Financial Engineering and Grand Challenges

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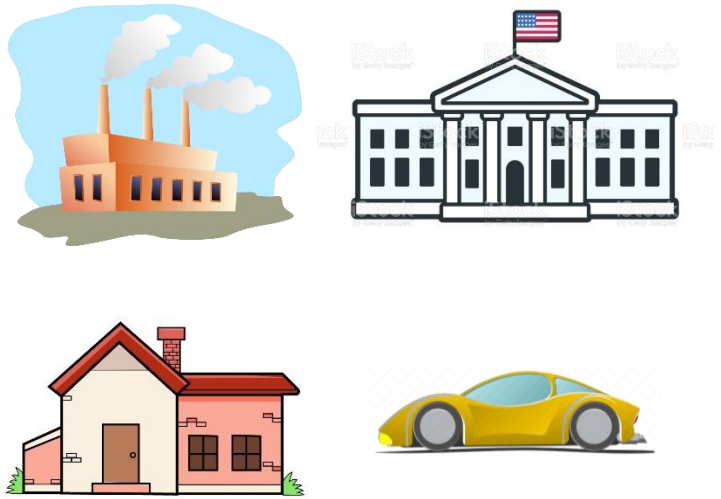
The financial sector in a nutshell



Investors
Have money to invest (savings)

Financial sector
Channels **savings** towards **investments**

Projects
Need money to be implemented (investments)

Financing Investments

Definition

- **To invest in projects, firms raise funds from investors by**
  - Borrowing from **debt** investors
  - Selling part of the firm to **equity** investors, who become shareholders/stockholders
- **Debt** (loans or bonds): Buyer (e.g. bank, bond investor) gives the firm **money today** in exchange for a **financial contract** containing a **promise to pay a cash flow** stream to the holder of the contract
- **Equity** (stocks): **Share of ownership** in a corporation. Firms obtain equity capital either internally by earning money and retaining it (i.e. keeping it in the firm) or externally by issuing new equity

Raising Debt

Two types of debt

- **Loans:** Private debt
  - **Main investors:** Banks
  - Illiquid
- **Bonds:** Publicly traded debt
  - Liquid.
  - **Main investors:** Pension funds, insurance companies, foundations, individuals via ETFs, hedge funds, ...
  - Bonds are used when the firm needs to raise a lot of money
  - Bonds are graded based on the risk of default

ICE BofA US corporate index effective yield	Rating (e.g. Moody's, Fitch, Standard and Poor's)	10.11.2021	16.05.2023	10.05.2024	23.10.2024
Investment grade	Aaa/AAA	1.97%	4.42%	5.05%	4.65%
	Aa/AA	1.91%	4.65%	5.19%	4.75%
	A/A	2%	5.13%	5.46%	4.98%
	Baa/BBB	2.46%	5.62%	5.78%	5.31%
High yield	Ba/BB	3.33%	6.89%	6.43%	5.92%
	B/B	4.72%	8.76%	7.54%	6.95
	Caa/CCC	7.57%	14.61%	13.83%	11.74%
	Ca/CC				
	C/C				

Source: FRED

Raising Equity

Several sources depending on the firm's maturity

- **Initial capital** directly provided by the entrepreneur and its family
  - *"familiy fools and friends"*
- Additional capital required for **growth** provided by outside investors
  - **Angel investors:** wealthy individuals who buy equity in small private firms
  - **Venture Capital (VC):** Limited Partnership specialized in buying equity in young innovative firms (start-ups)
  - **Private equity (PE)**: Limited Partnership specialized in buyung equity in existing privately held companies (rather than start-ups)
  - **Corporate investors**: corporates investing in private companies for financial and/or strategic reasons (e.g. Facebook & WhatsApp)
  - **Institutional investors:** pension funds, insurance companies, endowments, foundations, sovereign funds, hedge funds, mutual funds, banks, etc.
    - Institutional investors may also invest indirectly in private firms, by investing in VC and PE funds
- More mature companies can do an **Initial Public Offering** (IPO) and **raise equity** on the stock market
  - Large pool of financing: Retails investors, institutional investors, etc.

Bonds, Stocks, and Risk-Return profile

Equity vs debt

- Equity and debt represent **two different ways** to **raise money** to fund projects

	Debt (Loans or Bonds)	Equity (Stocks)
Ownership	Not an ownership interest	Represent an ownership stake in the firm
Position/Investor	Lender	Owner
Maturity	Known (e.g. 5 years)	Potentially unlimited
Voting rights	None	Yes
Payments	Coupon (interest) and Principal (loan amount)	Dividends Sale price of the stock
Number of payments	Known	Unknown
Priority in case of default	Have a legal claim to the payments	Residual claim
Risk	**Lower**	**Higher**
Expected return	**Lower**	**Higher**

  - Risks and returns for investors are very different

- Risk-return profile measured by: $Sharpe\ ratio = \frac{E[R] - R_f}{\sigma[R]}$

Financing Grand Challenges

Grand challenges

- **Examples**
  - Developing commercial fusion energy; contraception and family planning in China; transforming agriculture
- **They are inherently risky…**
  - Complex problems with no easy solution
  - Long development times, low probability of success, coordination issues
- **… and may not generate cash flows**
  - e.g. vaccination in developing countries, empowerment of minorities, mitigating effects of social network on mental health

Market failure: large benefits for society BUT risk ($\sigma[R]$) is too **large** and expected return ($E[R]$) too **low** to attract investors using **conventional tools** (bonds and equity)

Financial engineering can help

- **FE:** *"It is the use of mathematical techniques, statistics, economics and computer sciences to solve financial problems"* (source: Investopedia)
- **How?** By increasing the Sharpe ratio to make financing GC solutions attractive to investors

$$\uparrow Sharpe\ ratio = \frac{E[R] - R_f}{\sigma[R]} \uparrow\downarrow$$

Outline – 4 Examples

1. How can financial engineering **help local communities adapt to climate change**
2. How can financial engineering **accelerate vaccination** in developing countries
3. How can financial engineering **cure cancer**
4. How can financial engineering **enable the empowerment of minorities**

Bonds

A simple example

"A bond is a security sold by governments and corporations to raise money from investors today in exchange for the promised future payment." (Berk, De Marzo, 2011)

- **Several types of bonds**

	Pure discount bond	Coupon-paying bond
Maturity	5 years	5 years
Face value	$100	$100
rate	2%	2%, ann.
P_0	$P_0 = \frac{100}{(1+2\%)^5} = \$90.57$	$P_0 = \$100$

- The difference between the two types of bonds lies in the **timing** of cash flows
- Other types of bonds exist (e.g. convertible bonds, Social/**Environmental Impact Bonds** (S/EIB))

Social/Environmental Impact Bonds

What are they?

- Financial instrument issued to **finance public policies** (social/environmental)
- **Payoff depends on** the realisation of a desired social/environmental **outcome**
  - If the objectives are met, investors get a **larger** return
  - If the objectives are not met, investors get a **lower** return
- **Goal:** mobilizing private capital investors to supplement public investment dollars
  - Investors are only repaid if and when improved social/environmental outcomes are achieved
  - Principle: **hedging/risk sharing**
    - Reducing (or even eliminating) the financial risks associated to a future uncertain situation
    - Similar to insurance
- Examples of programs: recidivism, homelessness, early childhood education, **adapting to climate change**

Example – DC Water EIB to fund GI (1/2)

DC Water's project

- **Objective:** building Green Infrastructures to manage storm water runoff and reduce pollution from combined sewer overflow (CSOs)
  - CSOs drain sewershed…
  - … and the polluted waters Creek and Potomak rivers
- **Investors:** Goldman Sachs, Foundation
- **Municipal bond**
  - **Tender date:** 5 years
  - **Amount:** $25M
  - **Coupon Rate:** 3.43%, semi-annually
    - $C = \frac{3.43\%}{2} \times 25 = \$0.43M$

$$\uparrow \quad Sharpe\ ratio = \frac{E[R] - R_f}{\sigma[R]} \quad \uparrow\uparrow \ \uparrow$$

Financial engineering: EIB

- **Mechanism**: the financing is linked to performance outcomes

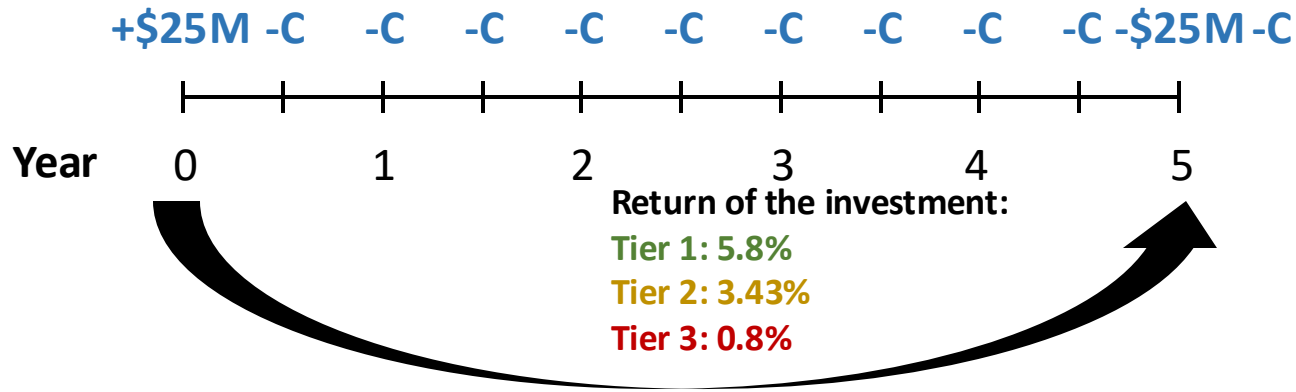
EIB Outcome Ranges

Tier	Runoff Reduction	Payments
1	Greater than 41.3%	DC Water pays Outcome Payment of $3,300,319.00 to Purchasers
2	18.6% to 41.3%	No Outcome Payment or Risk Share Payment
3	Less than 18.6%	Purchasers pay Risk Share Payment of $3,300,319.00 to DC Water

Source: DC Water (2020)

er with (1) **a financial**
erperformance and (2)
the **financial means** to mitigate it

Tier 1: -$3.3M
Tier 2: 0
Tier 3: +$3.3M



Example – DC Water EIB to fund GI (2/2)

Infrastructures funded by the project

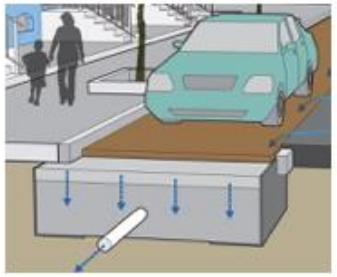
This parklet at Kansas Avenue & 2nd Street, NW was funded via the EIB.

Cobble lined swale

Curb extension bioretention

Parking lane permeable pavement

Planter Bioretention

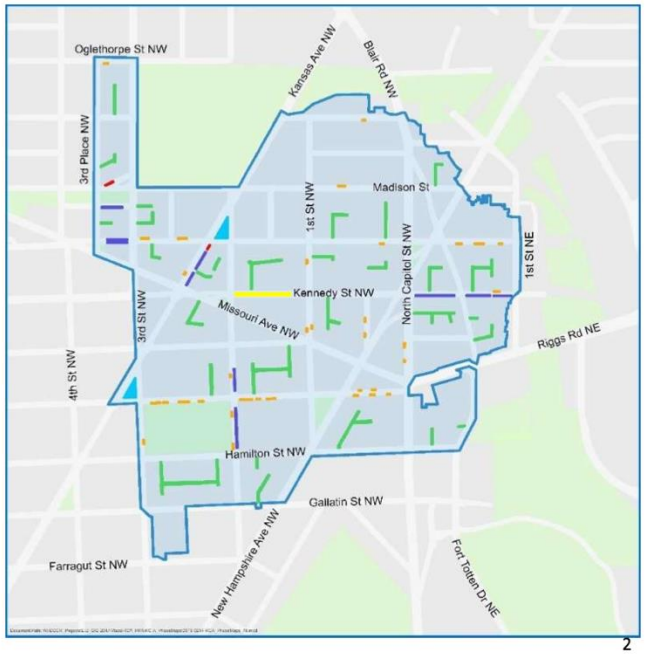


Parking lane permeable pavement

Source: DC Water (2021)

Number and Distribution of GI Facilities:

- Planter Bioretention – 36
- Curb Extension Bioretention - 2
- Parking Lane Permeable Pavement - 8
- Alley Permeable Pavement – 31
- GI Park – 2
- Kennedy Street



Source: DC Water (2021)

- **Pilot project:** Assess efficiency of GI & learning
- **Outcome:** -19.56% reduction in water runoff (Tier 2)

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The 2000 MDGs

Context (Keohane, and Madsbjerg 2016)

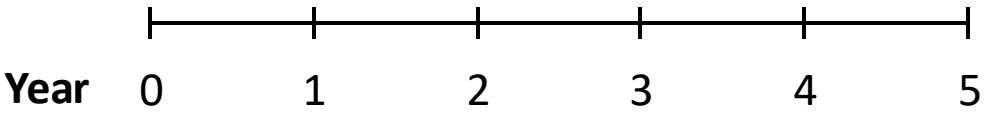
- **2000:** 191 countries pledge to finance actions related to 8 development goals for 2015
  - Note: The **Sustainable Development Goals** succeeded to the MDG in 2016
- **2002:** Lack of funding
  - Good intentions and bold aid pledges did not yield enough money to make good on the countries promises
  - The chancellor of the exchequer (G. Brown) sollicitated the finance industry (Goldman Sachs) to find innovative solutions to bridge the gap
    - **Solution:** «Frontloading»
    - **Intuition:** Transforming pledges for future aid spending into immediate funding for MDGs
    - **MDG:** Public health goal through immunization campaigns

Vaccine Bonds – In Theory

A new type of Social Bond: «Vaccine Bonds»

- A country pledges $125 M paid in $25 M tranches annually over 5 years to finance a vaccination campaign in a developing country

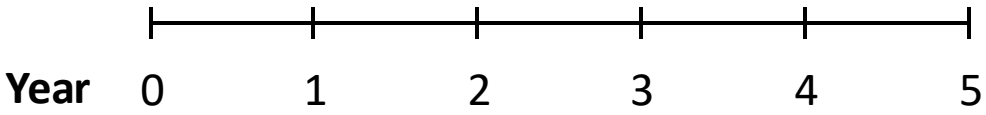
Scenario 1 – Traditional mechanism



Cash flows

Pledge +$25M +$25M +$25M +$25M +$25M

Scenario 2 – Use of "Vaccine Bond"



Cash flows

Pledge +$25M +$25M +$25M +$25M +$25M

High $Sharpe\ ratio = \frac{E[R] - R_f}{\sigma[R]}$ Low

Low -$5M -$5M -$5M -$105M

New, safe asset that provides diversification benefit to investors

Financing mechanism

- Pledge: Money is receive
- nments, are used to back the bonds
- pal (simplifying assumption: the money is put in non-interest-bearing reserve)
- Bond: 100M, 5% coupon rate, 5-year maturity

Implications

- Lower volume at inception of the project
- Money received in increments
- Need 5 years to see the impacts
- *"There is zero value vaccinating a child in 10 years if he or she dies from a vaccine-preventable disease this year"* (IFFIm 2019)

- Scaling effects lowering costs
- Immediate impact
- Diversification of investors' portfolio
- But payment of interests and costs if intermediation

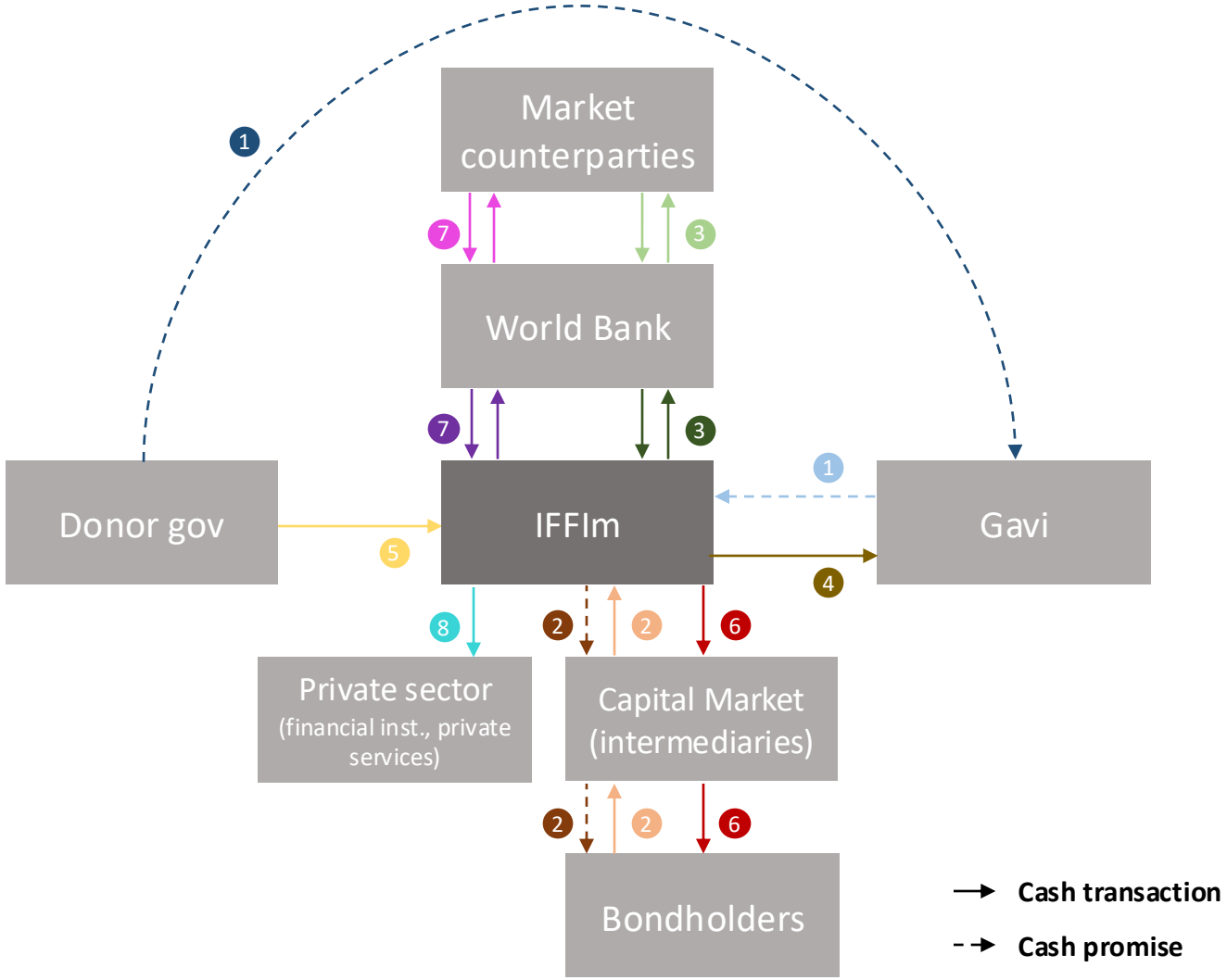
Vaccine Bonds – In practice

The International Finance Facility for Immunisation (IFFIm)

- **Creation:** 2006
- **Objective:** leveraging private finance to accelerate the implementation of MDG 6
- **Mechanism (Keohane and Madsbjerg 2016)**
  - Created the first «Vaccine Bond»
  - 5 years bond, at **5% interest rate**, 31 bp above the 5-year US Treasury rate (note: 1%=100pb)
  - **Rated AAA** or equivalent by credit-rating agencies
  - First bond issue in November 2006
  - $1B raised from Central Banks, retail investors, institutional investors
  - The money is used to finance the nonprofit Gavi, the Vaccine Alliance (also partly funded by the Bill & Melinda Gates Foundation) which conducts several large scale immunization programs in developing countries
- **Impact – 2006-2019 (Hughes-McLure, Mawdsley 2022)**
  - IFFIm secured $6.5 Bn in government pledges; $3.1 Bn received, i.e. payments made by governments to IFFIm
  - 35 bonds issues in various currencies, raising $6.1 Bn, 2.9 Bn disbursed to Gavi
  - Saved **2.9 million lives** and improvement of the quality of millions more
  - **$934 Mn** paid to finance industry as **interests to investors** ($879 Mn) and **fees to financial institutions** and professional services ($55 M)

Vaccine Bonds – In practice

How does IFFIm works? (Hughes-McLure, Mawdsley 2022)



1. Donor governments sign irrevocable **grant agreements** (often spanning **fifteen to twenty years**) with Gavi, which **assigns the grant rights** to IFFIm
2. IFFIm **issues bonds** in capital markets, backed by donor governments' pledges, and **receives the bond proceeds**
3. IFFIm enters into **hedging agreements with the World Bank** for its currency and interest rate risk exposure for donor government grants, and bond interest and principal payments; the World Bank enters into **hedging agreements with market counterparties**
4. Following a funding request from Gavi, IFFIm makes **disbursements** to immunization programs
5. Donor governments make **grant payments** to IFFIm, fulfilling their pledges
6. IFFIm makes **interest and principal payments** to bondholders
7. Throughout, IFFIm is transacting with the World Bank as its **treasury manager**, including in respect to IFFIm's significant investment portfolio, which holds **investments with market counterparties**
8. IFFIm incurs a variety of **fees** due to financial institutions, professional services and other companies

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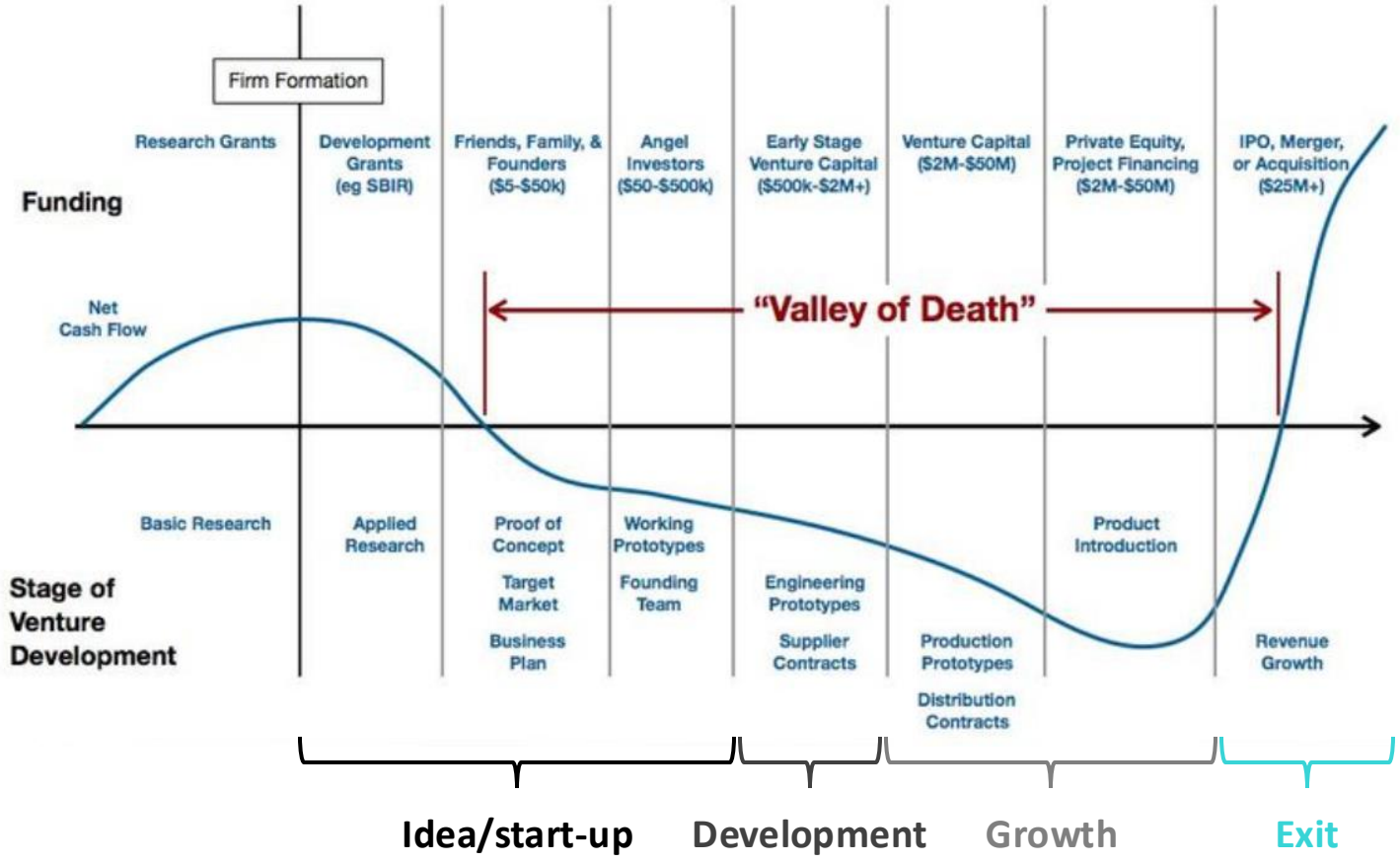
Introduction to the financing of a new company (1/3)

Lifecycle of a new venture

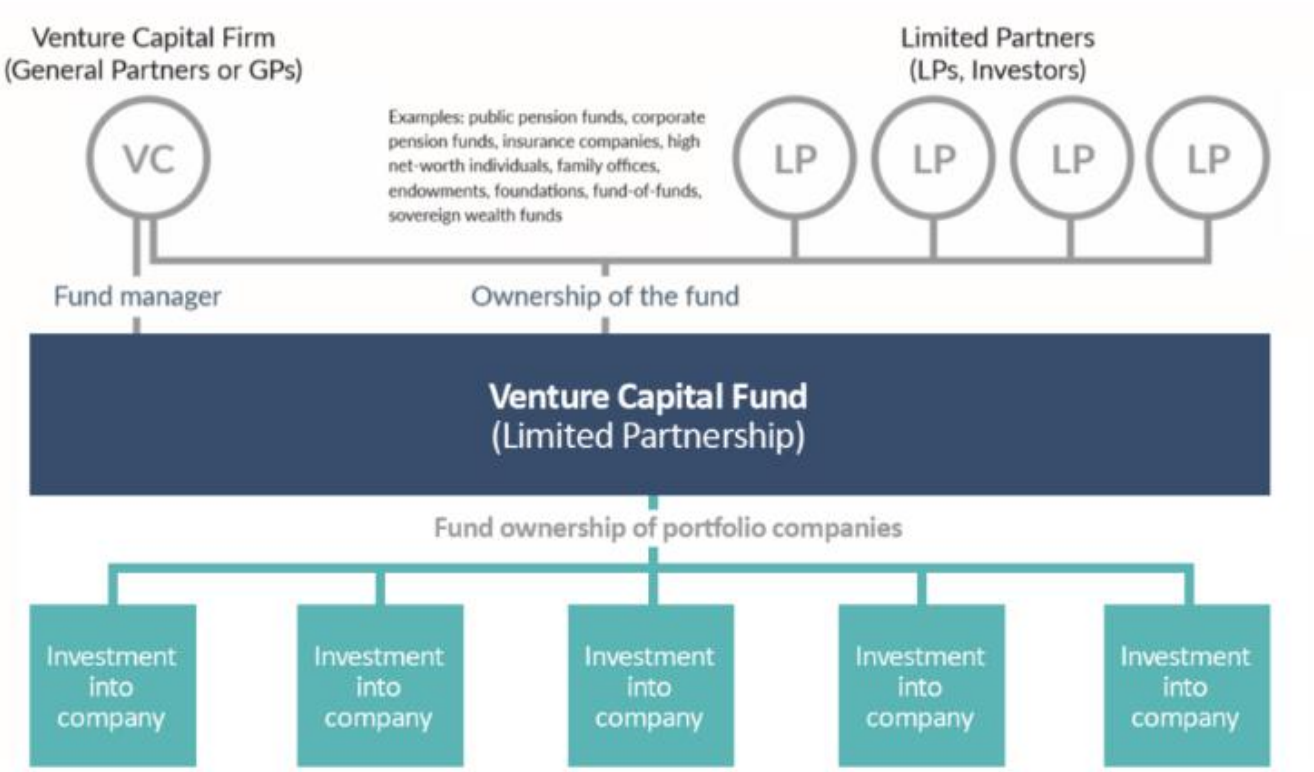


- **"Valley of death" (VoD):** period during which operations have started but the company does not yet generate enough revenue to finance them
- **Venture Capital:** provide capital that bridge the VoD

Source: UC Davis Center for Entrepreneurship, Graduate School of Business

Introduction to the financing of a new company (2/3)

Venture Capital fund structure



Source: U.S. National Venture Capital Association (NVCA)

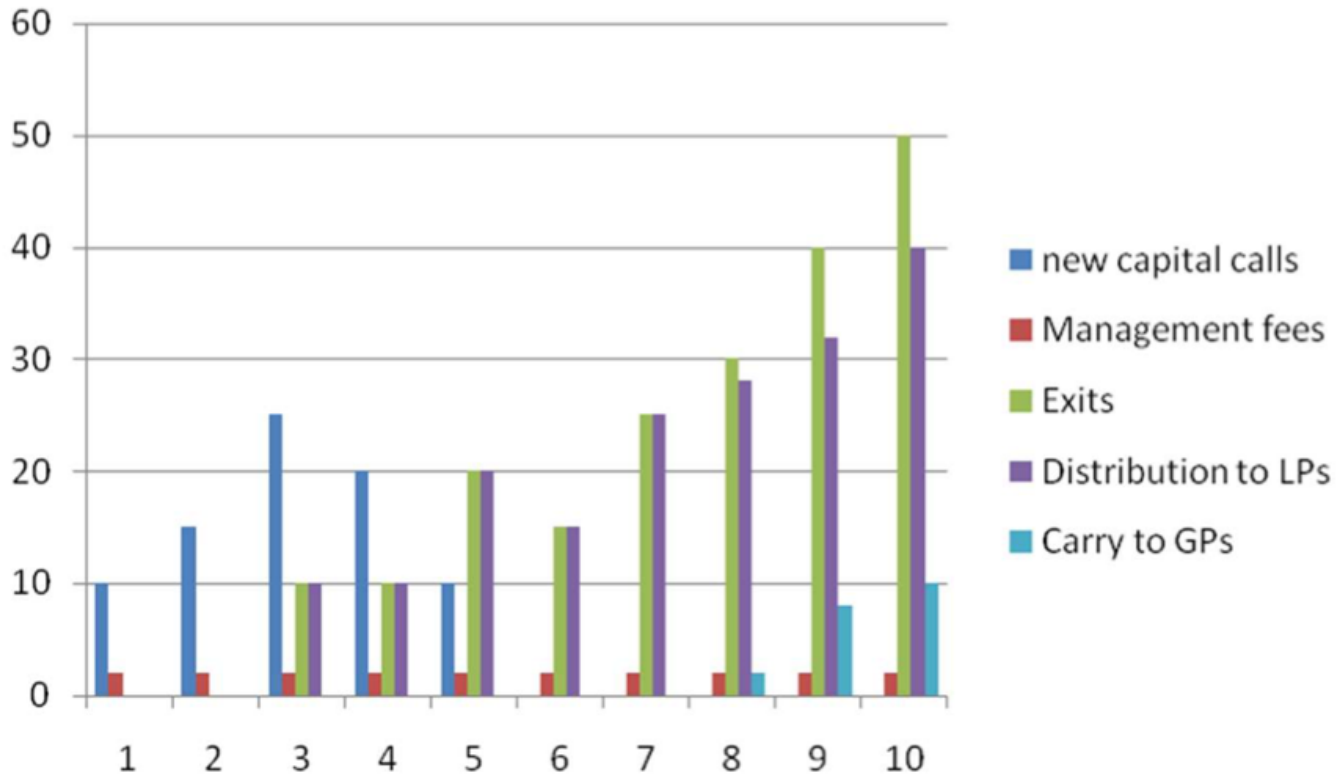
- **Partnership Agreement** between GP and LP to set up the fund
- Investors commit to a **fixed level of capital** at inception of the fund (e.g. $100M)
- GP **manages** the fund by investing in several promising companies
- Key figures - US, 31.12.2023 *(2020)*

$ Billion	2020	2022	2023
Assets under management (AUM)	694	1'116	1'213
Amount raised/year	89	163	67
Avg VC fund size	0.134	0.226	0.127
Largest VC fund raised	3.75	12.7	4

Sourcre: NVCA Yearbook 2024, 2023, 2020

Introduction to the financing of a new company (3/3)

Hypothetical performance of a $100M fund

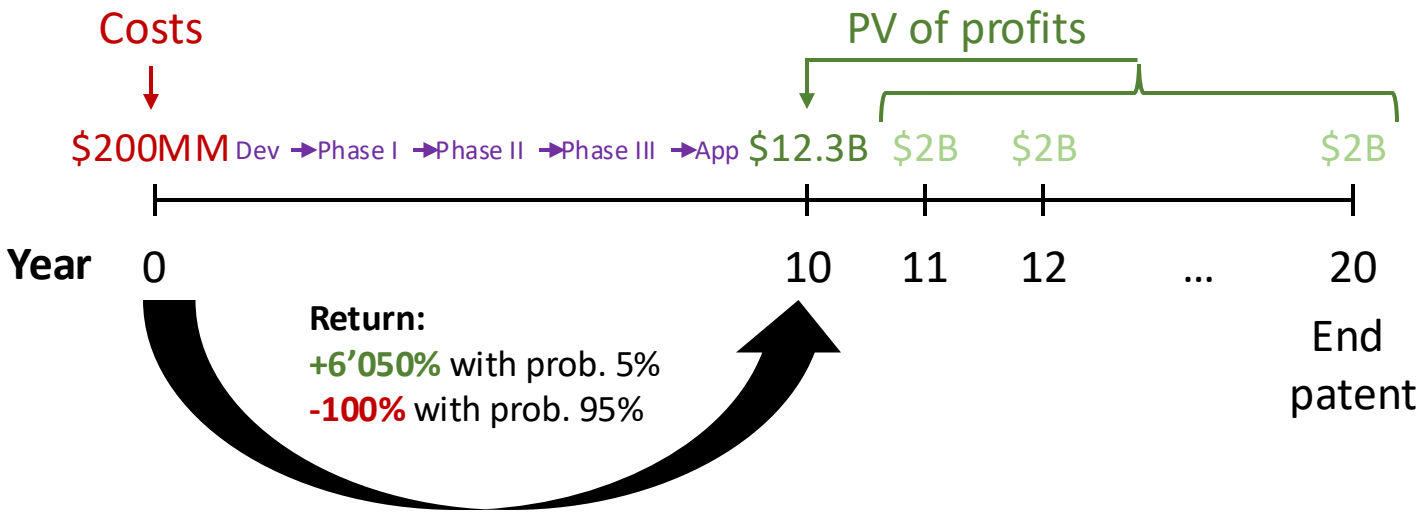


- Life of the fund: ~**10-12 years**
  - Investment period: **first 5 years** – funds are drawn when opportunities are found by GP
  - Holding period: **3-7 years**
  - Exit period: **before expiration** of the fund – no reinvestment are usually made*
  - Compensation of the fund: "**2/20 structure**"
    - 2% of Assets Under Management per year (management fee)
    - 20% of profits (carried interest)
- Carries are collected when LP's capital is recovered

Curing Cancer: A simple example (Hull, Lo, Stein 2019)

Example: Development of a new drug

- $200 MM investment
- 10 years development, trials, FDA Approval
- Probability of success is 5%
- If successful, annual profits of $2B for 10 years (patent)



Risk/reward tradeoff

- $Sharpe\ ratio = \frac{E[R]-R_f}{SD[R]}$
  - $R_f = 1.5\%$ (U.S. 10-year Treasury yield)

2001-2020	Investment	S&P 500	Pfizer
Expected return ($E[R]$)	11.9%	6.4%	4.6%
Volatility ($SD[R]$)	423.9%	15.1%	19.7%
Sharpe ratio	**0.02**	**0.33**	**0.17**

Risk/Reward profile not attractive

Megafund – Diversification (1/2)

Invest in 150 drug candidates simultaneously

- Assume the projects are IID
- Requires $0.2 \times 150 = \$30B$ of capital
  - Each project has weight $w = \frac{0.2}{0.2 \times 150} = \frac{1}{150}$ in portfolio P
- The risk reward tradeoff becomes
  - $E[R_p] = E\left[\sum_{i=1}^{150} wR\right] = \frac{1}{150}\sum_{i=1}^{150} R = 11.9\%$
  - $SD[R_p] = \frac{423.9\%}{\sqrt{150}} = 34.6\%$
  - $Sharpe\ ratio = \frac{11.9\% - 1.5\%}{34.6\%} = 0.30$

2001-2020	Investment (1)	S&P 500	Pfizer	Investment (150)
Expected return ($E[R]$)	11.9%	6.4%	4.6%	11.9%
Volatility ($SD[R]$)	423.9%	15.1%	19.7%	34.6%
Sharpe ratio	**0.02**	**0.33**	**0.17**	**0.30**

Risk/Reward profile attractive thanks to diversitification

↑ $Sharpe\ ratio = \frac{E[R] - R_f}{\sigma[R]}$ ↓

Megafund – Diversification (2/2)

Redu

Event
At least 1 hi
At least 2 hi
At least 3 hi
At least 4 hi

Source: Modification f

ICE BofA corporate index effective yield	Rating (e.g. Moody's, Fitch, Standard and Poor's)	10.11.2021	16.05.2023	10.05.2024	23.10.2024
Investment grade	Aaa/AAA	1.97%	4.42%	5.05%	4.65%
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	A/A	2%	5.13%	5.46%	4.98%
	Baa/BBB	2.46%	5.62%	5.78%	5.31%
High yield	Ba/BB	3.33%	6.89%	6.43%	5.92%
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	Caa/CCC	7.57%	14.61%	13.83%	11.74%
	Ca/CC				
	C/C				

Amount at t=0:
$ 21.7 B

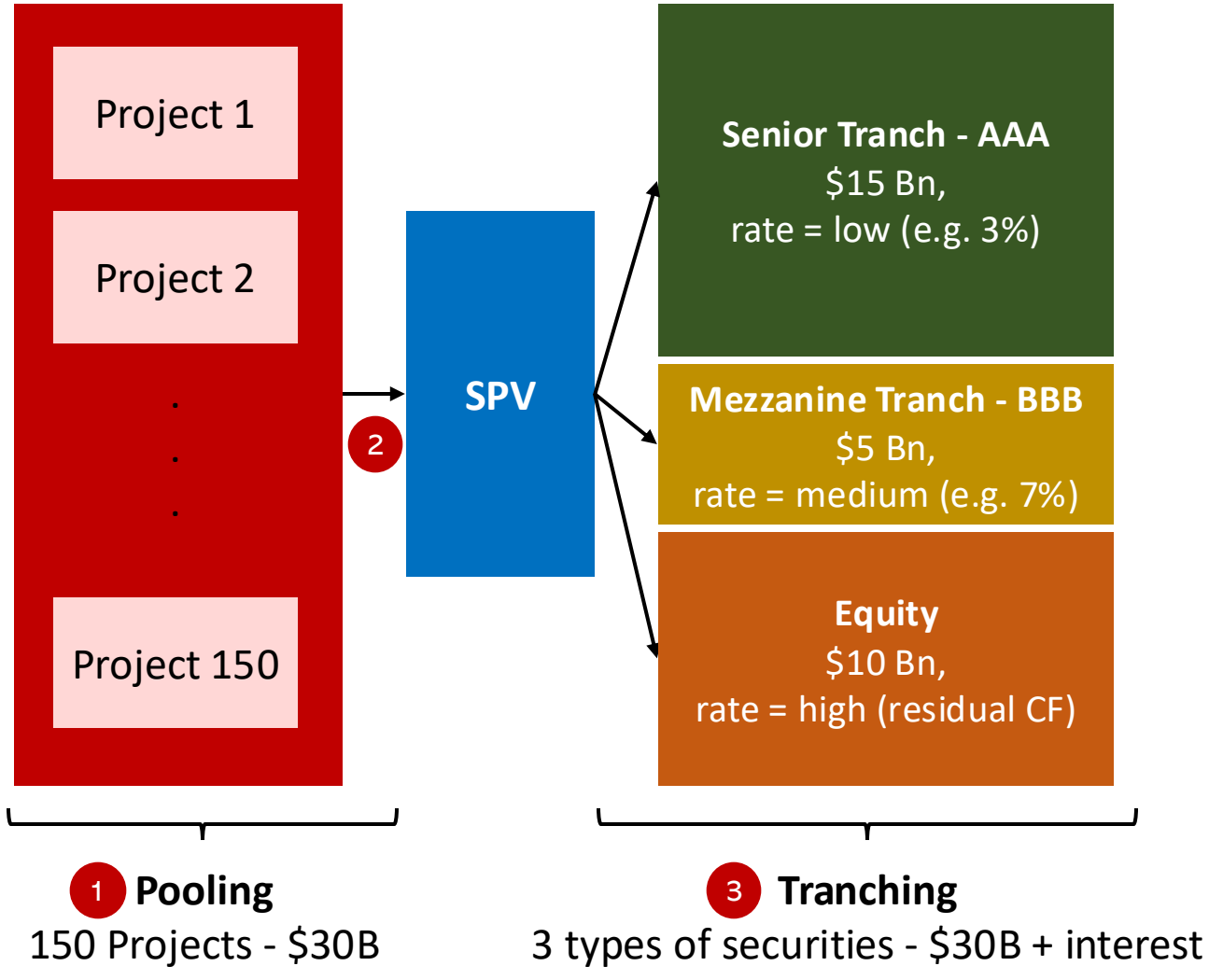
et (2023)
1'213 B ($
d income
corporate debt

- 3 h
  $ 3
- Pr
  1.8
- Possible to raise **$ 30.2 B** today

s to attract new investors with
(1) a different risk/reward profile and
(2) a larger amount of funding

Megafund – Securitization – Theory

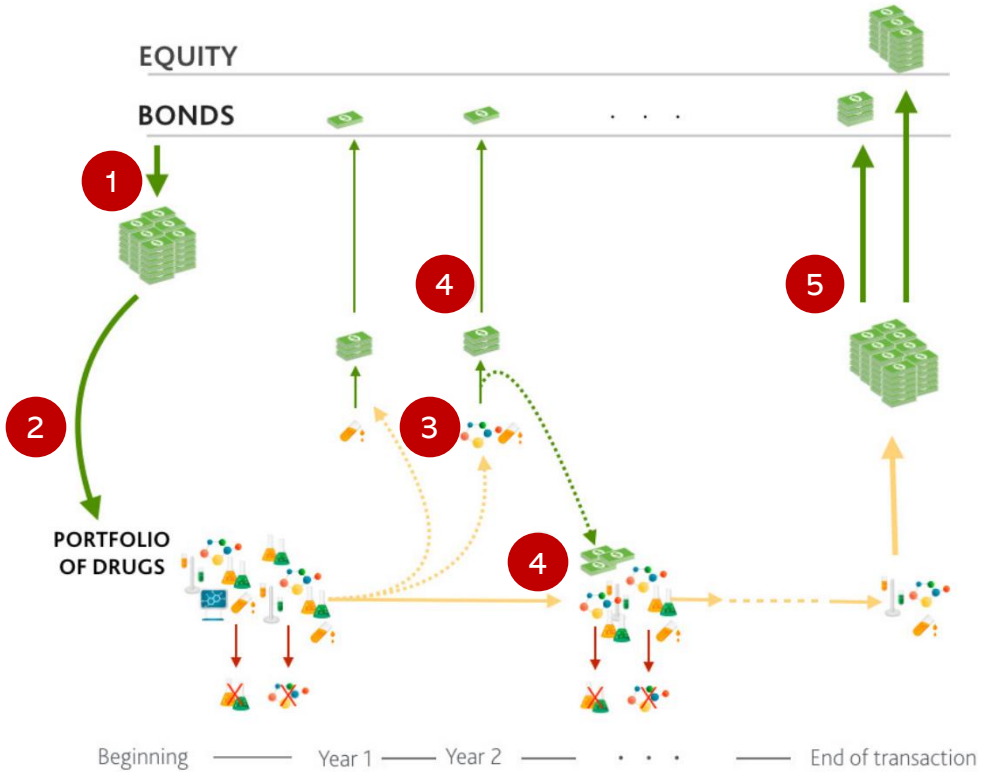
What is Securitization?



1. CF from risky projects are **pooled** together in a portfolio
2. A *Special Purpose Vehicle* (SPV) **acquires** that portfolio
3. The SPV transforms the portfolio's **cash flow** in different **Tranches** - Research Backed Obligations (RBO) - with different levels of **seniority** (risk)

Megafund – Securitization – In practice

Schematic design of cash-flow securitization, with coupon-paying debt, for a portfolio of early- stage drug development projects



Source: Figure 6 in Hull, Lo, Stein (2019)

1. Securities are issued
2. Proceeds from the sale of the securities are used to purchase a portfolio of candidate therapies
3. As therapies move through the approval process, they gain value and are sold or they fail and are withdrawn
4. Proceeds of the sales are used to pay principal and interest and to fund trials on remaining drugs
5. At the end of the transaction, the remaining portfolio is sold and the proceeds distributed

Example – BridgeBio Pharna Inc. (1/2)

BridgeBio – Portfolio of Orphan drugs

"We have created a sustainable engine for the systematic discovery, development, and commercialization of medicines for genetic disease"
(Bridgebio Company Presentation)

- Rare diseases
  - < 200'000 people in the U.S
  - Low correlation between projects successes
  - Larger probability of success
  - Shorter and cheaper development & approval time
- 2 important principles: (source: BridgeBio)
  - "The **willingness** and **scale to fail** and to re-allocate capital, within a de-centralized company model"
  - "**Distinctive early-stage asset selection**, based on a deep understanding of clinical unmet need, genetics, and underlying molecular pathophysiology"

Key metrics

- Creation: 2014
- IPO: 2019
  - IPO stock price: $17
  - Stock price *(Mkt cap)* 10/11/2021: $49.31 *($7.3B)*
  - Stock price *(Mkt cap)* 16/05/2023: $14.3 *($2.3B)*
  - Stock price *(Mkt cap)* 15/05/2024: $30.1 *($5.6B)*
  - Stock price *(Mkt cap)* 23/10/2024: $24.3 *($4.5B)*
- Portfolio: 30+ initiated programs since creation of the company *(May 2024, 2023)*
  (source: BridgeBio)
  - 1 in Pre-clinical (3, N/A)
  - 1 drugs in phase I (4, 4)
  - 1 drugs in phase II (0, 2)
  - 4 drugs in phase III *(2, 2)*
  - 2 drugs approved since company creation *(2, 2)*
- Funding: $3+ B raised in 10+ rounds

Example – BridgeBio Pharna Inc. (2/2)

BridgeBio Pharma

Summary | Financials | People | Technology | Signals & News

ounced Date	Transaction Name	Number of Investors	Money Raised
Mar 6, 2023	Post-IPO Equity - BridgeBio Pharma	–	$150M
Nov 18, 2021	Post-IPO Debt - BridgeBio Pharma	–	$750M
Feb 12, 2021	Post-IPO Secondary - BridgeBio Pharma	–	–
Jan 26, 2021	Post-IPO Debt - BridgeBio Pharma	–	$250M
Mar 4, 2020	Post-IPO Debt - BridgeBio Pharma	–	$475M
Jan 23, 2019	Series D - BridgeBio Pharma	8	$299.2M
Sep 13, 2017	Series C - BridgeBio Pharma	7	$135M
May 1, 2017	Series B - BridgeBio Pharma	1	$33.1M
Mar 1, 2016	Series B - BridgeBio Pharma	1	$6.9M

BridgeBio Pharma funds raised
Source: crunchbase

Open	24.56	Mkt cap	4.54B	52-wk high	44.32
High	24.81	P/E ratio	-	52-wk low	21.68
Low	24.12	Div yield	-		

BridgeBio Pharma stock price evolution
Source: Yahoo Finance

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Passive investing

Definitions

- **Index:** method to track the performance of a basket of securities
  - **S&P 500:** tracks the performance of the 500 *leading* publicly traded companies in the U.S.
    - Market cap weighting method
    - Examples of criteria to be included: U.S. company; mkt cap>11.8 B, be highly liquid, etc.
  - **SMI:** tracks the 20 largest Swiss stocks
    - Market cap weighting method; weight caped at 20%
- **Passive Investment:** Strategy that consists in maximizing returns by minimizing the number of trades
  - *Buy and hold* strategy
  - Examples of passive investing methods**: Index funds**, **Exchange Traded Funds (ETF)**

Index Funds and ETFs

Index Funds

- Introduced in the 1970s
- Type of mutual fund which portfolio tracks a financial market index
- How does it work?
  - Investors' money is pooled in a fund
  - The manager of the fund uses the money to buy the securities considered in the benchmark index
  - Managers follow the benchmark index, independent of its performance
  - Investors receive a return that mimics the benchmark

ETFs

- Introduced in the 1990s
- Type of security that can be structured to track **anything** (e.g. S&P500, oil price, Bitcoin, etc.)
- Hoes does it work?
  - An investment company (e.g. Blackrock) builds a portfolio of securities
  - Shares of this portfolio are then sold and traded on an exchange
- AUM of global ETFs 2022: 9.6 T (source: Statistia)

Benefits of Index Funds and ETFs
- Diversification
- Low fees
- Good long term returns

Drawbacks of Index Funds and ETFs
- Lack of flexibility
- Vulnerability to market swings
- No human element

Example – NAACP Minority Empowerment ETF (1/2)

NAACP Minority Empowerment ETF (NACP)

- **NAACP:** National Association for the Advancemenf of Colored People
- The NAACP Minority Empowerment ETF
  - Issued by the nonprofit fund manager **Impact Share**
  - Tracks the Morningstar Minority Empowerment Index (MMEI)
    - **Objective: "***providing exposure to US companies that have embedded strong racial and ethnic diversification policies into their corporate culture and that ensure equal opportunities to employees irrespective of their race or nationality"* *(source: Morningstar)*
    - ***Criteria to be included:***
      - ***Exclusion of businesses****: (1) involved in serious* ***social-related controversies****; (2) involved in* ***specific sectors*** *(Security Services and Correctional Facilities, tobacco, riot control-related products, and predatory lending); (3) which* ***do not comply*** *with the United Nations Global Compact (commitment to sustainable, socially responsible business practices. E.g., Procter & Gamble).*
      - *The index is then constituted of the* ***200 companies*** *that score best on* ***18 criteria established by the NAACP*** *(e.g. board diversity, discrimination policy, diversity programs) (list in the Appendix)*
    - ***Weighting method:*** *(1)* ***high scores*** *on the NAACP criteria, (2)* ***risks and returns similar*** *to the Morningstar US Large-Mid Cap Index (MUSLMCI)*

Top 10 Companies in MUSLMCI (weight %)	Top 10 Companies in MMEI (weight %)
Apple (6.78%)	Apple (5.47%)
Microsoft (6.15%)	Microsoft (4.79%)
Amazon.com (2.53%)	NVIDIA (3.45%) ↑
NVIDIA (1.83%)	Amazon.com (3.01%) ↓
Alphabet Class A (1.72%)	Alphabet Class A (3.00%)
Berkshire Hathaway (1.59%)	Meta Class A (2.70%)
Alphabet Class C (1.51%)	Alphabet Class C (2.64%)
Meta Class A (1.44%)	Salesforce (2.49%)
Exxon Mobil (1.31%)	Cisco Systems (2.43%)
UnitedHealth Group (1.24%)	Exxon Mobil (2.36%)
Source: Morningstar US Large-Mid Index Factsheet (30/04/2023)	Source: Morningstar Minority Empowerment Index Factsheet (30/04/2023)

Not part of the MMEI in 2023 due to low score across indicators

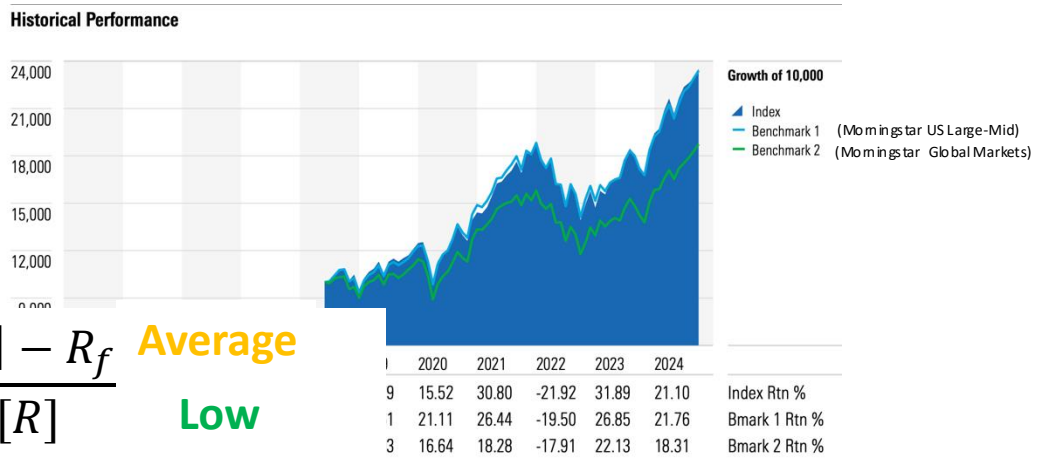
Example – NAACP Minority Empowerment ETF (2/2)

Financial Engineering

- **Diversification**: portfolio of companies
- Management fee is **split in two**
- Theoretical example (Connaker, Madsbjerg 2019, HBR)
  - Consider a **management** AUM
  - **Impact share:** receives 2! the fund
  - **The NAACP** receives the difference, i.e. 50 bps: 5$/year for each $1'000 invested in the fund
- The NAACP receives a return for its engagement with the companies indexed

Does it work?

- **MMEI**



High $Sharpe\ ratio = \frac{E[R] - R_f}{\sigma[R]}$ Average Low

Diversified portfolio of "good" companies

24)

- **NACP ETF**

Data as of 05/17/2023

		05/15/2024	10/24/2024
Net Assets	$41,758,961	$44,873,847	$54.18m
Shares Outstanding	1,425,000	1,175,000	1,300,000
NAV	$29.30	$38.19	$41.67

Source: Impact Share

Conclusion

- Finance is a very creative industry
- Financial engineering offers lots of flexibility to structure products that can help finance Grand Challenge
  - However it also has a cost that needs to be taken into account
- The key point is ***incentives***
  - Providing the right risk/reward tradeoff to make it attractive to investors

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Appendix

List of criteria established by the NAACP (source: morningstar)

- Board Diversity
- Discrimination Policy
- Diversity Programs
- Freedom of Association Policy
- Scope of Social Supplier Standards
- Community Development Programs
- Health and Safety Management System
- Conflict Minerals Programs
- Media Ethics Program
- Human Rights Program
- Editorial Guidelines
- Advertising Ethics
- Human Capital Development
- Responsible Product Offering
- Responsible Marketing Policy
- Human Rights Policy
- Gender Pay Equality Program
- Gender Pay Disclosure


Merci

Discussion – Quick thoughts on your GCs

- **Urbanisme - territoire**
  - Urban planning in India – rich, poor and mechanism of sharing' space in Hyderabad city
  - Regeneration of historic settlements and habitats (in the Alps and in Greece)
- **Santé,environnement**
  - Fighting the rise of antimicrobial resistance in the EU
  - Transforming agriculture and the meat industry
  - Preserving soil health while ensuring agriculture independence in Switzerland
- **Secteurs, business models**
  - Promoting sustainable mobility solutions in Switzerland
  - Transition of the energy provisioning system in Switzerland
  - Decarbonization of the cement industry (global south)
  - Sustainable passenger aviation
  - Exploring consumtion and production solutions to takle the challenges of fast fashion
  - Job substitutes by applied AI in China
- **Technology**
  - Deployment of commercial nuclear fusion energy
- **Social**
  - Improving the communication of science to the public
  - Contraception and family planning in China
  - Digitalization of the higher educations in Latin America