



The Hebrew University of Jerusalem

Syllabus

Financial Innovations for Economic Development - 55721

Last update 11-08-2023

HU Credits: 3

Degree/Cycle: 2nd degree (Master)

Responsible Department: Business Administration

Academic year: 0

Semester: 1st Semester

Teaching Languages: English

Campus: Mt. Scopus

Course/Module Coordinator: Prof. Glenn Yago

Coordinator Email: glenn@jerusaleminstitute.org.il

Coordinator Office Hours: Wednesdays, 5-7

Teaching Staff:

Prof Glenn Yago

Course/Module description:

This course will focus on the means and methods of finance applied to social, economic, and environmental challenges facing developing economies. Financial innovations give rise to new intermediaries (community venture capital, permanent capital facilities, revolving loan funds, social investment banks, business development companies, venture investment trusts etc.), new types of intermediaries (community venture capital, permanent capital facilities, revolving loan funds, social investment banks, business development companies, venture investment trusts etc.), new types of instruments (structured credit, blended finance, SME and microfinance, social, environmental and development impact bonds, sustainability-linked, social and green bonds, diaspora bonds, catastrophic risk bonds, royalty trusts, community investment notes, and risk pooling finance mechanisms and facilities), and new services, platforms or techniques (ETFs, AMCs, impact investing, public-private partnerships, guaranteed offtake agreements, financial intermediary facilities, credit enhancements, risk syndication, international finance facility for immunization, product development partnerships, supply-chain financing) to create jobs, build communities, and enable capital formation that accelerates inclusive economic growth. This survey course on financial innovation is followed by an applied project development seminar in the Spring Semester (DEVP 290 and MBA 55680). This enables us ultimately to embed and link single-point solutions into system and portfolio-based financing models to finance sustainability transitions .

This course provides a survey of development finance theory and practice, including case study applications of innovative finance policy, programs, projects, and securities/financial product design. The final assignment is to prepare a project concept note for a sustainable finance initiative that may be subsequently pursued in a second semester research seminar to prepare for potential field assignments for those interested into a deeper dive into development finance fieldwork.

Course/Module aims:

Specific mapping described in the Project Concept Note specify SDG goals and targets addressed (relevant for projects inclusion into potential pooled securities and their design).

Themes for these project proposals could include increasing food and agriculture (agricultural productivity, improve food quality and sustainability), global health (including diagnostics, primary care and community projects, treatment modalities

and preventive medicine; bio based and sustainable solutions), energy (low carbon projects and climate change adaptation), and environmental finance (sustainable water, land and forest management, conservation and ecosystem services, biodiversity, drought prevention, carbon projects, etc.).

Projects design (and the financial instruments designed for them) and could include:

- SME finance for enterprise development (compare and contrast specific private equity, revolving loan fund models, structured finance solution etc.);
- Environmental or energy infrastructure (use modern finance mechanisms such as risk pooling and risk transfer to create climate response systems to protect food security, technology transfer for water technology, water quality/recycling, distributed water treatment and production or on-grid, off-grid, or under-grid renewable energy project);
- Agricultural or food innovation (plant or soil science technology innovations, post-harvest, or supply chain finance models utilizing agricultural pull-mechanisms);
- Global health innovation (development impact bond, product development partnership, advanced market commitment applied to a vaccine, treatment modality, or preventive measure).

These project proposals would address a prospective practical development project and explicate the deployment of a development finance innovation.

The project proposal would address how innovative finance could design a capital structure for a project or development target that mobilizes:

- 1) new pools of private and public revenue streams;
- 2) new revenues options (e.g., tax, charges, fees, bond sales);
- 3) new incentives (frontloading and debt-based instruments, philanthropic/government guarantees, public-private partnerships, insurance, and other market-based mechanisms).

These projects can be completed as individual (or teams of two reflecting the team members' increased level of effort to meet this assignment's objective).

Guidelines and an example of such a project concept note will be discussed in the first joint class on October 9.

Learning outcomes - On successful completion of this module, students should be able to:

Specific mapping described in the Project Concept Note specify SDG goals and targets addressed (relevant for projects inclusion into potential pooled securities and their design).

Themes for these project proposals could include increasing food and agriculture (agricultural productivity, improve food quality and sustainability), global health (including diagnostics, primary care and community projects, treatment modalities and preventive medicine; bio based and sustainable solutions), energy (low carbon projects and climate change adaptation), and environmental finance (sustainable water, land and forest management, conservation and ecosystem services, biodiversity, drought prevention, carbon projects, etc.).

Projects design (and the financial instruments designed for them) and could include:

- SME finance for enterprise development (compare and contrast specific private equity, revolving loan fund models, structured finance solution etc.);*
- Environmental or energy infrastructure (use modern finance mechanisms such as risk pooling and risk transfer to create climate response systems to protect food security, technology transfer for water technology, water quality/recycling, distributed water treatment and production or on-grid, off-grid, or under-grid renewable energy project);*
- Agricultural or food innovation (plant or soil science technology innovations, post-harvest, or supply chain finance models utilizing agricultural pull-mechanisms);*
- Global health innovation (development impact bond, product development partnership, advanced market commitment applied to a vaccine, treatment modality, or preventive measure).*

These project proposals would address a prospective practical development project and explicate the deployment of a development finance innovation.

The project proposal would address how innovative finance could design a capital structure for a project or development target that mobilizes:

- 1) new pools of private and public revenue streams;*
- 2) new revenues options (e.g., tax, charges, fees, bond sales);*
- 3) new incentives (frontloading and debt-based instruments, philanthropic/government guarantees, public-private partnerships, insurance, and other market-based mechanisms).*

These projects can be completed as individual (or teams of two reflecting the team members' increased level of effort to meet this assignment's objective).

Guidelines and an example of such a project concept note will be discussed in the

first joint class on October 9.

Through the projects, students will demonstrate their ability to:

- *Design and construct an innovative finance application (for either a proof of concept or beta site project) in a developing economy;*
- *Measure, analyze and report development impacts of an innovative finance project;*
- *Identify and develop how a development impact investment would benefit and expand capital access through the creative use of innovative financing tools;*
- *Assist a high-impact project to access flexible market and below-market financial tools;*
- *Identify how to structure the transaction and identify potential interested partners with aligned interests in the proposed project.*
-

Attendance requirements(%):

100

Teaching arrangement and method of instruction: Lectures by professor and student presentation based on literature and case study reviews.

Course/Module Content:

DETAILED READINGS Per Section of Course:

***Required Readings for Lectures*

**For Student Presentations*

1. Introduction to Financial Toolkit and Innovative Finance for Development (October 9)

- 1. **Yago, Glenn and Steven Zecher, "Innovating Sustainable Finance for Development Impact," in Paul Walsh and Ciara Whelan (eds.), Transforming our World: the UN 2030 Agenda for Sustainable Development, London: Elgar, 2023.*
- 2. **Kersten Stamm and Dana Vorisek, "Investment in Emerging and Developing Economies: Reversion to Trend is not Enough," Brookings, February 22, 2023.*
- 3. **Homi Kharas and Charlotte Rivard, "Financing for sustainable development is clogged," Brookings Blog, May 11, 2022.*
- 4. **Convergence Blended Finance (2023). Best Practices for Donor Governments Engaging in Blended Finance. Convergence Report.*
- 5. ** "Productive, Sustainable and Inclusive Investment: 2022-26 Technical Strategy," British International Investment, 2022.*
- 6. **Allen, Franklin and Yago, Glenn. "Financing the Future: Market-Based*

Innovations for Growth". Upper Saddle River, New Jersey: Pearson/Wharton School Publishing, 2010:

a. Chapter 1: The Evolution of Finance;

b. Chapter 2: A Framework for Financial Innovation: Managing Capital Structure.

*7. **Anja-Nadine Koenig, Chirs Club and Andrew Apampa, Innovative Development Finance Toolbox, KFW, October 2020.*

*8. ** Humphrey, C. (2023) Tapping the potential of borrower led multilateral development banks. ODI Working paper. London: ODI.*

Framing Finance through Lessons from New (Endogenous) Growth Theory and Economics of Climate Change

9. "Integrating nature and knowledge into economics," Popular Science Background, Nobel Prize in Economic Sciences, 2018. (Key Reading Background on Endogenous Growth Theory-Romer, et.al.)

*10. **Ross Levine, "Finance, Growth and Inequality", IMF Working Paper, WP/21/164 (June 2021).*

11. Levine Aghion, Peter Howitt, and Ross Levine, "Financial Development and Innovation-Led Growth," in T. Beck and R. Levine, Handbook of Finance and Development, London: Elgar, 2018

12. Mollaahmetoglu, E. and G. Y. Akcali, "The Missing-Link between Financial Development and Economic Growth: Financial Innovation, Procedia Computer Science 158 (2019) 696-704

This important reading contextualizes financial innovation as part of this process.

13. Economic Growth, Technological Change, and Climate Change, Scientific Background Paper, Economic Sciences. Nobel Prize, 2018. (Key background reading on Nordhaus, Eccles, etc. impact of climate finance and environment, green accounting, etc.).

Key Videos to Watch:

VIDEO: Milken Innovation Center-Blum Lab for Developing Economies-Jerusalem, How do we do financial field work together

VIDEO: Hans Rosling, Global Population Growth

VIDEO: Tyler Cowan, Marginal Revolution, On Romer's contribution to development economics Endogenous Technological Change

VIDEO: EconJohn, Endogenous (New) Growth Model

VIDEO: EconJohn, Endogenous Growth Models-Learning by Doing

Structural Changes in Capital Markets

*1. **Stiglitz, Joseph E. 1988. "Why Financial Structure Matters." Journal of Economic Perspectives, 2 (4): 121-126.DOI: 10.1257/jep.2.4.121*

*2. **Corporate Finance: A Roadmap to Mainstream SDG Investments, UN Global Compact Action Platform on Financial Innovation for the SDGs, 2019.*

*3. **Capital Markets and Sustainable Finance, Chapter 5, World Investment Report, 2021, UNCTAD.*

*i. *Case Study "High Level Mapping to SDGS: Green, Social and Sustainable Bonds,"*

-
- International Capital Markets Association, June 2021.
- ii. *Handbook: Harmonic Framework for Impact Reporting, Green and Social Bond Principles*, June 2021.
3. **Kozloski, Maria. *Zero Gap Fund: 2022 State of the Portfolio*," Rockefeller Foundation, July 2023.
4. **Allison Harwood, "Accelerating Securitization in Africa to Finance the SDGs: Future Flow Securitizations," Milken Institute, February 8, 2021."
5. **Allison Harwood, "Securitization: Positive Instrument to Help fund the Sustainable Development Goals," Milken Institute, 2022.
6. **Bernstein, Shai, Abhishek Dev and Josh Lerner, "The Creation and Evolution of Entrepreneurial Public Markets," *Journal of Financial Economics*, 136/2 (May 2020): 307-329.
7. **Impact Assets, 2023. *Data Base of Impact Asset Managers*.
8. *Freiberg, David, DG Park, George Serafeim, and T. Robert Zochowski. "Corporate Environmental Impact: Measurement, Data and Information." *Harvard Business School Working Paper*, No. 20-098, March 2020. (Revised July 2020.)
9. *Patrick Bolton and Frederic Samama, *Capital Access Bonds: Contingent Capital with an option to Convert*," *Economic Policy*, April, 2012.
10. *Case Study: *Viability of Gender Bonds in SSA: A Landscape Analysis and Feasibility Assessment*, FSDAfrica/UN Women, September 2020.
11. *Case Study: *EUR 7-year Social Bond: African Development Group*, 2021
12. *Case Study: *Masala Green Bond: IFC and YES Bank*
13. *Case Study: *John Schellhase and Harris Mohsin, Ghana's Daakye Program: An African Securitization Case Study*, Milken Institute, 2021.
14. ***Special Section on Sustainability-Linked Bonds:
- a. *Case Study: *What are Sustainability-Linked Bonds and how can they support the net-zero transition?*, November 2022
- b. *Sustainability-Linked Bonds: Guidance for sustainability-link bonds as transition finance instruments*, *Climate Bonds*, November 2022.
- c. Raquel de la Orden and Ignacio de Calonje, *Sustainability-Linked Finance: Mobilizing Capital for Sustainability in Emerging Markets*, *International Finance Corporation*, January 2022.
- d. Vulturius, Gregor, et.al., "Sustainability-linked bonds—their potential to promote issuers' transition to net-zero emissions and future research directions," *Journal of Sustainable Finance and Investment*, February 2022.

Key Videos:

Investing with Impact through Public Securities Markets to Finance the SDGs, Virtual Forum, Milken Institute, July 8, 2021 (Evan Harvey, Head of Sustainability, Nasdaq, Shameela Soobramoney, Chief Sustainability Officer, Johannesburg Stock Exchange, Quyen Tran, Impact Investing, BlackRock)

1. **Allen, Franklin and Yago, Glenn. "Financing the Future: Market-Based Innovations for Growth". New Jersey: Wharton School Publishing, 2010:

-
- a. Chapter 3: Innovations in Business Finance;
 - b. Appendix: The Black-Scholes Formula.
 2. **Allen, Franklin, Xian Gu and Julapa Jagtiani, "A Survey of Fintech Research and Policy Discussion," Working Papers Research Department, WP 20-21, Federal Reserve Bank of Philadelphia, June 2020.
 3. *New Horizons in African Finance: Reducing Risk and Mobilizing Financing on a New Scale, African CEO Forum and International Finance Corporation, 2016. See Case Studies on: Azito Energy, Eobank, Cargil SIB on Cocoa Loans, Bayport (Bond Markets), Nutrition, Education (Bridge Academies), and Helios (Private Equity).
 4. <https://www.5minutefinance.org/concepts/capital-structure>

Key Videos to watch:

Paddy Hirsh, Capital Structure Explained
Managerial Finance, Capital Structure

"Bridge and Blend: The Role of DFIs in Scaling Sustainable Financing," Milken Institute, Virtual Forum, February 21, 2021: Amit Bouri, Global Impact Investing Network; Joan Larrea, CEO, Covergence; Nancy Lee, Center for Global Development; Monish Mahurkar, IFC.

II. Entrepreneurial Finance (October 16)

1. ** IFC SME Ventures: Investing in Private Equity in Sub-Saharan African Fragile and Conflict-Affected Situation, IFC and Cross-Boundary Ventures, October 2018.
2. William Janeway, Ramana Nanda, Matthew Rhodes-Kropf, "Venture Capital Booms and Startup Financing", Working Paper 21-116, 2021.
3. ** Allen, Franklin, Careletti, Elena, et.al., "Improving Access to Banking: Evidence from Kenya" Review of Finance, 2020:1-40, BAFFI CAREFIN Centre Research Paper No. 2018-104, Available at SSRN: <https://ssrn.com/abstract=eq3305047> or <http://dx.doi.org/10.2139/ssrn.3305047>.
4. Parvez, Al-Amin, et.al., "Fintech and Inclusive Growth: Evidence from 25 Asian Developing Countries," Asian Development Bank Institute, Workpaper Series, No. 1385 (May 2023).
5. Yago, Glenn, "Development Finance Case Studies: Innovative Finance for Sustainable Development Goals," Milken Innovation Center-Jerusalem Institute, 2018:
1: Aspada, India & Bangladesh
6. "Stimulating Investment in Emerging-Market SMEs," Financial Innovations Lab Report, Milken Institute, 2009.
7. **Case Study: Chu, Michael, and Tahilyani, Rachna, "Aspada: In Search of the Right Structure for Impact Investing," Harvard Business School Case 314-099, April 2014 (Revised July 2014).
8. **Case Study: Lustig, Michael P. "An innovative model for using social investment to drive financing inclusion in Israel," Government Outcomes Lab, Oxford University,

June 2022.

9. ****Case Study: Capital Access in Israel's Underserved Markets, Financial Innovations Lab Report, Milken Innovation Center-Milken Institute, February 2015.**

Key Videos to watch:

Raman Nanda, "Entrepreneurs as Scientists: Understanding and addressing financing frictions in Deep Tech," Imperial College London Business School, March 24, 2021

Aspada News Story, Young Turks

Financial Innovation Labs, Milken Institute, What is a Financial Innovation Lab? Bridging Funding Gaps, Solving Global Challenges

III. Project Mechanics Lecture and Workshop on SDGs--Building Solutions Sets into Project Pipeline (October 23)

Practitioner Guest Lecturer:

Steven Zecher, Project Director, Milken Innovation Center-Jerusalem Institute

This week will be devoted to background and development of the Project Development Concept Note for the final work product of the course---linking development finance projects to programs to policies to capital market transactions.

Key background readings for this session are:

****Ian Thomson, "Innovative Ways to Finance Sustainability Projects," Financial Management, July 18, 2023.**

****Godnar, Gordon and B. Comer, Project Finance Teaching Note," Wharton School, University of Pennsylvania, 1996.**

UPDATE: Dovrak, Paul, "Put a fence around It: Project finance explained"

****Huxley, Joe, "Value Capture Finance, Making Urban Development Pay Its Way," Urban Land Institute, 2009.**

****Asset Backed Securitization," Stern School of Business, NYU, 2016.**

IV. Impact Investment and Social Finance: Social Impact Bonds and Beyond (October 30)

*Practitioner Guest Lecture:

Gila Norich, Director, Advisory Services, Social Finance-Israel, Impact Metrics and

Development Impact

Intro Reading: Sir Ronald Cohen, Impact: Reshaping Capitalism to Drive Real Change, London: Edbury Press, 2020. Chapters 2 and 3: 34-85.

1. ***Andrew Lo and Tuixun Zhang, "Quantifying the Impact of Impact Investing," MIT Laboratory for Financial Engineering. 18 April 2023.*
 2. ***Evaluating the Impact of Blended Finance: Convergences's Case Study Portfolio Revisted," Learning Report, May 2023.*
 2. ***Emily Gustafsson-Wright and Elyse Painter, A Review of Outcomes-based Financing in 2022 and Beyond, Brookings, January 2023.*
 3. *Lee, Christopher, Ragini Chawla and Aron Betru, Priming SDG Markets: Can International Donors and Implementers Create an Impact Investment Pipeline?, Milken Institute, 2020.*
 4. **Case Study "High Level Mapping to SDGS: Green, Social and Sustainable Bonds," and Working towards a Harmonized Framework for Impact Reporting, International Capital Market Association, June 2023.*
 5. **Case Study: Emily Gustafsson-Wright, et.al., " From Evidence to Scale: Lessons Learne from the Quality Eductional India Development Impact Bond," Brookings Center for Universal Education, November 2022.*
 6. **Case Study: Impact MuniBond: Social bond to tackle poverty and unlock growth in Philadelphia, Impact Alpha, May 25, 2023.*
 7. **Case Study: Refugee Impact Bond, Convergence, February 2023.*
- Measuring Impact:*

1. *Developing DFC's New Development Performance Measurement System: Impact Quotient (IQ) Indicators, U. S. International Development Finance Corporation, 2020. See also: [here](#).*
2. *Ronald Cohen and George Serafaim, "How to Measure a Company's Real Impact," Harvard Business Review, September 3, 2020. (see Video below)*
3. *Practical Impact: GIF's approach to impact measurement, Global Innovation Fund, June 2019.*
4. **Case Study Addy, Chris, et. al., Calculating the Value of Impact Investing, Harvard Business Review, January-February, 2019.*
5. *Technical Guidance, Government Outcomes Lab, Oxford Univeristy, 2023,*

Videos to Watch:

Toby Eccles, Investing in Social Change

Measuring Real Impact: An Overview of the Impact Weighted Account Initiative (Sir Ronald Cohen, GSG Impact; Prof. George Serafeim, Harvard Business School; Quyen Tran, Blackrock)

V. Financing Ideas: Disruptive Science and Tech Finance for SDGs (November 6)

1. ****Allen, Franklin and Yago, Glenn.** "Financing the Future: Market-Based Innovations for Growth". Upper Saddle River, New Jersey: Pearson/Wharton School Publishing, 2010:Chapter 7: Financing Cures
2. ****Reinventing Business through Disruptive Technologies: Sector Trends and Investment Opportunities in Emerging Markets**, IFC 2019.
3. ****Ranil Dissanayake and Bernat Camps Adroque**, The Case for More Pull Financing," Center for Global Development, June 8, 2023.
4. **** Kremer, Michael, Jonathan Levin, and Christopher M. Snyder.** 2020. "Advance Market Commitments: Insights from Theory and Experience." AEA Papers and Proceedings, 110: 269-73.DOI: 10.1257/pandp.20201017
5. ****Alan Ho and Jake Taylor**, "Using Advance Market Commitments for Public Purpose Technology Development," Belfer Center for Science and International Affairs, May 2021.
6. **Unlocking Technology for the Global Goals**, WEF/PwC, January 2020.
7. **** Center for Global Development**, "Making Markets for Development Innovations, December 2022.
8. ***Case Study*Hull, John C. and Lo, Andrew W. and Stein, Roger**, Funding Long Shots (October 25, 2017). Rotman School of Management Working Paper No. 3058472.
9. ***Case Study: Abdullah Alhamdan, Z.M. Halem, et.al.**, Financing Fusion Energy, Journal of Investment Management, 21/1 (2023).
10. ***Case Study: Lo, Andrew W., and Kien Wei Siah (2021)**, Financing Correlated Drug Development Projects, Journal of Structured Finance, <https://doi.org/10.3905/jsf.2020.1.114> .
11. ***Case Study: Vu, Jonathan T., et.al.**, "Financing Vaccines for Global Health Security," Med RXIV, March 2020. See also non-technical summary in "The Challenging Economics of Vaccine Development in the Age of COVID 19, and What can be done about it", Global Forum 2020.
12. ***Forman, Sandra M., Lo, Andrew W., Shilling, Monica and Sweeney, Grace K.** "Funding Translational Medicine via Public Markets: The Business Development Company," Journal of Investment Management, 13/4 (2015): 9-32.
13. **Case Study * Lo, Andrew W. and Naraharisetti, Surya**, 2014, "New Financing Methods in the Biopharma Industry: A Case Study of Royalty Pharma, Inc.," Journal of Investment Management 12, 4-

Videos to Watch:

Andrew Lo, MIT Financial Engineering Lab, New Funding Models for Biomedical Innovation

Michael Kremer, University of Chicago, Development Innovation Lab, Designing Incentives for vaccine Innovation, Production and Distribution: Lessons from the pandemic

Anya Eldan, Start-Up Division, Israel Innovation Authority, Bio-Convergence

Andrew Lo, MIT Financial Engineering Lab, Lessons from Hollywood

VI. Infrastructure (Resilient, Social-Environmental, and Tourism) (November 13)

Infrastructure and Urban Revitalization Finance–

Practitioner Guest Lecture:

Dan Carol, “The Case for an Infrastructure Pre-Development Fund,” Milken Institute (April 2020)

Public Finance Innovations

- 1.***See Global Infrastructure Hub—G20 Knowledge Center for sustainable resilient, and inclusive Infrastructure—Analysis, Case Uses, and infrastructure technology.*
- 2.**“Unlocking Infrastructure Investment: Innovative Funding and Financing in Regions and Cities,” OECD Report for G20 Infrastructure Working Group, 2021.*
- 3.***Perspectives on Sustainable Development Finance: Infrastructure in the 21st Century, Guggenheim, 2022.*
- 4. **New Perspectives on Results-Based Blended Finance for Cities: Innovative Finance Solutions for Climate-Smart Infrastructure, International Bank for Reconstruction and Development/World Bank 2019.*
- 5.**C40 Finance Facility, How to Finance Urban Infrastructure: Explainer, 2018*
- 6. **Godnar, Gordon and B. Comer, Project Finance Teaching Note,” Wharton School, University of Pennsylvania, 1996. UPDATE: Dovrak, Paul, “Put a fence around It: Project finance explained,” Windpower engineering and Development, April 11, 2016.*
- 5.**Huxley, Joe, “Value Capture Finance, Making Urban Development Pay Its Way,” Urban Land Institute, 2009.*
- 6.**Asset Backed Securitization,” Stern School of Business, NYU, 2016.*
- 7.Case Study*Satterhwaite, David “The Impact of Urban Development on Risk in Sub-Saharan Africa’s cities with a focus on small and intermediate Urban Centers,” International Journal of Disaster Risk Reduction, 26 (2017) 16-23.*
- 8.Case Study: * “New Perspectives on Climate Finance for Cities: Finance Solutions for New and Emerging Infrastructure Approaches to Urban Climate Mitigation and Adaptation,” Siemens-Citi-C40 Cities. 2021/*
- 9. Case Study: “Hartford County Metropolitan District,” Moody’s Credit Opinion, August 2022.*
- 10.Case Study: “Financing Urban Resiliency: Coastal Resiliency in Lower Manhattan,”*
Milken Institute Financing, Financial Innovation Lab, September 2019

Videos to Watch:

"Infrastructure, Resilience and Recovery: A Webinar Series on Innovative Policy, Funding and Financing Mechanisms for a New Era," Milken Institute/ United for Infrastructure, June 2020.

(Note specifically, Laura Drescher, Quantified Ventures; also their website on outcomes-based finance for infrastructure and case studies of DC Environmental Impact Bond and first publicly offered environmental impact bond as key financial innovations here).

"What if we could pave Africa's roads?," Gyude Moore, Center for Global Development, 2022.

Housing

1. ***Allen, Franklin and Yago, Glenn. "Financing the Future: Market-Based Innovations for Growth". New Jersey: Wharton School Publishing, 2010:*
 - a. Chapter 4: *Innovations in Housing Finance.*
2. ***Allen, Franklin, James R. Barth, and Glenn Yago, "Fixing the Housing Market: Financial Innovations for the Future), Wharton School Publishing 2012:*
 - a. Chapter 1, *"Housing Crises Go Global: The Boom, The Bust and Beyond," 1-68;*
 - b. Chapter 4: *"Housing in Emerging Markets," 103-138;*
 - c. Chapter 5: *"Future Innovations in Housing Finance," 139-170, New Jersey: Wharton School Publishing/Pearson, 2012.*
3. ***"Toward Affordable Housing in Israel," Financial Innovations Lab Report, Milken Innovation Center-Jerusalem Institute, October 2013.*
4. *"Financing Green Building in Residential Development," Financial Innovations Lab Report, Milken Innovation Center-Jerusalem Institute, March 2017.*

Regional Development and Project Finance – Infrastructure, Culture, Tourism

Practitioner Guest Lecture:

Paul Burtenshaw, University College-London, Sustainable Preservation Initiative, "Economic Impacts of Cultural Heritage"

Infrastructure

1. *Bob Buhr, Adaptation Bonds: Lessons from the US Municipal Bond Market to Help Close the Adaptation Financing Gap, Imperial College, London Business School, 2022.*
2. *College Business School-Centre for Climate Finance and Investment, September 2022*
3. ***Chou, Ben, et.al., "State Revolving Funds to Build Climate-Resilient Communities," NRDC Issue Paper, June 2014.*
4. ***"Innovative Finance to Address Africa's Infrastructure Needs," Financial Innovations Lab, Milken Institute, May 2016.*

-
5. *Hansen, Kenneth and Molle, Anthony, "World Bank Guarantees for Private Projects," Norton Rose Fulbright, April 12, 2016.
 6. *Case Study Tourism Tax in Jerusalem: Promoting Tourism Development, Milken Innovation Center Policy Brief, September 2, 2019.

Focus on Cultural Heritage Tourism and Sustainable Development

7. Burtenshaw, P., 2017. *Economics in Public Archaeology*. In Moshenska, G. (ed), *Key Concepts in Public Archaeology*. London, UCL Press. 31-42
8. Gould, P., & Burtenshaw, P. 2019 *Community Economic Development and Archaeology*. *Encyclopedia of Global Archaeology* (2nd Edition)
9. Lafrenz Samuels, K., 2016. Transnational turns for archaeological heritage: From conservation to development, governments to governance, *Journal of Field Archaeology*, 41:3, 355-367, DOI: 10.1080/00934690.2016.1174031
10. *Case Study: Levy, T. E., et. al., "At-Risk Heritage and Virtual Reality Visualization for Cyber-Archaeology; The Mar Saba Test Case," in Forte, M. and H. Murtiera, *Digital Cities: Between History and Archaeology*, Oxford University Press, 2020.

VIDEO: Hospitality in the Kidron/Wadi El-Nar River Basin-Green Pilgrimage Mountain Bike

VIDEO: Kidron Wadi El Nar: The Politics of Sewage

VII. Environmental Finance)November 20)

Relevant Weblink for this section: Environmental Finance (www.environmental-finance.com)

UN Environment Program-Finance Initiative (<https://www.unepfi.org/>)

1. **"What Gets Measure Gets Finance: Climate Finance Funding Flows and Opportunities, Rockefeller Foundation and Boston Consulting Group, November 2022.
2. **"Pinko, Nicole, Bella Tonkonogy, et.al., "An Innovative IFI Operating Model for the 21st Century: Capitalization Mobilization Roadmap," Climate Policy Initiative, June 2023.
3. Wharton, Kate, Jake Cusack, and Matthey Tilleard, "Unlocking private capital for nature-based solutions in emerging and frontier markets," Crossboundary, August 2021.
4. Case Study: Enrico Biffis, et.al., *Forestry-Backed Assets Design*, Imperial College Business School, Singapore Green Finance Center, December 2022.
- 5.
6. **Allen, Franklin and Yago, Glenn. *Financing the Future: Market-Based Innovations for Growth*. New Jersey: Wharton School Publishing, 2010:
 - a. Chapter 5: *Environmental Finance: Innovating to Save The Planet*

-
7. ****World Bank Outlook 2050: Strategic Directions Note: Supporting countries to Meet Long-Term Goals of Decarbonization, 2020: 48-78 (Advancing Cross-Cutting Solutions---focus for project implementation plans).**
 8. ****Bolton, Patrick,Z. Halem,and M. Kacpercyk,The Financial Cost of Carbon, Journal of Applied Corporate Finance, 11 June 2022: 17-29.**
 9. ****Bolton, Patrick, et.al., The Green Swan: Central banking and financial stability in the age of climate change, Bank of International Settlements, January 2020: 1-20;47-64.**
 10. ****Bolton, Patrick, Xavier Musca and Frederic Samama, "Global Public Private Investment Partnerships: A Financing Innovation with Positive Social Impact", Journal of Applied Corporate Finance, 32/1 (Spring 2020).**
 11. ***Litterman, Bob "What is the Right Price for Carbon Emissions?" Regulation, Summer 2013: 38-43:Litterman, Bob,"A Pragmatic Approach to Climate Change," April 19, 2016;**
 12. ***Case Study: "Converting Emerging Markets to Green Finance: Amundi and the IFC, Imperial College Business School, March 2020.**
 13. ***Case Study: "Frontier Climate: Advance Market Commitment to Accelerate Carbon Removal," 2023.**
 14. **Case Study: DC Water Environmental Impact Bond, Goldman Sachs/Calvert Foundation, 2016**
 15. **Case Study: Rose, Adam and Dan Wei, "Impacts of the Property Assessed Clean Energy (PACE) program on the economy of California," Energy Policy 137 (2020).**
 16. **Case Study: Green FinTech Blockchain and Energy Grid**
- Required reading: Deloitte. What is a blockchain (Canvas)**
<https://hbr.org/2017/03/what-initial-coin-offerings-are-and-why-vc-firms-care>
<https://hbr.org/2016/05/the-impact-of-the-blockchain-goes-beyond-financial-services>

Suggested resources:

Blockchain is building a new kind of energy grid, Technology Review
How Utilities are using blockchain to modernize the grid, Harvard Business Review, 2017.

Brooklyn Smart Grid – Blockchain-enabled

10.Case Study *Quesnel, Kim, Ajami, Naushua K. and Wyss, Noemi, "Tapping into Alternative Ways to Fund Innovation and Multipurpose Water Projects: A financing Framework from the Electricity Sector," Stanford Woods Center for the Environment, Stanford University, February 2016..

11.Case Study: Danish Climate Investment Fund, September 2017 (KIF and Convergence).

12Case Study: The Great Lakes and St. Lawrence Blue Growth Fund Final Report, 2017

VIDEO: Democratizing Capital for Energy and Sustainable Growth Transitions, Milken Institute

Global Conference, May 2, 2023

If COP 27 proved anything, it is that pledges to achieve sustainable development, resilience, and technology solutions will not be met by unfunded pledges at

international conferences, but by rational financing. In short, what gets measured gets financed. When developing countries must borrow at 11 to 20 percent (wealthy countries pay about few less, the cost of money constitutes an insurmountable barrier to development, especially to middle- and low-income countries in Asia and Africa. Just as hard-hit countries were given access to concessionary borrowing to meet Covid-related costs, so too must developing economies be offered the creative financing needed to create sustainable solutions in the fields of energy, transport, construction, agriculture, and health care. Experts in the fields of international development and finance will discuss how capital structure matters now more than ever in building a regenerative and inclusive global economy for sustainable stability and growth. Speakers include, Irene Arias Hofman, CEO, Inter-American Development Bank Lab; Julie Becker, CEO, Luxembourg Stock Exchange; Yaniv Tepper, Founder, Angeleno Group; Simon Winter, Executive Director, Syngenta Foundation

VIDEO: The Price on Nature (Richard Sandor)

Solid Waste and WASH (Water, Sanitation and Hygiene)

1. *Blass, Vered, Heffer, Shiri, Yago, Glenn and Zecher, Steven, "Financing Solid Waste Disposal in Israel," Financial Innovations Lab Report, Milken Institute, November 2012.
2. Hyun, Christopher, et. al., Sanitation for Low Income Regions: A Cross-Disciplinary Review, Annual Review of Environment and Resources, 2019. 44:287-318, 2019.
3. Hobbs, Shakira and Nicole Barclay, "Sustainability Approach: Food Waste to Energy Solutions for Small Rural Developing Communities," International Journal of Environmental, cultural, Economic and Social Sustainability: Annual Review, 2018.

River Revitalization and Smart Watershed Management

1. *"Financing Kidron/Wadi El Nar River Revitalization," Financial Innovations Lab Report, Milken Institute, July 2013 (Case Study).
2. "Revolving Fund for River Restoration". Financial Innovations Lab Report, Milken Institute, December 2009.
3. Maclean, Caitlin and Yago, Glenn, "Financial Innovations for Freshwater Revitalization: Transboundary Project Finance in Israel, Jordan, and the Palestinian Authority," Financial Innovations Lab Report, Milken Institute, December 2009.
4. Case Study: Walske, Jennifer M. and Laura D. Tyson, "Sanergy: Tackling Sanitation in Kenyan Slums," Berkeley Haas Case Studies, July 2016.
- 5.

Biodiversity

1. **Innovative Finance for Nature and People: Opportunities and Challenges for

-
- Biodiversity-Positive Carbon Credits and Nature Certificates," Global Environment Facility, International Institute for Environment and Development, March 2023.*
2. ***Di Marco, Moreno, et.al., "Sustainable Development Must Account for Pandemic Risk," Proceedings of the National Academy of Sciences, February 25, 2020 177 (8) 3888-3892.*
 3. ***Case Study: Yago, Glenn, "Biodiversity Conservation in Israel," Financial Innovations Lab Report, Milken Institute, July 2012.*
 4. ** Case Study Maclean, Caitlin, Creating Mechanisms for Conservation Finance in Southeast Asia, Financial Innovations Lab Report, Milken Institute, September 2015*

VIDEO: Africa: Economic Recovery and Transformation, Milken Institute Global Conference Oct. 20, 2020

VIII. Global Development Finance -Energy (November 27)

Practitioner Guest Lecture:

TBD

Cara Carmichael, et.al., The Carbon Emissions Impact of Demand Flexibility, New York/Boulder: RMI, February 2021.

Whitney Mann, et.al., Zeroing In: The US Financial Sector Perspective on Net-Zero Lending and Investing, RMI, 2021.

1. **Case Study: Teal Emery, "Solar Can't Scale in the Dark," Energy for Growth Hub, May 2023.*
2. **Case Study: "Climate Investor One", 2022.*
3. **Case Study: "Grid Densification: Innovation Insight" Mini-Grid Innovation Lab, Crossboundary, June 20, 2023.*
4. **Case Study: Pavlak, Leticia P., et.al., Ignite Power in Rwanda: Electric Power on a Different Scale for All? IESE Business School, University of Navarra, OOP-625-E, April 2021*

Case Studies for Catastrophic Risk and Climate Change

1. ***Ando, S., et.al., Sovereign Climate Debt Instruments: An Overview of the Green and Catastrophe Bond Markets, IMF Climate Note, 2002/004.*
2. ***How Agricultural Index Insurance Can Promote Risk management and Resilience in Developing Economies, Feed the Future Innovation Lab for Markets, Risk and Resilience, University of California Davis, September 2019.*
3. **Case Study: Climate Resilience and Adaptation Finance and Technology Transfer Facility, January 2022.*
4. **Case Study: Syroka, Joanna and Wilcox, Richard, "Rethinking International Disaster Aid Finance," Journal of International Affairs, Spring/Summer 2006, 59/2.*

-
5. Beavogui, Mohamed, "Building Resilience Against Climate Change: African Risk Capacity," *Africa Policy Review*, 2018.
 6. *Case Study: Long duration energy storage for a renewable grid, McKinsey & Co., 2021.
 7. **Yago, Glenn (ed.), "Development Finance Case Studies: Innovative Finance for Sustainable Development Goals," Milken Innovation Center-Jerusalem Institute, 2018:
 - a. Case Study 3: Ignite Power, Rwanda;
 - b. Case Study 5: Gigawatt Global, Rwanda;
 - c. Case Study 6: Sustainable Water Finance in California and Israel: Financing Tech Transfer.

Case Studies for Energy

1. Bonner, Dale, MacLean, Caitlin, "Public-Private Infrastructure Financing Solutions," *Financial Innovations Lab Report*, Milken Institute, November 2014.
2. **MacLean, Caitlin, Olderman, Katie "Innovative Financing Models for Energy Infrastructure in Africa," *Financial Innovations Lab Report*, Milken Institute, May 2015.

IX. Development Finance: Food Water Nexus (December 4)

1. **Accelerating Agritech Solutions in Israel, California, and Developing Economies, *Financial Innovations Lab Report*, Milken Innovation Center/Blum Lab, Jerusalem Institute, June 2020.
2. **Climate Bonds Initiative Agricultural Criteria:
<https://www.climatebonds.net/standard/agriculture>
3. **Carney, Kevin, et.al., "The Endowment Effect of Collateralized Loans," *Development Innovation Lab*, University of Chicago, Working Paper, No. 2022-70, May 2022.
4. Herrero, Mario, et.al., "Articulating the effect of food systems innovation on the Sustainable Development Goals," *Lancet Planet Health*, December 8, 2020.
5. *Case Study: Levi, Retsef, Manoj Rajan, Somya Singhvi, Yanchong Zheng, The impact of unifying agricultural wholesale markets on prices and farmers' profitability , *Proceedings of the National Academy of Sciences* Feb 2020, 117 (5) 2366-2371; DOI: 10.1073/pnas.1906854117
6. **Pathways to Prosperity: Rural and Agricultural Finance: State of the Sector Report,
Feed the Future-USAID, ISF, Rural and Agricultural Finance Learning Lab. 2020.
7. **Examining the Climate Finance Gap for Small-Scale Agriculture, *Climate Policy Initiative*, 2020.
8. Rosa, Lorenzo, et.al., "Closing the yield gap while ensuring water sustainability," *Environmental Research Letters*, 13, 104001, 2018,
9. *Tam, Vikki and Chris Mitchell, "How Farmer-Allied Intermediaries can Transform Africa's Food Systems," *Bain and Company*, 2020.
10. *Havemann, T., Negra, C. & Werneck, F. Blended finance for agriculture:

exploring the constraints and possibilities of combining financial instruments for sustainable transitions. *Agric Hum Values* 37, 1281–1292 (2020).

<https://doi.org/10.1007/s10460-020-10131-8>

11. * Domink Kaluser and Christine Negra, *Getting Down to Earth (and Business): Focus on African Smallholders' incentives for Improved Soil Management, Sustainable Food Systems*, 6 October 2020.

12. "Paying for Outcomes—Protecting Human and Animal Health in Sub-Saharan Africa," *Financial Innovations Lab Report*, Milken Institute, February 2011.

13. *Pay for Results in Development: A Primer for Practitioners*, USAID/Palladium, 2018

14. **Yago, Glenn, "Development Finance Case Studies: Innovative Finance for Sustainable Development Goals," *Milken Innovation Center-Jerusalem Institute*, 2017:

a. *Case Study 4: The Case of Aflatoxin and Maize Production Pay-for-Outcomes*; See also: *Ag Results Summary of Project*, here.

b. *Case Study 2: Financing Kidron/Wadi El Nar Revitalization-Waste Water; Treatment and Regional Agriculture and Tourism Development*.

15. *Case Study Du, X., Lu, L., Reardon, T. and Zilberman, D., "The Economics of Agricultural Supply Chain Design: A Portfolio Selection Approach," *American Journal of Agricultural Economics*, 98/5 (10 October 2016):1377-1388.

16. *Case Study: Schmidt, Amy. "The Time is Now for Climate Smart Supply Chains," April 2023. (explores multiple producer, aggregator, and guaranteed offtake agreements).

17. **"Financial Models for Water Sustainability," *Financial Innovations Lab Report*, Milken Innovation Center-Jerusalem Institute, April 2016.

18. * Case Study "Conducting A Feasibility Study for a Financing Facility for Cocoa Smallholders in Ghana," *Convergence*, Rabo Bank, Rainforest Alliance, May 2018

19. *Case Study, "Catalytic Climate Finance Facility (CCFacility), *Convergence and Climate Policy Initiative*, 2023.

20. * Case Study "Financing Fisheries Reform: Blended capital approaches in support of sustainable wild-capture fisheries," *Environmental Defense Fund and Duke Nicholas Institute for Environmental Policy Solutions*, January 18, 2018

21. * Case Study "Financing Sustainable Land Use: Unlocking business opportunities in sustainable land use with blended finance," *KOIS Invest and Blended Finance Taskforce*, January 2018

VIDEO

Somya Singvi, MIT, *Unifying Ag Markets for Price Discovery* (Levi, et.al. Case study above)

X. Global Development Finance—Global Health –(December 11)

1. Shekar, Meera, et.al., "Innovative Financing for Nutrition," *Nature Food*, Volue 4 (23 June 2023):464-471.

2. Kremer, Michael, et.al., "Water Treatment and Child Mortality: A Meta-analysis

and Cost-effectiveness Analysis," BFI Working Paper No. 2022-26, Development Innovation Lab, University of Chicago, January 2023.

3. Damani, Shazneed, et.al., "Using Wastewater Data About Infectious Disease Dynamics in Communities: Issue Brief," Mathematica, Rockefeller Foundation, 2023.

4. Lorcan Clarke, et.al., "Development Impact Bonds Targeting Health Outcomes," Center for Global Development 133, December 2018

5. * Paul Yager, Gonzalo J. Domingo, John Gerdes, Point-of-Care Diagnostics for Global Health, Annual Review of Biomedical Engineering 2008 10:1, 107-144

6. **Chng, Belinda, MacLean, Caitlin, Singh, Harlin, "New Models for Financing Vaccination Programs in Southeast Asia," Financial Innovations Lab Report, Milken Institute, 2016.

7. * Case Study: Lessons from the world's first development impact bond for maternal health," Government Outcomes Lab, Mathematica, 2020.

Required Reading:

1) Final paper-Project Concept Note

Two key readings to prepare for your project:

"High Level Mapping to SDGs: Green, Social and Sustainable Bonds," and Working towards a Harmonized Framework for Impact Reporting, International Capital Market Association, June 2020.

Concept Note for Sustainable Infrastructure, Duke University, Nicholas Institute, July 2020

Requirements:

- Students are requested to choose a topic and submit a one-page outline prior class on (October 13)
- Powerpoint presentations and discussion of each Project Concept Note (done as individual or group no great than 3) will be in a special class review session to be scheduled
- Subject to approval of the topic and the outline, students are required to compose 15-20 pages (double-spaced) and submit the final paper no later than (December 16)
- Late papers will not be accepted.
- The project concept note will be based on diagnostic questions the students wish to pursue focused upon a related to one more specific Sustainable Development Goals related to specific impact measurements. The objective is to develop a feasible and investable development project using the financial toolkit presented in the course work and in research and case studies discussed in the class and potentially

eligible to be included in a social, health, or environmental impact bond or a pooled security for sustainability, social and green bonds under the criteria of the International Capital Markets Association (discussed in reading below and included in high-level mapping of such securities for meet SDGs).

These project concept could be considered for possible further work in a class offered in the Spring do prepare the project concept note into a project implementation plan for Fieldwork fellowships applications by eligible students at the Milken Innovation Center in conjunction with the Blum Lab for Developing Economies at the Jerusalem Institute or existing development finance field sites by other partners in the field in Africa, India, or Latin America as part of our ongoing collaboration between: UC-Berkeley and the Jerusalem Institute-Milken Innovation Center/Hebrew University of Jerusalem School of Business Development Finance Practice Program. Students who complete successful field assignments as Fellows will receive a graduate Development Finance Practice certificate from the Hebrew University of Jerusalem School of Business.

- The project concept note will be based on diagnostic questions the students wish to pursue focused upon a related to one more specific Sustainable Development Goals related to specific impact measurements.

- Their project will need to address the following questions:

- 1. What are the financial bottlenecks for the SDG challenges?*
- 2. Why isn't funding availability? Does the market work?*
- 3. If not, why not?*
- 4. Who could fund and what do they care about?*
- 5. What financial tools can help catalyze that funding through a development capital structure stack or design?*

Additional questions that will need to be addressed in each project implementation proposal would also include:

- Project: What is the project proposing to do?*
- Opportunity: What need is it meeting? Who is interested in the success of this project? Who are the stakeholders?*
- Team: Who is doing it? What is their experience, expertise, roles?*
- Market: Who is the customer? What are the marketing channels to reach the customer?*
- Costs: How much does it cost to build? To operate?*
- Capital Structure: How will it be financed? By whom and under what terms and conditions? What are the returns to each investor?*
- Plan: What is the work plan and milestones?*

-
- *Risks: What are the risks and how will the risks be mitigated?*
 - *Outcomes: What are the outcomes and how will they be measured?*

Students will need to address these issues in their proposal:

- *Different innovative financing tools and resulting instruments for potential impact investments;*
- *Methods of risk mitigation;*
- *Different models for structuring impact investment funds, blended finance models and capital structures, and pooled-securities to develop the financing pipeline;*
- *Examine use of catalytic first loss models, grants, loans, equity, etc. that can be mobilize for impact enterprise and project finance addressing development goals.*
- *Creative ways to target small and middle-size enterprises and projects through pooled securities, revolving loan facilities, fintech, and alternative risk assessment and management models.*

-

2) Completion of case study write-ups and readings presentations for class discussion: You will be asked to review and present case studies and/or readings related to the course from those listed below. Students will be asked to choose their presentation groups by the end of Class Monday , October 31. This summary presentation and related class attendance and engagement in lectures and questions will comprise the second area of course evaluation. (20%) Please note presentation sign-up page on the course website on B-Course.

**Instructor Lecture and Overview (either synchronous or asynchronous) will precede each Guest Lecture or case study presentations as noted below. .*

I. Introduction to Finance Toolkit and Innovative Finance (October 24)

Structural Changes in Capital Markets and Development Finance

- a. Global Trends*
- b. What is Financial Innovation? From Structured to Blended Finance*
- c. Why and How does Capital Structure Matter? (October 24)*

II. Entrepreneurial Finance (October 24)

- a. Lifecycle of Finance*
- b. Business Finance and Capital Structure*
- c. Equity, Debt finance, and Hybrid Debt Instruments*
- d. SME Finance*

III. Project Mechanics Lecture and Workshop on SDGs--Building Solutions Sets into Project Pipeline (October 31)

**Practitioner Guest: Lecturer:*

Steven Zecher, Project Director, Milken Innovation Center-Jerusalem Institute

This week will be devoted to background and development of the Project Development Concept Note for the final work product of the course---linking development finance projects to programs to policies to capital market transactions.

Key background readings for this session are:

***New Perspectives on Results-Based Blended Finance for Cities: Innovative Finance Solutions for Climate-Smart Infrastructure, International Bank for Reconstruction and Development/World Bank 2019.*

***Case Study Arezki, Rabbah, et.al., "From Global Savings Glut to Financing Infrastructure," Economic Policy, April 2017: 221-261.*

***Godnar, Gordon and B. Comer, Project Finance Teaching Note," Wharton School, University of Pennsylvania, 1996.*

UPDATE: Dovrak, Paul, "Put a fence around It: Project finance explained"

***Huxley, Joe, "Value Capture Finance, Making Urban Development Pay Its Way," Urban Land*

Institute, 2009.

****The ABCs of Asset-Backed Securitization," Guggenheim, 2022*

***Asset Backed Securitization," Stern School of Business, NYU, 2016.*

*IV. IV. Impact Investment and Social Finance: Social Impact Bonds and Beyond
(November 7)*

**Practitioner Guest Lecture: TBD*

- a. Pay for performance contracting*
- b. Full-spectrum Asset Class Product and Program Development Finance*
- c. Risk-Return-Impact: Metrics*

*V. Financing Ideas: Disruptive Science and Tech Finance, Focus on Global Health
(November 14)*

**Guest Lecture: Prof. Andrew Lo, MIT Financial Engineering Lab
"Research-Based Obligations and Lessons from Hollywood"*

- a. From Venture Capital Models to Research Bond Obligations*
- b. Disruptive Technologies and the Sustainable Development Goals*

*VI. Infrastructure (Resilient, Social-Environmental, and Tourism Applications)
(November 21)*

Practitioner Guest Lecture:

TBD

Reading:

*Dan Carol, "The Case for an Infrastructure Pre-Development Fund," Milken Institute
(April 2020)*

- a. Infrastructure Projects*
- b. Urban Revitalization*

VII. Environmental Finance (November 28, December 5)

Practitioner Guest Lecture:

*Frederic Samama, Climate Change and Financial Innovation, CIO, Amundi-CPR Asset
Management*

*XI. Development Finance—Blended Finance (Case Study Applications) (December
12)*

Practitioner Guest Lecture:

Dr. Christine Negra, VisantVision, "Blended Finance in Sustainable Agriculture"

XII. Development Finance-Energy (Case Study Applications) (December 26)

Practitioner Guest Lecture:

TBD

Special Readings:

"FERC Order 2222 Levels the Playing Field for Distributed Energy Resources," Claire Gotham, Power and Utilities, February 18, 2021

Cara Carmichael, et.al., The Carbon Emissions Impact of Demand Flexibility, New York/Boulder: RMI, February 2021.

Whitney Mann, et.al., Zeroing In: The US Financial Sector Perspective on Net-Zero Lending and Investing, RMI, 2021.

XIII. Development Finance—Food-Water Nexus (Case Study Applications) (December 26, January 2)

Practitioner Guest Lecturers:

Naty Barak, Chief Sustainability Officer, Netafim/Obia, Community Irrigation Model: Case of Karanataka

Special Readings:

"How to Mobilize Private Investment at Scale in Blended Finance", Convergence and DFID Impact Programme, April 8, 2020

XIV. Development Finance –Global Health (January 9, 16)

TBD

XV. Project Implementation Plan Presentations by Student Teams (January 23)

Course Assignments and Readings

Reference Resource throughout course: Miken Institute 5-Minute Finance

The course presumes some basic knowledge of economics and finance. Please use our 5-Minute Finance app above for review as well as the Glossary and Appendix link supplied as part of the course.

Remedial review and terms (present value, compound interest, understanding capital structure, investment and consumption, Black-Scholes Formula, forward and future contracts, etc.) are easily accessible at Kahn Academic Finance and Capital Markets.

DETAILED READINGS Per Section of Course:

****Required Readings for Lectures**

***For Student Presentations**

I. Introduction to Financial Toolkit and Innovative Finance for Development (October 24)

1. Homi Kharas and Charlotte Rivard, "Financing for sustainable development is clogged," *Brookings Blog*, May 11, 2022.
2. ****Allen, Franklin and Yago, Glenn.** "Financing the Future: Market-Based Innovations for Growth". Upper Saddle River, New Jersey: Pearson/Wharton School Publishing, 2010:
 - a. Chapter 1: The Evolution of Finance;
 - b. Chapter 2: A Framework for Financial Innovation: Managing Capital Structure.
3. ****Anja-Nadine Koenig, Chirs Club and Andrew Apampa,** *Innovative Development Finance Toolbox*, KFW, October 2020.
4. "Integrating nature and knowledge into economics," *Popular Science Background*, Nobel Prize in Economic Sciences, 2018. (Key Reading Background on Endogenous Growth Theory-Romer, et.al.)
5. ****Ross Levine,** "Finance, Growth and Inequality", *IMF Working Paper*, WP/21/164 (June 2021).
6. Levine Aghion, Peter Howitt, and Ross Levine, "Financial Development and Innovation-Led Growth," in T. Beck and R. Levine, *Handbook of Finance and Development*, London: Elgar, 2018
7. Mollaahmetoglu, E. and G. Y. Akcali, "The Missing-Link between Financial Development and Economic Growth: Financial Innovation, *Procedia Computer Science* 158 (2019) 696-704
This important reading contextualizes financial innovation as part of this process.
8. *Economic Growth, Technological Change, and Climate Change*, *Scientific Background Paper*, Economic Sciences. Nobel Prize, 2018. (Key background reading on Nordhaus, Eccles, etc. impact of climate finance and environment, green accounting, etc.).
9. Madsberg, S. and Keohane, G., *Rockefeller Foundation (eds.), The Innovative Finance Revolution*, *Special Issue of Foreign Affairs*, February 2017.
Framework for SDG Aligned Finance, OECD, 2020

Key Videos to Watch:

VIDEO: Milken Innovation Center-Blum Lab for Developing Economies-Jerusalem, How do we do financial field work together

VIDEO: Hans Rosling, Global Population Growth

VIDEO: Tyler Cowan, Marginal Revolution, On Romer's contribution to development economics Endogenous Technological Change

VIDEO: EconJohn, Endogenous (New) Growth Model

VIDEO: EconJohn, Endogenous Growth Models-Learning by Doing

II. A. Structural Changes in Capital Markets (October 24)

1. ****Corporate Finance: A Roadmap to Mainstream SDG Investments**, UN Global Compact Action Platform on Financial Innovation for the SDGs, 2019.

2. ****Capital Markets and Sustainable Finance**, Chapter 5, World Investment Report, 2021, UNCTAD.

i. ***Case Study "High Level Mapping to SDGs: Green, Social and Sustainable Bonds,"** International Capital Markets Association, June 2021.

ii. **The Social Bond Market: Towards a new asset class.** Impact Invest Lab, International Capital Markets Association, 2018

iii. **Handbook: Harmonic Framework for Impact Reporting, Green and Social Bond Principles**, June 2021.

3. Allison Harwood, "Accelerating Securitization in Africa to Finance the SDGs: Future Flow Securitizations," Milken Institute, February 8, 2021."

4. ****Bernstein, Shai, Abhishek Dev and Josh Lerner, "The Creation and Evolution of Entrepreneurial Public Markets,"** Journal of Financial Economics, 136/2 (May 2020): 307-329.

5. ***Freiberg, David, DG Park, George Serafeim, and T. Robert Zochowski. "Corporate Environmental Impact: Measurement, Data and Information."** Harvard Business School Working Paper, No. 20-098, March 2020. (Revised July 2020.)

6. ***Patrick Bolton and Frederic Samama, Capital Access Bonds: Contingent Capital with an option to Convert,"** Economic Policy, April, 2012.

7. ***Case Study: Viability of Gender Bonds in SSA: A Landscape Analysis and Feasibility Assessment**, FSDAfrica/UN Women, September 2020.

8. ***Case Study: Biau, Carole, "Common Capital Market Infrastructure for East Africa: Options for Way Forward,"** Milken Institute, Center for Financial Markets, January 2018.

9. ***Case Study: EUR 7-year Social Bond: African Development Group**, 2021

10. ***Case Study: Masala Green Bond: IFC and YES Bank**

11. ***Case Study: John Schellhase and Harris Mohsin, Ghana's Daakye Program: An African Securitization Case Study**, Milken Institute, 2021.

Key Videos:

Somya Singvi, MIT, Unifying Ag Markets for Price Discovery (Levi, et.al. Case study above)

Investing with Impact through Public Securities Markets to Finance the SDGs, Virtual Forum, Milken Institute, July 8, 2021 (Evan Harvey, Head of Sustainability, Nasdaq,

Shameela Soobramoney, Chief Sustainability Officer, Johannesburg Stock Exchange, Quyen Tran, Impact Investing, BlackRock)

1. **Allen, Franklin and Yago, Glenn. "Financing the Future: Market-Based Innovations for Growth". New Jersey: Wharton School Publishing, 2010:
 - a. Chapter 3: Innovations in Business Finance;
 - b. Appendix: The Black-Scholes Formula.
2. **Allen, Franklin, Xian Gu and Julapa Jagtiani, "A Survey of Fintech Research and Policy Discussion," Working Papers Research Department, WP 20-21, Federal Reserve Bank of Philadelphia, June 2020.
3. *New Horizons in African Finance: Reducing Risk and Mobilizing Financing on a New Scale, African CEO Forum and International Finance Corporation, 2016. See Case Studies on: Azito Energy, Eobank, Cargil SIB on Cocoa Loans, Bayport (Bond Markets), Nutrition, Education (Bridge Academies), and Helios (Private Equity).
4. <https://www.5minutefinance.org/concepts/capital-structure>

Key Videos to watch:

Paddy Hirsh, Capital Structure Explained
Managerial Finance, Capital Structure

"Bridge and Blend: The Role of DFIs in Scaling Sustainable Financing," Milken Institute, Virtual Forum, February 21, 2021: Amit Bouri, Global Impact Investing Network; Joan Larrea, CEO, Covergence; Nancy Lee, Center for Global Development; Monish Mahurkar, IFC

B. Entrepreneurial Finance (October 24)

1. ** IFC SME Ventures: Investing in Private Equity in Sub-Saharan African Fragile and Conflict-Affected Situation, IFC and Cross-Boundary Ventures, October 2018.
2. William Janeway, Ramana Nanda, Matthew Rhodes-Kropf, "Venture Capital Booms and Startup Financing", Working Paper 21-116, 2021.
3. ** Allen, Franklin, Careletti, Elena, et.al., "Improving Access to Banking: Evidence from Kenya" Review of Finance, 2020:1-40, BAFFI CAREFIN Centre Research Paper No. 2018-104, Available at SSRN: <https://ssrn.com/abstract=3305047> or <http://dx.doi.org/10.2139/ssrn.3305047>
4. **Ayyagari, Meghana, et.al., SME Finance, Policy Research Working Paper 8241, World Bank Group, Development Research Group, November 2017.
5. Yago, Glenn, "Development Finance Case Studies: Innovative Finance for Sustainable Development Goals," Milken Innovation Center-Jerusalem Institute, 2018:
 - 1: Aspada, India & Bangladesh
6. "Stimulating Investment in Emerging-Market SMEs," Financial Innovations Lab Report, Milken Institute, 2009.
7. **Case Study: Chu, Michael, and Tahilyani, Rachna, "Aspada: In Search of the Right Structure for Impact Investing," Harvard Business School Case 314-099, April 2014 (Revised July 2014).

Key Videos to watch:

Raman Nanda, "Entrepreneurs as Scientists: Understanding and addressing financing frictions in Deep Tech," Imperial College London Business School, March 24, 2021

Aspada News Story, Young Turks

Financial Innovation Labs, Milken Institute, Bridging Funding Gaps, Solving Global Challenges

III. Project Mechanics Lecture and Workshop on SDGs--Building Solutions Sets into Project Pipeline (October 31)

Practitioner Guest Lecturer:

Steven Zecher, Project Director, Milken Innovation Center-Jerusalem Institute

This week will be devoted to background and development of the Project Development Concept Note for the final work product of the course---linking development finance projects to programs to policies to capital market transactions.

Key background readings for this session are:

***New Perspectives on Results-Based Blended Finance for Cities: Innovative Finance Solutions for Climate-Smart Infrastructure, International Bank for Reconstruction and Development/World Bank 2019.*

***Case Study Arezki, Rabbah, et.al., "From Global Savings Glut to Financing Infrastructure," Economic Policy, April 2017: 221-261.*

***Godnar, Gordon and B. Comer, Project Finance Teaching Note," Wharton School, University of Pennsylvania, 1996.*

UPDATE: Dovrak, Paul, "Put a fence around It: Project finance explained"

***Huxley, Joe, "Value Capture Finance, Making Urban Development Pay Its Way," Urban Land Institute, 2009.*

***Asset Backed Securitization," Stern School of Business, NYU, 2016.*

IV. Impact Investment and Social Finance: Social Impact Bonds and Beyond (November 7)

**Practitioner Guest Lecture:*

Gila Norich, Director, Advisory Services, Social Finance-Israel, Impact Metrics and Development Impact

Intro Reading: Sir Ronald Cohen, Impact: Reshaping Capitalism to Drive Real Change, London: Edbury Press, 2020. Chapters 2 and 3: 34-85.

1. ***Friede, Gunnar, et al., "ESG and Financial Performance: Aggregated Evidence from more than 200 Empirical Studies," Journal of Sustainable Finance and Investment, 5:4, 210 – 233, 2015.*

2. ***Creating Impact: The Promise of Impact Investing, International Finance Corporation, World Bank Group, 2019.*

2. ***Emily Gufstafson-Wright, et. al., What is the Size and Scope of the Impact Bonds Market, Global Economy and Development, Brooking Institution, July 2020. See further reports in this series of evaluations on measuring the success of impact bonds here.*

3. *Lee, Christopher, Ragini Chawla and Aron Betru, Priming SDG Markets: Can International Donors and Implementers Create an Impact Investment Pipeline?, Milken Institute, 2020.*

4. **Case Study "High Level Mapping to SDGS: Green, Social and Sustainable Bonds," and Working towards a Harmonized Framework for Impact Reporting, International Capital Market Association, June 2020.*

Measuring Impact:

1. *Ronald Cohen and George Serafaim, "How to Measure a Company's Real Impact," Harvard Business Review, September 3, 2020. (see Video below)*

2. *Practical Impact: GIF's approach to impact measurement, Global Innovation Fund, June 2019.*

3. **Case Study Addy, Chris, et. al., Calculating the Value of Impact Investing, Harvard Business Review, January-February, 2019.*

Videos to Watch:

Toby Eccles, Investing in Social Change

Measuring Real Impact: An Overview of the Impact Weighted Account Initiative (Sir Ronald Cohen, GSG Impact; Prof. George Serafeim, Harvard Business School; Quyen Tran, Blackrock)

V. Financing Ideas: Disruptive Science and Tech Finance for SDGs(November 14)

1. ***Allen, Franklin and Yago, Glenn. "Financing the Future: Market-Based Innovations for Growth". Upper Saddle River, New Jersey: Pearson/Wharton School Publishing, 2010:Chapter 7: Financing Cures*

-
2. ****Reinventing Business through Disruptive Technologies: Sector Trends and Investment Opportunities in Emerging Markets**, IFC 2019.
 3. ****Seidl da Fonseca R., Pinheiro-Veloso A. (2018) The Practice and Future of Financing Science, Technology, and Innovation. Foresight and STI Governance**, vol. 12, no 2, pp. 6-22. DOI: 10.17323/2500-2597.2018.2.6.22
 4. Walsh P. P., Murphy E, Horan D. "The Role of Science, Technology and Innovation in the UN 2030 Agenda", May 2020, *Technological Forecasting and Social Change*.154.
 5. ***Tincq, B., Cunha Brito, M. and Sinet, L. The Frontiers of Impact Tech: Moonshots worth taking in the 21st Century. Paris: Good Tech Lab, 2019.**
 5. ***Case Study***Hull, John C. and Lo, Andrew W. and Stein, Roger, *Funding Long Shots* (October 25, 2017). Rotman School of Management Working Paper No. 3058472. Available at SSRN: <https://ssrn.com/abstract=3058472> or <http://dx.doi.org/10.2139/ssrn.3058472>
 6. ***Case Study: Lo, Andrew W., and Kien Wei Siah (2021), Financing Correlated Drug Development Projects, Journal of Structured Finance,** <https://doi.org/10.3905/jsf.2020.1.114> .
 7. ***Case Study: Vu, Jonathan T., et.al, "Financing Vaccines for Global Health Security," Med RXIV, March 2020. See also non-technical summary in "The Challenging Economics of Vaccine Development in the Age of COVID 19, and What can be done about it", Global Forum 2020.**
 8. ***Forman, Sandra M., Lo, Andrew W., Shilling, Monica and Sweeney, Grace K. "Funding Translational Medicine via Public Markets: The Business Development Company," Journal of Investment Management, 13/4 (2015): 9-32.**
 9. **Case Study * Lo, Andrew W. and Naraharisetti, Sourya, 2014, "New Financing Methods in the Biopharma Industry: A Case Study of Royalty Pharma, Inc.," Journal of Investment Management 12, 4-**

Videos to Watch:

Andrew Lo, MIT Financial Engineering Lab, *Can Financial Engineering Cure Cancer?*

Anya Eldan, Start-Up Division, Israel Innovation Authority, *Bio-Convergence*

Andrew Lo, MIT Financial Engineering Lab, *Lessons from Hollywood*

VI. Infrastructure (Resilient, Social-Environmental, and Tourism) (November 21)

Infrastructure and Urban Revitalization Finance–

Practitioner Guest Lecture:

Dan Carol, "The Case for an Infrastructure Pre-Development Fund," Milken Institute (April 2020)

Public Finance Innovations

1. ***“The Public Wealth of Cities: How to Turn Around Cities Fortune by Unlocking Public Assets,” Citi GPS: Global Perspectives and Solutions, March 2018.*
 2. ***New Perspectives on Results-Based Blended Finance for Cities: Innovative Finance Solutions for Climate-Smart Infrastructure, International Bank for Reconstruction and Development/World Bank 2019.*
 3. ***Case Study Arezki, Rabbah, et.al., “From Global Savings Glut to Financing Infrastructure,” Economic Policy, April 2017: 221-261.*
 4. ***Godnar, Gordon and B. Comer, Project Finance Teaching Note,” Wharton School, University of Pennsylvania, 1996. UPDATE: Dovrak, Paul, “Put a fence around It: Project finance explained,” Windpower engineering and Development, April 11, 2016.*
 5. ***Huxley, Joe, “Value Capture Finance, Making Urban Development Pay Its Way,” Urban Land Institute, 2009.*
 6. ***Asset Backed Securitization,” Stern School of Business, NYU, 2016.*
 7. *Case Study*Satterhwaite, David “The Impact of Urban Development on Risk in Sub-Saharan Africa’s cities with a focus on small and intermediate Urban Centers,” International Journal of Disaster Risk Reduction, 26 (2017) 16-23.*
 8. ***“New Perspectives on Climate Finance for Cities: Finance Solutions for New and Emerging Infrastructure Approaches to Urban Climate Mitigation and Adaptation,” Siemens-Citi-C40 Cities.*
 9. *Case Study: “Hartford County Metropolitan District,” Moody’s Credit Opinion, July 2018*
 10. *Case Study: “Financing Urban Resiliency: Coastal Resiliency in Lower Manhattan,”
Milken Institute Financing, Financial Innovation Lab, September 2019*
- Videos to Watch:

“Filling the Global Infrastructure Gap” Milken Institute Global Conference, June 2019

“Infrastructure, Resilience and Recovery: A Webinar Series on Innovative Policy, Funding and Financing Mechanisms for a New Era,” Milken Institute/ United for Infrastructure, June 2020.

(Note specifically, Laura Drescher, Quantified Ventures; also their website on outcomes-based finance for infrastructure and case studies of DC Environmental Impact Bond and first publicly offered environmental impact bond as key financial innovations here).

Housing

1. ***Allen, Franklin and Yago, Glenn. "Financing the Future: Market-Based Innovations for Growth". New Jersey: Wharton School Publishing, 2010:
a. Chapter 4: Innovations in Housing Finance.*
2. ***Allen, Franklin, James R. Barth, and Glenn Yago, “Fixing the Housing Market:*

Financial Innovations for the Future), Wharton School Publishing 2012:

- a. Chapter 1, "Housing Crises Go Global: The Boom, The Bust and Beyond," 1-68;
- b. Chapter 4: "Housing in Emerging Markets," 103-138;
- c. Chapter 5: "Future Innovations in Housing Finance," 139-170, New Jersey: Wharton School Publishing/Pearson, 2012.
3. **"Toward Affordable Housing in Israel," *Financial Innovations Lab Report*, Milken Innovation Center-Jerusalem Institute, October 2013.
4. "Financing Green Building in Residential Development," *Financial Innovations Lab Report*, Milken Innovation Center-Jerusalem Institute, March 2017.

Regional Development and Project Finance – Infrastructure, Culture, Tourism

Practitioner Guest Lecture:

Paul Burtenshaw, University College-London, Sustainable Preservation Initiative, "Economic Impacts of Cultural Heritage"

Infrastructure

1. **Chou, Ben, et.al., "State Revolving Funds to Build Climate-Resilient Communities," *NRDC Issue Paper*, June 2014.
2. **"Innovative Finance to Address Africa's Infrastructure Needs," *Financial Innovations Lab*, Milken Institute, May 2016.
3. *Hansen, Kenneth and Molle, Anthony, "World Bank Guarantees for Private Projects," *Norton Rose Fulbright*, April 12, 2016.
4. *Case Study *Tourism Tax in Jerusalem: Promoting Tourism Development*, Milken Innovation Center Policy Brief, September 2, 2019.

Focus on Cultural Heritage Tourism and Sustainable Development

5. Burtenshaw, P., 2017. *Economics in Public Archaeology*. In Moshenska, G. (ed), *Key Concepts in Public Archaeology*. London, UCL Press. 31-42
 6. Gould, P., & Burtenshaw, P. 2019 *Community Economic Development and Archaeology*. *Encyclopedia of Global Archaeology* (2nd Edition)
 7. Lafrenz Samuels, K., 2016. Transnational turns for archaeological heritage: From conservation to development, governments to governance, *Journal of Field Archaeology*, 41:3, 355-367, DOI: 10.1080/00934690.2016.1174031
 8. *Case Study: Levy, T. E., et. al., "At-Risk Heritage and Virtual Reality Visualization for Cyber-Archaeology; The Mar Saba Test Case," in Forte, M. and H. Murtiera, *Digital Cities: Between History and Archaeology*, Oxford University Press, 2020
- VIDEO: *Hospitality in the Kidron/Wadi El-Nar River Basin-Green Pilgrimage Mountain Bike*

VIDEO: *Kidron Wadi El Nar: The Politics of Sewage*

VII. Environmental Finance)November 28, December 5)

Relevant Weblink for this section: Environmental Finance (www.environmental-finance.com)

UN Environment Program-Finance Initiative (<https://www.unepfi.org/>)

1. **Allen, Franklin and Yago, Glenn. *Financing the Future: Market-Based Innovations for Growth*. New Jersey: Wharton School Publishing, 2010:
 - a. Chapter 5: Environmental Finance: Innovating to Save The Planet.
2. **World Bank Outlook 2050: Strategic Directions Note: Supporting countries to Meet Long-Term Goals of Decarbonization, 2020: 48-78 (Advancing Cross-Cutting Solutions---focus for project implementation plans).
3. **Bolton, Patrick, et.al., *The Green Swan: Central banking and financial stability in the age of climate change*, Bank of International Settlements, January 2020: 1-20;47-64.
4. **Bolton, Patrick, Xavier Musca and Frederic Samama, "Global Public Private Investment Partnerships: A Financing Innovation with Positive Social Impact", *Journal of Applied Corporate Finance*, 32/1 (Spring 2020).
5. *Litterman, Bob "What is the Right Price for Carbon Emissions?" *Regulation*, Summer 2013: 38-43:
 - a. Litterman, Bob, "A Pragmatic Approach to Climate Change," April 19, 2016;
 - b. Jones, Peyton, "Selling Stranded Assets: Profit, Protection and Prosperity," *International Endowments Network*, June 17, 2015.
6. Case Study: "Converting Emerging Markets to Green Finance: Amundi and the IFC, Imperial College Business School, March 2020.
7. Case Study: DC Water Environmental Impact Bond, Goldman Sachs/Calvert Foundation, 2016
8. Case Study: Rose, Adam and Dan Wei, "Impacts of the Property Assessed Clean Energy (PACE) program on the economy of California," *Energy Policy* 137 (2020).
9. Case Study: Green FinTech Blockchain and Energy Grid
Required reading: Deloitte. What is a blockchain (Canvas)
<https://hbr.org/2017/03/what-initial-coin-offerings-are-and-why-vc-firms-care>
<https://hbr.org/2016/05/the-impact-of-the-blockchain-goes-beyond-financial-services>

Suggested resources:

Blockchain is building a new kind of energy grid, *Technology Review*

How Utilities are using blockchain to modernize the grid, *Harvard Business Review*, 2017.

Brooklyn Smart Grid – Blockchain-enabled

10. Case Study *Lee, Thomas, "Fossil Fuel Stranded Assets: Efficient Market or Carbon Bubble?" Wharton Public Policy Initiative, April 12, 2017.

11. Case Study *Quesnel, Kim, Ajami, Naushua K. and Wyss, Noemi, "Tapping into Alternative Ways to Fund Innovation and Multipurpose Water Projects: A financing Framework from the Electricity Sector," Stanford Woods Center for the

Environment, Stanford University, February 2016..

12. Case Study: Danish Climate Investment Fund, September 2017 (KIF and Convergence).

13. Case Study: The Great Lakes and St. Lawrence Blue Growth Fund Final Report, 2017

VIDEO: The Price on Nature (Richard Sandor)

Solid Waste and WASH (Water, Sanitation and Hygiene)

1. *Blass, Vered, Heffer, Shiri, Yago, Glenn and Zecher, Steven, "Financing Solid Waste Disposal in Israel," Financial Innovations Lab Report, Milken Institute, November 2012.

2. VIDEO: Kidron Wadi-El Nar

3. Hyun, Christopher, et. al., Sanitation for Low Income Regions: A Cross-Disciplinary Review, Annual Review of Environment and Resources, 2019. 44:287-318, 2019.

4. Hobbs, Shakira and Nicole Barclay, "Sustainability Approach: Food Waste to Energy Solutions for Small Rural Developing Communities," International Journal of Environmental, cultural, Economic and Social Sustainability: Annual Review, 2018.

River Revitalization and Smart Watershed Management

1. *"Financing Kidron/Wadi El Nar River Revitalization," Financial Innovations Lab Report, Milken Institute, July 2013 (Case Study).

2. "Revolving Fund for River Restoration". Financial Innovations Lab Report, Milken Institute, December 2009.

3. Maclean, Caitlin and Yago, Glenn, "Financial Innovations for Freshwater Revitalization: Transboundary Project Finance in Israel, Jordan, and the Palestinian Authority," Financial Innovations Lab Report, Milken Institute, December 2009.

4. Case Study: Walske, Jennifer M. and Laura D. Tyson, "Sanergy: Tackling Sanitation in Kenyan Slums," Berkeley Haas Case Studies, July 2016.

Biodiversity

1. **Moving Mountains: Unlocking Private Capital for Biodiversity and Ecosystems," The Biodiversity Finance Initiative, Finance for Nature, UNDP, 2019.

2. **Di Marco, Moreno, et.al., "Sustainable Development Must Account for Pandemic Risk," Proceedings of the National Academy of Sciences, February 25, 2020 177 (8) 3888-3892.

3. **Case Study: Yago, Glenn, "Biodiversity Conservation in Israel," Financial Innovations Lab Report, Milken Institute, July 2012.

4. * Case Study Maclean, Caitlin, Creating Mechanisms for Conservation Finance in Southeast Asia, Financial Innovations Lab Report, Milken Institute, September 2015

VIII. Global Development Finance – Blended Finance (December 12)

1. **Yago, Glenn and Allen, Franklin “Financing the Developing World,” *World Financial Review*, September-October 2011:44-48
2. **Price, Jennifer and Najada Kumbuli, “Blended Finance: what is it, what it isn’t and how to use it for maximum impact” <https://www.calvertimpactcapital.org/blog/822-blended-finance-what-is-it-what-it-isnt-and-how-to-use-it-for-maximum-impact/>, Calvert Impact Capital, August 17, 2018
3. **“How to Mobilize Private Investment at Scale in Blended Finance”, *Convergence and DFID Impact Programme*, April 8, 2020
4. **Lee, Nancy and Dan Preston, “The Stretch Fund: Bridging the Gap in the Development Finance Architecture,” *Center for Global Development*, December 2019
5. *Designing an Israeli Development Financing Platform: Towards Sustainable Development Goals*, *Financial Innovations Lab Report*, June 2019.
6. *Convergence Blending Global Finance " The State of Blended Finance 2020"*, Published October 2020.
7. Kamstra, Mark and Shiller, Robert J., “The Case for Trills: Giving the People and their Pension Funds a Stake in the Wealth of Nations,” *Cowles Foundation Discussion Paper*, No.1717, August 2009.
8. Lee, Chris, Aron Betru and Paul Horrocks, “Guaranteeing the Goals: Adapting Public Sector Guarantees to Unlock Blended Financing for the U. N. Sustainable Development Goals,” *Milken Institute and OECD*, April 2018.
9. “Innovative Financing for Development: Scalable Business Models that Produce Economic, Social and Economic Outcomes,” *Global Development Incubator*, September 2014.
10. * Case Study Gustafsson-Wright, Emily, .et.al., “Impact Bonds in Developing Countries,” *Brookings and Convergence Finance*, September 2017.
11. *Betru, Aaron, Huang, Ziyi, and Mueller, Jackson, “Leaving Transferred Money on the Table: Will Remittance-Linked Financial Products Add Value to Development Finance?”, *Viewpoints*, *Milken Institute*, March 2017.
12. *Akkoyunlu, Sule and Stern, Maximillian “An Empirical Analysis of Diaspora Bonds,” *Graduate Institute-Geneva*, *Research Paper 3*, 2012.

VIDEO: *Africa: Economic Recovery and Transformation*, *Milken Institute Global Conference* Oct. 20, 2020

IX. Global Development Finance -Energy (December 26)

Practitioner Guest Lecture:

TBD

Special Readings:

"FERC Order 2222 Levels the Playing Field for Distributed Energy Resources," *Claire*

Gotham, Power and Utilities, February 18, 2021

Cara Carmichael, et.al., *The Carbon Emissions Impact of Demand Flexibility*, New York/Boulder: RMI, February 2021.

Whitney Mann, et.al., *Zeroing In: The US Financial Sector Perspective on Net-Zero Lending and Investing*, RMI, 2021.

1. *Case Study *Tonknogy, Bela et.al., "Blended Finance in Clean Energy: Experiences and Opportunities," *Climate Policy Initiative*, January 2018.
2. *Case Study "Crossboundary Energy," *Convergence*, October 2016.
3. *Case Study" Pavlak, Leticia P., et.al., *Ignite Power in Rwanda: Electric Power on a Different Scale. . .for All?* IESE Business School, University of Navarra, OOP-625-E, April 2021

Case Studies for Catastrophic Risk and Climate Change

1. **How Agricultural Index Insurance Can Promote Risk management and Resilience in Developing Economies, *Feed the Future Innovation Lab for Markets, Risk and Resilience*, University of California Davis, September 2019.
2. "Financial Innovations for Catastrophic Risk: Cat Bonds and Beyond," *Milken Institute, Financial Innovations Lab Report*, Milken Institute, April 2008.
3. *Case Study Syroka, Joanna and Wilcox, Richard, "Rethinking International Disaster Aid Finance," *Journal of International Affairs*, Spring/Summer 2006, 59/2.
4. Beavogui, Mohamed, "Building Resilience Against Climate Change: African Risk Capacity," *Africa Policy Review*, 2018.
5. **Yago, Glenn (ed.), "Development Finance Case Studies: Innovative Finance for Sustainable Development Goals," *Milken Innovation Center-Jerusalem Institute*, 2018:
 - a. Case Study 3: *Ignite Power, Rwanda*;
 - b. Case Study 5: *Gigawatt Global, Rwanda*;
 - c. Case Study 6: *Sustainable Water Finance in California and Israel: Financing Tech Transfer*.

Case Studies for Energy

1. Bonner, Dale, MacLean, Caitlin, "Public-Private Infrastructure Financing Solutions," *Financial Innovations Lab Report*, Milken Institute, November 2014.
2. **MacLean, Caitlin, Olderman, Katie "Innovative Financing Models for Energy Infrastructure in Africa," *Financial Innovations Lab Report*, Milken Institute, May 2015.

X. Development Finance: Food Water Nexus (January 2, 9)

Practitioner Lecturer:

Naty Barak, Chief Sustainability Officer, Netafim-OBIA, The Community Irrigation Model:

Lessons from Karanataka

-
1. ****Accelerating Agritech Solutions in Israel, California, and Developing Economies**, Financial Innovations Lab Report, Milken Innovation Center/Blum Lab, Jerusalem Institute, June 2020.
 2. Herrero, Mario, et.al., "Articulating the effect of food systems innovation on the Sustainable Development Goals," *Lancet Planet Health*, December 8, 2020.
 3. *Case Study: Levi, Retsef, Manoj Rajan, Somya Singhvi, Yanchong Zheng, The impact of unifying agricultural wholesale markets on prices and farmers' profitability , *Proceedings of the National Academy of Sciences* Feb 2020, 117 (5) 2366-2371; DOI: 10.1073/pnas.1906854117
 4. ****Pathways to Prosperity: Rural and Agricultural Finance: State of the Sector Report**,
Feed the Future-USAID, ISF, Rural and Agricultural Finance Learning Lab. 2020.
 5. ****Examining the Climate Finance Gap for Small-Scale Agriculture**, Climate Policy Initiative, 2020.
 6. Rosa, Lorenzo, et.al., "Closing the yield gap while ensuring water sustainabilityl," *Environmental Research Letters*, 13, 104001, 2018,
 7. *Tam, Vikki and Chris Mitchell, "How Farmer-Allied Intermediaries can Transform Africa's Food Systems," Bain and Company, 2020.
 8. *Havemann, T., Negra, C. & Werneck, F. Blended finance for agriculture: exploring the constraints and possibilities of combining financial instruments for sustainable transitions. *Agric Hum Values* 37, 1281-1292 (2020).
<https://doi.org/10.1007/s10460-020-10131-8>
 9. * Domink Kaluser and Christine Negra, *Getting Down to Earth (and Business): Focus on African Smallholders' incentives for Improved Soil Management, Sustainable Food Systems*, 6 October 2020.
 10. "Paying for Outcomes—Protecting Human and Animal Health in Sub-Saharan Africa," *Financial Innovations Lab Report*, Milken Institute, February 2011.
 11. *Pay for Results in Development: A Primer for Practitioners*, USAID/Palladium, 2018
 12. ****Yago, Glenn**, "Development Finance Case Studies: Innovative Finance for Sustainable Development Goals," Milken Innovation Center-Jerusalem Institute, 2017:
 - a. Case Study 4: The Case of Aflatoxin and Maize Production Pay-for-Outcomes; See also: Ag Results Summary, here.
 - b. Case Study 2: Financing Kidron/Wadi El Nar Revitalization-Waste Water; Treatment and Regional Agriculture and Tourism Development.
 13. * Case Study Du, X., Lu, L., Reardon, T. and Zilberman, D., "The Economics of Agricultural Supply Chain Design: A Portfolio Selection Approach," *American Journal of Agricultural Economics*, 98/5 (10 October 2016):1377-1388.
 14. ****"Financial Models for Water Sustainability"**, Financial Innovations Lab Report, Milken Innovation Center-Jerusalem Institute, April 2016.
 15. * Case Study "Conducting A Feasibility Study for a Financing Facility for Cocoa Smallholders in Ghana," *Convergence*, Rabo Bank, Rainforest Alliance, May 2018
 16. * Case Study "Financing Fisheries Reform: Blended capital approaches in support of sustainable wild-capture fisheries," *Environmental Defense Fund* and

Duke Nicholas Institute for Environmental Policy Solutions, January 18, 2018
17. * Case Study "Financing Sustainable Land Use: Unlocking business opportunities in sustainable land use with blended finance," KOIS Invest and Blended Finance Taskforce, January 2018

XI. Global Development Finance—Global Health –(January 16)

1. Lorcan Clarke, et.al., "Development Impact Bonds Targeting Health Outcomes," Center for Global Development 133, December 2018
2. * Paul Yager, Gonzalo J. Domingo, John Gerdes, Point-of-Care Diagnostics for Global Health, Annual Review of Biomedical Engineering 2008 10:1, 107-144
3. **Chng, Belinda, MacLean, Caitlin, Singh, Harlin, "New Models for Financing Vaccination Programs in Southeast Asia," Financial Innovations Lab Report, Milken Institute, 2016.
4. * Case Study "The Utkrisht Impact Bond Case Study," Convergence: Blending Global Finance: January 2018

XIV. Program Implementation Plan Team Presentations (January 23)

Additional Reading Material:

Grading Scheme:

Essay / Project / Final Assignment / Home Exam / Referat 60 %
Presentation / Poster Presentation / Lecture/ Seminar / Pro-seminar / Research proposal 20 %
Attendance / Participation in Field Excursion 20 %

Additional information:

REQUIREMENTS:

All readings are required. Together with attendance at the lectures and participation in structured discussions they will provide students with a tool kit to develop a concise proposal focused on financing a targeted development impact (the course's final project). This end of semester project will be a proposal for the application of an innovative finance product(s) to a project or program that would target a specific sector (agriculture/food, health, energy, or environmental), geography (developing/frontier economy); and/or technology transfer or development application related to the UN's sustainable development goals. This will require a description of the proposed project or program, milestones, project targets, outputs,

inputs (including financial, technology and intellectual property inputs), identification and quantification of social, economic and/or environmental outcomes, proposed capital structure, sources and uses of funds and a targeted range of return on investment and social/environmental impact (including identification of potential avoided costs). This would include the identification of specific financial tools (bonds, notes, guarantees and credit enhancement, grants, performance based contracts, revolving loan funds or structured finance product, etc.) and how they might be applied to serve the development target.

Themes for these project proposals would include increasing food and agriculture (agricultural productivity, improve food quality and sustainability), global health (including diagnostics, primary care and community projects, treatment modalities and preventive medicine; bio based and sustainable solutions), energy (low carbon projects and climate change adaptation), and environmental finance (sustainable water, land and forest management, conservation and ecosystem services, biodiversity, drought prevention, carbon projects, etc.). Projects could include:

- SME finance for enterprise development (compare and contrast specific private equity, revolving loan fund models, structured finance solution etc.);
- Environmental or energy infrastructure (use modern finance mechanisms such as risk pooling and risk transfer to create climate response systems to protect food security, technology transfer for water technology, water quality/recycling, distributed water treatment and production or on-grid, off-grid, or under-grid renewable energy project);
- Agricultural or food innovation (plant or soil science technology innovations, post-harvest, or supply chain finance models utilizing agricultural pull-mechanisms);
- Global health innovation (development impact bond, product development partnership, advanced market commitment applied to a vaccine, treatment modality, or preventive measure).

These project proposals would address a prospective practical development project and explicate the deployment of a development finance innovation.

The project proposal would address how innovative finance could design a capital structure for a project or development target that mobilizes:

- 1) new pools of private and public revenue streams;
- 2) new revenues options (e.g., tax, charges, fees, bond sales);
- 3) new incentives (frontloading and debt-based instruments, philanthropic/government guarantees, public-private partnerships, insurance, and other market-based mechanisms).

These projects can be completed as individual (or teams of two reflecting the team members' increased level of effort to meet this assignment's objective).

Guidelines and an example of such a project implementation proposal will be discussed in the first class on October 21.

Through the projects, students will demonstrate their ability to:

- Design and construct an innovative finance application (for either a proof of concept or beta site project) in a developing economy;*
- Measure, analyze and report development impacts of an innovative finance project;*
- Identify and develop how a development impact investment would benefit and expand capital access through the creative use of innovative financing tools;*
- Assist a high-impact project to access flexible market and below-market financial tools;*
- Identify how to structure the transaction and identify potential interested partners with aligned interests in the proposed project.*