Up and coming innovation hubs
<ul style="list-style-type: none"> ▶ These hubs have a first mover advantage and an enviable lead in terms of size. They are home to a large number of FinTechs (750+) and many unicorns ▶ These hubs have attracted a high amount of capital and attract world class technical, entrepreneurial and FS talent ▶ These hubs have strong interconnectivity and there are examples of policy initiatives targeting the growth of the FinTech sector ▶ There are strong incubators/ connectors and coordinating agencies that bring together the ecosystem. 	<ul style="list-style-type: none"> ▶ These hubs are relatively mature, rapidly growing and are home to large number of FinTechs (100-750) ▶ The hubs have attracted less capital than leading hubs, however, however funding appears to be growing ▶ These hubs have distinct advantages that have allowed them to grow and mature, however some elements can be further developed. For example, in both ecosystems there are prominent academic institutions and strong access to talent, but access to capital can likely be improved for early and mid-stage FinTechs in particular within the regions. 	<ul style="list-style-type: none"> ▶ These hubs are rapidly emerging and are home to many FinTechs (less than 100) ▶ These hubs anchor on an established / pre-existing specialism or industry center (e.g., payments, banking, etc) ▶ There are strong public-private partnerships, collaboration from local academic institutions and local policies and incentives catalyzing these hubs - and a strong sentiment of "Local First" ▶ These hubs have strong FinTech ambitions and have champions that have played a key role in coalescing the ecosystem. There is a strong ecosystem bolstering initiatives between stakeholders.
<ul style="list-style-type: none"> ▶ London ▶ San Francisco ▶ New York 	<ul style="list-style-type: none"> ▶ Canada (Montreal and Toronto) ▶ Massachusetts 	<ul style="list-style-type: none"> ▶ Atlanta ^q ▶ Charlotte

^q While we have classified Atlanta as an up and coming hub, it is growing rapidly in size and maturity and many of its attributes are similar to those of emerging innovation hubs

I. Canada (with a focus on Toronto and Montreal)



Overview

The Canadian FinTech ecosystem is underpinned by a robust financial services sector that accounts for 5% of the nation's employment and 7% of GDP. There are ~528 FinTech companies in Canada. These include: Clearbanc, Blockstream and Coinsquare.²³ The largest number of FinTechs exist in Ontario (47%), followed by Quebec (24%) and British Columbia (18%).²⁴

Strengths include local talent with highly skilled global talent drawn in through government initiatives, established technology centers of excellence, a prominent financial services environment and an emerging policy environment.

Strengths and success factors

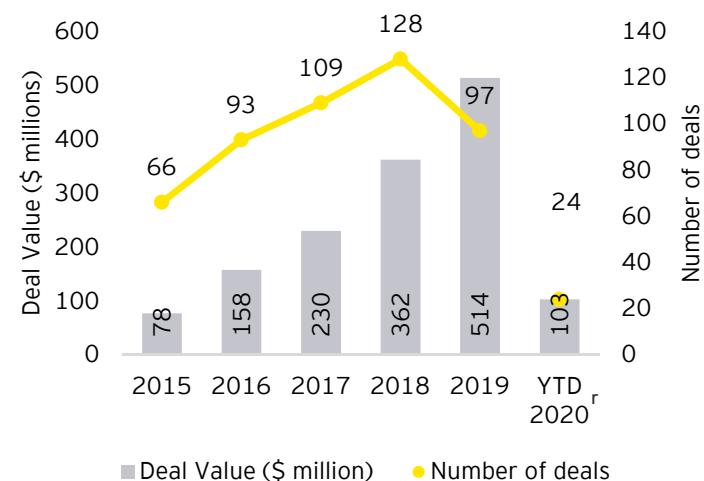
1. Talent and Culture

- In 2017, the Canadian Government launched the Global Skills Strategy to promote global investment in Canada and facilitate faster entry into the country for top international talent. The pilot program from 2017 to 2019 was viewed by many as a success and the Global Talent Stream was made a permanent program within the Canadian immigration system.
- Montreal has established itself as a prominent global AI hub through a collaborative ecosystem of AI researchers, academia, government, startups and established players. Montreal has four universities with a strong focus on AI (McGill, Université de Montréal, Polytechnique Montreal and HEC). There are 11,000 students dedicated to AI and data related university programs. Collaboration between academics and industry is fostered through initiatives such as IVADO institute, which brings together industry developers and academics to develop expertise in data science, operational research and AI. More broadly, government grants have supported Montreal's AI focus, with over \$1 billion in funding dedicated to university research and the decision to choose Montreal as a headquarters for SCALE AI, dedicated to building enhanced supply chains by leveraging AI.²⁵
- Ontario's 45 colleges and universities produce approximately 39,600 STEM graduates each year.²⁶ University of Toronto and Trilogy Education launched FinTech Boot Camp, which is a 24-week part-time program and is geared towards experienced professionals. The Ontario region has 12,000 financial firms employing over 360,000 people.²⁶ Canada also benefits from a vibrant entrepreneurial community and is ranked third according to the Global Entrepreneurship Index score.²⁷

2. Capital

- There are 200+ PE firms, 450+ VC firms and 500+ angel investors (individuals and groups) based in Canada. FinTech Investment by VCs was \$514 million in 2019 and has grown at a CAGR of 61% from 2015-2019.

FIGURE 5.1 | VC investment into the Canadian FinTech sector⁷



- Although capital lags behind other global hubs in terms of FinTech investment value, Canada has seen an increased availability of seed and pre-seed financing for FinTech companies. However, there is a lack of later stage funding options, which has been restrictive to scaling-up FinTech companies. Canadian startups strongly rely on US private equity for later-stage investments, with a typical trajectory of opting to leave the country for expansion and further funding.

3. Policy and Regulation

- In October 2016, the Ontario Securities Commission (OSC) introduced the OSC Launchpad to provide direct support on regulatory guidance to new and early-stage FinTech businesses in Canada. The initiative is staffed with representatives of various regulatory branches.²⁸ In January 2017, the OSC formed the FinTech Advisory Committee to provide guidance on developments in the FinTech space and the unique challenges faced by FinTechs in the securities industry.²⁸

^r YTD data as of 6/15/2020

I. Canada (with a focus on Toronto and Montreal)



- ▶ The OSC inked a co-operation agreement with the UK Financial Conduct Authority (FCA) and the Australian Securities and Investment Commission (ASIC) to provide mutual support to innovative FinTech businesses as they seek to expand their businesses into each other's market.²⁹
- ▶ In February 2017, the Canadian Securities Administrators (CSA) - an umbrella body of all Canada's provincial securities regulators launched the Regulatory Sandbox Initiative with the goal of helping FinTech businesses get to the market quicker.³⁰
- ▶ The federal and provincial governments also introduced R&D tax credits for FinTech businesses. The City of Toronto, together with the Ontario Government launched the Starter Company Plus grant program to help small businesses adopt digital technologies. The program will provide grants ranging from \$2,500 to \$5,000 and one-on-one guidance from an Enterprise Toronto small business advisor.³¹

4. Infrastructure and Technology

- ▶ Canada has three vibrant technology hubs: Toronto-Waterloo, Vancouver, and Montreal. These clusters are perceived to be highly attractive to foreign talent and millennials.³² The ease of setting up and running a business is perceived to be high.
- ▶ Toronto is one of the most diverse cities in the world and is the country's financial hub.³³ Toronto is also the headquarters of major Canadian banks and notable pension funds and hedge funds.³⁴ The Toronto-Waterloo corridor, a 100 km stretch, is the second largest technology cluster in North America.³⁵
- ▶ Montreal has established itself as a prominent global AI hub through a collaborative ecosystem of AI researchers, academia, government, startups and established players. The interconnected community has attracted many prominent technology companies to set up as AI-specific labs in the city. Montreal boasts 11,000 students dedicated to AI and data-related university programs.

5. Interconnectivity

- ▶ There are over 70 accelerators in Canada and over 35 incubators in Canada. Notable accelerators include TechStars Toronto, Next Canada. Notable incubators include Velocity, Anges Quebec Capital and Mobio.³⁶
- ▶ Some connectors/collaboration initiatives include:
 - ▶ **Digital Finance Institute:** Think tank for FinTech, financial innovation, regulation and financial inclusion.³⁶
 - ▶ **Toronto Finance International:** Public-private partnership between Canada's financial services institutions, academia and the government to drive the growth and competitiveness of Toronto's financial services sector.³⁷
 - ▶ **Montréal FinTech Station:** Physical location serving as a development catalyst for young FinTech companies.³⁸
- ▶ Some notable events include: Canada FinTech week, National FinTech Canada Conference, Canadian FinTech and AI awards, FinTech Connect Toronto.

A closer look:

- ▶ **Montreal's FinTech research unit:** The Université du Québec à Montréal, Finance Montréal and Autorité des Marchés Financiers (AMF) combined to launch a FinTech-focused research initiative. The venture is being funded with \$2 million over five years with equal contributions from AMF and Finance Montréal. The unit focuses on a range of issues, including the impact of the FinTech ecosystem on the financial sector, the impact of innovation on customer and employee experiences, investor protection, and innovations enabled by an exponential increase in computational power and big data.²⁵
- ▶ **Toronto Finance International**
TFI is a public-private partnership between Canada's three levels of government, the financial services sector and academia. TFI aims to drive competitiveness and growth of Toronto's financial sector and establish its prominence as a notable international financial center. TFI convenes public and private stakeholders and deliver collective initiatives to address barriers and foster growth in innovation in the financial sector. Some initiatives include³⁶:
 - ▶ **FinTech educational series:** Created a forum for large financial institutions and FinTechs to connect and to educate stakeholders on the latest in technological and regulatory developments impacting financial services.
 - ▶ **Promoting Toronto as a FinTech hub:** Participates in the broader dialogue on the themes, opportunities and challenges to innovation in the Canadian financial sector.
 - ▶ **Partnerships with Global Financial Centers:** Joins to raise the profile of the Toronto Financial Centre and ensure that Canada's financial sector is represented in important international dialogues.

Overview

London is home to one of the world's largest financial sectors, diverse talent pools and innovation-oriented government and regulators. The UK remains a global FinTech capital. UK FinTech represented 11 billion in revenue in 2019, up from 6.6 billion in 2015. The UK has over 1,600 FinTech firms headquartered in the region, with the number expected to double by 2030.³⁹ Example FinTech unicorns include: Revolut, Checkout.com and Transferwise.⁴⁰

Strengths of the ecosystem include, progressive regulatory and tax environment, presence of top global talent, and strong connectivity through collaboration bridges and independent organizations.

Strengths and success factors

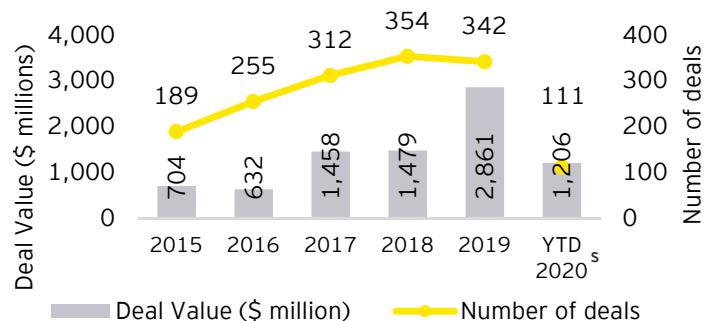
1. Talent and Culture

- ▶ The UK has a high density of top ranked postsecondary education institutions, with London alone home to four of the top 30 ranked universities in the world.³⁷
- ▶ The financial services sector is facing growing skills gaps driven by a fundamental shift in roles that the industry is trying to recruit, and the types of skills required in those jobs. A 2018 House of Commons Report suggests that the STEM pipeline has weakened at the school and university level.⁴³
- ▶ The country has 2.1 million people working in the technology sector, 1.1 million employed in the financial services sector and 76,500 people working in the FinTech sector.⁴⁰

2. Capital

- ▶ The availability of capital in London is supported by a healthy mix of government-backed initiatives, corporate venture capital (CVC), PE and VC firms. There are 420+ PE firms, 720+ VC firms and 1,300+ angel investors based in London.⁶
- ▶ UK FinTechs raised 3.6 billion in 2019, up from 524 million in 2015, primarily driven by strong growth in PE and VC investing. From a regional standpoint, London received 88% of all funding in 2019.^{41, s}

FIGURE 5.2 | VC investment into the London FinTech sector⁷



- ▶ The government's venture capital initiatives , notably Seed Enterprise Investment Scheme (SEIS) and the Enterprise investment scheme (EIS), are designed to offer tax benefits to investors to encourage investment in startups and early stage businesses and have been well utilized for investments in financial services.⁴² In addition, FIs are also investing in innovation and investment of FinTech startups. For example, all nine of the UK's largest banks have established a FinTech focused incubator or accelerator or CVC vehicle.
- ▶ The proximity to financial services and technology sectors has been a key driver in FinTech investment, particularly at the early stage. Access to capital is strong for early-stage startups.

3. Policy and Regulation

- ▶ Our interviews indicate that UK has a supportive policy and tax environment. The Financial Control Authority (FCA) combines all the UK's financial regulators into one department. A special group of FCA professionals has been set up to focus on advising and helping FinTechs understand existing and possible future regulations.
- ▶ HM Treasury, through its Regulatory Innovation Plan for FinTech, has outlined the current and future directives/ guidelines for the four UK financial services regulators including Financial Conduct Authority (FCA), Payment Systems Regulator (PSR), Prudential Regulatory Authority (PRA) and Bank of England (BoE). The Innovation Plan aims to build on the UK's position as the global leader in FinTech development.⁴³
- ▶ There is a tax regime tailored to early stage and angel investors as well as entrepreneurs/founders. Incentives include relief with low capital gains tax for entrepreneurs, R&D tax credits, an enterprise investment scheme for early investors and tax relief on

^s YTD data as of 6/15/2020



new equipment.⁴⁴ Along with the lowest corporation tax rate in the G20, the UK offers research and development incentives.⁴⁵

- ▶ Given the recent COVID-19 crisis, the UK government has created a 'Future Fund', pledging a £250M match funding for startups impacted by coronavirus. Companies can obtain convertible loans of between £125,000 and £5 million, provided that they are able to secure a matching amount from private investors.⁴⁶ More recently, the FCA announced it will pilot a digital sandbox intended to foster innovation from firms developing solutions addressing the COVID-19 pandemic.⁴⁷

4. Infrastructure and Technology

- ▶ London is a concentrated hub for technology companies, financial institutions, government and universities all centered in the same jurisdiction. London's financial sector is uniquely located alongside a booming technology sector- something uncharacteristic of Silicon Valley, Route 128, or Wall Street.⁴⁸ While challenges include high cost of living and office space, there is a meaningful network of talent and capital.
- ▶ The UK is considered to be market-leading with respect to certain key digital infrastructure planks, including payments, API development and open banking. In 2018, the UK was the first country to take the government led approach to mandating Open Banking, creating common API standards for data sharing across nine banks, with the aim of stimulating competition and innovation in financial services.

5. Interconnectivity

- ▶ London is home to more than 160 accelerators and over 60 incubators.⁵⁰
- ▶ Some notable events include:
 - ▶ FinTech Connect: Exhibition where teams from financial institutions can make informed buying decisions on the latest innovations on the market and where FinTechs come to accelerate dialogues with digital buyers.⁴⁹
 - ▶ London FinTech Week: Series of events on emerging issues in FinTech.⁵⁰
 - ▶ Lendit FinTech Europe: Provides 50+ sessions from industry pioneers across lending, digital banking, FinTech, and PayTech innovation.⁵¹
- ▶ The UK has been proactive in creating formal arrangements to enhance international connections. Examples include the FinTech bridges (such as with Australia) and the UK-US innovation partnership. The UK regulators including the FCA have collaboration

agreements with almost every top FinTech hub in multiple geographies including Singapore, China, Korea, Canada, Hong Kong and Australia, providing UK FinTechs with technologies, funding and access to international markets. The UK government, through its Department of International Trade, also sponsors missions, sending select FinTechs to the United States to raise awareness and facilitate cross-border commercial opportunities.

A closer look

- ▶ **The Financial Control Authority ("FCA")**
From a regulatory standpoint, the FCA, with its mandated focus on competition and programs, such as Project Innovate, is viewed by FinTechs as a key strength in the ecosystem. Policy led innovation includes initiatives such as the FCA's regulatory sandbox, open banking and a payments infrastructure.
 - ▶ Financial Conduct Authority's sandbox has become a blueprint for fostering innovation around the world. Since the inception of the FCA Sandbox, it has supported over 700 FinTech firms and increased their average speed to market by 40% compared with the regulator's standard authorization time.⁵²
 - ▶ The New Bank Start-up Unit is a joint initiative from the Prudential Regulation Authority (PRA) and the Financial Conduct Authority to support an organization looking to set up a banking business in the UK. The organizations have complied detailed support plans across all stages: early-stage, pre-application, application, mobilization, and after-authorization.⁵³
- ▶ **Innovate Finance**
An independent membership association representing the UK's FinTech community, has played a key role in coalescing the ecosystem and bringing together stakeholders. Some notable initiatives include:
 - ▶ Women in FinTech initiative: Aimed at bringing more female entrepreneurs to the UK and making the UK's FinTech ecosystem more diverse. Events/activities include: power hours, webinars, workshops and publishing the women in FinTech powerlist.⁵⁴
 - ▶ FinTech Jobs Board: A dedicated online resource that promotes FinTech opportunities in the UK and aims to connect FinTech firms with potential candidates.⁵⁴
 - ▶ Innovate Finance Global Summit: Convenes FinTech community, from innovators, institutions and investors to regulators, policymakers and startups in London.⁵⁴
 - ▶ FinTech VC Speed Dating event: Curated evening to bring together FinTech founders raising an early series round of funding with many of the UK's most active investors in FinTech (VCs, CVCs and angels).⁵⁴



Overview

New York is one of the largest FinTech hubs in the US and globally. New York is a global financial hub and is home to prominent financial institutions, including JPMorgan, Citigroup, Goldman Sachs, Morgan Stanley, AIG and American Express. New York is also home to more than 770 FinTechs such as Lemonade, Betterment and Axoni.⁵⁵

Strengths of the ecosystem include strong access to capital, strong technical, entrepreneurial and FS talent, entrepreneurial culture in the city, proximity to prominent financial institutions and a large start-up community.

Strengths and success factors

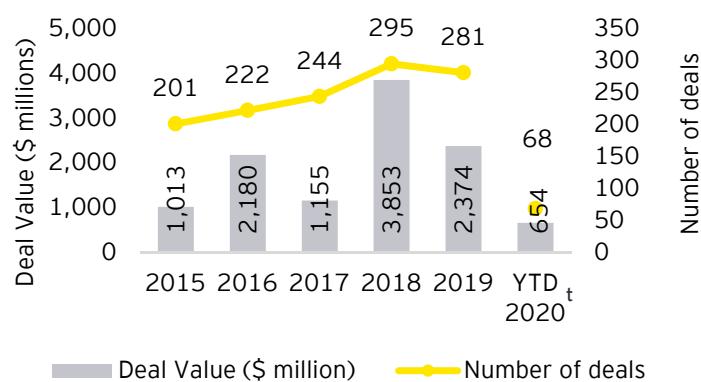
1. Talent and Culture

- ▶ When assessing the availability of technical, financial services and entrepreneurial talent, New York has strong coverage across all three skill sets. New York has a finance-experienced talent pool and is home to world renowned education centers.
- ▶ New York has over 200 colleges and universities and the largest concentration of higher education institutions in the world. Universities in NYC, including NYU, Columbia and Cornell University's CornellTech, offer courses in FinTech.⁵⁶ The Columbia Engineering FinTech Boot Camp is a 24-week virtual bootcamp with a curriculum including Financial Fundamentals, Machine Learning Applications in Finance, Blockchain and Programming.⁵⁷
- ▶ Efforts are being made to nurture the next generation workforce to be technologically competent. Examples include the Computer Science New York City (CSNYC), a state-wide initiative, that helps to build a supportive ecosystem to advance computer science education in NYC and STEM Matters NYC, that offers experiential science and STEM programs for students in kindergarten through grade 12.⁵⁸
- ▶ New York has over 650,000 Tech employees, over 600,000 FS employees and approximately 57,000 FinTech employees^{59, 43}. The entrepreneurial community is very engaged, and New York is viewed as a leader in terms of female entrepreneurship.⁶⁰

2. Capital

- ▶ As a global financial center, New York attracts billions of dollars in venture capital. There are 780+ PE firms, 1,260+ VC firms and 1,930+ angel investors based in New York.⁷
- ▶ FinTech Investment by VCs was \$2.4 billion in 2019 and has grown at a CAGR of 24% from 2015-2019.⁷ The availability of seed funding is strong in New York, where FinTechs benefit from an established investor culture of investing in start-ups via engaged angel networks.^t

FIGURE 5.3 | VC investment in to the New York FinTech sector⁷



3. Policy and Regulation

- ▶ The Federal Reserve Bank of New York launched the FinTech Advisory Group in 2019, with the aim to present perspectives on emerging issues.⁶¹
- ▶ The New York State Department of Financial Services ("NYDFS") is the department of the New York state government responsible for regulating financial services and products, including those subject to the New York insurance, banking and financial services laws.⁶⁰
- ▶ An example tax incentive is the STARTUP-NY Program, which provides tax benefits to approved businesses that locate in vacant space or land of approved New York State public and private colleges and universities, approved strategic state assets, and New York State incubators affiliated with private universities or colleges that are designated as tax-free NY areas.⁶²

^t YTD data as of 6/15/2020



4. Infrastructure and Technology

- ▶ New York City benefits from its proximity to major financial institutions, innovation culture in the city, and a large startup community. New York's tech industry is one of the fastest growing areas of the US economy.⁶³
- ▶ New York also leads in the development and implementation of technologies in FinTech, driving some of the most innovative and firms that span across sectors. Some examples of NY FinTechs include: Axoni (Blockchain), Better (real estate), Betterment (investing) and Lemonade (insurance). While real estate is expensive, co-working spaces have become a built-in part of the NYC tech culture, as they create opportunities for synergy and networking.

5. Interconnectivity

New York has over 120 accelerators and over 50 incubators.⁶

- ▶ Example third-party organizations that help bring the ecosystem together are:
 - ▶ StartupBootcamp FinTech New York: three-month program that provides 10 FinTech companies with hands-on mentorship from industry experts, office space in New York, seed funding and access to global investors.⁶⁴
 - ▶ Empire Startups: An organization that touts itself as the largest community of FinTech entrepreneurs, investors, and bank innovators in the world, Empire Startups provides content, programming, and events with a focus on New York, San Francisco and Toronto.⁶⁵
 - ▶ FinTech Innovation Lab: 12-week program that helps early-to growth-stage enterprise technology companies refine and test their value proposition with the support of the largest financial service firms.⁶⁶
- ▶ The city also draws various VC conferences and FinTech events including Consensus by CoinDesk, LendIt FinTech, Finovate Fall, Future of FinTech by CB Insights, Banking & FinTech Innovation Roundtable, New York FinTech Week, Empire FinTech conference and FinTech Sandbox demo day.⁶⁷

A closer look

▶ FinTech Innovation Lab

The FinTech Innovation Lab was launched in the wake of the financial crisis in 2010 by the Partnership for the City of New York, Accenture, a roster of the country's largest financial institutions and notable FinTech investors. Public and private sector leaders recognized a need to make the next generation of financial services a more sustainable, forward-looking sector.⁶⁸ The fund has raised over \$1.3 billion for over 429 proof of concepts and has created over 1,500 jobs. Originally established in New York, the lab has now expanded to Hong Kong and London.

▶ Department of Financial Services ("DFS"):

Some example initiatives undertaken by DFS include:

- ▶ In 2019, DFS became the first US state banking regulator to join Global Financial Innovation Network, the international network of financial regulators and related organizations committed to supporting financial innovation in the best interests of consumers.²⁰
- ▶ DFS signed a Memorandum of Understanding with Autorité de Contrôle Prudentiel et de Résolution (ACPR) to ease entry for FinTech innovators into the New York and French markets. Both parties aim to encourage innovations, enhance consumer protection, enable cross-border movements for FinTech's and provide regulatory support in respective markets.⁶²
- ▶ DFS Fast Forward: The NYDFS launched this pilot program to help insurance firms navigate the regulatory process. The program has expanded in scope to include finance, healthcare and insurance. DFS is encouraging hearing from businesses whom offer a digital innovation aimed at facilitating recovery from COVID-19.⁶²
- ▶ Launched a Research and Innovation division, which is focused on FinTech innovation and consumer protection. The Division takes on the responsibility of licensing and supervising entities engaged in "virtual currency business activity" that fall within the scope of New York's BitLicense regime.

IV. San Francisco



Overview

San Francisco's Bay area, which is home to Silicon Valley, is a prominent global FinTech hub globally. While most hubs are established around financial centers in the world, San Francisco is a technology hub that has attracted financial innovators globally. San Francisco has more FinTech companies and sees more FinTech investment than any other city in the US.⁶⁹

There are 900+ FinTechs headquartered in San Francisco (with 1300+ in California)⁶ and San Francisco is also home to the largest number of FinTech unicorns in the US (13 FinTech unicorns), with combined valuation of \$90 billion as of April 2020. FinTech unicorns include: Stripe, Ripple, and Coinbase.⁸

Strengths of San Francisco include availability of cutting-edge technology innovations, strong serial entrepreneur and investor culture, availability of strong technical talent and availability of early stage capital.

Strengths and success factors

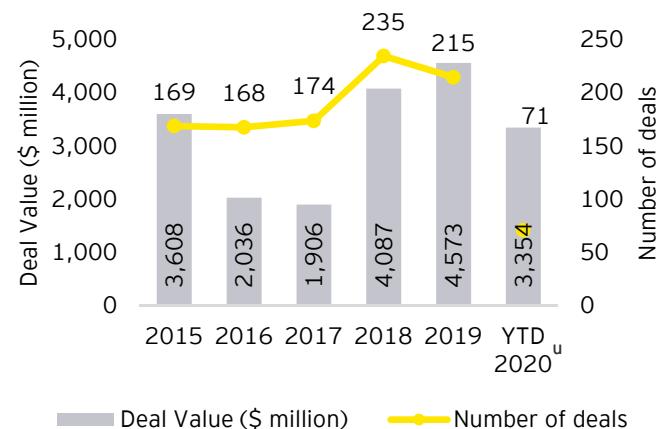
1. Talent and Culture

- ▶ San Francisco, and Silicon Valley more broadly, produces and attracts high-quality technology talent in the US. There are approximately 50 universities and colleges in the Bay Area, including Stanford University and University of California, Berkeley.^{105, 56} Some example programs include the Berkeley FinTech Boot Camp and FinTech School.^{70, 71}
- ▶ The San Francisco Bay Area is ranked as the largest, most concentrated technology labor pool and has the most competitive hiring environment.⁸ The area also boasts talent that can be sourced from headquarters of some of the world's largest tech companies (i.e. Google, Facebook, Apple).⁷²
- ▶ San Francisco has strong cultural diversity of talent and a serial entrepreneur culture. Many FinTech founders have demonstrated excellence in scaling companies, attracting more entrepreneurs to the ecosystem. The State of California prohibited non-compete clauses, making it easier for star performers to leave a company to start their own. San Francisco has over 411,000 Tech employees and over 195,000 financial services employees.⁵⁹

2. Capital

- ▶ There are 320+ PE firms, 1,560+ VC firms and 3,600+ angel investors based in San Francisco.
- ▶ FinTech Investment by VCs was \$4.6 billion in 2019 has grown at a CAGR of 6% from 2015-2019.^{7, u}

FIGURE 5.4 | VC investment in to the San Francisco FinTech sector⁷



- ▶ In addition, there is a strong serial-investor culture where capital from successful FinTech investments and exits is recycled back in the sector, e.g., the PayPal founders who have gone on to found new enterprises is a well-known example of this.

3. Policy and Regulation

- ▶ The SF Fed has established a team of FinTech analysts to study market developments from a financial institution supervision perspective, with the goal to engage in industry outreach and to help build technical expertise among supervisors.⁷³
- ▶ In addition, the OCC hosts innovation office hours in San Francisco. There is also a proposal underway to remake the California Department of Business Oversight into a direct regulator of FinTech companies, debt collectors, credit reporting agencies and others.⁵
- ▶ California plans to create a program for FinTech companies to work with regulators on innovative products and services; central to this plan is the creation of an Office of Innovation in San Francisco, a hub for FinTech innovation.⁵¹ In spite of one of the nation's most extensive consumer privacy laws pertaining to the collection of consumer personal information, California is well-known for being a hotbed of B2C FinTech activity.⁷⁴

^u YTD data as of 6/15/2020



4. Infrastructure and Technology

- ▶ Silicon Valley is the centre for global innovative technology companies and is home to 2,000+ technology companies, the densest concentration in the world.⁷⁵
- ▶ While housing costs are very high, many entrepreneurs and FinTechs are attracted to San Francisco due to access to VC/ angel investments, executive leadership of global technology companies and other founders.

5. Interconnectivity

San Francisco is home to 196 accelerators of which 40 are dedicated FinTech accelerators and 85.⁶

- ▶ Further, the city is home to many corporate innovation labs, including Hitachi Financial Innovation Laboratory, Visa - San Francisco Innovation Center, Mastercard Labs, among others.
- ▶ Example FinTech incubators and accelerators based in San Francisco:
 - ▶ **Y-Combinator:** Pioneered a biannual three-month boot-camp model, bringing founders to Silicon Valley to provide mentorship, workshops and funding, connect them with potential investors and acquirers on Demo Day. Provided seed funding for various FinTech startups, especially those seeking to launch web/mobile applications.
 - ▶ **Plug and Play Tech Center:** Focused on seed and early-stage investor and runs 12 industry-specific accelerator programs twice a year, that acts as a platform for major corporations and high quality startups to connect and collaborate.
 - ▶ **500 Startups:** Invests primarily in consumer and SME internet, financial services and eCommerce startups. 500 Startups supports startups via their Seed Accelerator Programs which emphasize digital marketing, customer acquisition, lean startup practices, and fundraising for pre-Seed companies.
- ▶ Several notable FinTech events are held in San Francisco, including the Blockchain Expo North America, FiNext, Finovate Spring Conference, Future of FinTech - CB Insight and Lendit FinTech USA.⁷⁶

A closer look

- ▶ **FinTech school - promoting education for experienced talent**
The FinTech School was started by serial entrepreneurs and subject matter experts. The FinTech school delivers a range of FinTech courses and practical training on the latest FinTech sector, entrepreneurship and product development topics to individuals, institutions, and entrepreneurs globally. It also offers comprehensive programs and onsite boot-camp like trainings. It is part of a larger FinTech innovation ecosystem, FinTech Portfolio, which augments education with research, technical resources, and mentoring (incubator and accelerator) support.⁷¹
- ▶ **San Francisco Fed**
The SF Fed has a dedicated team of analysts that offers insights to FinTechs on building partnerships within the industry, integrating compliance and regulatory considerations into early stages of business development, and putting customers first in terms of data privacy and protection. This group also holds regularly scheduled office hours to help FinTechs navigate the regulatory environment

Beyond the Navigate program, the SF Fed also provides a short list of the key regulators involved at both the state and federal level in governing FinTech, with descriptions and contact details to help FinTechs understand the regulatory bodies that align to their business. The SF Fed also publishes thought leadership materials, including speeches and publications, that speak to how FinTech is impacting banking and financial services and how the Fed is thinking about the initiatives from a risk and opportunities perspective.⁷³



Overview

With 120+ FinTechs headquartered in Georgia, the State has grown and matured its FinTech ecosystem.⁷⁷ The FinTech ecosystem is anchored by its existing specialization in payments, exemplified by the over two-thirds of all US processed payments that flow through the state on an annual basis.⁷⁸ Atlanta is home to FinTechs including Kabbage, Bakkt and Bitpay.²³

Some strengths of the overall ecosystem include: the availability of talent, public-private partnerships, tax incentives, low cost of living, and strong support from academic institutions.

Strengths and success factors

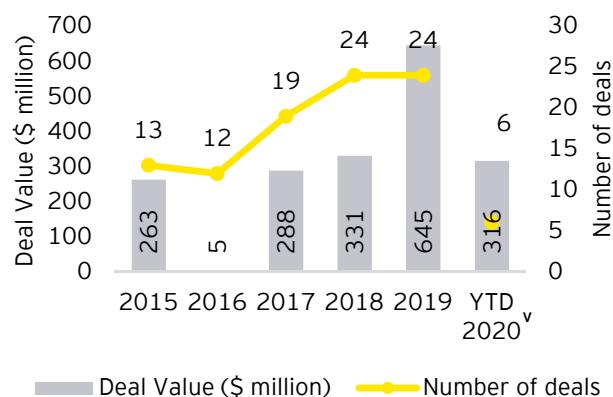
1. Talent and Culture

- ▶ The availability of talent in Atlanta is strong. Metro Atlanta is home to 70 colleges and universities with more than 275,000 students enrolled. Research universities include University of Georgia, Georgia Institute of Technology, and Georgia State University and smaller public and private colleges.⁷⁹
- ▶ The Georgia FinTech Academy brings together the FinTech industry and 26 schools that are part of University System of Georgia (USG).⁸⁰
- ▶ The state has over 270,000+ employees working in the technology sector, 190,000+ employed in the financial services sector and 38,000 people working in the FinTech sector.⁷⁵ It is ranked as the top in the country for job openings for STEM graduates per capita.^{80,v}

2. Capital

- ▶ There are 49 PE firms, 83 VC firms and 116 angel investors based in Atlanta. FinTech Investment by VCs was \$645 million in 2019 and has grown at a CAGR of 25% over the period 2015-2019.⁷
- ▶ The state has over 270,000+ employees working in the technology sector, 190,000+ employed in the financial services sector and 38,000 people working in the FinTech sector.⁷⁷ It is ranked as the top in the country for job openings for STEM graduates per capita.^{80,v}

FIGURE 5.5 | VC investment in to the Atlanta FinTech sector⁷



- ▶ Some example initiatives to connect startups with capital include: Engage Ventures and the Advanced Technology Development Center ("ATDC"). Engage Ventures is a hybrid VC and business accelerator that has commitment from 11 Fortune 500 businesses. Engaged companies, including FinTechs, have previously secured funding between \$500k to \$25MM.⁸¹ ATDC is a startup incubator at Georgia Tech that aims to help technology entrepreneurs in Georgia launch and build successful companies, and has a dedicated FinTech track.

3. Policy and Regulation

- ▶ The Atlanta Fed has started "office hours" that are designed to help companies gain insights into the banking regulator's thinking on the FinTech sector.⁸² The Atlanta Fed has offered its regulatory and payments security expertise to help the University System of Georgia craft its FinTech-focused curriculum.⁸²
- ▶ There are tax incentives available for angel investors, startups and corporations including:
 - ▶ Angel Investor Tax Credit: Provides an individual state tax credit of up to \$50,000 on an annual basis for individual angel investors who invest in early stage companies.⁸³
 - ▶ Corporate taxes: The state of Georgia's tax incentives includes a 5.75% corporate tax rate and job tax credit, which provides a tax credit ranging from \$1,250-\$4,000 per year for five years for every job created.⁸³
 - ▶ Startup Tax Exemptions: Provides a tax exemption for new and emerging technology businesses. Provides an exemption for businesses from paying the City's license.⁸⁴

^v YTD data as of 6/15/2020



4. Infrastructure and Technology

- ▶ Atlanta is dubbed as the “Transaction Alley” of the world - 70% of all global financial transactions pass through companies headquartered in Atlanta. There are 120+ companies processing about two-thirds of all US payments. The state began attracting payment companies in 1987 when state lawmakers lifted caps on credit-card interest rates and annual fees.^{76, 79}
- ▶ Some advantages of Atlanta include low cost of living, access to the most traveled airport in the world, high quality of life and its unique advantage as the only major city in the region.^{74; 77}

5. Interconnectivity

- ▶ Atlanta is home to 23 accelerators and four incubators.⁶ Some example accelerators include ATDC, Atlanta Tech Village, Atlanta Bridge Community, Tech Square Labs and TechStars.⁸⁵
- ▶ In addition, there are a number of third-party magnets/ organizations that bring the ecosystem together. Some example organizations/ events include:
 - ▶ FinTech Atlanta: A coalition of companies ranging from Fortune 500s to startups, that are working to cement Atlanta as the recognized global capital of financial technology.⁸⁵
 - ▶ Technology Association of Georgia (TAG): TAG's mission is to Connect, Promote, Influence and Educate Georgia's technology ecosystem to advance the innovation economy. TAG hosts more than 150 events each year and serves as an umbrella organization for 26 professional societies.⁷⁷
 - ▶ American Transaction Processors Coalition (“ATPC”): Represents more than 70 Georgia-based companies that develop products and provide resources supporting the financial service industry's technology needs.⁸⁶
 - ▶ FinTech South: An annual event that is dedicated to the exchange of insights, innovations and trends fueling FinTech.⁸⁷
- ▶ Atlanta has effectively leveraged its relationship with the Charlotte, North Carolina FinTech community in order to access markets that it has been not been able to cultivate within the state, including the banking sector. Through participation in events like the Charlotte FinTech Week Conference, Atlanta FinTech participants have been able to create connectivity and strengthen the ecosystems of both states.

A closer look

- ▶ Advanced Technology Development Center (“ATDC”): Startup incubator at Georgia Tech that seeks to help technology entrepreneurs in Georgia launch and build successful companies. There is a FinTech track which has ~32 early stage FinTechs. The ATDC has \$2.5 billion in investments and has sponsorship from a large financial institution for the FinTech track. The FinTechs stay in the incubator for 1-4 years and graduate when they raise a series A round. The ATDC does not take a stake in the company.⁸⁵
- ▶ Georgia FinTech Academy - The Georgia FinTech Academy brings together the FinTech industry and the University System of Georgia (26 schools). The Academy offers students education and training on a wide range of FinTech topics and career pathways. The curriculum was shaped in partnership with industry, by surveying companies on the skills they will be looking for in the next 10 years (e.g., AI, DLT, cybersecurity). The Academy's focus is on workforce development and partnerships with financial services corporations and FinTechs. The Academy has successfully placed more than 1000 students in FinTech careers, and the goal of the Academy is to place 5000 students in FinTech careers annually by 2025.⁸⁰

Overview

North Carolina is the 2nd largest banking center in US after New York, with many global banks headquartered in the state. Charlotte has grown in its prominence as a FinTech hub within the state and across the US.

There are 55 FinTechs located in North Carolina, of which 25+ are located in Charlotte.⁶ There are two FinTech unicorns based in Charlotte - AvidXchange and Tresata.⁸

Strengths of the Charlotte ecosystem include: strong access to domestic talent, access to large FIs, strong interconnectivity and low cost of living.

Strengths and success factors

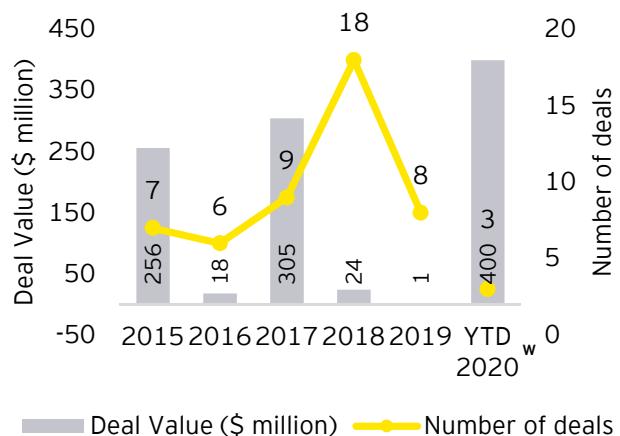
1. Talent and Culture

- ▶ The Research Triangle made up of the North Carolina State University in Raleigh, Duke University in Durham, and the University of North Carolina in Chapel Hill, are key feeders for talent in the state. North Carolina leads the Leading Technology State (LTS index) in industry funding for academic research in science and engineering. Prominent initiatives for STEM education include NC STEM center and Center for STEM education.⁸⁸
- ▶ UNC-Charlotte is the first university in the state to offer a FinTech bootcamp. In addition to weeks of classroom training, each student receives career planning services, employer network events and a review of the student's portfolio.⁸⁹
- ▶ The state employs over 103,000 tech employees and over 84,000 FS employees.⁵⁹ Charlotte has also been ranked as the best city for technology hiring and the best metro for growth in STEM jobs.⁹⁰

2. Capital

- ▶ There are 22 PE firms, 32 VC firms and 24 angel investors based in Charlotte.⁷ Active FinTech investors include Frontier Growth, Pamlico Capital and Carolina FinTech Ventures.
- ▶ North Carolina ranks 7th in VC funding and 15th in business funded R&D as per the North Carolina State of Technology 2020 Industry Report.⁹¹ Between January 2015 and May 2020, Charlotte attracted 51 VC investments for a total deal value of \$1 billion.^w

FIGURE 5.6 | VC investment in to the Charlotte FinTech sector⁷



3. Policy and Regulation

- ▶ At 2.5%, North Carolina has the lowest corporate income tax rate in the US.⁹²
- ▶ The Carolina FinTech Hub, a JV non-profit organization formed by the major banks and tech companies in the region, is working with North Carolina General Assembly members to bring forth a FinTech sandbox, which seeks to create a business-friendly environment for FinTech start-up activity. One objective is to help streamline regulations that are perceived to make it difficult for smaller organizations to take root and grow. The State enacted the NC Financial and Insurance Regulatory Sandbox Act and established the NC Financial and Insurance Innovation Commission for development of FinTech-specific regulations.⁹³
- ▶ There are a number of targeted, performance-based incentive programs available to help grow companies in the state.⁹⁴ For example, the Job Development Investment Grant offers companies' options to offset the cost of locating or expanding in North Carolina.⁹²

4. Infrastructure and Technology

- ▶ Charlotte is the 2nd largest banking center by assets (after New York). It is home to some of the largest US, banks including Bank of America and is also the largest employment hub for Wells Fargo.⁹⁵
- ▶ The infrastructure that the banks have built and the financial talent in the area has created a conducive atmosphere for FinTech companies. Charlotte offers a high quality of life and low cost of living and a strong entrepreneurial community.⁹⁶

^w YTD data as of 6/15/2020



5. Interconnectivity

- ▶ Charlotte has three accelerators and five incubators. Accelerators in Charlotte include Queen City FinTech, Joules Accelerator and City Startup Labs while incubators include Binary Ventures, RevTech Labs, IncuSeed.Ventures, Area15 and VentureWorx.⁶
- ▶ Example connectors/ events include:
 - ▶ Carolina FinTech hub: Nonprofit partnership of regionally headquartered financial services firms, FinTech companies, universities and government working to fuel the future growth and success of emerging financial technologies.¹⁰³
 - ▶ Queen City FinTech: Accelerator that chooses 10 to 12 companies for development twice a year, providing them office space and \$20,000, with a plan to raise a seed fund. Partners with major institutions including Bank of America, Wells Fargo and AIG, among others.⁹⁷
 - ▶ North Carolina Technology Association - Holds annual technology expo in Charlotte. It seeks to help its members grow regionally and compete globally by actively connecting business decision makers, educating government officials on issues relevant to the technology industry and providing educational and executive networking events.⁹⁸
- ▶ Some notable events include: Blockchain Generation Challenge, Blockchain Charlotte, Venture and FinTech Generations.^{99, 100, 101, 102}

A closer look

- ▶ **The Carolina FinTech Hub**
The Carolina FinTech hub began with local Government convening key industry stakeholders and challenging them to harness innovation. Local Government involvement fostered buy-in from various industry groups; after that, the initiative was taken private. The Carolina FinTech Hub is now a JV non-profit organization formed by the major banks and tech companies in the region, with the mission to make the Carolinas region (both North and South Carolina) a global FinTech destination. The Carolina FinTech hub has programming focused on talent, innovation and outreach.¹⁰³
- ▶ **Workforce Investment network ("WIN") in Carolina FinTech hub**
 - ▶ WIN is geared towards promoting upward mobility, developing technical talent in the region and increasing the number of minorities and women pursuing technology careers.
 - ▶ WIN offers paid professional development to underserved, motivated adults in the Carolinas. Upon successful completion of the intensive 6-month program, participants are offered full time employment at a FinTech or bank.
 - ▶ Based on our interviews, we learned that 31 of 33 graduated from the program in the first cohort and 51 of 55 graduated from the program in the second cohort. Graduates have seen an increase in salary from approximately \$11,000 per year to \$55,000 per year due to the acquired skills.¹⁰³

vii. Key metrics

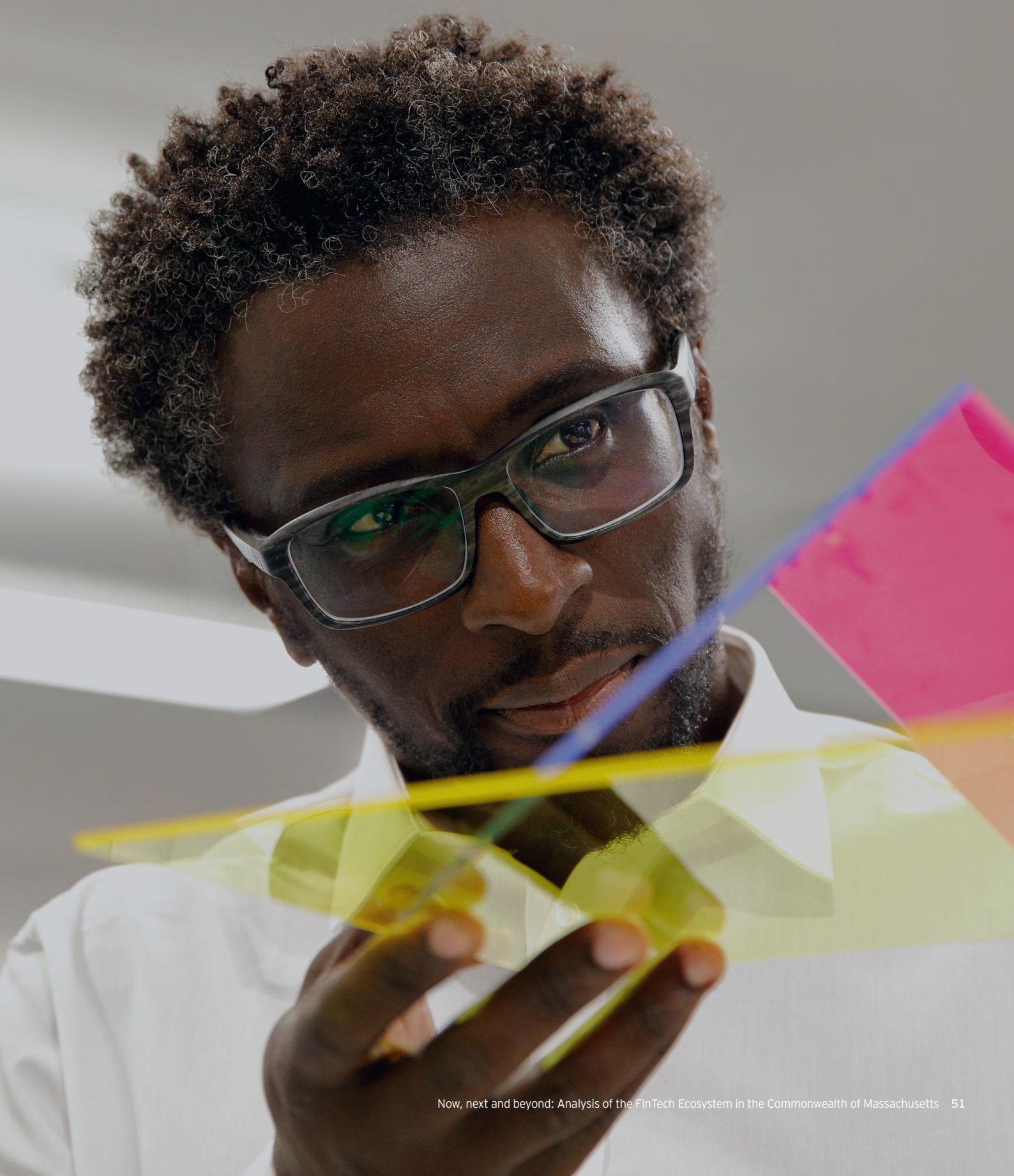
Region	# of FinTechs ⁶	# of FinTech unicorns ⁸	Talent and culture # of academic institutions	Capital		Policy and regulation Sample initiatives and incentives	Infrastructure and Technology	Interconnectivity # of incubators ⁶ # of accelerators ⁶
				# of capital providers ⁶	VC funding ⁶			
London 	1076	10	91 ¹⁰⁴	Overall VC-724 PE- 421 Angel - 1,300 FinTech inclusive ^x VC- 177 PE- 59 Angel - 253	Cumulative capital 2015-May 2020 - ~\$8.34b CAGR (2015-2019): 42%	<ul style="list-style-type: none"> ▶ FCA initiatives²⁹ ▶ Regulatory sandbox⁴¹ ▶ Tax regime⁴³ 	Leading in payments infrastructure	Incubators - 62 Accelerators- 163
San Francisco 	910	16	281 (California) 50 (Bay area) ¹⁰⁵	Overall VC - 1565 PE - 325 Angel - 3,634 FinTech inclusive VC - 472 PE - 46 Angel - 571	Cumulative capital 2015-May 2020 - ~\$19.56b CAGR (2015-2019): 6%	<ul style="list-style-type: none"> ▶ SF Fed initiatives⁷⁵ ▶ OCC office hours⁵ 	Leading technology hub	Incubators - 86 Accelerators- 196
New York 	771	3	238 ⁵⁵	Overall VC - 1,262 PE - 786 Angel - 1931 FinTech inclusive VC- 219 PE- 69 Angel - 248	Cumulative capital 2015-May 2020 - ~\$11.23b CAGR (2015-2019): 24%	<ul style="list-style-type: none"> ▶ NY Fed initiatives⁶⁰ ▶ NYDFS initiatives⁶¹ 	Leading in FinTech innovation	Incubators - 61 Accelerators- 104
Canada 	528	No FinTech unicorns	96 ¹⁰⁶	Overall VC - 462 PE - 212 Angel (individual and group) - 510 FinTech inclusive VC - 83 PE- 18 Angel - 52	Cumulative capital 2015-May 2020 - ~\$1.44b CAGR (2015-2019): 61%	<ul style="list-style-type: none"> ▶ OSC Launchpad²⁶ ▶ Regulatory sandbox³⁰ ▶ R&D tax credits³¹ 	Prominent AI hub	Incubators - 37 Accelerators- 71

^x FinTech inclusive firms have invested in one or more FinTech companies.

Region	# of FinTechs ⁶	# of FinTech unicorns ⁸	Talent and culture # of academic institutions	Capital		Policy and regulation Sample initiatives and incentives	Infrastructure and Technology	Interconnectivity # of incubators ⁶ # of accelerators ⁶
				# of capital providers ⁶	VC funding ⁶			
Massachusetts	357	3	105	Overall VC - 557 PE - 419 Angel - 480 FinTech inclusive VC - 203 PE - 89 Angel - 109	Cumulative capital 2015-May 2020 - ~\$2.85b CAGR (2015-2019): 26%	▶ "Meet the regulators" initiative ²²	Leading in digital health, cybersecurity and robotics innovation	69 incubators, accelerators and innovation labs
Atlanta	79	1	57 ¹⁰⁷	Overall VC - 83 PE - 49 Angel - 116 FinTech inclusive VC- 12, PE - 5 Angel- 14	Cumulative capital 2015-May 2020 - ~\$1.85b CAGR (2015-2019): 25%	▶ Atlanta Fed initiatives ⁸⁰ ▶ Tax credits for angel investors, startups and corporations ⁸¹	Leading payments hub	Incubators- 4 Accelerators- 23
Charlotte	28	2	98 ⁶	Overall VC - 32 PE -22 Angel - 24 FinTech-specific VC - 5 PE- 3 Angel - 4	Cumulative capital 2015-May 2020 - ~\$1b ^y CAGR (2015-2019): NMF	▶ Low Tax rates ⁹⁰ ▶ Targeted programs to attract companies ⁹¹	Growing technology hub	Incubators- 5 Accelerators- 3

^y Note: 89% of funding raised for the period 2015 - May 2020 was from AvidXchange

| Relative strengths of the Massachusetts ecosystem



Relative strengths of the Massachusetts ecosystem

The heatmap below highlights the current presence of stakeholders across each ecosystem element. For example, to what extent may capital providers be impacting talent and culture in the ecosystem? Blank squares represent areas where no tangible intersection exists.

Our analysis is based on the results of our interviews and surveys, prior EY studies¹⁰⁸ on FinTech hubs and findings from our secondary research referenced throughout this report. We have taken into consideration the assets and attributes observed for Massachusetts and compared against what we have observed across other FinTech hubs.

Elements → Stakeholders ↓	Talent and Culture	Capital	Policy and Regulation	Infrastructure and Technology	Interconnectivity
Capital Providers (496 FinTech-focused capital providers)	Lack of serial investor culture. Conservative, risk-averse culture	Many capital providers, but limited local early stage funders or angels with FinTech appetite		Healthy contribution of capital towards the advancement emerging technologies e.g., AI/ML	Low level of connectivity, particularly between early stage local investors and FinTechs
Academia (105 academic institutions)	Top source of financial, entrepreneurial and technical talent globally		Opportunity to increase thought leadership and connectivity with policymakers	Many university-sponsored incubators, accelerators and labs driving research on new technology	Examples of good connectivity across stakeholders (e.g. MIT FinTech Conference); opportunity for more cross-university connectivity
Regulators and Policymakers (Federal regulators, state regulators, policymakers)		Less incentives available to angel investors, capital providers and FIs observed relative to other hubs	Fewer initiatives observed relative to other hubs	Some involvement in emerging technologies (e.g., Boston Fed blockchain initiatives)	Less connectivity observed relative to other hubs
FIs (283 banks 67 asset managers 55 insurance firms)	Opportunity to promote continuing education of workforce in emerging technologies	Low level of direct investment from FIs into FinTechs	Opportunity to increase FI participation in regulatory initiatives e.g., RegTech meetups, AI Think Tank	Opportunity to further develop internal sandboxes and innovation initiatives to collaborate with FinTechs	Connectivity with FinTechs through incubators/accelerators, investment bankers, in-house innovation
Accelerators / incubators (29 FinTech-focused accelerators / incubators)	Promote inclusive culture and the connective tissue in the Massachusetts	Opportunity to provide more capital raising advisory services for FinTechs		Opportunity to provide additional affordable office space to FinTechs	Instrumental in providing connectivity across all ecosystem stakeholders and well-positioned to play a broader role
FinTechs (357 FinTechs)	Lack of serial founder culture, few FinTech personalities/ alumni networks	Capital raised by FinTechs in Massachusetts on the rise, however much is non-local capital. Funding gap for early and mid-stage FinTechs	Few examples of local FinTechs helping shape policy and regulation e.g., AI Think Tank	Focused on technical solutions for difficult problems benefitting the whole industry	Connectivity within FinTech community (e.g., founders, successful alumni) and with other stakeholders (e.g., investors, regulators) can be improved

Strong with element

Average within element

Area for improvement within element

Not Applicable

Stakeholder commentary

Stakeholder	Commentary
 Capital Providers	<ul style="list-style-type: none"> Massachusetts has a healthy number of VC and PE firms, however early stage FinTechs face challenges accessing capital due to low participation and risk tolerance of local investors. In leading hubs, a robust mix of capital providers is typically present as well as a strong angel investing and serial investing culture. For example, in San Francisco, non-accredited investors are an important contributor to the ecosystem. There may be an opportunity to unlock more capital from investors and provide incentives to de-risk and spur investment in FinTech in Massachusetts.
 Academia	<ul style="list-style-type: none"> The Massachusetts academic community is among the strongest in the US, developing top FinTech, entrepreneurial and technical talent. Initiatives across other hubs aim to focus on developing inter-university cohorts of FinTech talent (e.g., Georgia FinTech Academy). There are also examples of talent being driven through the engagement of underserved communities (e.g., Workforce Investment Network in North Carolina). There may be opportunities for targeted initiatives in Massachusetts. These institutions may look to build greater connectivity with other stakeholders, and act as a FinTech catalyst by providing thought leadership and advancing innovation in emerging technologies.
 Regulators and Policymakers	<ul style="list-style-type: none"> In the US, many regulations and policies impacting FinTechs and financial institutions are federal in nature. However, the state can play an important role in accelerating the growth of the FinTech sector by fostering investments and talent development. Some examples of regulatory and policy initiatives include Atlanta (angel tax credits to drive investments), Montreal (FinTech research unit to foster talent), New York (NYDFS initiatives to reduce regulatory hurdles).
 Financial Institutions	<ul style="list-style-type: none"> Currently, there are varying levels of engagement from local FIs, however FinTechs, and the ecosystem as a whole, may benefit from a more active FI community with greater collaboration and connectivity. Examples of programmatic efforts that bring together FinTechs and FIs include the “Run it by buyers” program in Atlanta and FinTech Innovation Lab in New York. The Massachusetts ecosystem may significantly benefit from the executive-level commitment by financial institutions – in particular, a move from promotional to commercial commitments.
 Accelerators/ incubators	<ul style="list-style-type: none"> The Massachusetts ecosystem is heavily driven by the strong efforts of the three accelerators focused on FinTech: DCU, MassChallenge and the FinTech Sandbox. Also, events such as Boston FinTech Week and the FinTech Meetups help foster connectivity within the ecosystem. Some accelerators/incubators include: Y-combinator, Plug and Play Center, 500 Startups, ATDC. There may be opportunity for the accelerators to further amplify their roles as coordination and championing agencies and to meet specific programmatic needs of FinTechs in the state.
 FinTechs	<ul style="list-style-type: none"> FinTechs in Massachusetts take pride in their emphasis on solving difficult questions faced by the industry. Many of the innovations emanating from the state are focused on technical problems with a view toward providing technology solutions that benefit the industry as a whole. In leading hubs, there have been a high number of FinTech unicorns and successful exits – these founders with successful exits then go on to invest in early stage companies. In addition, there is indication of a culture where there are strong alumni networks/ FinTech personalities. FinTech founders surveyed in Massachusetts rated the overall ecosystem well – however, it is perceived that the ecosystem could offer more in terms of capital and interconnectivity amongst all stakeholders. Specifically, the FinTech founders felt they could benefit from increased access and collaboration with FIs. When considering collaboration in the ecosystem, FinTechs may need to demonstrate more enterprise-readiness and prepare for the complexities of the onboarding processes of financial institutions.

| Considerations for Next and Beyond



Considerations for Next and Beyond

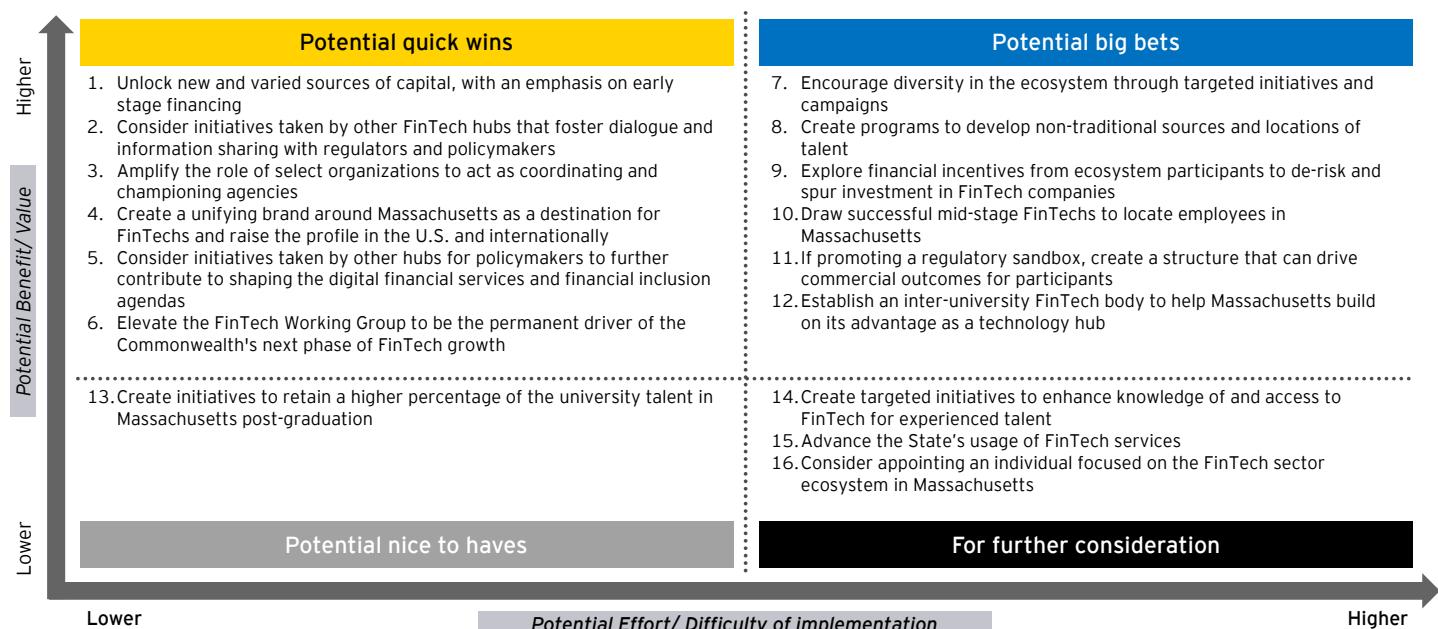
I. Overview of recommendations

Based on our assessment of the state of the FinTech ecosystem in Massachusetts and leading practices observed at other FinTech hubs in the US and globally, we offer 16 recommendations for your consideration as Massachusetts strives to become a pre-eminent location for FinTech. These recommendations are focused on achieving these foundational outcomes that we believe are important to drive the growth of FinTech in Massachusetts:

- ▶ University talent remains in the State after graduation, experienced talent has interest and access, and out-of-State talent is drawn in to launch and seed new enterprises
- ▶ Financial institutions are receptive commercial partners and attractive sources of capital and/or exits
- ▶ Entrepreneurs have access to and can attract all stages of capital
- ▶ Massachusetts is livable and workable for start-ups and scale-ups
- ▶ State regulatory frameworks are accessible, navigable and transparent
- ▶ There is a strong and accessible network of mentors and peers that cultivates collaboration and a culture of innovation
- ▶ There are magnets and initiatives that strengthen interconnectivity among all stakeholders

Our recommendations are bucketed under “potential quick wins”, “potential big bets”, “potential nice to haves” and “for further consideration”. The potential of effort/difficulty is estimated based input from the FinTech Working Group, as well as results of our interviews and surveys, and prior EY studies. For example, the recommendation on unlocking new and varied sources of capital is classified as lower effort/difficulty since it is incremental to what is being done by the FinTech Working Group and may be easier to mobilize with resources currently available. The potential benefit/value is estimated based on the existing strengths and weaknesses across the elements of the ecosystem and the impact of similar initiatives we have seen across other innovation hubs. See figure below for our recommendation framework.

FIGURE 7.1 | Recommendations for the MA FinTech ecosystem



II. "Potential quick wins"

1

Unlock new and varied sources of capital, with an emphasis on early stage financing

Our findings indicate there is a need for early stage capital and opportunities may exist to unlock more capital from the healthy number of capital providers based in Massachusetts. We recommend a set of targeted initiatives geared towards directing more capital from local angel investors and other capital providers into Massachusetts FinTech.

1. Develop a learning series for non-FinTech angel investors to demystify financial services and educate investors on the opportunity to invest in FinTechs
2. Target super angels and create programming that facilitates greater connectivity between super angels and FinTechs (e.g., virtual pitch days) and between super angels and FIs (e.g., Q&A sessions)
3. Highlight the strengths of Massachusetts FinTech to capital providers by spotlighting success stories and selectively sponsoring participation at national events (e.g., LendIt, Finovate)
4. Consider if investors may be inclined to support a crowdfunding platform native to Massachusetts that becomes a potential source not only of funding, but also a potential source for education, wealth creation, and connectivity, and diversifies the investor base.

In addition, there may be opportunities to create a "local first" sentiment to enhance funding in the Massachusetts ecosystem.

2

Consider initiatives taken by other FinTech hubs that foster dialogue and information sharing with regulators and policymakers

We have observed initiatives aimed to accelerate FinTech activity from regulators and policymakers at other hubs

- **The Financial Control Authority (FCA)** combines all the UK's financial regulators into one department. A special group of FCA professionals has been set up to focus on helping FinTechs understand existing and possible future regulations.
- **The SF Fed** has a dedicated team of analysts that offers insights to FinTechs on building partnerships within the industry, integrating compliance and regulatory considerations into early stages of business development, and putting customers first in terms of data privacy and protection.

- **The Ontario Securities Commission** inked a co-operation agreement with the UK Financial Conduct Authority (FCA) and the Australian Securities and Investment Commission (ASIC) to provide mutual support to innovative FinTech businesses as they seek to expand their businesses into each other's market.
- **The DFS in New York** signed a Memorandum of Understanding with Autorité de Contrôle Prudentiel et de Résolution (ACPR) aimed to ease entry for FinTech innovators into the New York and French markets.

3

Amplify the role of select organizations to act as coordinating and championing agencies

We recommend amplifying the role of galvanizing organizations that centralize information and resources and activate champions across stakeholder groups. This promotion and funding role can be played by any private sector, public sector or non-profit organization.

These organizations can also develop targeted initiatives that focus on programmatic needs of FinTechs. Our survey results indicate FinTechs can benefit from greater mentorship, greater connectivity, and better infrastructure. FinTechs specifically seek greater access to investors, entrepreneurs, FIs and the state officials and greater commercial commitment from FIs. In addition, these coordinating agencies can create programming to connect other stakeholders such as Angel investors with FIs, and Academia with FinTechs and FIs.

In addition, we recommend expanding ecosystem participation of non-traditional FinTech players. Given Massachusetts is a global biotech hub, we believe biotech is an area that could offer compelling cross-synergies. There may be opportunities to engage with select firms and industry organizations through targeted programming. Some ideas include adding champions from BioTech to the FinTech Working Group, creating avenues for FinTechs to explore linked solutions (e.g., financial wellness, payments in healthcare), hosting events that bring together industry leaders.

4

Create a unifying brand around Massachusetts as a destination for FinTechs and raise the profile in the US and internationally

The FinTech ecosystem in Massachusetts may benefit from creating a unifying brand and enhancing its overall reputation as a pre-eminent location for FinTech. Raising its profile may have a direct impact on its ability to attract and retain FinTech start-ups, talent, and investments, both nationally and globally. Other hubs have taken similar efforts e.g., Toronto Finance International aims to play a key role in elevating Toronto's brand, through partnerships, marketing collateral, publications and events.

Some ideas for raising the profile of Massachusetts include sharing ecosystem success stories, including unicorns, exits, FI / FinTech partnerships, academic institutions (e.g., how local talent has contributed to the ecosystem). In addition, the ecosystem may benefit from elevating the profile of founders within Massachusetts and showcasing successful exits.

We recommend creating a Massachusetts FinTech 40 index (similar to Next40 in France) to bring together FinTechs with greatest opportunity and provide these companies international visibility. This may not only raise the international profile of FinTechs in Massachusetts but may also help in obtaining funding and accelerating growth.

Massachusetts may also benefit from increased interconnectivity across New England (e.g., Hartford for InsurTech, Rhode Island for design) and with other FinTech hubs for information sharing, joint innovation and market expansion.

5

Consider initiatives taken by other hubs for policymakers to further contribute to shaping the digital financial services and financial inclusion agendas

Given the COVID-19 crisis, there is a need for greater growth and resiliency in the ecosystem. Example initiatives taken by other hubs that impact the digital financial services and financial inclusion agendas include:

- ▶ **DFS FastForward**, a program that seeks to help accelerate digital solutions that could advance New York's recovery from the COVID-19 crisis, with its goal of reducing barriers and accelerating the regulatory approval process.⁶²

- ▶ **The New Bank Start-up Unit** is a joint initiative from the Prudential Regulation Authority (PRA) and the Financial Conduct Authority to support organizations looking to set up a banking business in the UK. They have compiled support plans across various stages: early-stage, pre-application, application, mobilization, and -post authorization.⁵³
- ▶ **HM Treasury**, through its Regulatory Innovation Plan for FinTech, has outlined the current and future directives/guidelines for the four UK financial services regulators, aiming to build on the UK's position in FinTech development.¹⁰⁹

6

Elevate the FinTech Working Group to be a permanent driver of the Commonwealth's next phase of FinTech growth

The FinTech Working Group has made meaningful strides in driving innovation initiatives. The FinTech Working Group can build on its momentum and formalize its mandate to further drive innovation and the FinTech agenda. The group can look to amplify its role and expand participation to enhance representation from all ecosystem stakeholders. There may also be a need to generate awareness of the FinTech growth agenda amongst the working group, ecosystem participants, and more broadly. We believe with greater institutionalization and structure, there is opportunity for the FinTech Working Group to be a permanent driver for the Commonwealth's next phase of FinTech growth.

III. "Potential big bets"

7

Encourage diversity in the ecosystem through targeted initiatives and campaigns

Our survey results and interviews indicate that Massachusetts may have an opportunity to create a more diverse and inclusive FinTech ecosystem. We have observed leading practices of focused efforts specific to diversity that may be instructive for Massachusetts. For instance, Innovate Finance in the UK is actively promoting gender diversity through power hours, webinars, workshops and publishing the women in a FinTech powerlist. We recommend a championing organization to take a lead role in promoting diversity through efforts including:

1. Centralizing resources around diversity partners and resources (e.g., affinity groups, clubs at undergraduate schools).
2. Socializing ideas and resources with all ecosystem stakeholders to promote diversity.
3. Incorporating a focused commitment to diversity and inclusion into existing organizations and encourage new programming that supports hiring, funding and nurturing diverse talent.

We recognize that these ideas alone cannot ensure diversity in the ecosystem, but cumulative commitment and action from all participants has the potential to be impactful.

8

Create programs to develop non-traditional sources and locations of talent

A sustainable solution to address technical talent shortage in Massachusetts could be to nurture experienced talent locally. Examples of programs for consideration include:

1. Similar to the Carolina Workforce Investment network ("WIN program") in Carolina FinTech hub, implement a workforce development program for technical talent amongst disadvantaged or under-represented individuals.
2. Create and promote development zones in Western Massachusetts and academic hubs outside of Boston to provide opportunity for a rich source of remote, entry-level engineering talent.
3. Promote the sourcing of technical talent from outside the financial services sector through cross-sector meetups and marketing events to encourage diversity of thought and experience (e.g., showcasing innovation in finance to alternative industry networks to entice engagement across sectors.

9

Explore financial incentives from ecosystem participants to de-risk and spur investment in FinTech companies

Given the COVID-19 crisis, financial incentives to FinTechs may be instrumental in fortifying the resilience of the ecosystem. There may be opportunities to provide FinTechs funding support in the form of grants and conditionally repayable loans from willing ecosystem participants. We see a range of financial incentives in other regions that have been put in place with the intention of spurring FI and FinTech growth. For example, there are more than 20 states that offer tax credits to angel investors.

In addition, there may be opportunities for other industry participants (i.e. corporations, accelerators/incubators) to provide financial incentives through free credits, competitions, or sponsorships.

10

Draw successful mid-stage FinTechs to locate employees in Massachusetts

Some hubs have taken the approach of influencing large FIs/ FinTech's to relocate through targeted efforts and incentives. While uprooting a growing FinTech from its home base can be an expensive proposition, there may be opportunities to encourage early to mid-stage companies to create incremental economic activity in Massachusetts. For example, there may be opportunities to encourage a mid-stage FinTech developing an enabling technology or launching a new product to locate a critical mass of new employees in Massachusetts. This could have the potential to create a ripple effect in branding and future angel investing as these mid-stage FinTechs grow and ultimately, have an exit event. In other hubs, we have seen economic development zones and financial incentives such as payroll tax relief or payroll matching to locate FinTech employees in the region. There may be opportunities for other ecosystem participants to provide unique benefits such as targeted access to high quality talent or commercial access to FIs.

11

If promoting a regulatory sandbox,
create a structure that can drive
commercial outcomes for participants

We suggest that consideration be given to how regulatory and commercial outcomes are driven within the regulatory sandbox. Based on our interviews and surveys, ecosystem participants prefer when sandboxes have a clearly stated purpose and extends beyond state borders. Some examples of strategies used for implementing a regulatory sandbox, include:

- a. Arming the regulatory sandbox with a rigorous, clearly articulated purpose with a mandate that extends beyond state requirements.
- b. Inviting corporate compliance executives from FIs so POCs are designed to meet firm compliance requirements alongside other safeguards.

12

Establish an inter-university FinTech body to help Massachusetts build on its advantage as a technology hub

Massachusetts has a strong education infrastructure and is a global technology hub. However, these advantages do not appear to be well harnessed by FinTech. Taking a cue from Montreal's inter-university FinTech unit, we recommend a cross-collaboration effort across universities, corporations and the government that provides research and programming leverage and efficiencies across the expansive community. The inter-university FinTech body can inform the general public on technology trends shaping FinTech, both in Massachusetts and more broadly, and bring in top thought leaders from partner universities. In addition, the unit can choose to allocate research funds to areas that are expected to drive FinTech growth in the next five to ten years. This initiative could help drive thought leadership, innovation/R&D and help position Massachusetts as a global technology hub for financial services.

IV. "Potential nice to haves"

13

Create initiatives to retain a higher percentage of the university talent in Massachusetts post-graduation

Massachusetts is recognized as a leader in academia, but that source of talent is not translating into a steady stream of FinTech entrepreneurs and there is a supply-demand mismatch of technical talent. We recommend creating targeted programs focused to identify, nurture and retain talent. Examples of initiatives/ programs include:

1. Similar to the Georgia FinTech Academy, facilitate a learning and recruiting network among universities, FIs and the FinTech community.
2. Create grants, scholarships to retain top talent - focused talent that is committed to building careers in Massachusetts.
3. Facilitate job fairs/ a career website for students and experienced talent interested in FinTech as well as relevant technologies (AI, blockchain, big data, etc.) to engage with the experienced talent. For example, Innovate Finance (UK) has an online FinTech jobs board that promotes FinTech opportunities in the UK and aims to connect FinTech firms with potential candidates

Strong retention of talent is often a byproduct of an attractive overall ecosystem, and we believe that the implementation of other recommendations could naturally create conditions for the retention of talent. Because of this, we have classified this initiative as a "potential nice to have."

V. "For further consideration"

14

Create targeted initiatives to enhance knowledge of and access to FinTech for experienced talent

Based on our interviews, there appears to be a need to upskill talent at traditional FIs towards a more tech-enabled future. While we recognize this is a pressing gap, we remain conscious of the ecosystem bandwidth spent on nurturing talent in broader financial services. Some ideas to consider include:

1. Promote formal training and networking opportunities across firms to equip experienced professionals with relevant skills
2. Develop focused continuing education programs between universities and FIs to enhance technical skills within the existing workforce
3. Create a centralized resource for the most relevant and accredited technical and FinTech courses offered by universities in Massachusetts, that can be shared with FIs

15

Advance the State's usage of FinTech services

We have observed examples across other hubs where the state has become a user of FinTech services. An example of such a program is the Startups-In-Residence Program in San Francisco. This program allows government agencies and startups to co-develop customized solutions that meet the specific needs of their department. To this end, we recommend identifying and training relevant parties within the Commonwealth, including those with procurement responsibilities, on FinTech solutions applicable to government agencies. In addition, to promote the sentiment of "local first" there could be minimum local sourcing requirements for FinTech solutions consumed by the State.

16

Consider appointing an individual focused on the FinTech sector ecosystem in Massachusetts

Along the lines of championing/ coordinating organizations, we recommend considering appointing an individual to focus on the FinTech sector in Massachusetts. This individual could:

1. Inform and hold ecosystem stakeholders accountable for diversity and inclusion results.
2. Work with the private and public sector to raise the regional and national profile of Massachusetts in FinTech.
3. Collaborate with financial services and seek increased executive commitment from FIs - encourage shift from promotional to commercial commitment through targeted initiatives e.g., partnerships between regional banks and FIs, corporate challenges.
4. Identify centers of innovation in urban areas to provide office space for FinTech startups through partnerships with corporations, FIs and universities (e.g., the Barclays RISE workspace in New York)

These recommendations may enable greater sustainability and growth of the FinTech and the financial services in Massachusetts.

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