MIT MANAGEMENT
SLOAN SCHOOL

MIT SLOAN **IDEA EXCHANGE**

FINANCE BEYOND CRISIS

Impact, Disruption, and Innovation

Thursday, April 25, 2019 / Convene, 117 West 46th Street / New York, NY

#MITSloanFinance

Welcome Remarks

David Schmittlein, John C Head III Dean, MIT Sloan School of Management

MIT MANAGEMENT SLOAN SCHOOL

Opening Session

Leonid Kogan, PhD ’99, Nippon Telegraph & Telephone Professor of Management
Faculty Head, Finance Group, MIT Sloan School of Management

MIT MANAGEMENT SLOAN SCHOOL

Finance at MIT

Where ingenuity drives results

More than 75 years

pushing boundaries

solving problems

improve the world

For more than 75 years
MIT has been pushing the boundaries of finance to think beyond what's possible – solving problems to improve business and the world.

The financial crisis tested industries, governments, and academia. Some failed.

Finance at MIT scored high

by tackling issues head on.

The crisis strengthened our resolve

...principled finance is an **essential leadership skill**

...the language of finance is a **passport to engaging in the world**


IMPACT
=
our
common
ground
INGENUITY

What is…

Finance at MIT

It's the people taking finance **education, thought and invention** to new levels

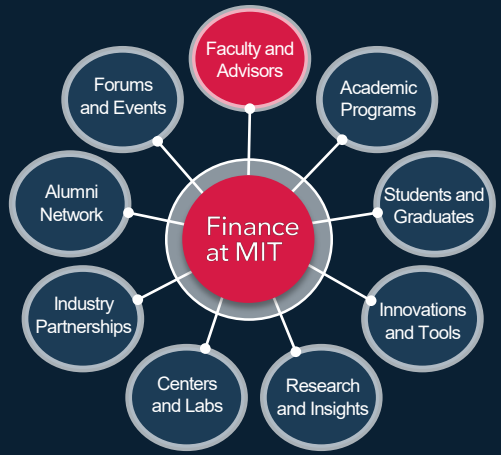
It's the vast capabilities, resources and potential of the global **MIT Finance Ecosystem**

It's where **ingenuity drives results**

The MIT Finance Ecosystem is a unique living network of people, programs, degrees, research and partnerships.

Faculty and Advisors

Leading excellence in finance



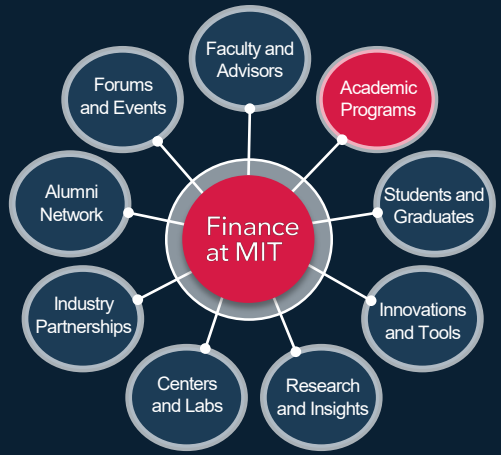
21 full-time tenure-track

16 affiliated faculty

25 industry leading advisors

Academic Programs

Built on rigor and action



- Master of Finance
- MBA Finance Track
- PhD Program in Finance
- Executive Education
- Undergraduate programs
- MicroMasters in Finance

Students and Graduates

Delivering exceptional skills

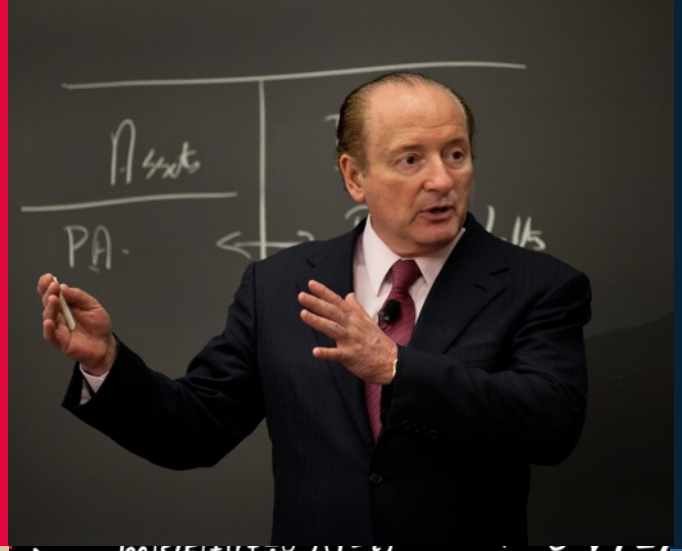
Over 20 years
of Action Learning

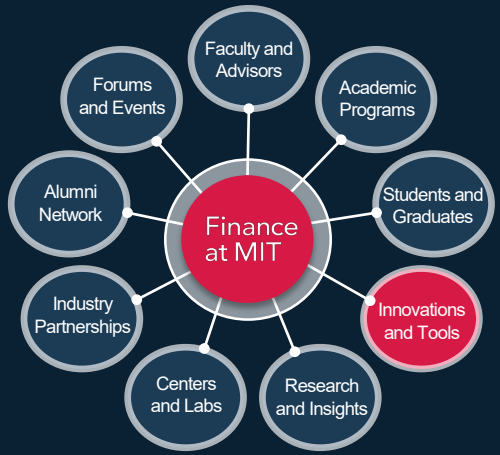
More than 2,500
students engaged

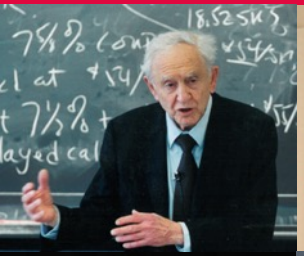
Over 500
collaborative projects

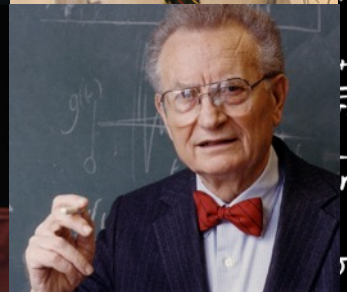
75%
repeat companies

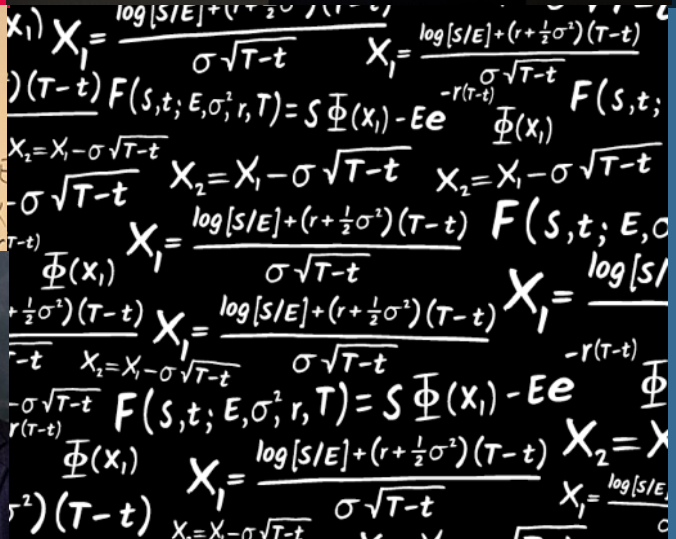
Innovations and Tools
Pioneering modern finance









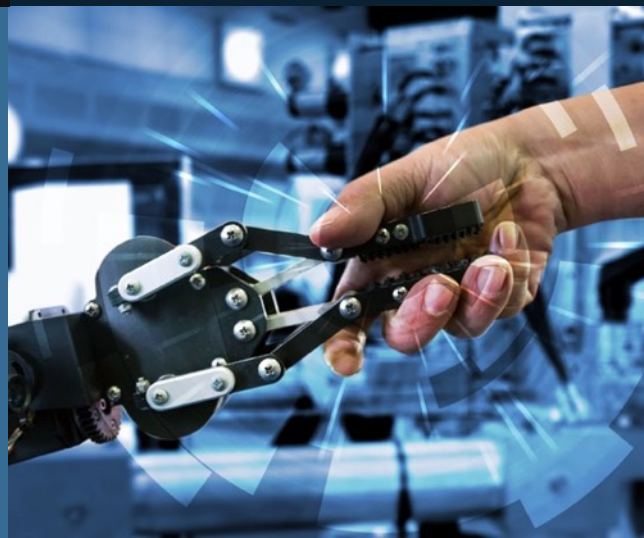


*"The **modern** intellectual history of **finance** begins with Paul A. Samuelson, who started his lifelong career at **MIT** in 1940."*

Research and Insights

Shaping finance ideas

- Investor behavior
- Systemic risk
- Funding models
- Financing retirement
- Technological innovation



Centers and Labs Bridging academia and industry

MIT LFE LABORATORY FOR FINANCIAL ENGINEERING

CSAIL

CANCERx

MIT GCFP GOLUB CENTER FOR FINANCE AND POLICY

Industry Partnerships Engaging global business

New business **models**

Broader **access**

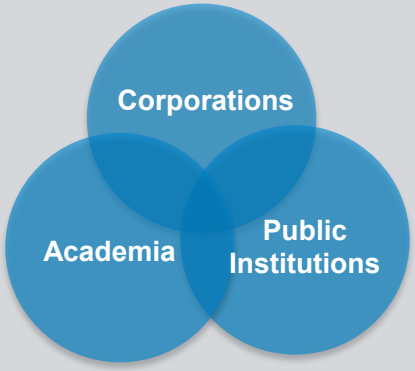
Data driven **insights**

Improved **security**

CSAIL

Alumni Network

Making global impact



24,000 MIT Sloan alumni

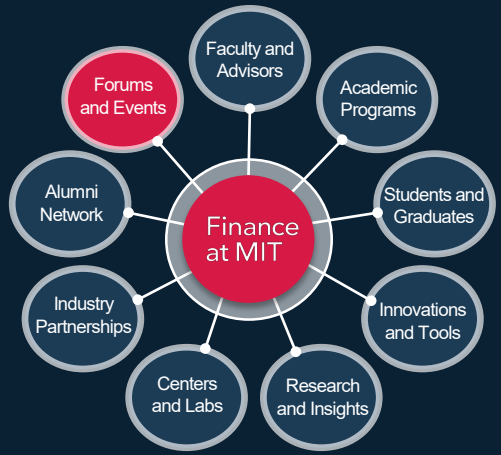
136,000 MIT alumni

95 MIT clubs

90 countries

Forums and Events

Presenting thought leaders



- MIT FinTech Conference
- MIT Sloan Investment Conference
- MIT Venture Capital & Innovation Conference
- MIT ETA Summit

OUR VISION

Solve complex problems and fuel progress in the world through the ingenuity and reach of the **MIT Finance Ecosystem.**

Solve complex problems

fuel progress in the world

IMPACT

=

Finance at MIT

Where ingenuity drives results

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SeLFIES—A Globally Applicable Bond Innovation to Improve Retirement Funding, Support Infrastructure Development, and Lower Government Financing Cost and Risk

Robert C. Merton, PhD ’70, School of Management Distinguished Professor of Finance, MIT Sloan School of Management

Global Challenges of Funding Retirement

Why current retirement funding systems may not be sustainable

- Sources of potential non-sustainability of current retirement funding systems
  - Shifting demographics: populations aging rapidly
  - Increasing longevity: population living longer
  - Economy shift from rural agriculture toward city industrial
  - Difficult budget positions of governments running deficits
  - Legacy of large unfunded liabilities of define-benefit and pay-as-you-go ("*PAYGO*") pension plans from inadequate contributions and overly optimistic return-earning
  - PAYGO systems' sustainable contribution rates are very sensitive to demographics, longevity and growth rate of the economy
  - Contribution and balance sheet risks too great for plan sponsors causes the subsequent exit from defined-benefit plans *("DB")*
  - Traditional role of defined-contribution plans ("*DC")* was supplemental and not for core retirement funding, and so current practice is not a suitable solution for core retirement

Korea: Challenges of Funding Retirement

Why current retirement funding systems may not be adequate or sustainable

- National Pension Service (NPS) fund may be on unstainable long-term path
  - Buffer fund is expected to diminish from 2040 and could be depleted by 2060
  - Increasing the contribution rate from current 9% to correct this may be difficult
  - Cutting benefits may also be difficult and at a 40% maximum replacement ratio which is already inadequate to provide a full retirement funding, may not work
  - Increasing general tax rates to provide government subsidy is not a long-run fix
  - Trying to increase return by taking more investment risk, requires a “safety net” funding plan in case the risk is realized
- About 51% of population is in NPS, which means that 49% is not covered
- Private pensions: 17% of population have a retirement pension and 24% have a personal voluntary one. However those so covered have large overlap with NPS and so a material part of population is uncovered by either a public or private plan
- Conclusion: more of the population will become responsible for funding a larger proportion of their retirement through personal saving and Defined-Contribution plans
- *SeLFIES* is a proposed innovation to enable people to do so and improve retirement outcomes

What is a Goal for a “Good” Retirement?

“An inflation-protected income for life that allows you to sustain the *standard of living* you enjoyed in the *latter* part of your working life.”

Standard of living is measured by *income*, and not by *wealth*. Standard-of-living risk is measured by income risk and not wealth risk

Reality everywhere: Individuals will have to take greater responsibility for funding their own retirement in the future than in the past.

SeLFIES is a bond innovation to address this challenge.

What are SeLFIES?
Standard-of-Living indexed, Forward-starting, Income-only Securities

- SeLFIES payouts are designed to create a pension-like payout pattern desired by individuals for retirement
- There is a deferred start of payouts until a specified future date (anticipated retirement date) and from that date on there are annual level payouts with indexing, until a specified ending date (a bit longer than life expectancy at retirement)
- SeLFIES would be issued as a series in small denominations with different annual starting dates
- The payouts are indexed to aggregate per capita consumption, so that the holder is hedged against both consumption inflation and standard of living change risks
- Robust design to work in any country.

E.G. SeLFIES – Standard-of-Living indexed, Forward-starting, Income-only Securities

26-Year Old Planning to Retire at Age 65 (2058) with Goal of $50,000 Retirement Income

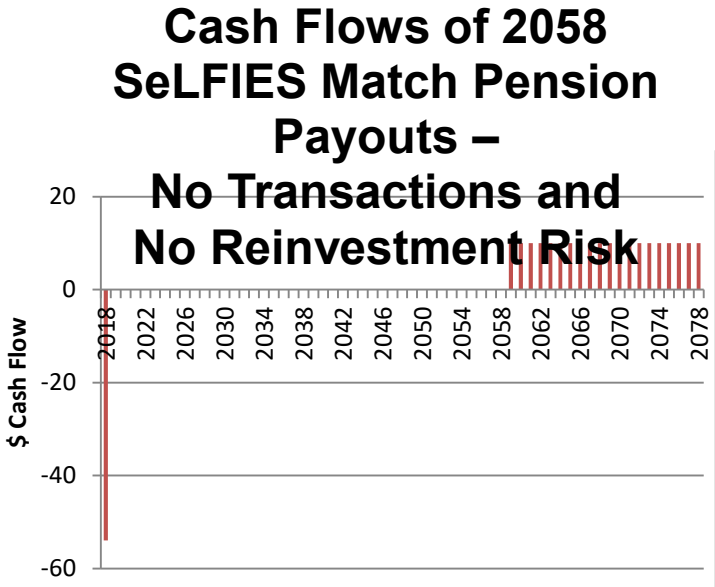
- Each 2058 SeLFIES has the following:
  - Starts paying periodic level-payouts of $10/year in 2058 for a fixed period of 20 years, with no principal or “balloon” payout at its maturity in 2078
  - Payouts indexed to per-capita consumption
  - Protects the holder against inflation and standard-of-living changes

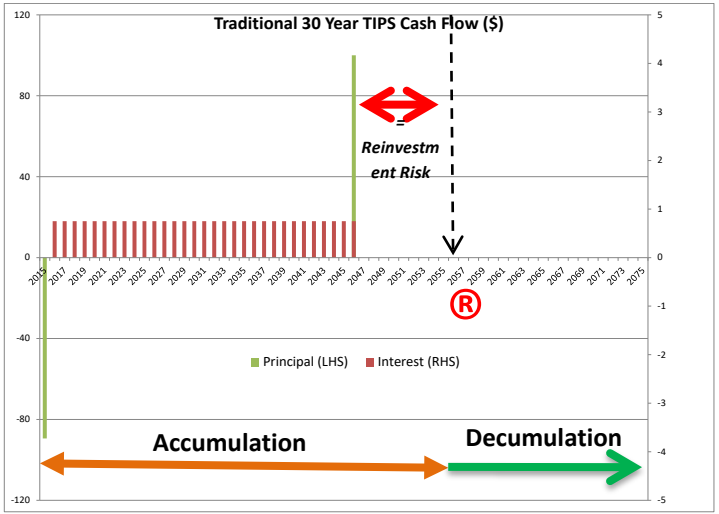
- Super simple to figure out what you need to own to meet your goal
  Goal = $50,000/$10 = need to own 5,000 bonds

- Super simple to figure out how close you are to your goal
  Where am I? Own 3,000 bonds = $30,000. You are 60% to your goal

- Addresses the challenge of a lack of financial literacy for savers to take responsibility for their own retirement outcomes

Why Do SeLFIES Have a Payout Time Pattern Different from Traditional Bonds with Periodic Coupon Payments and a Principal "Balloon" Payment at Maturity?





Why Index Cash Payouts to Consumption Per Capita Instead of Just to Inflation (CPI) ?

Goal for retirement is referenced to sustaining the standard of living experienced in the *latter* part of work life just before retirement –

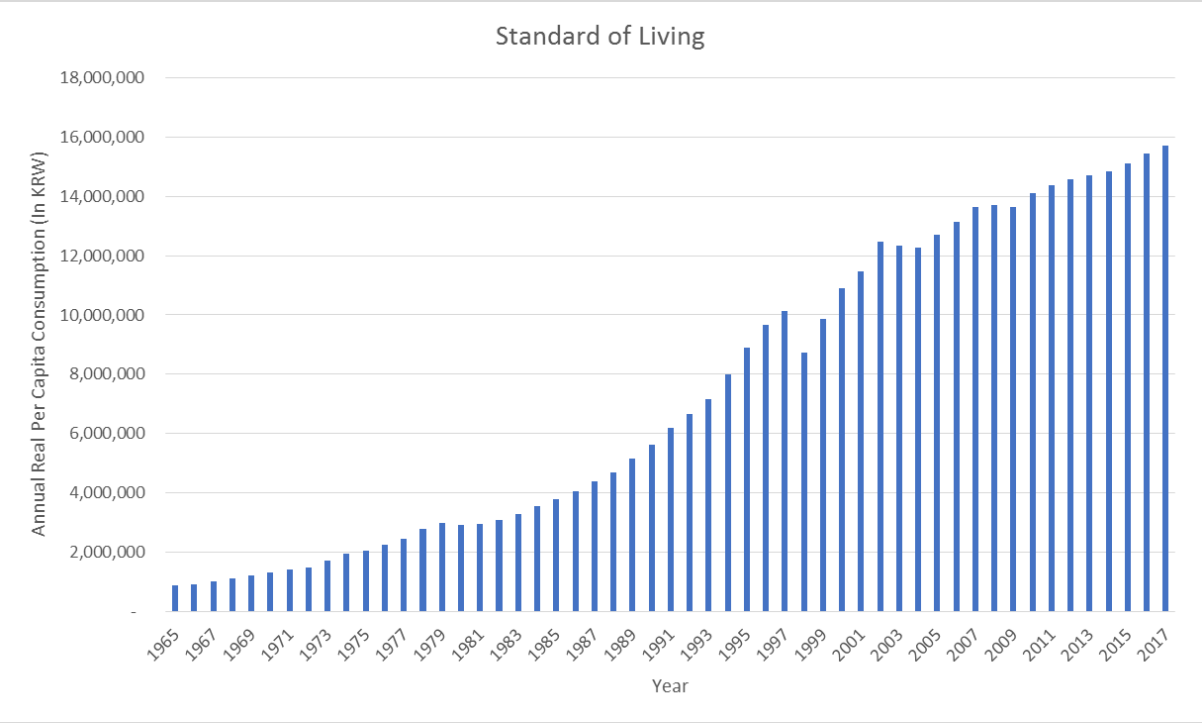
Average Compound Growth Rates: Korea

Time Period	Consumption per Capita*	Inflation (CPI)**	Standard of Living (SoL)	Goal Short-Fall CPI Only / (CPI & SoL)	
2007-2017	3.7%	2.3%	1.4%	0.87	10 Years
1997-2017	5.0%	2.2%	2.7%	0.64	20 years
1987-2017	8.4%	3.9%	4.3%	0.28	30 years
1965-2017	13.6%	7.4%	5.8%	0.04	53 years

*Covers both inflation (CPI) and standard of living (SoL) **Covers inflation (CPI) only

Source: Statistics Korea, Bank of Korea Economic Statistics System

Standard of Living Growth in Korea 1965-2017
Annual Inflation-adjusted per Capita Consumption



Who Will be the Users of SeLFIES? Individual Retail and Institutional Investors

- Individuals who are uncovered by any public or private pension plan and must accumulate assets for retirement through personal saving
- Individuals who are covered by a pension plan but the plan benefits are inadequate to provide for a good retirement and they must accumulate additional assets for retirement through personal saving
- Individuals who are covered by a pension plan but at least part of the plan requires their personal decision-making and responsibility as to what to invest the plan assets in, as in a defined-contribution (DC) plan
- Institutional investors such as pension funds and insurance companies who have pension and annuity benefit liabilities, and want to hedge them effectively and at low cost
- General institutional and retail investors who would want an efficient and low-cost core “best-diversified” portfolio, according to finance theory [Consumption Capital Asset Pricing Model, Breeden 1979]

Why Government Should be the Issuer of SeLFIES?

- SeLFIES will have no credit risk and so made very simple for buyers because do not worry about risk of default and all the associated disclosures
- Reliable supplier—to be successful most be prepared to issue bonds in good and bad times and have the capacity to provide large volume on regular basis
- Governments with VAT are “natural” issuers because the bond payments can be hedged by VAT revenues, since VAT is a tax on consumption
- Issuing SeLFIES ensures more domestic holding of government debt, a material benefit, especially for emerging market countries
- A security issued by government to improve financial market “completion” similar to 2007 issuing of JGB 40-year “ultra longs” or 1997 issuing of US Treasury inflation-indexed bonds “TIPS,” could also reduce debt funding cost
- Governments doing infrastructure financing improve maturity-matching of funding for infrastructure investments which reduces re-financing risk and issuing costs; can also be used to management government tax-revenue risk

Addressing Multiple Market Needs and Policy Objectives with a Single Bond Innovation: Retirement Income, Funding Infrastructure, and Improving Investors' Core Diversification… all by Issuing SelFIES

- Principle: match the "best" issuers with the "best" holders and improve to maximize scale and minimize cost
- Retirement funding improvements for individuals and institutions; improve maturity-matching of funding for infrastructure investments to reduce re-financing risk and issuing costs;
  control government tax-revenue risk
- Pattern of delayed payouts for many years and then level payouts match infrastructure cash inflow pattern and provides a precise match to cash flow needs of retirees, so no further transactions are needed by either issuer or buyer
- Finance science predicts that an asset which is perfectly correlated with aggregate consumption would be an ideal diversification asset for all investors

Appendix

- Survey of professional interest in SeLFIES—South Africa
- Scientific papers underlying SeLFIES
- Public interest in SeLFIES—op-ed and news articles

Survey of Interest in SeLFIES - What feature(s) of SeLFIES appeal to you?

A. Forward Starting / Deferred payment

B. The in-force payment pattern

C. The indexing feature

D. Some or all of the above

E. None of the above

Voted:136

Survey of Interest in SelFIES:
Assuming it was possible, would you take retirement SeLFIES?

A. Definitely interested – Assuming the economics makes sense

B. Slight interest – Can't really see the investment merit here

C. No Interest

Voted:136

Actuarial Society of South Africa Conference 2018

Scientific Papers Underlying SeLFIES Concept

- Muralidhar, A., K. Ohashi, and S. Shin. 2014a. The Relative Asset Pricing Model: Implications for Asset Allocation, Rebalancing, and Asset Pricing. *Journal of Financial Perspectives* (https://www.gfsi.ey.com/the-journal-of-financial-perspectives.php) March 2014
- Muralidhar, A., K. Ohashi, and S. Shin. 2014b. The Relative Asset Pricing Model: Toward a Unified Theory of Asset Pricing, *Journal of Investment Consulting*, Vol. 15, No. 1, 51-66, 2014
- Muralidhar, A., K. Ohashi, and S. Shin. 2016. The Most Basic Missing Instrument in Financial Markets: The Case for Bonds for Financial Security, *Journal of Investment Consulting*, Vol. 16, No. 2, p. 34-47, 2016
- Merton, Robert C. "On Consumption-Indexed Public Pension Plans." In *Financial Aspects of the U.S. Pension System*, edited by Zvi Bodie and John B. Shoven. Chicago: University of Chicago Press, 1983. Reprinted as Chapter 18 in Robert C. Merton, *Continuous-Time Finance,* Wiley-Blackwell, 1990, revised edition 1992.

Interest In SeLFIES: OP-ED & Articles

- South Africa: Survey Actuarial Society of South Africa
- USA/Europe: Op-ED Pensions & Investments Europe & PLANSPONSOR
- UK: The Economist Will SeLFIES Stick?
- France: OP-ED Le Monde
- Japan: Nikkei
- Australia: Investment Magazine
- India: Times of India
- Turkey: RÖPORTAJ

SeLFIES - USA / Europe

Time for retirement 'SeLFIES'?

Robert Merton & Arun Muralidhar

To address the looming retirement crisis, many governments are introducing new pension programmes tied to employment for uncovered workers (NEST in the UK and Secure Choice in some US states). These attempt to improve access to pensions, and continue a trend of transferring responsibility for retirement security from governments and employers (via defined benefit [DB] plans) to the individual (via defined contribution [DC]plans), as neither governments nor companies are willing to bear the liabilities associated with pension obligations. This shift requires new thinking about how portfolios are managed and which instruments are available to investors. Our proposed SeLFIES (Standard of Living indexed, Forward-starting, Income-only Securities) make individuals self-reliant and are also advantageous for governments.

For optimal portfolio management, members of DC plans should focus on maximising funded status or retirement income (not wealth, as in traditional investment approaches)[1]. Further, unlike multi-generational DB plans, DC plans must achieve their objectives in a single lifetime, and it is hard to pool risks because these plans are inherently flexible: (a) participation is often voluntary; (b) participants may require liquidity; (c) retirement ambitions, risk tolerance and life expectancy vary; and (d) employment patterns change over time (ie, the gig economy does not tether an individual to a single company). A new financial instrument is needed to enable financial security for retirees in the current environment.

DC investors seek to ensure a guaranteed, real income, ideally from retirement to death. It is also reasonable to assume they would want to lead a lifestyle comparable to pre-retirement. Investing in existing assets (stocks, bonds, or REITs) is risky because these do not provide a simple cash flow hedge against desired retirement income. For example, viewed through the retirement income lens, a portfolio of traditional, 'safe' government securities, unless heavily financially engineered, would be risky because of the cash flow (and potential maturity) mismatch between traditional bonds and the desired income stream.

There is thus a need for governments to issue a new 'safe' bond instrument, which we call SeLFIES. These will ensure retirement security and the government is a natural issuer[2].

The innovative SeLFIES design

A default-free bond offers certainty about two characteristics critical for DC retirement portfolios: (i) a commitment to pay over a particular time horizon (how/when one is paid); and (ii) a specific cash flow (what is paid). DC investors require a guaranteed cash flow that protects their real purchasing power in retirement. Two simple innovations could create the 'perfect' instrument.

The first innovation addresses (i) 'how/when one is paid' by creating forward-starting, income-only bonds. These would start paying investors upon retirement, paying coupons-only for a period equal to the average life expec- ▸

SeLFIES - Australia

SeLFIES a good look for Australian retirement

By Robert C. Merton and Arun S. Muralidhar | 06/06/2018

The Treasury Department has issued a report seeking comment on ways to improve retirement income security in Australia (*Retirement Income Covenant Position Paper: Stage one of the Retirement Income Framework*, May 2018).

SeLFIES - India

N ECSTASY OF IDEAS

THE TIMES OF INDIA, MUMBAI
MONDAY, FEBRUARY 5, 2018

SeLFIES For India

These long-term bonds can fund India's infrastructure needs and improve retirement security

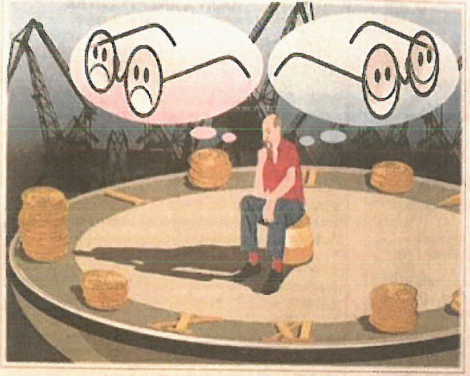
Robert C Merton and Arun S Muralidhar

The Indian government unveiled its Budget and recognises that the infrastructure sector needs investments of Rs 50 lakh crore to boost GDP (allocating Rs 5.9 lakh crore as a primary step). Simultaneously, certain provisions in the Budget seek to improve the lives of retirees, and finance minister Arun Jaitley specifically noted that, "A life with dignity is a right of every individual, in general, more so for the senior citizens."

One of the major challenges that India will face is ensuring the income security of its senior citizens, especially in a country where financial literacy is relatively low. The government can easily fund infrastructure, especially since it has given permission to the National Highways Authority of India (NHAI) and other institutions to issue bonds, and have an immediate impact on the retirement challenge by issuing a new type of long-term bond, one we call SeLFIES – Standard of Living Indexed, Forward-starting, Income-only Securities.

SeLFIES address many of the challenges raised in the Budget and are also advantageous to the ministry of finance, especially in light of the recent implementation of a Goods and Services Tax (GST).

"A life with dignity" would ideally include guaranteed, real income, from retirement through death, and the ability to lead a lifestyle comparable to pre-retirement. The Indian government



and decumulation because they are largely financial illiterate.

The complexity of retirement planning leaves many confused about what constitutes adequate savings for retirement. Individuals are overwhelmed by the information provided and the absence of a robust and uniform method to make these calculations. Moreover, there is uncertainty over what to invest in and how best to decumulate. Most adults can barely answer questions about compound interest, the effects of inflation or the benefit of diversification. Investing in existing assets is risky relative to the retirement objective, because these assets fail to provide a simple or low-cost cash-flow

SeLFIES are designed to pay people when they need it and how they need it. Even the most financially illiterate individual can be self-reliant with respect to retirement planning

annuity markets are not sufficiently deep or developed. More importantly, many hesitate to buy annuities because they can be complex, opaque and illiquid; investors fear not being able to bequeath

the risk of inflation and standard-of-living improvements.

SeLFIES are designed to pay people when they need it and how they need it, and greatly simplify retirement investing. A 55-year old today would buy the 2023 bond, which would start paying coupons when he turns 65, in 2028, and keep paying for 20 years, through 2046.

In this way even the most financially illiterate individual can be self-reliant with respect to retirement planning. For example, if someone wants to guarantee Rs 50,000 annually, risk-free for 20 years in retirement to maintain their current standard of living, they would need to buy 500 SeLFIES – ie, Rs 50,000 divided by Rs 100 – over their working life.

The complex decisions of how much to save, how to invest, and how to draw down are simply folded into an easy calculation of how many bonds to buy. SeLFIES do not address all issues, including longevity risk, but go a long way toward improving retirement security.

These securities are a good deal for governments, too. In fact, governments are the biggest beneficiaries. SeLFIES not only improve retirement outcomes for all citizens saving for retirement, but also have spill-over benefits.

First, cash flows from SeLFIES reflect synergistic cash flows for infrastructure spending: namely, large cash flows upfront for capital expenditure, followed by delayed, inflation-indexed revenues, once projects are online. Financing infrastructure has been a challenge and a priority for the current government, especially given the current Budget. Second, SeLFIES gives the Indian government a natural hedge of revenues against the bonds, through GST.

The looming retirement crisis needs

SeLFIES - Japan

経済教室

A・ムラリダール ジョージ・ワシントン大学教授
R・マートン マサチューセッツ工科大学教授

老後保障向け金融商品
退職後支払いの新型国債を
個人の資産運用負担 軽減

ポイント
- ○老後保障確保に応える金融商品ほぼなし
- ○退職時から一定期間均等額を払う仕組み
- ○長期インフラ投資の資金手当てにも適合

2007年に東大客員教授を務めていた筆者の1人（ムラリダール）は日本の社会保障制度を分析した。公的年金制度は人口高齢化に深刻な圧力をかけられているが、社会の連帯という概念を支える柱になっていると結論づけた。

公的年金制度は退職者に一定の年金収入を保障するが、各人の希望にかなう収入を確保するといった柔軟性は限られる。そこで国民は個人的に銀行預金をするとか、保険会社と契約して年金商品を買うなどの策を講じて、退職後に備えているのが現状だ。だが多くの人は金融知識が乏しいにもかかわらず、複雑な資産運用の判断を迫られている。

日本も退職後の保障を改善できるような新しい金融商品を導入する必要がある。今日では多くの国が人口構成の変化（平均寿命の延びや出生率の低下）と低成長により、同様の課題に直面している。社会保障制度を支えるための増税の余地は限られている。

もう一人の筆者（マートン）は、日本政府が年金基金や保険会社のALM（資産・負債の総合管理）を改善する目的で40年物国債を発行した際に関わった。今回提唱するイノベーション（革新）は過去に米国、フランス、インドでも提案した。従来の保障を維持・強化するとともに、個人が退職後に備えるための低コストでわかりやすく直接的な手段を提供できるだろう。

◇　◇

米国での投資の新しい方向性にゴールベース投資がある。個人がめざすゴール（目標）は退職後に備えたいとか、家を買いたいというように多様だとの認識から出発する。ゴールが各人各様であるとすれば、そのために必要な投資戦略も異なるはずだ。

図は現在25歳の人が65歳から25年間にわたり、年収300万円（月収25万円）を確保したいと考えている場合の退職年金のフローを示したものだ。これだけの保障（ゴール）があれば、退職前の生活水準を退職後も維持できるとする。このキャッシュフローのパターンは、家の購入や旅行といった他のゴールのためのパターンとは全く違う。

社会保障制度から年200万円（月約17万円）の年金が給付されるとすると、年100万円を自分で手当てする必要がある。このゴールの達成にとって阻害要因となるのが金融知識の欠如だ。いくら貯金すればよいのか、どの資産に投資すればよいのか、どんなペースで取り崩すのがよいのかなどの判断を迫られる。

大人でも複利、インフレの影響、分散投資のメリットなどに関する質問に答えられる人はほとんどいない。そのうえ民間の保険会社が提供する据え置き期間付き年金を除いて、図のような特殊なパターンに応えられる資産は存在しない。しかしこうした金融商品は仕組みが複雑で流動性が低く、遺族給付の柔軟性に乏しいうえ、大概は高コストだ。一方、銀行預金は資産を守ってくれるが、利回りが低いため退職者には不向きだ。

発行済みの日本国債は利子のみを半年に1度支払い、元本は満期時に償還される方式をとる。仮に額面5万円の40年物日本国債を買えば、半年に1度の利払いがあり、5万円の元本は最後の利払いとともに40年後に償還される。

一方、個人向け小口額面（1万円）の10年物国債は変動金利付きしか発行されない。この国債は資産保護の観点からは安全な金融商品にみえるかもしれない。だが実際には図のような望ましいキャッシュフローのパターンと比べるとかなりリスクが大きい。個人はまだ働いていて収入のあるうちから、必要もないのに利子をもらうことになる。

従って将来の不確定な利率で再投資せざるを得ない。元本は一度に償還されるので、キャッシュフローのミスマッチと再投資リスクを招くことになる。たとえ元本がインフレ率に応じて調整される物価連動国債であっても、それだけでは不十分だ。退職よりかなり前に貯金を投資に回しているため、生活水準が大きく変動している場合に対応しきれなくなるためだ。

退職後も生活水準を維持しようとすれば、必要な金額は退職までの長い間に増えていく可能性が高い。生活水準を維持するには備えが足りないということになりかねない。

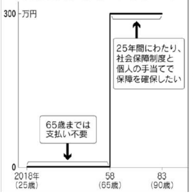
◇　◇

日本政府はより期間の長い50年物国債を発行することは可能だろう。しかしそれよりも、低コストで流動性が高く超長期の新型債券を発行する方がよい。そのために筆者が

Robert C. Merton 44年生まれ。MIT博士。97年ノーベル経済学賞受賞

Arun S. Muralidhar ⑪年生まれ。専門は⑪⑪

現在25歳の人が希望する退職年金のキャッシュフローのイメージ（年収ベース）



SeLFIES - Turkey


Prof. Robert Merton

Time for retirement 'SeLFIES' adlı makalede bahsi geçen SeLFIES tahvilleri hakkında bilgi verir misiniz? Bu tahviller OKS'ye nasıl bir efektif yaklaşım kazandıracak?

Önerdiğimiz yenilik; ABD, Avustralya, Japonya ve Hindistan'da olduğu gibi, Türkiye'de de emeklilik sistemini iyileştirip, milyonlarca katılımcıya, düşük maliyetli, kolay ve güvenli bir emeklilik yolu açabilir. Zamanlama açısından da Türkiye'de özel emeklilik sisteminde yaşanan zorluklara

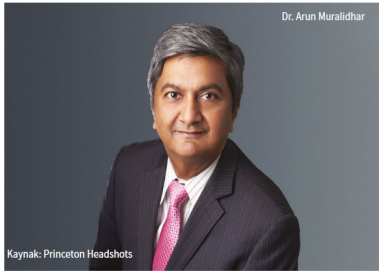
MIT PROFESÖRÜ NOBEL ÖDÜLLÜ ROBERT MERTON VE GEORGETOWN ÜNİVERSİTESİ EMEKLİLİK ARAŞTIRMALAR MERKEZİ DR. ARUN MURALİDHAR; "Emeklilik İçin Basit ve Etkin Bir Çözüm Önerisi: SeLFIES"

çözüm ve sosyal dayanışmaya da katkı yapar.

Bireyler, emeklilikte hayat standardını devam ettirmek için enflasyona yenik düşmeyen garantili bir gelire ihtiyaç duyarlar. Örneğin, ortalama bir Türk vatandaşı, emeklilikte rahat ve güvende olmak için, bugünün parası ile ayda 2 bin TL'ye ihtiyaç duyabilir. Ancak; buna ulaşmak için, ne kadar tasarruf edip, emeklilikte ne kadar harcayacağına dair belirsizlik vardır. Çoğu yetişkin birey, bileşik faiz, enflasyonun etkisi veya yatırımda riski dağıtma gibi temel finansal okur yazarlık konularından bihabardır. Dahası, riskli menkullere yatırım yapmak, emeklilik açısından risklidir çünkü bu finansal varlıklar bir emeklinin ihtiyaç duyduğu basit ve düşük maliyetli nakit akışını sağlayamaz. Hatta "güvenli" devlet tahvilinden oluşan portföy bile, belli bir maliyet karşılığında ciddi finansal mühendisliğe tabi olmadan, risklidir, çünkü nakit akışı ve vadeler uyuşmayabilir. Şu anda, Türk Devlet Tahvilleri (DT), geleneksel tür olup vadeye kadar kupon faizi ve vadede ana para ödemektedir. Bugün 10 yıllık DT'ni satın alan kişiler, senede iki kerelik kupon faizi (1.000 TL anapara başına yıllık toplam 140 TL) ve 10. yılda son kuponla birlikte anaparayı almaktadır. Sermayeyi koruma perspektifinden güvenli gibi gözüken bu tahviller, aslında bir emekliye gerekli olan nakit akışı hedefine kıyasla oldukça riskli araçlardır. Riskin sebebi sudur: Bireyler ihtiyaç duymadıkları anda kupon alırlar (çalışıp para kazanırken) ve dolayısıyla gelecekte belirsiz faiz oranlarıyla yeniden yatırım yapmak zorundadırlar. Anapara ödemesi (10 yıl sonra) kişi emekli olmadan (30-40 yıl sonra) yapıldığı için, nakit akışı uyumsuzluklarına ve yeniden yatırım riski alınmasına yol açar. Karmaşık finansal önlemler bu zorluğu gideremez, ayrıca riskli ve maliyetli olabilir. Bu ödemeler enflasyona göre ayarlansa bile, yine de yeterli olmayacaklardır, çünkü emeklilikten çok önce yatırıma yönlendirilen tasarruflar için yaşam standardı riski gerçekten önemlidir. Çalışırken bir kişinin hayat tarzını devam ettirmek için gereken miktar, bu uzun dönemde artmaya devam edecek, emeklilikte bunun için gerekli yeterli tasarruftan mahrum olacaktır.

SeLFIES adını verdiğimiz ve yaşam standardına endeksli olarak ileri bir tarihte faiz kuponu ödeyen menkul kıymetler bu sorunların çoğuna çözüm getirebilmektedir. Türk Hazinesi yeni düşük maliyetli, likit ve "güvenli" çok uzun vadeli bir borçlanma enstrümanı çıkartabilir. Bu özel tahviller, kişi emekli olunca ödeme yapmaya başlıyor ve emeklilikte ortalama yaşam beklentisine eşit bir süre için (örneğin 20 yıl), kişi başına harcama miktarına endeksli reel bir kupon (mesela yılda 5 TL) ödüyor. SeLFIES, hem enflasyon, hem de yaşam standardında yükselme riskini telafi etmektedir. SeLFIES, insanlara ihtiyaç duydukları zaman ve istedikleri şekilde ödeme yapmak için tasarlanmıştır ve emeklilik yatırımını büyük ölçüde basitleştirmektedir.

"ÖNERDİĞİMİZ YENİLİK, ABD, AVUSTRALYA, JAPONYA VE HİNDİSTAN'DA OLDUĞU GİBİ, TÜRKİYE'DE DE EMEKLİLİK SİSTEMİNİ İYİLEŞTİRİP, MİLYONLARCA KATILIMCIYA, DÜŞÜK MALİYETLİ, KOLAY VE GÜVENLİ BİR EMEKLİLİK YOLU AÇABİLİR."


Dr. Arun Muralidhar

Kaynak: Princeton Headshots

Bugün 55 yaşındaki bir kişi, 2028 tahvilini satın alacak ve 65 yaşına geldiğinde kupon ödemesi almaya başlayacak ve bu ödemeler 20 yıl boyunca 2048'a kadar devam edecek. Finansal okur-yazarlığı en düşük kişi bile, emeklilik planlamasını kendi başına yapabilir. Örneğin katılımcı, risksiz 20 yıl ve yılda 25.000 TL'lik güvenceli bir emeklilik planı isterse, çalışma hayatı boyunca 5.000 SeLFIES satın alması gerekecek (25.000 TL / 5). Ne kadar biriktirileceği, nasıl yatırım yapılacağı ve yatırımın nasıl çekileceği gibi karmaşık soruların hepsi basit bir hesaba indirgenmektedir. Basit, likit ve düşük maliyetle işlem görme ve düşük kredi riski gibi özellikleri yanında, SeLFIES varislere de bırakılabilmektedir. SeLFIES, emeklilikte uzun yaşam riski gibi tüm sorunları çözmese de emeklilik güvencesini iyileştirmek için önemli bir adımdır.

SeLFIES ihraç eden devletler için de iyi bir araçtır ve aslında devlet bundan en çok faydalanacak taraftır. SeLFIES, tüm katılımcılar için emeklilik sonuçlarını iyileştirmekle kalmaz, aynı zamanda mevcut yönetim ve gelecekteki hükümetler için de faydaları vardır. Birincisi, bu tür kağıtlar, bütçede KDV gelirleri olan Hazine'ye doğal bir geri ödeme koruması sağlamaktadır. İkincisi, SeLFIES'in nakit akışları, altyapı harcamalarının nakit ihtiyaçlarına uyumlu bir sinerji sunmaktadır. Yani, SeLFIES ilk ihraç edildiğinde gelen yüksek nakit akışı projenin yatırımını fonlar. Proje hayata geçip enflasyona endeksli gelir yaratmaya başladığında da reel kuponları öder. Ayrıca, hükümet bu tür tahviller çıkardığında, sigorta şirketleri ya da altyapı inşaatı şirketleri gibi diğer şirketler de ihraç ederek piyasayı büyütüp tamamlarlar. Böylelikle tüm yük devlete binmez. Bu menkuller, geleneksel devlet tahviline benzedikleri için, otomatik katılım sistemine kolaylıkla dahil edilebilir ve katılımcılar, emeklilik geliri perspektifinden tek güvenli varlık olan SeLFIES tahvillerini otomatik alabilirler.

SeLFIES tahvillerinin bireysel emeklilik katılımcılarının gelecekte alacağı emekli maaşına yönelik olarak nasıl bir çözüm sunacağını düşünüyorsunuz?

Normal bir bireye emeklilik dönemi bütçesini sorsanız, size yılda 25.000 TL'ye ihtiyacım var gibi bir cevap vermesi, toplam 450.000 TL'lik bir emeklilik portföyüm var ve bundan senede 25.000 TL çekeceğim demesinden, çok daha olasıdır. Çoğu vatandaş, emeklilik gelir seviyesini telaffuz eder; hedef servet seviyesini değil. SeLFIES tahviller tam da bunu, yani bireylerin istediğini sağlar: Hayat standardına endeksli her yıl artan sabit bir maaş. Bahsi geçen SeLFIES tahvillerinin emekliliğe bu denli uygun olmasının nedeni, bu tahvillerin nakit akışının emeklilik dönemi gelir ihtiyacını tam anlamıyla karşılamasıdır.

Tercümanlar: Kübra Şebnem Koldemir
Mehmet Gerz

SeLFIES, hem enflasyon, hem de yaşam standardında yükselme riskini telafi etmektedir. SeLFIES, insanlara ihtiyaç duydukları zaman ve istedikleri şekilde ödeme yapmak için tasarlanmıştır ve emeklilik yatırımını büyük ölçüde basitleştirmektedir.

Röportaj: Rabia Kübra Kanun

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The Role of Housing and Mortgage Markets in the Financial Crisis

Antoinette Schoar, Michael M. Koerner (1949) Professor of Entrepreneurship; Professor Finance, MIT Sloan School of Management

NEW CONSENSUS OF THE HOUSING CRISIS

- Housing markets were subject to a classic asset bubble
  - Rising house prices and over-optimistic expectations played a key role in the increase in mortgage debt and defaults
  - Households increased demand for housing and mortgage debt across all income groups, especially middle-class borrowers
  - Banks lent against increasing collateral values and underestimate the risk of defaults

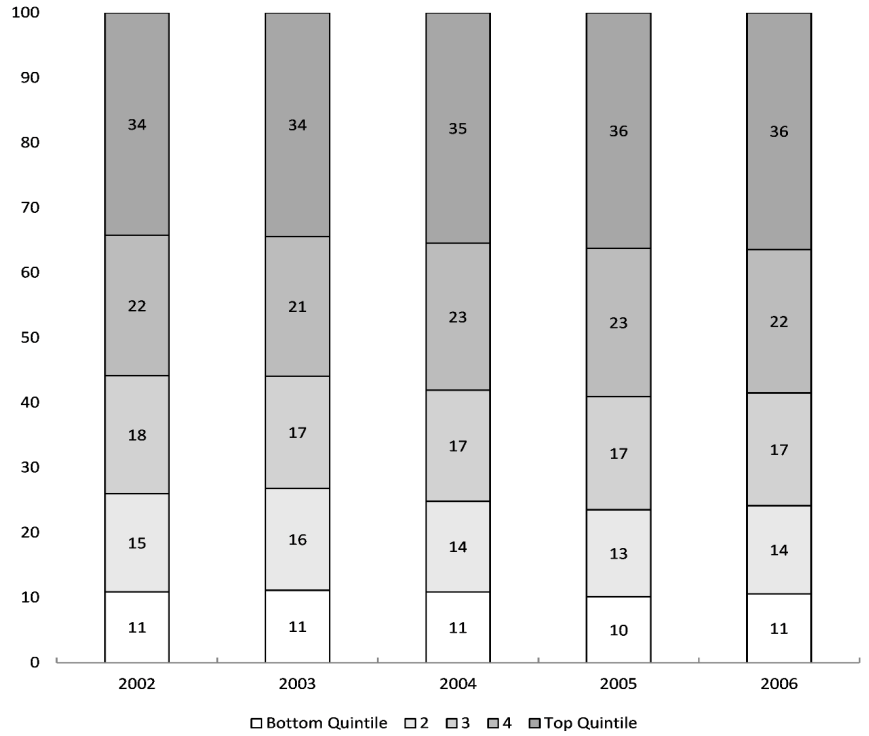
- Not a “subprime crisis” but a middle-class crisis!
  - Financial sector acted as an amplification mechanism for changes in expectations by lending into the bubble
  - No unilateral shift of credit allocation towards marginal or sub-prime borrowers, Adelino, Schoar, Severino (2015, 2016)

THE FACTS

- The Run-up: Credit expanded across the income distribution, not just poor or low FICO borrowers
  - Middle/high income households had a much larger contribution to mortgage debt before the crisis than poor/low FICO borrowers
  - Debt-to-income levels (DTI) went up for all income groups
  - Loan-to-Value distribution stayed constant before the crisis
  - Faster churning of houses leading up to the crisis
  - Ownership rates went down for subprime and low income households before the crisis

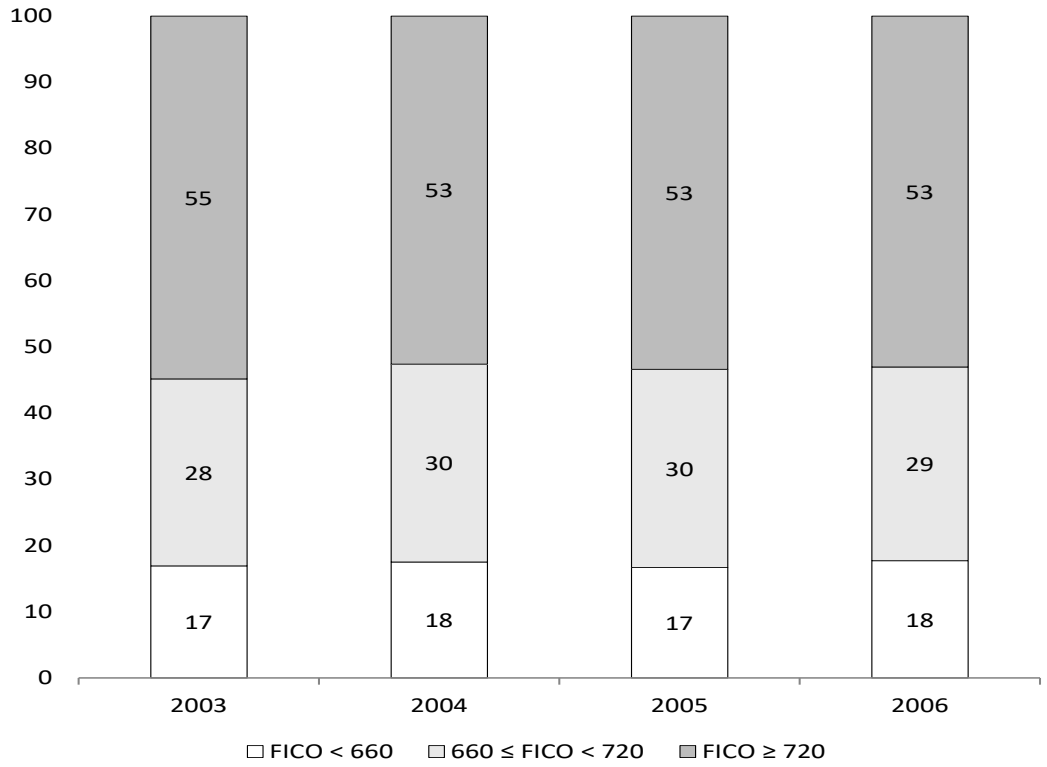
- The Aftermath: Sharp increase in delinquencies for middle class and prime borrowers after 2007
  - Middle class and high FICO borrowers made up much larger share of defaults, especially in areas with high house price growth

MORTGAGE ORIGINATION ACROSS INCOME GROUPS STAYED STABLE

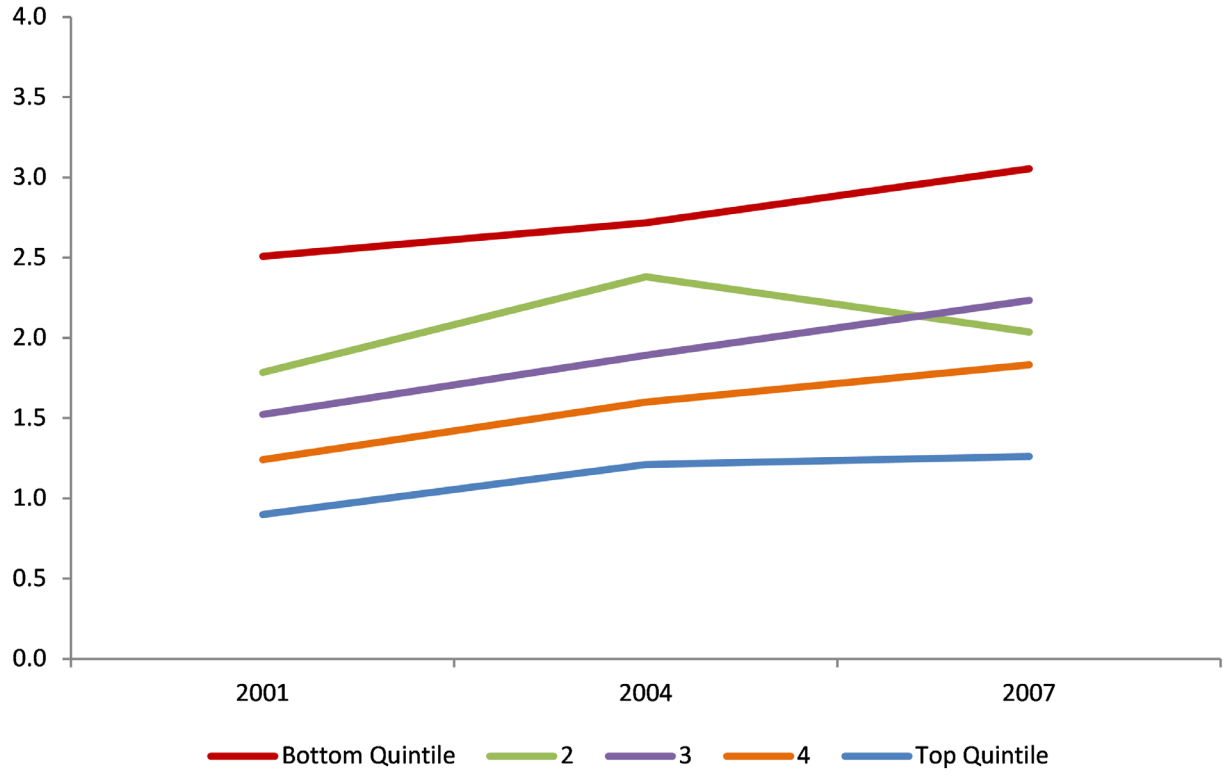


Fraction of mortgage dollars originated per year by income quintile (HMDA)

ORIGINATION BY FICO SCORES

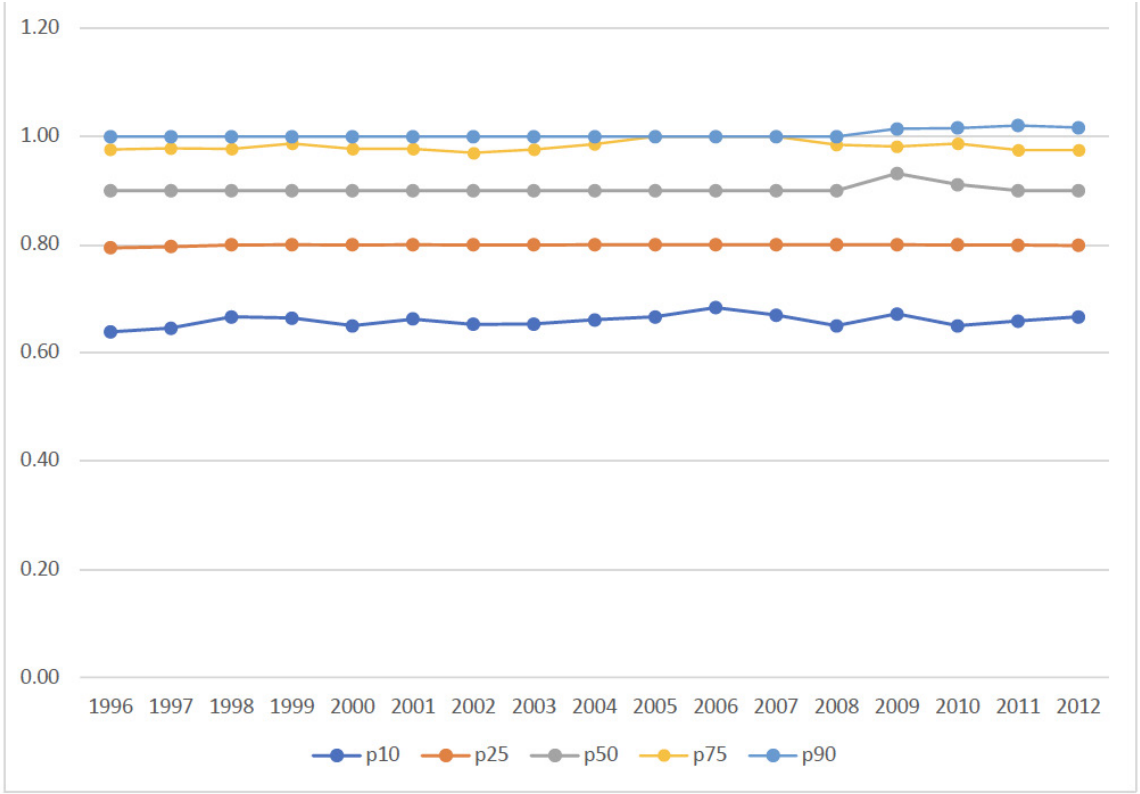


MORTGAGE DEBT EXPANDED PROPORTIONALLY



Data from SCF, own calculations

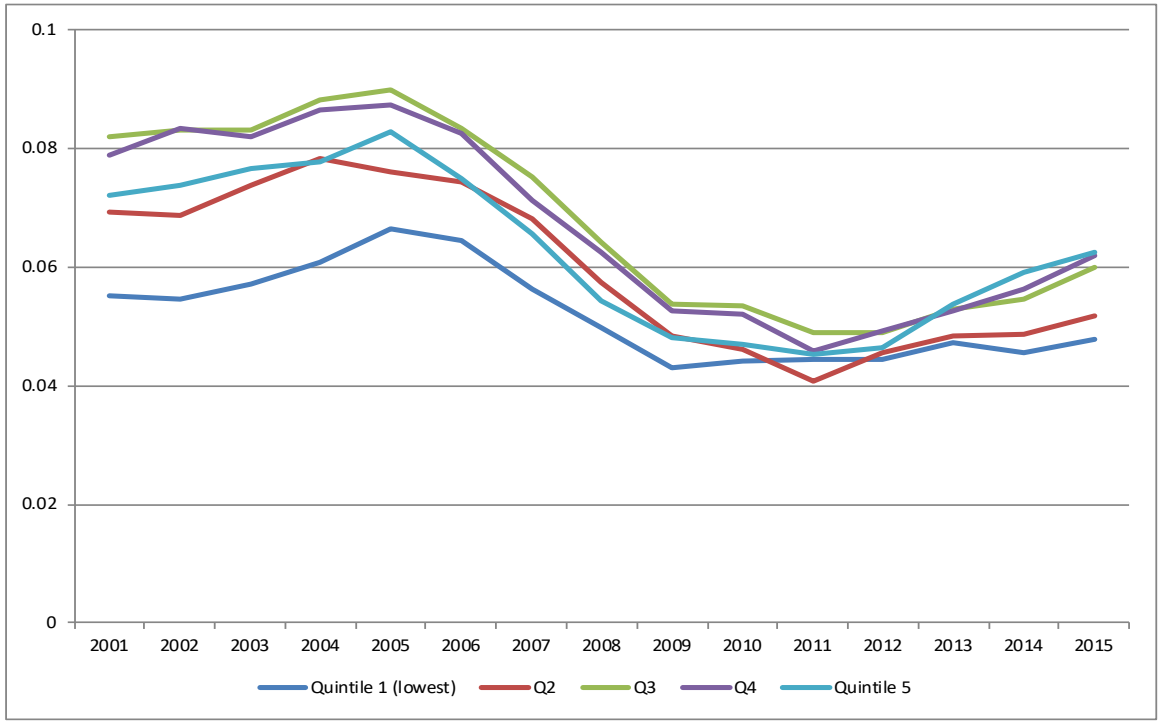
COMBINED LOAN TO VALUE DISTRIBUTION AT ORIGINATION



Corelogic, own calculations

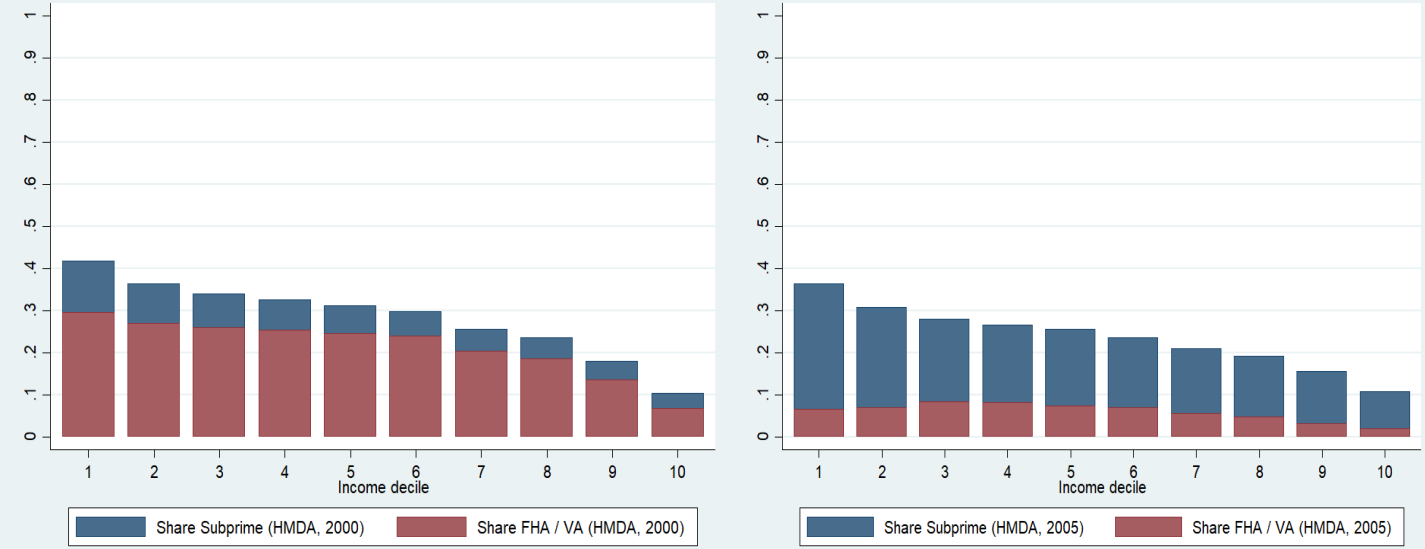
INCREASED SPEED OF HOME SALES

Share of owners moving in last 12 months, ACS data



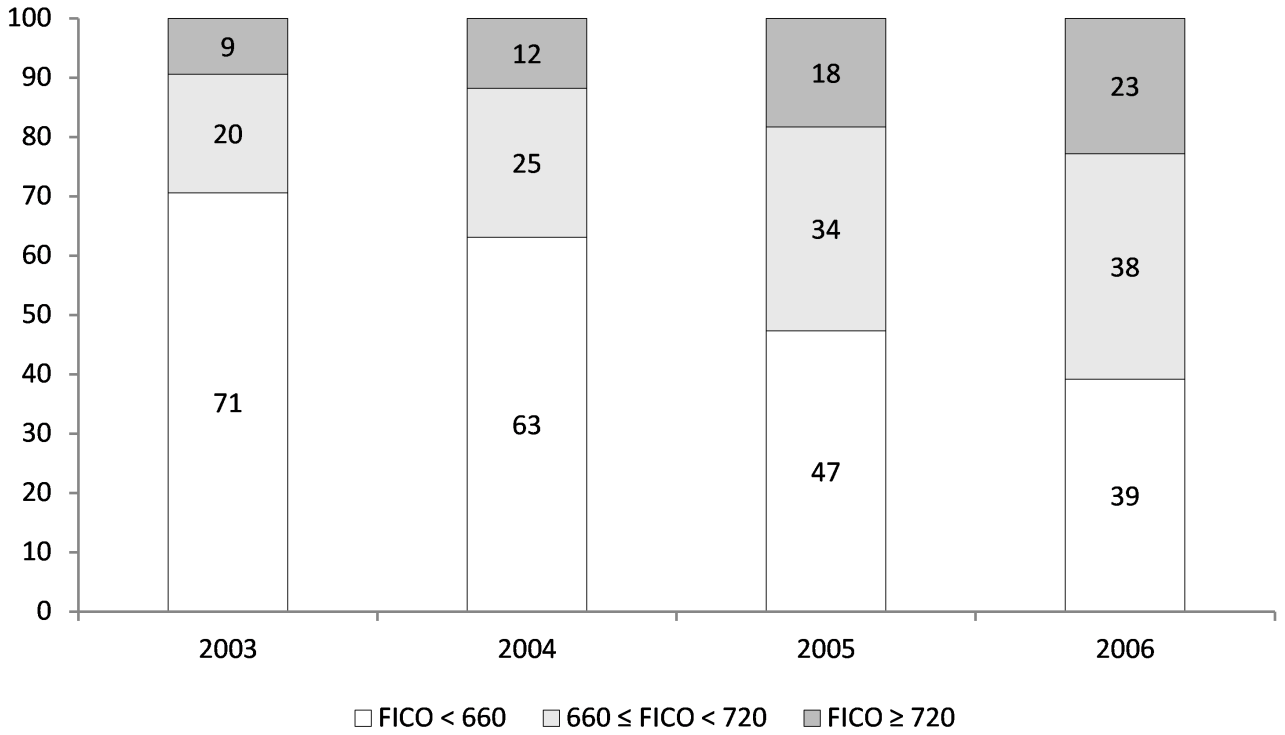
SUBPRIME TAKES ROLE OF FHA/VA

Share of FHA/SubPrime Mortgages in 2000 versus 2005

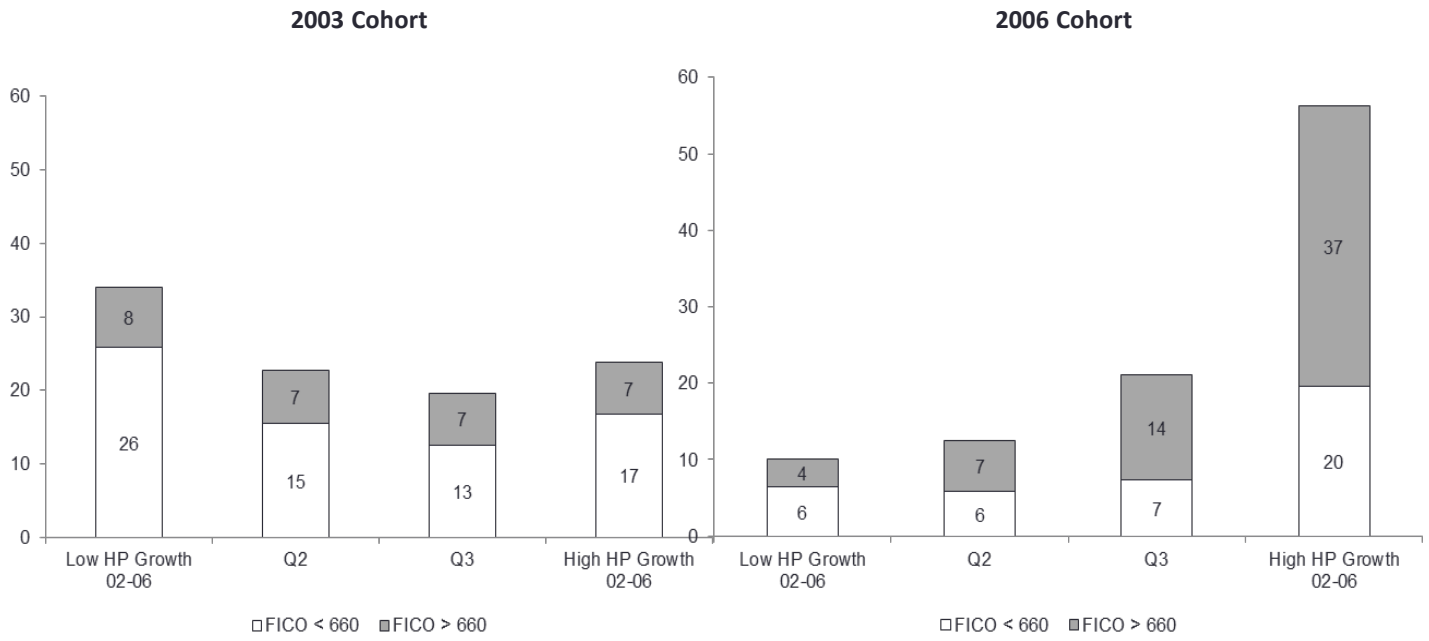


THE AFTERMATH …

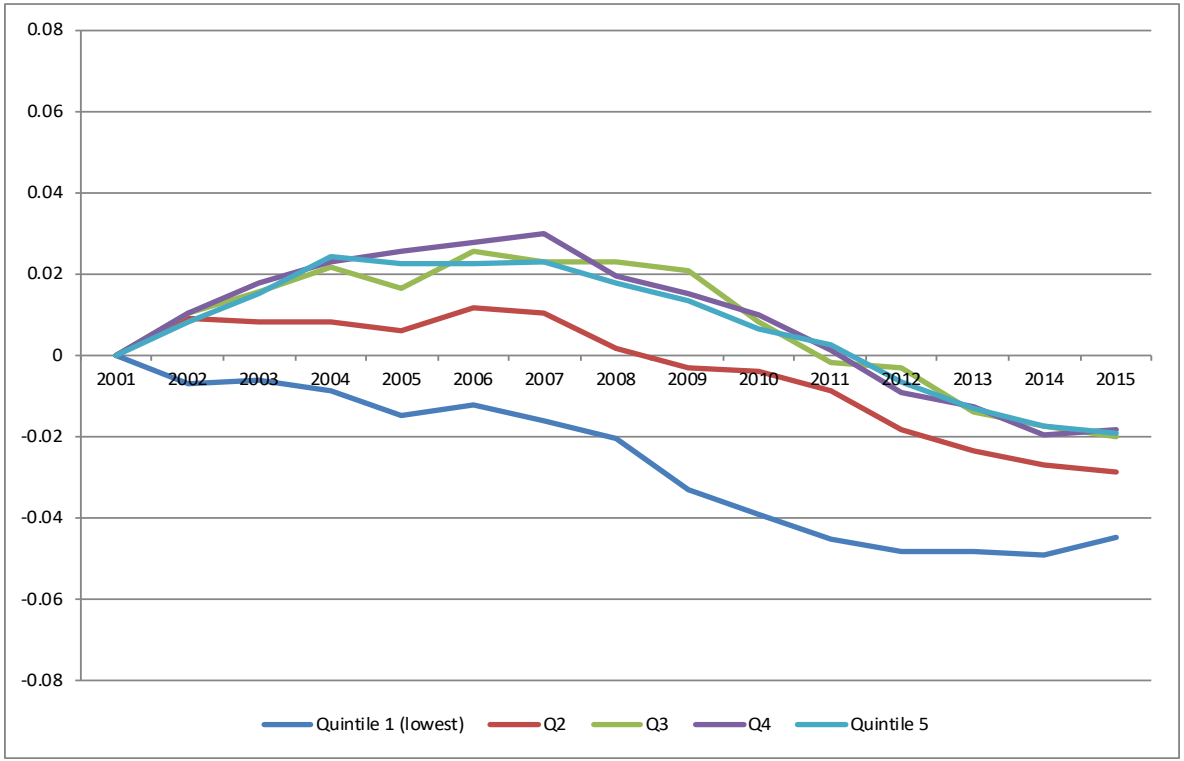
SHARE OF DELINQUENT MORTGAGES (3 YRS OUT)



SHARE OF DELINQUENT MORTGAGES BY FICO AND HOUSE PRICE GROWTH



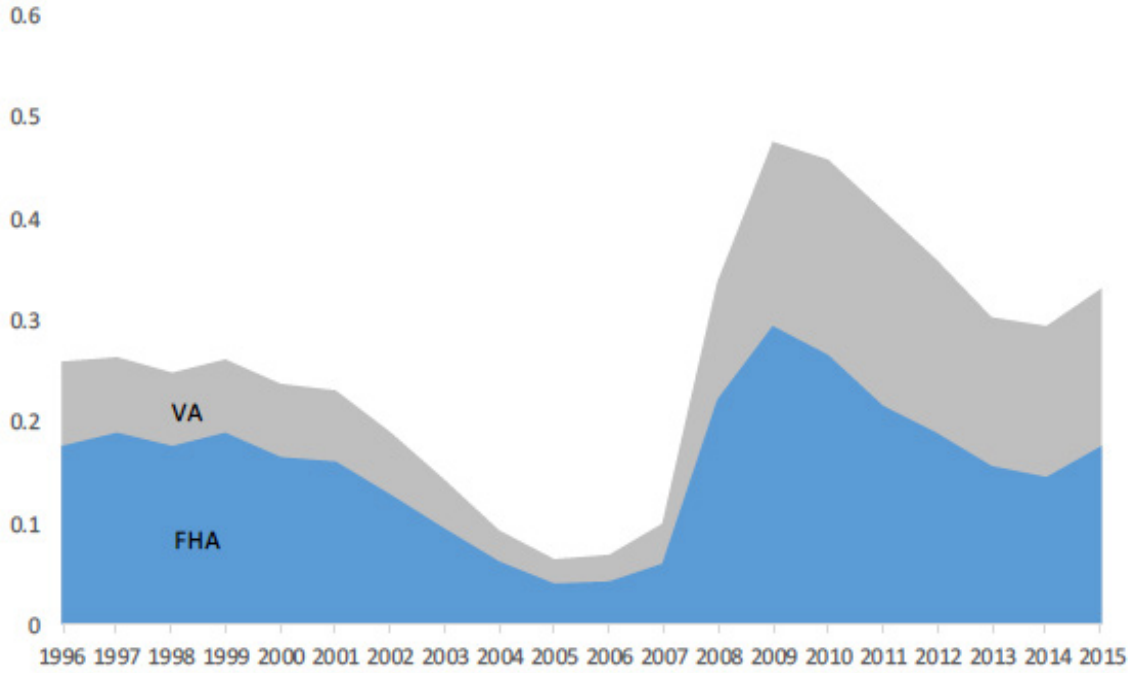
DROP IN HOMEOWNERSHIP FOR LOW INCOME HOUSEHOLDS



Data from ACS, own calculations

AND IF YOU WANT TO BE SCARED …

Share FHA and VA loans



Data from Corelogic, own calculations

IMPORTANT POLICY IMPLICATIONS

- (Optimistic) house price expectations played a major role in the expansion of credit and delinquencies

- Important focus on macro-prudential implications
  - Systemic build up of risk can lead to losses across the financial system, e.g. strategic responses to house price drops
  - Protect functioning of financial system when crisis occurs
  - How to build provisions against losses across financial institutions once a crisis occurs

- After the crisis the risk of housing debt has shifted to the government (FHA, VA and the GSEs)
  - Next housing downturn will be born by US tax payers

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Break

Program will resume at 11:00 a.m.

Please help yourself to refreshments at the three Nourish stations throughout the venue.

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Is Equity Market Exchange Structure Anti-Competitive?

Chester Spatt, Golub Distinguished Visiting Professor of Finance, MIT Sloan School of Management; Distinguished Senior Fellow, MIT Golub Center for Finance and Policy
Pamela R. and Kenneth B. Dunn Professor of Finance, Tepper School of Business, Carnegie Mellon University

Post “NMS” Stock Trading & Exchange

- Access fee pilot & market data
- Affiliate families vs. competition
- Cross-subsidization
- Analogy: Pricing tiers: The design of airline frequent flyer programs and competition
- Rebate pricing tiers: Customized, intricate, price discrimination & agency conflict
- Interaction: Pricing tiers, data & co-location
- Profit-max pricing tactics by exchanges
- Link to “Best Execution”

“Maker-taker” vs. “Taker-maker”

- “Maker-taker”
  - Subsidize “maker” (limit order)—rebate
  - Charge fees to “taker” (market order)
  - Encourage liquidity provision: Exchange competition
- “Taker-maker” (“inverted model”)
  - Subsidize “taker” (market order)—rebate
  - Charge fees to “maker” (limit order)
  - Enhance attractiveness for market orders
  - Similarities to “payment for order flow” model
- Neutrality vs. Agency

Agency Problem

- Distortion in the routing decision due to distinct buckets for routing fees & rebates vs. execution—sets up “agency” conflicts
- Evidence in the form of routing to platforms that offer rebates, poor/slow execution (both empirically, theoretically)
- Battalio, Corwin and Jennings (*JF*, 2016) documents agency problems & identifies some problematic brokers
- Enhanced disclosures on routing practices or execution costs would be very useful
    - — Ban on fees/rebates or side pocket

Access Pilot Proposal

- SEC unanimously adopted (Dec. 2018) a pilot to study tightening the fee caps and whether it should ban rebates
- Control and three treatment groups
  - Reduce fee cap to 15 mils from 30 mils
  - Reduce fee cap to 5 mils from 30 mils
  - Eliminate rebates and let fees adjust
- Exchanges filed suit vs. SEC
  - Agency vs. neutrality revisited
  - Partial stay by SEC, pending resolution

Recent SEC Action on Market Data

- SEC (10/16/2018) declared that it would not approve proposed exchange price increases, unless satisfying Exchange Act
- Fair and reasonable; not unduly discriminatory; promote competition
- Public roundtable (10/25-26/2018) highlighted calls for the exchanges to be more transparent to facilitate analysis of compliance with Exchange Act**
- Exchanges vs. buy-side & brokers

Exchanges and Affiliates

- Three main exchange families (95% share) and a total of 13 exchanges
  - NYSE
  - Nasdaq
  - BATS/CBOE (BATS and Direct Edge merger)
  - IEX (no rebates)—new entrant, no price tiering and data charges
- Joint staffing, potential *pricing* coordination within a parent company/family

Nature of Competition

- Tension between competition for individual orders (better pricing for customers) vs. competition among platforms (innovation)
    - Issue in selling assets (e.g., house brokers)
- Central limit order book (“CLOB”) and the importance of liquidity externality vs. fragmentation
- Affiliate families limit the competition among platforms in pricing exchange activities without concentrating liquidity & enhancing the competition facing orders

Rebates and Fees

- Fees are capped at 30 mils/shares (Reg NMS)
- Baseline rebates at about 20 mils/share
- Many alternatives to get somewhat larger rebates, sometimes larger than 30 mils
- Given that costly to operate a trading platform, fees should exceed rebates, at least without cross-subsidization
    - Otherwise, access fees are a loss leader

Cross Subsidization of Trading

- In a number of situations the highest rebates being offered can exceed the maximum fee (30 mils) under Reg NMS
- Nasdaq: 30.5
- Direct Edge: 32
- BATS: 32
- ARCA: 31 (NYSE: 27.5 mils)
- NYSE American with Electronic DMM: 45 mils to add displayed liquidity (and charge only two mils to take liquidity!)

Frequent Flyer Programs

- Major airlines (American, United, Delta) use four award levels and two main paths to get to each:
  - Each airline has 8 pricing tiers & more options
  - Limited options to buy miles or status—opaque—customization—surplus extraction
- All paths involve qualifying dollar spending & either qualifying miles or segments
- American and United use identical thresholds; Delta mostly uses similar ones

More on Frequent Flyer Status

- Many paths facilitate price discrimination & surplus extraction (Qualifying dollars, miles or segments can bind)
- Average reward increases with flights
- Entry barrier vs. entrants whose rewards & benefits essentially proportional:
  - JetBlue, Southwest
- Status based on cumulative performance
  - Marginal value uncertain early in the period
  - Marginal value high (or low) late in the period

Large Numbers of Pricing Tiers

- Per Royal Bank of Canada (RBC) Capital Market, 1,023 pricing tiers across platforms (839 two years ago)
- The pricing tiers determined by at least 3,762 pricing variables
- Of these, 381 consist of rebates

Pricing Tiers and Complexity

- Odd (“weird”) features to some pricing tiers together with the number of them suggests that many selected by a single participant or designed for one—extraction and price discrimination; customization
- Many tiers with complex conditions—some very odd—as if customized for some clients (and to exclude others): RBC, 2018
- Relatively continuous rebates—differ only by about .5 mils, but *increasing* w/activity

Table 1 (Nasdaq)
Rebate to Add Displayed Liquidity

Conditions: All US Equities (Executed at or above $1.00 per share)	**Rebate for Per Share Executed**
Greater than **1.25%** add	$0.00305
Greater than **0.60%** added	$0.0029
Greater than **0.30%** added	$0.0027
Greater than **0.10%** added	$0.0025
Minimum of 250,000 shares added per day in Tape A or Tape B securities (combined)	$0.0020
Minimum of 10,000 shares executed via QDRK	$0.0020
All other firms	$0.0020 for Tape A & B Securities $0.0015 for Tape C Securities

Table 2 (Nasdaq)
Rebate to Add Displayed Liquidity

Conditions: All US Equities **(Executed at or above $1.00 per share)**	**Rebate for Per Share Executed**
1. Add greater than **0.60%** TCV; and 2. Add NOM Market Maker liquidity in Penny Pilot Options and/or Non- Penny Pilot Options of **0.10%** or more of total industry ADV in the customer clearing range for Equity and ETF option contracts per day in a month on NOM; and 3. Add Customer, Professional, Firm, Non-NOM Market Maker and/or Broker-Dealer liquidity in Penny Pilot Options and/or Non- Penny Pilot Options of **1.50%** or more of total industry ADV in the customer clearing range for Equity and ETF option contracts per day in a month on NOM	$0.00305
1. Add greater than **0.12%** TCV; and 2. Add Customer, Professional, Firm, Non-NOM Market Maker and/or Broker-Dealer liquidity in Penny Pilot Options and/or Non-Penny Pilot Options of **1.15%** or more of total industry ADV in the customer clearing range for Equity and ETF option contracts per day in a month on NOM	$0.0030
1. Add greater than **0.10%** TCV; and 2. Add Customer, Professional, Firm, Non-NOM Market Maker and/or Broker-Dealer liquidity in Non-Penny Pilot Options of **0.40%** or more of total industry ADV in the customer clearing range for Equity and ETF option contracts per day in a month on NOM	$0.0027

Table 4 (Nasdaq)
Rebate to Add Displayed Liquidity

Conditions: All US Equities **(Executed at or above $1.00 per share)**	**Rebate for Per Share Executed**
Greater than **0.60%** added	$0.0029
Greater than **0.40%** added of which 0.10% are Tape B securities	$0.0029
Greater than **0.15%** added and total contracts per day (added and removed) of 0.9% or more of total industry ADV in the customer clearing range for Equity and ETF option contracts per day in a month on NOM	$0.0029
Add greater than 0.50% TCV and Remove greater than 0.70% TCV	$0.0029
Add Customer, Professional, Firm, Non-NOM Market Maker and/or Broker-Dealer liquidity in Penny Pilot Options and/or Non- Penny Pilot Options of 1.15% or more of total industry ADV in the customer clearing range for Equity and ETF option contracts per day in a month on NOM	$0.0029

Monthly Tiers

- Tier price applies to the current month, but only known at the end of the month
- This prevents the broker from immediately rebating back the rebate to his client or even disclosing it contemporaneously, which would have been natural solutions.
- Customers recognize the inability to rebate or disclose contemporaneously

Monthly Tiers, Agency Conflicts

- Lack of knowledge of incentive by buy-side client prevents neutralizing
- Exchange interest served by agency conflict as it maximizes the broker's incentive—otherwise no ability to price discriminate or serve as entry barrier
- Constant tiers would mitigate some of the agency conflict as rebate would be known
- Exchange's client is the broker-dealer; exchange doesn't know investor identity

Partial Remedies

- Public disclosure of pricing tiers by exchanges under SEC's "fair access requirements"
- However, no public disclosure of which pricing tier a particular broker received
- Even no disclosure of numbers of brokers receiving a particular tier
- Enhance disclosure environment
- Favor banning non-constant rebates, if rebates retained

Why “Cross Subsidize”?

- Over time relatively more of the revenue of the NYSE and Nasdaq comes from selling data and relatively less from trading
- A reasonable assumption is that the value of data is proportional to *overall* trading activity, so subsidizing trading can be profitable

More on Cross Subsidization

- Ordinarily, cross subsidization is fine when there are two-sided markets (platform theory). However:
- Agency theory—potentially important distortions in trading and order routing
- Exchange Act pricing
  - Fair and reasonable; not unduly discriminatory; promote competition
  - IEX recently did its own cost study to argue costs are about 5% of data/connectivity fees

Data as a Product

- Potential costs (technology) now quite low
- Whose data (intellectual property?) is it?
    - Zuckerberg say data not owned by Facebook!
- Basic quotes and trade data are utility, SIP
- Exchanges offer a range of prop data (e.g., order books) & co-location services
- Of course, some potential purchasers of *proprietary* data would find the value much greater than others (e.g., high vol.; HFT)
- Data, co-location fees *fixed*, so does not discourage activity—not traditional price discrimination

Rebates and Trading Incentives

- Rebate tiering and marginal incentives increases activity on an exchange and value of its proprietary data
- Higher (marginal) rebates imply that the value of being at the front of the queue is greater
  - Hence greater incentive to achieve this and hence willingness to purchase fast technology and co-location to become as fast as possible
  - Akin to the dynamic between trading and data
  - Strong interaction effects

Profit Max by Exchanges

- Attract activity by fixed fees for proprietary and co-location (costs, but no variable charges); reinforced by volume discounts for orders adding liquidity (tiered rebates)
- Facilitates price discrimination to individual brokers due to diminishing marginal value
- Price discrimination reinforced across volume states by using relative volumes
- By attracting more orders, exchanges charge more for prop data & co-location
- Large liquidity providers: Neg all-in pricing

More on Best Execution

- If proprietary data is required for Best Execution, then the Exchanges would charge relatively higher prices for data as they are a monopoly supplier. Monopoly data would arise due to the business need for the data (even w/o formal “Best Ex”).
- While investors can execute anywhere--so little monopoly power in stock prices, each exchange has monopoly control over data!
    - So more important to regulate data pricing than stock prices; Opp. of prior SEC (& NMS)

Best Execution

- U.S. Treasury “Capital Markets” report suggests not “requiring” data for “Best Execution,” except for the basic data through the “SIP” for “Best Execution”
- Purchase of proprietary data viewed as a regulatory cost & source of market power
- SEC not explicit about what data needed for “Best Ex”—perhaps because of faster markets, evolving algos

Conclusions

- Price discrimination and marginal reward
- Customization and surplus extraction
- Relative volume—entry barrier for exchange and brokerage customers
- Agency maximizes routing incentive
- Tiering prevents neutralizing agency
- Tiering enhances value of data, colocation
- Declining unit costs of liquidity providers
- Policy: Constant rebates, strong disclosure

Q&A

How to submit your questions

WEB

Scan the QR Code or visit POLLEV.COM/MITSLOAN

Enter your name and class year (Example: Sally, MBA 99)

Enter your question during any Q&A Session

TEXT

Text MITSLOAN to 22333

Text in your questions during any Q&A Session

Lunch

Program will resume at 1:15 p.m., seating is available in the Gallery, Living Room, and Hub One.

MIT MANAGEMENT
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MIT SLOAN **IDEA EXCHANGE**

FINANCE BEYOND CRISIS

Impact, Disruption, and Innovation

Thursday, April 25, 2019 / Convene, 117 West 46th Street / New York, NY

#MITSloanFinance

MFin Ten Years and Counting

Moderator: **Heidi V. Pickett**, Assistant Dean, Master of Finance Program, MIT Sloan School of Management

Kapil Dilwali, SB ’09, MFin ’10, Vice President, Investment Banking - Corporate Finance Advisory, J.P. Morgan

What if…

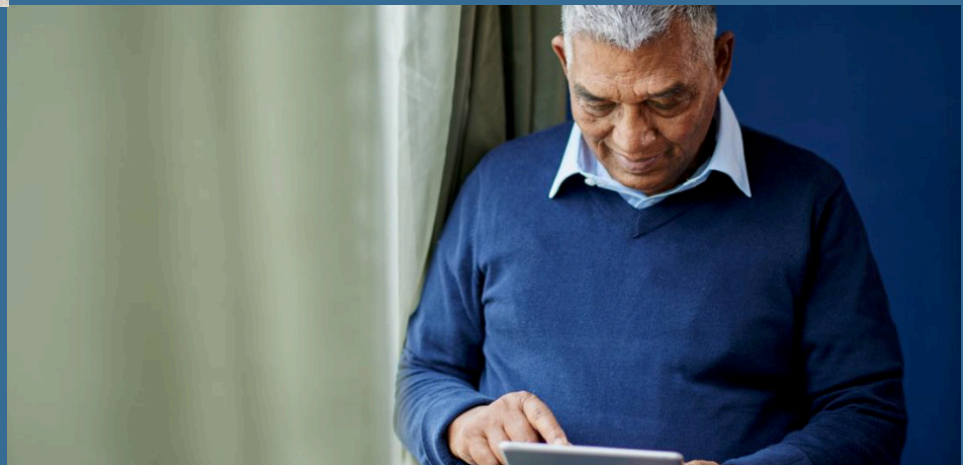
Government, industry and academia partnered to create a resilient **global financial infrastructure?**

Financial engineering could cure cancer, solve the energy crisis and stop global warming?

What if…

FinTech brought access to the 2 billion people without a bank account driving better outcomes in education, healthcare, and more?

We could (re)design **finance tools** to address the increased longevity in populations and the decreased prevalence of pension plans?

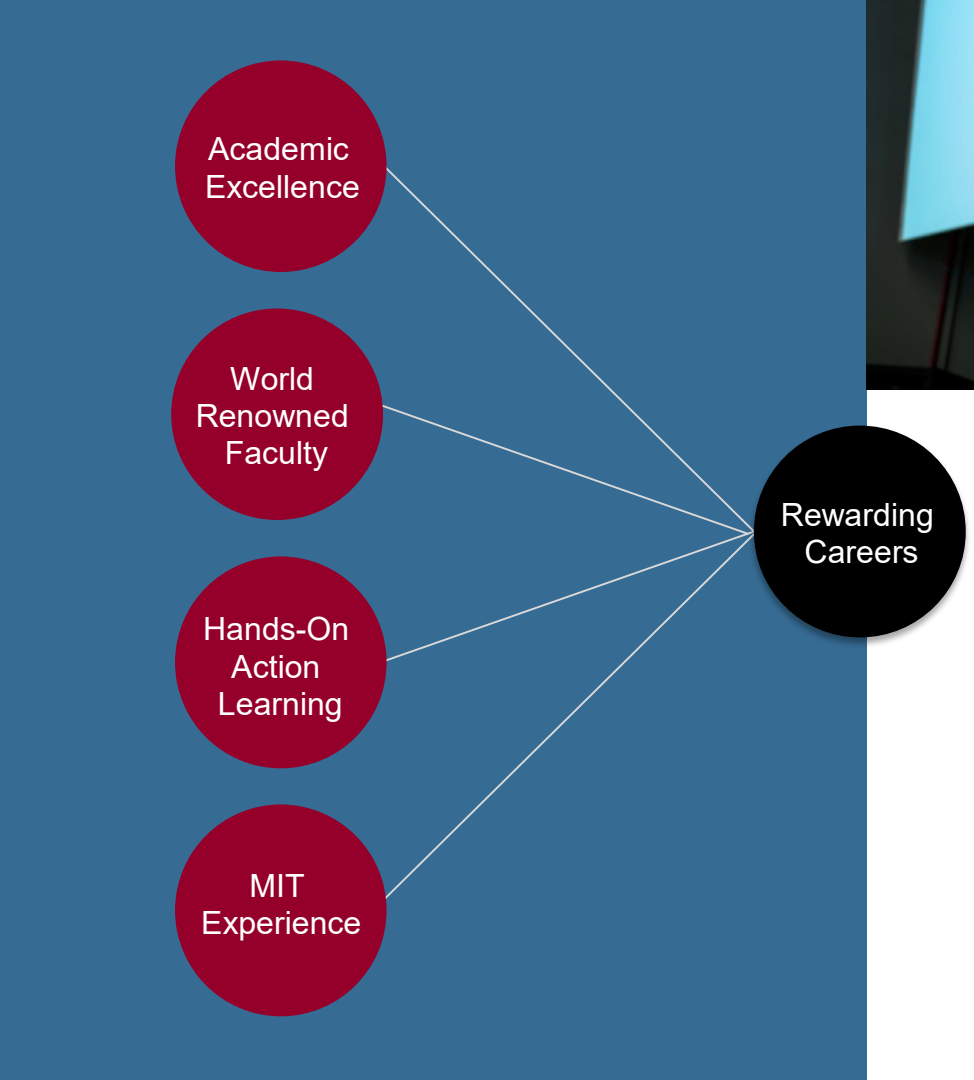


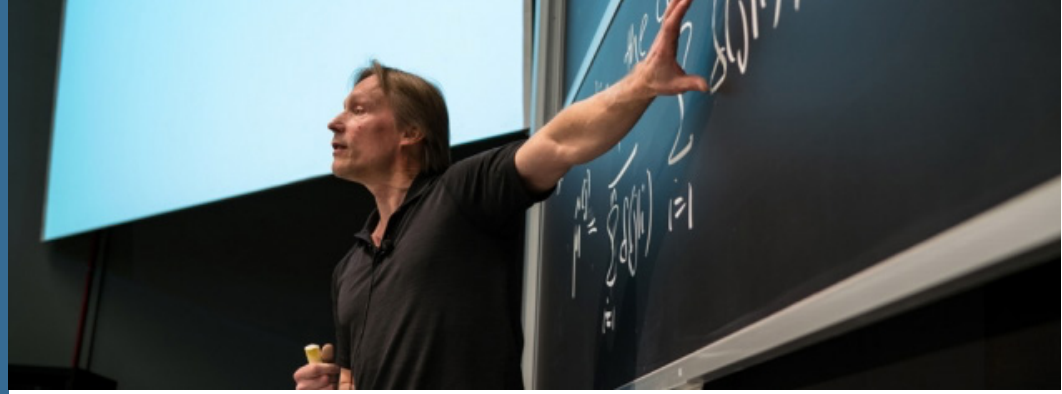
MFin

Mastering Finance
Ten Years and Counting

Significant Milestones

2008	MFin is launched!
2009	Welcomed 1st class
2010	Prof. Merton returns to MIT
2011	Added Ethics to curriculum
2012	New MFin Action Learning: Finance Research Practicum℠
2013	Incorporated math courses
2014	1st annual Asia Study Tour
2015	Introduced 18M format
2016	STEM Classified
2017	Added financial engineering concentration
2018	Welcome 10th class
2019	Graduate 10th class
2020	MFin 10th year reunion





MFin Features

STEM Classified

12 & 18 month Options

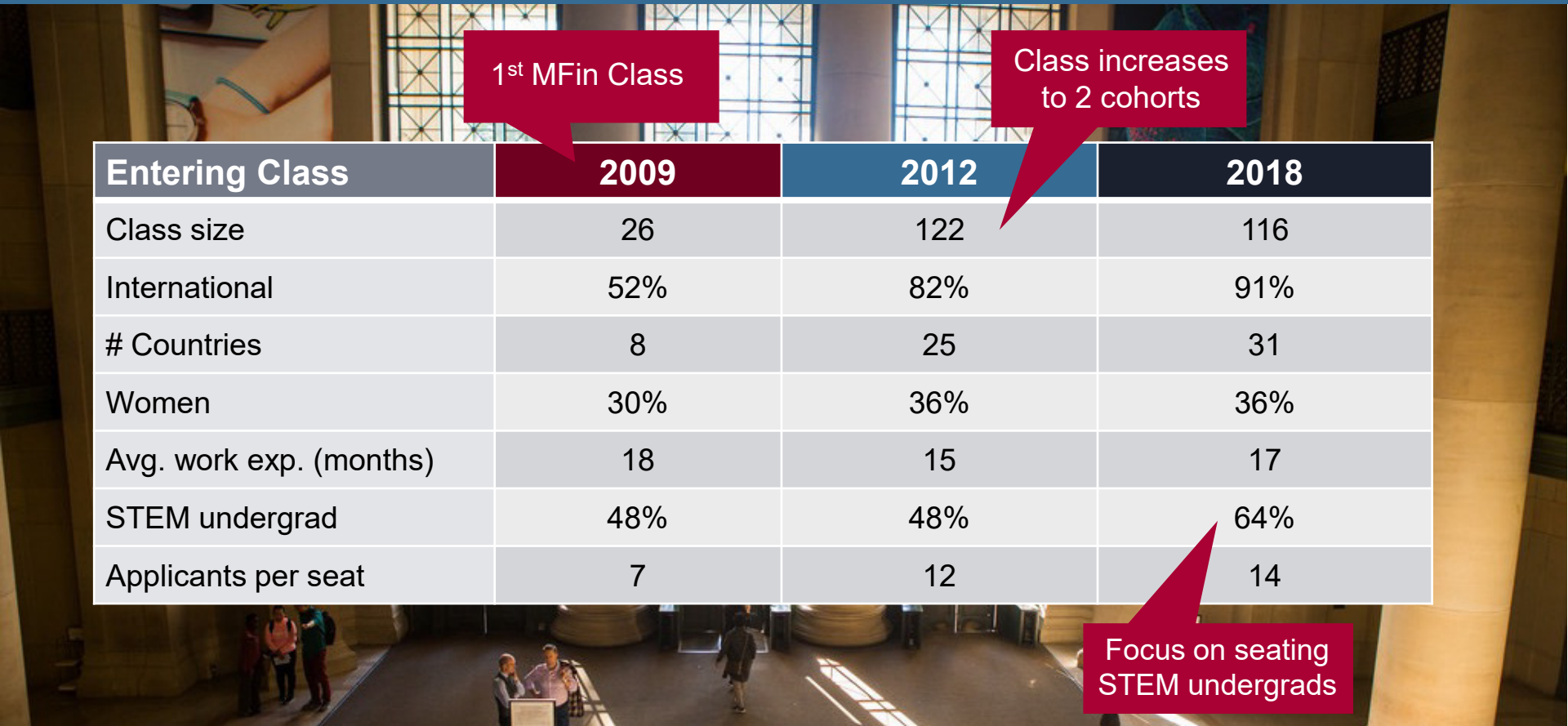
Concentrations in:

- Financial Engineering
- Capital Markets
- Corporate Finance

Certificates in:

- Business Analytics
- Sustainability
- Healthcare

MFin is a smart investment for high achievers



Entering Class	2009	2012	2018
Class size	26	122	116
International	52%	82%	91%
# Countries	8	25	31
Women	30%	36%	36%
Avg. work exp. (months)	18	15	17
STEM undergrad	48%	48%	64%
Applicants per seat	7	12	14

MFin Curriculum for pilot class

Academic year 2009/2010

Then…

Master of Finance Degree Requirements

Required Core (Summer Term):

- Finance Theory
- Corporate Financial Accounting

Required Advanced Core:

- Analytics of Finance Engineering

Required Action Learning: (choose 1)

- Proseminar in CM/IM (F)
- Proseminar in CF/IB (F)

Restricted Electives: (min 4)

- Entrepreneurial Finance
- Investments
- Options & Futures Markets
- Mergers & Acquisitions
- Advanced Corporate Finance
- Valuation
- Business Analysis Financial Statements

General Electives: (min 3)

- Graduate level courses or Thesis

Academic innovation and excellence

We help students customize to suit their strengths

…and Now!

Required Core (Summer Term):

- Finance Theory
- Corporate Financial Accounting
- **Financial Mathematics or**
- **Advanced Mathematical Methods for Financial Engineering**

Required Advanced Core:

- **Financial Markets (F)**
- **Corporate Finance (F)**
- Analytics of Finance (S) or
- **Advanced Analytics of Finance (S)**

Required Action Learning: (choose 1)

- Proseminar in CM/IM (F)
- Proseminar in CF/IB (F)
- **Finance Research Practicum (IAP & SH-1)**

Required Professional & Technical Development

- **Finance Ethics & Social Responsibility (FH-1)**
- **Programming Literacy Test**

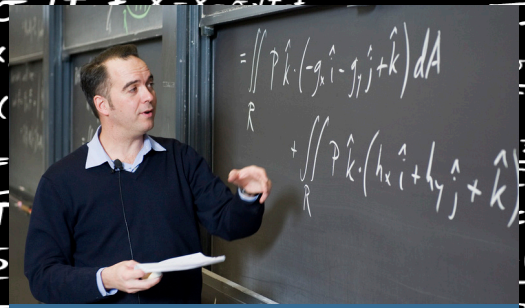
Restricted Electives: (min 4)

- Entrepreneurial Finance & VC
- Options & Futures Markets
- Fixed Income Securities & Derivatives
- Mergers, Acquisitions & PE
- **International Finance – Capital Markets**
- Advanced Corporate Finance
- **Financial Engineering**
- **Functional & Strategic Finance**
- **Asset Management, Lifecycle Investing, & Retirement Finance**
- **Consumer Finance: Markets, Product Design and FinTech**
- **Financial Market Dynamics**

General Electives: (min 0)

- Graduate level courses or Thesis

Expanding the finance ecosystem since 2008



50%

increase in tenured track finance faculty

50%

expansion of finance courses

63%

new finance related clubs and competitions

MFin graduates represent over 70 countries

Global representation promotes diverse thinking

Afghanistan
Argentina
Armenia
Australia
Bangladesh
Belarus
Belgium
Belize
Bolivia
Brazil
Bulgaria
Cambodia
Cameroon
Canada
Chile
China
Colombia
Czech Republic
Denmark
Dominican Republic
Egypt
El Salvador
Finland
France
Georgia
Germany
Greece
Hong Kong
Hungary
Iceland
India
Indonesia
Iran
Ireland
Israel
Italy
Japan
Jordan
Kazakhstan
Korea
Kuwait
Lebanon
Luxembourg
Malaysia
Malta
Mexico
Monaco
Morocco
Netherlands
Nigeria
Norway
Pakistan
Paraguay
Peru
Poland
Romania
Russia
Saudi Arabia
Singapore
South Africa
Spain
Sweden
Switzerland
Taiwan
Thailand
Tunisia
Turkey
Ukraine
United Arab Emirates
United Kingdom
United States
Venezuela
Vietnam
Zambia

Rewarding Careers

MFin is an investment that will generate returns throughout your lifetime

Quantitative Finance **consultant**

derivatives trader **private wealth manager** private equity

credit strategy analyst **Investment Banking** **risk manager**

Consulting fixed income research analyst

M&A associate **Corporate Finance** **Impact Investing**

quant trader **quantitative investment analyst** portfolio manager

FinTech investment bank analyst

proprietary trader **Asset Management**

Rewarding Careers

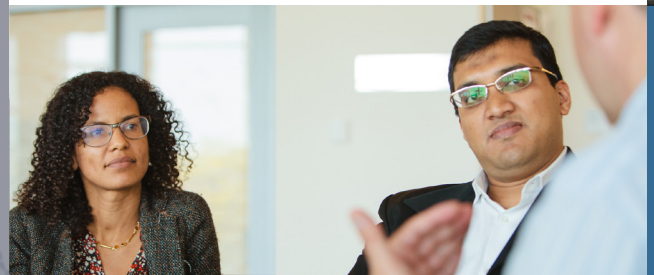
99%
RECEIVED OFFER
FULL-TIME EMPLOYMENT

100%
CONDUCTED
SUMMER INTERNSHIP

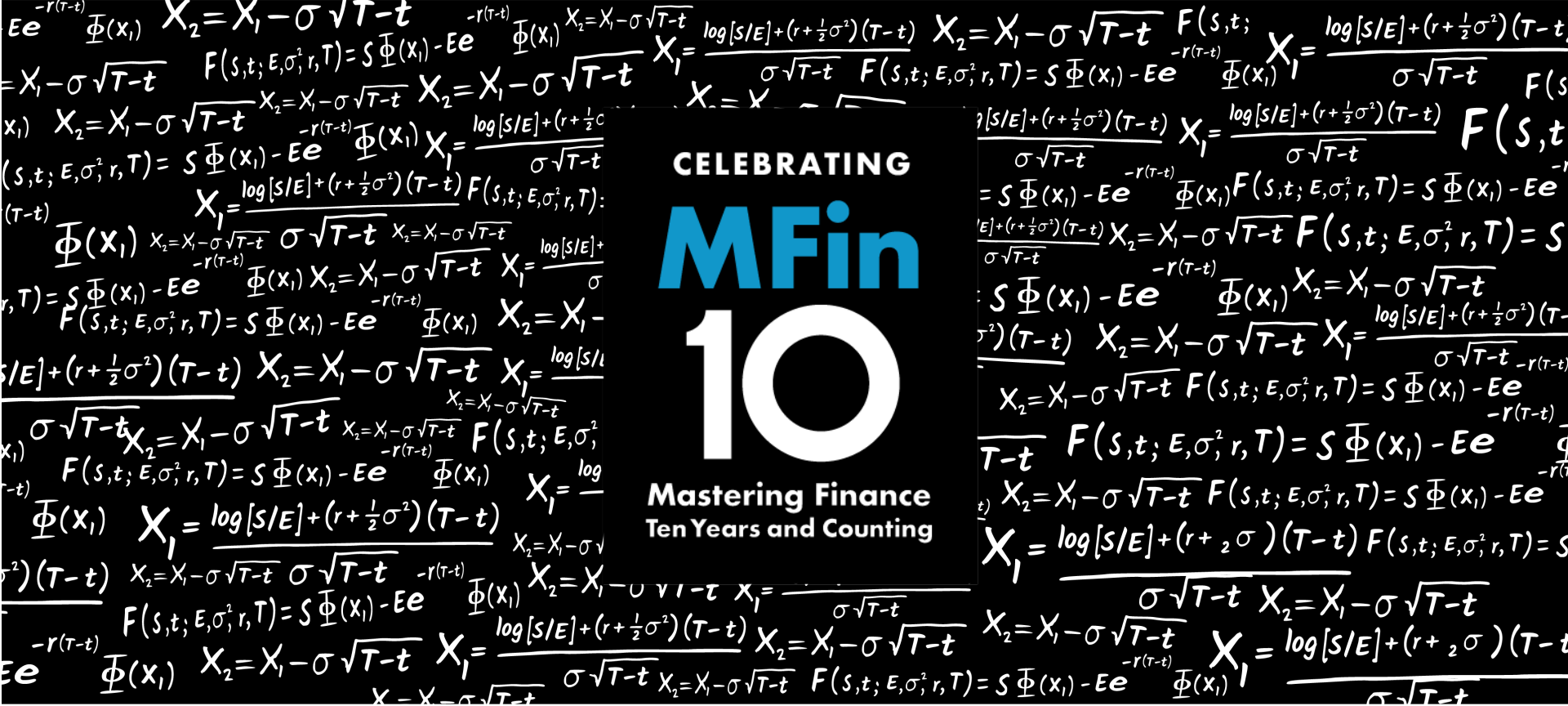
Morgan Stanley · AQR · CITADEL · J.P.Morgan · Goldman Sachs · McKinsey&Company · BARCLAYS · citi · Capula · BLACKROCK · HSBC · PANAGORA

ACCEPTED FULL-TIME EMPLOYMENT
- 65% NORTH AMERICA
- 24% ASIA
- 10% EUROPE

ACCEPTED SUMMER INTERNSHIP
- 74% NORTH AMERICA
- 24% ASIA
- 2% EUROPE



76%
CONVERTED INTERNSHIP TO
FULL-TIME OFFER



MIT MANAGEMENT
MASTER OF FINANCE

Developing the next Masters of Finance

Master of Finance – Impact, Disruption, and Innovation

Brian Liston and Edward Woodford
MFin ‘15, Forbes 30 under 30, 1st licensed cryptocurrency exchange

Seed CX

Chinedu Azodoh
MFin ’15, Cofounder, Max. Max is on a mission to make moto-taxis safe, affordable and accessible across West Africa.

BlackRock

Joshua Kazdin
MFin ’11 Led creation of SAE Impact Investing Platform: BlackRock Impact World Equity Fund & Impact US Equity Fund

MFin Ten Years and Counting

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MIT MANAGEMENT SLOAN SCHOOL

Alumni Panel Discussion

.....

Moderator: **Matthew Rothman**, Senior Lecturer, MIT Sloan School of Management
Managing Director, Goldman Sachs

Armen Avanessians, SB ’81, Chief Investment Officer, Quantitative Investment Strategies, Goldman Sachs Asset Management

Cheryl M. Duckworth, CFA, SM ’94, Partner and Senior Managing Director; Director, Global Consultant Relations, Wellington Management

Joseph Naggar, MBA ’96, Partner and Head of Structured Products, GoldenTree Asset Management

C.S. Venkatakrishnan, SB ’86, SM ’89, PhD ’91, Chief Risk Officer, Barclays

Q&A

How to submit your questions

WEB

Scan the QR Code or visit POLLEV.COM/MITSLOAN

Enter your name and class year (Example: Sally, MBA 99)

Enter your question during any Q&A Session

TEXT

Text MITSLOAN to 22333

Text in your questions during any Q&A Session

Break

.....

Program will resume at 1:45 p.m.

Please help yourself to refreshments at the three Nourish stations throughout the venue.

MIT MANAGEMENT
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MIT SLOAN **IDEA EXCHANGE**

FINANCE BEYOND CRISIS

Impact, Disruption, and Innovation

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#MITSloanFinance

Technological Innovation and Creative Destruction of Human Capital

Lawrence D.W. Schmidt, Victor J. Menezes (1972) Career Development Professor of Finance; Assistant Professor, Finance, MIT Sloan School of Management

Technological Innovation and Creative Destruction of Human Capital

Lawrence D.W. Schmidt, Victor J. Menezes (1972) Career Development Professor of Finance; Assistant Professor, Finance, MIT Sloan School of Management

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Fintech Beyond Crisis

Gary Gensler, Senior Lecturer, MIT Sloan School of Management; Senior Advisor to the Director, MIT Media Lab; Co-Director of Fintech, CSAIL

MIT Sloan Idea Exchange
Finance Beyond Crisis

FinTech

Gary Gensler

April 25, 2019

mit media lab

FinTech @CSAIL

MIT MANAGEMENT SLOAN SCHOOL

Overview

- Finance and Financial Technology
- AI, Machine Learning and Deep Learning
- Blockchain Technology
- Payments
- FinTech Actors
- Public Policy Frameworks
- Conclusions

Financial Sector

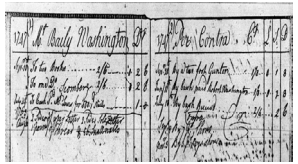
Moves, Allocates & Prices Money and Risk

Long has had Symbiotic Relationship with Technology

FinTech – the Early Years

Ledgers

Proto Cuneiform



George Washington's Ledger

IBM 360

Money

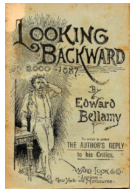
Roman Gold Aureus

Nigerian Cowrie Shells

Yap Rai Stones

U.S. Private Bank Note

Credit Cards



Term 'Credit Card'

First Bank Card

First Plastic Card

FinTech - Finance's Fertile Ground

- Dematerialization of Money, Securities and Credit
- Vast and Expanding Amounts of Customer Data
- Rapid Expansion of Computational & Analytical Power
- Reliance on Multiple Systems of Ledgers
- Wide Public Acceptance of New Tech
- Legacy Customer Interface and Processing Systems
- Infrastructure Systems' Costs and Counterparty Risks
- Economic Rents and Centralized Concentrated Risks

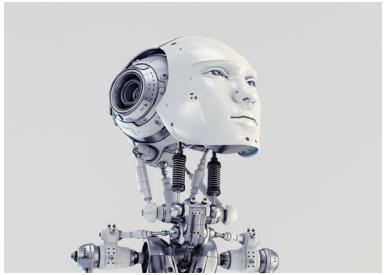
FinTech – Disruptive Potential

- Updated Customer User Interface and Robo Advice
- Greater Financial Inclusion
- Peer to Peer Services
- ‘Internet of Value’: Interoperable Movement of Value & Micro Payments

- AI for Managing Credit, Trading, Insurance & Underwriting Risks
- Greater Liquidity for Less Liquid Asset Classes
- Shorter Settlement Cycles and Lower Counterparty Risks
- Streamlined Accounting, Compliance & Processing Systems

- Revenue Models shifting to Data for Free Services
- Efficiencies & Tighter Margins => Financial Sector at a Lower GDP %

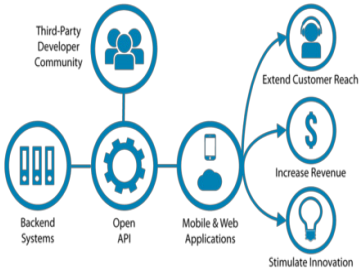
FinTech – Technologies of our Times



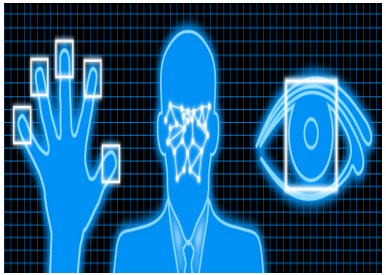
AI & ML

Blockchain

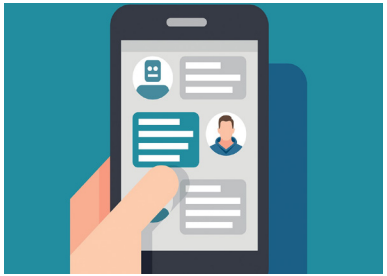
Cloud



Open API



Biometrics

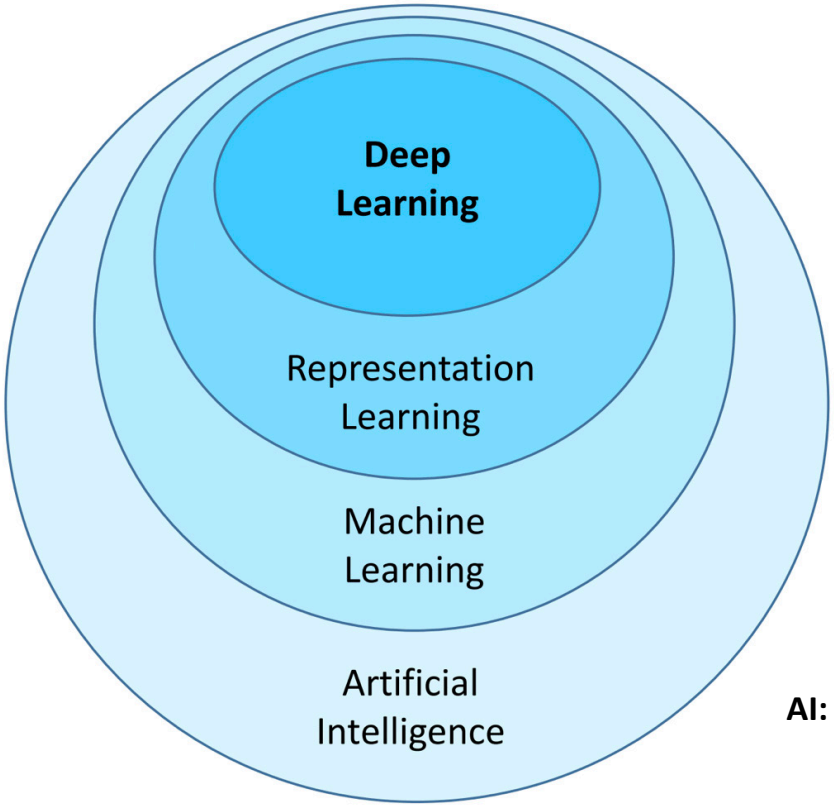


Chatbots

Mobile

RPA

AI and Machine Learning



DL: Machine Learning using Deep Neural Networks

RL: Machines able to Infer Features & Learn from Data

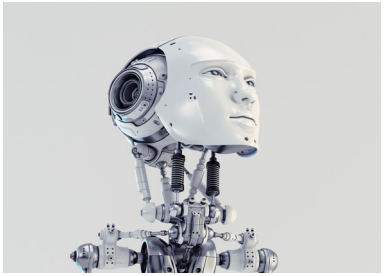
ML: Machines able to Adjust (‘Learn’) from Data

AI: Machines Capable of Imitating Intelligent Human Behavior

Deep Learning in **One** Slide

- **What is it:**
  Extract useful patterns from data.
- **How:**
  Neural network + optimization
- **How (Practical):**
  Python + TensorFlow & friends
- **Hard Part:**
  Good Questions + Good Data
- **Why now:**
  Data, hardware, community, tools, investment
- **Where do we stand?**
  Most big questions of intelligence have not been answered nor properly formulated

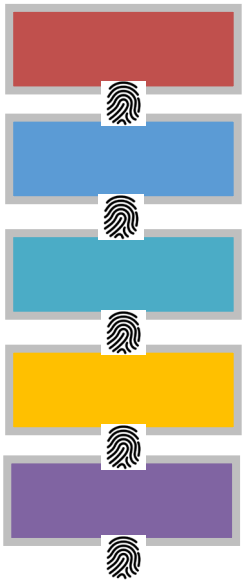
Ethics and Governance of AI



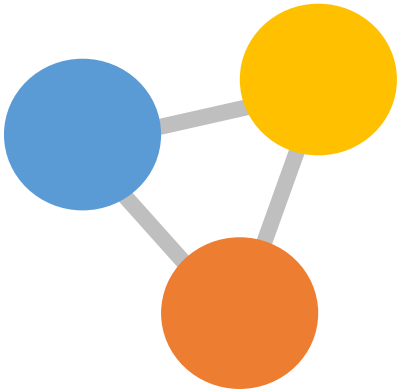
- Biases, Inclusion and Values
- Transparency, Auditability and Explaining Algorithms
- Privacy and Data Ownership
- Jobs
- ‘Singularity’

Blockchain Technology

timestamped
append-only log



multiple party
consensus protocol



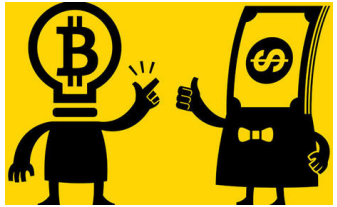
decentralized
auditable
database

Secured via cryptography
- Hash functions for **integrity**
- Digital signatures for **consent**

Addresses '**cost of trust**'
(Byzantine Generals problem)
May use Native Token as incentive
- Permissioned

Tamper resistant record of
- Transfers of **value**
- Running of **computer code**

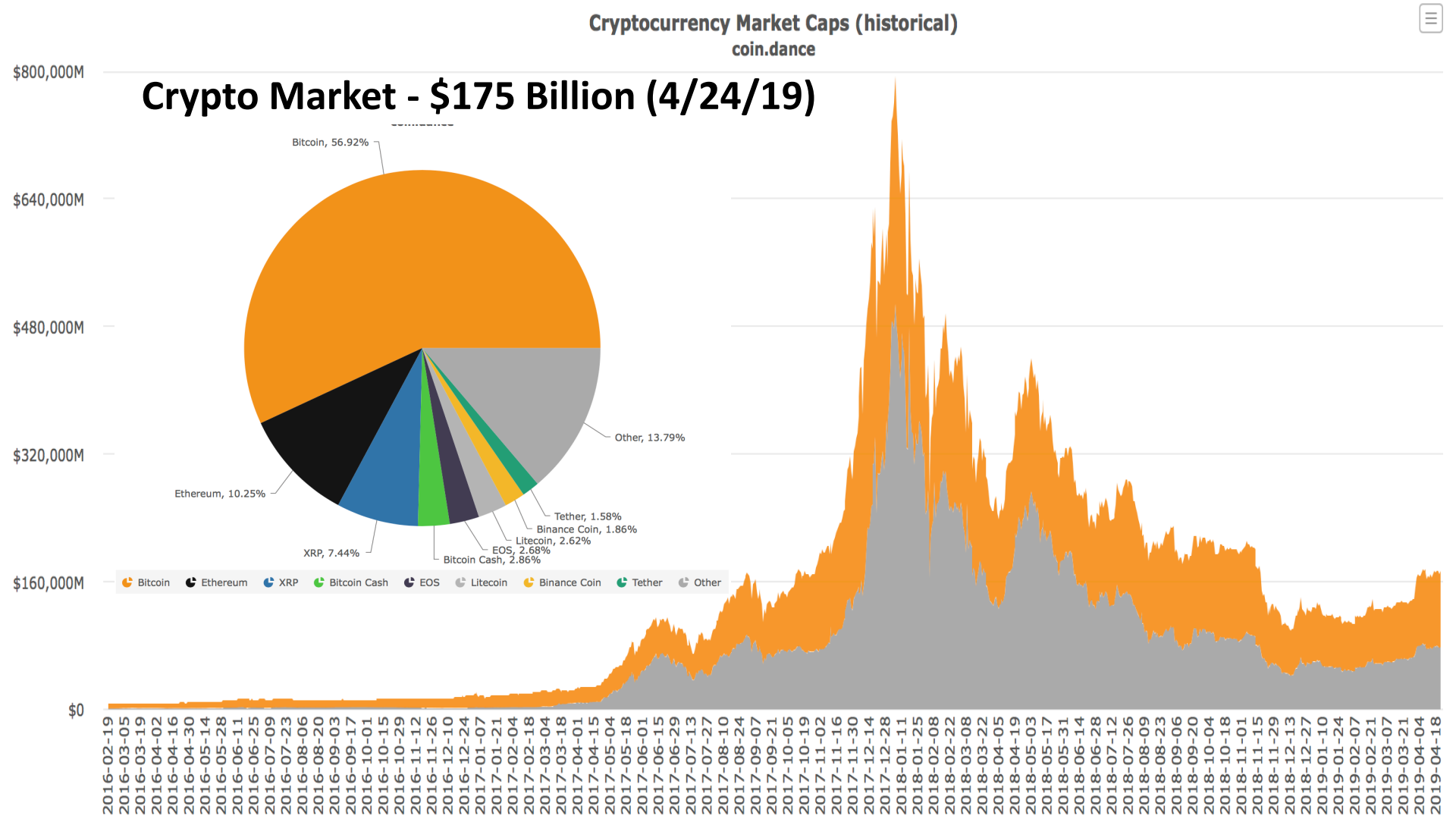
Blockchain Technology



- Provides Peer to Peer Alternative to Computing & Moving Value
- Can Lower Verification and Networking Costs
- Use Cases Must Address purpose vs. Traditional Data Bases?

- Incumbents Largely Looking at Private Permissioned Systems
- Crypto Finance Markets are Rive with Scams, Fraud and Manipulation
- Adoption rests on tackling Technical, Commercial and Policy Challenges

- Potential exists, though, to be a Catalyst for Change


Cryptocurrency Market Caps (historical)
coin.dance
Crypto Market - $175 Billion (4/24/19)
$800,000M
$640,000M
$480,000M
$320,000M
$160,000M
$0
Bitcoin, 56.92%
Ethereum, 10.25%
XRP, 7.44%
Bitcoin Cash, 2.86%
EOS, 2.68%
Litecoin, 2.62%
Binance Coin, 1.86%
Tether, 1.58%
Other, 13.79%
Bitcoin
Ethereum
XRP
Bitcoin Cash
EOS
Litecoin
Binance Coin
Tether
Other
2016-02-19
2016-03-05
2016-03-19
2016-04-02
2016-04-16
2016-04-30
2016-05-14
2016-05-28
2016-06-11
2016-06-25
2016-07-09
2016-07-23
2016-08-06
2016-08-20
2016-09-03
2016-09-17
2016-10-01
2016-10-15
2016-10-29
2016-11-12
2016-11-26
2016-12-10
2016-12-24
2017-01-07
2017-01-21
2017-02-04
2017-02-18
2017-03-04
2017-03-18
2017-04-01
2017-04-15
2017-05-04
2017-05-18
2017-06-01
2017-06-15
2017-06-29
2017-07-13
2017-07-27
2017-08-10
2017-08-24
2017-09-07
2017-09-21
2017-10-05
2017-10-19
2017-11-02
2017-11-16
2017-11-30
2017-12-14
2017-12-28
2018-01-11
2018-01-25
2018-02-08
2018-02-22
2018-03-08
2018-03-22
2018-04-05
2018-04-19
2018-05-03
2018-05-17
2018-05-31
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2018-10-04
2018-10-18
2018-11-01
2018-11-15
2018-11-29
2018-12-13
2018-12-27
2019-01-10
2019-01-24
2019-02-07
2019-02-21
2019-03-07
2019-03-21
2019-04-04
2019-04-18

Crypto Token Sectors

- **Payment Tokens ≈ $125 - 130B**
  - Bitcoin ($97B), …
- **Platform Tokens ≈ $30 - 35B**
  - Ethereum ($17B), …
- **DApp Tokens ≈ $12 - 17B**
  - Binance Coin ($3.1B), …
- **Stable Value Tokens ≈ $4B**
  - Tether ($2.7B), …
- **Tokenized Securities and Assets**

Financial Sector Potential Use Cases

- **Venture Capital -** Crowdfunding through Initial Coin Offerings
- **Payment Systems -** Cross border, Large interbank, & Retail
- **Trade Finance & Loan Financing -** Digitizing paper-based processes
- **Clearing, Settlement and Processing –** Securities & Derivatives
- **Tokenized Fiat (Stable Value Coins), Securities & Assets**
- **Central Bank Initiatives**

FinTech - Digital & Mobile Payments

1998

1999

2003

2007

Mobile App

2011

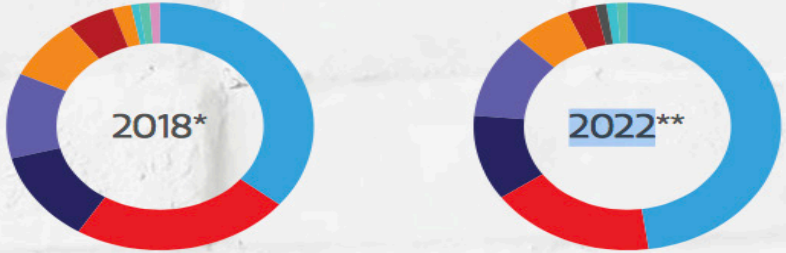
2011

2013

2014

Global Payments Methods

Global eCom payment methods



	2018*	2022**
eWallet	36%	47%
Credit Card	23%	17%
Debit Card	12%	11%
Bank Transfer	11%	11%
Charge & Deferred Debit Card	8%	6%
Cash on Delivery	5%	3%
Pre-Paid Card	2%	1%
PostPay	1%	1%
eInvoices	1%	1%
PrePay	1%	0%

Global POS payment methods

	2018*	2022**
Cash	31%	17%
Debit Card	29%	30%
Credit Card	20%	22%
eWallet	16%	28%
Charge Card	2%	2%
Pre-Paid Card	1%	1%

Source: Worldpay 2018 Report

FinTech – The Actors

Big Finance

蚂蚁金服 ANT FINANCIAL
Bank of America
citi
Fidelity INVESTMENTS
HSBC
Nasdaq
CIBC
CHASE
Goldman Sachs
ICBC
STATE STREET

Startups

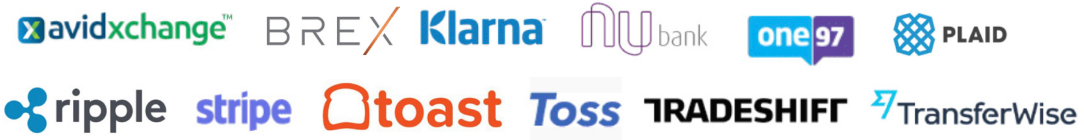
9F 玖富 9Fbank.com 移动金融大师兄
affirm
Atom bank
avaloq essential for banking
AVANT
avidxchange
bgl group
草根投资 CGTZ.COM
chime
CIRCLE
confluent
credit karma
goeuro
GUSTO
Kabbage
Klarna
monzo
N26
nu bank
OakNorth
one97
PLAID
policybazaar.com Compare. Buy. Save.
Revolut
robinhood
stripe
老虎證券 TIGER BROKERS
TRADESHIFT
TransferWise
团贷网
Toss
ZENEFITS

Big Tech

阿里巴巴 Alibaba.com
Baidu 百度
Google
facebook
amazon
Apple
Microsoft
Tencent 腾讯

FinTech – Startup 'Unicorns'

- Payments



- Credit and Lending

- Asset Management and Advisory

- Trading and Capital Markets

- Insurance and Other

- Comprehensive

Public Policy Framework

- Protecting the Public

- Financial Stability

- Guarding Against Illicit Activity

FinTech - Policy Alternatives

- New Activities Come within Existing Frameworks & Laws
- Clarification where Application of Rules are Ambiguous

- Legal and Regulatory Requirements Adjusted:
  - For New Activities
  - For Existing Activities
- Regulatory Perimeters Moved

- Early Stage Activity Requirements Limited (e.g. Sandboxes)

FinTech – Disruptive Potential

- Updated Customer User Interface and Robo Advice
- Greater Financial Inclusion
- Peer to Peer Services
- ‘Internet of Value’: Interoperable Movement of Value & Micro Payments

- AI for Managing Credit, Trading, Insurance & Underwriting Risks
- Greater Liquidity for Less Liquid Asset Classes
- Shorter Settlement Cycles and Lower Counterparty Risks
- Streamlined Accounting, Compliance & Processing Systems

- Revenue Models shifting to Data for Free Services
- Efficiencies & Tighter Margins => Financial Sector at a Lower GDP %

Conclusions

- Finance has long had a Symbiotic Relationship with Technology
- We already Live in a Digital Financial Age
- The Pace of Technology Innovation and Adoption has Accelerated

- Financial Innovations present both Rewards & Risks
- Startups, Big Financial and Big Tech will all Play a Role
- Public Confidence and Growth is built upon Living within Public Policy Norms

- Development will Swing with much Hype Masquerading as Fact
- FinTech, though, will disrupt current Revenue and Margin Models
- The Potential of FinTech to Provide Better Services and Bring Change is Real

Q&A

How to submit your questions

WEB

Scan the QR Code or visit POLLEV.COM/MITSLOAN

Enter your name and class year (Example: Sally, MBA 99)

Enter your question during any Q&A Session

TEXT

Text MITSLOAN to 22333

Text in your questions during any Q&A Session

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Fireside Chat

David Schmittlein, John C Head III Dean, MIT Sloan School of Management

John A. Thain, SB ’77, Life Member, MIT Corporation; Former Chairman & Chief Executive Officer, CIT Group, Inc

Q&A

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MIT MANAGEMENT SLOAN SCHOOL

Closing Remarks

Leonid Kogan, PhD ’99, Nippon Telegraph & Telephone Professor of Management
Faculty Head, Finance Group, MIT Sloan School of Management

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