Lecture 8
Finance I

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History of Economic Growth and Crises
10 November 2020

Outline of the course

1. The Malthusian Era
2. Fundamental causes of growth
3. Innovation and crises
    1. Technology
    2. **Finance**
        1. overview of money, banks, bonds, annuities, insurance, stocks
        2. financial innovation and politics: revolutionary England
        3. next lecture: crises
4. Unleashing talent

Commodity money

Persson (2010, Ch 7)

- Money reduces transaction costs and risk through three functions
  - means of payment
  - store of value
  - unit of account
- Commodity money
  - based on the intristic value of metal, shells, pearls, furs, salt, grains, cigarettes...
  - can be anything that is easily recognizable and has a high value-to-weight ratio

Low value-to-weight ratio: Sweden issued copper-based coins in 1607. The intristic value of copper was very low and thus these *plåtmynt* ended up weighting up to 19.7kg. To deal with the pratical problem of such heavy currency. Johan Palmstruch's Stockholms Banco issued the first European bank notes in 1657. See Lappalainen (2007): *Maailman painavin raha* for a wonderful account of this period.

Bill of Exchange

Persson (2010, Ch 7)

- Metal money impractical for long-distance trade $\rightarrow$ Bill of Exchange
  - essentially a promise from the debtor to pay the creditor later
  - initiated by Italian merchant bankers in the 13th century, spread with Italian migration, Hanseatic League followed later
  - initially an instrument for trade, but became a credit instrument and a substitute for money

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- Discounting of bills
  - introduced in Antwerpen in later 16th century
  - idea: intermediary buys the bill at a discount before it matures

- Banknote is kind of a ‘mutation’ of the bill of exchange
  - advantage: did not require the chain of liability
  - ... only the reputation of the bank mattered
- Banknotes issued by private banks until 20th century
- Link to commodity money until 1971

618–907: Merchant receipts, China
960: first generally circulating notes, China
1657: Stockholms Banco’s notes for copper
1690s: London banks start offering deposit facilities, discounting, clearing, note-issuing (e.g. Bank of England established in 1694)
1855: fully printed notes

The Moneychanger and his Wife by Marinus Claeszoon van Reymerswaele, 1539

Usury and interest rates

Persson (2010, Ch 7), Ferguson (2007, Ch 1)

- Early Christian thought: any positive interest rate is usury and thus Christians are not allowed to demand interest
- The Church became more flexible around the 16th century
  - pawnshops charged "rent for storage space", lending fees
  - opportunity cost became a legitime ground for an interest rate
- Much of financial services provided by Jews
  - reinforced by restrictions to work other occupations
  - e.g. *ghetto nuovo* established in Venice in 1516

The emergence of modern banking

Persson (2010, Ch 7), Ferguson (2007, Ch 1)

- Merchant banks
  - slowly evolved from the medieval form to offer everything from underwriting bonds to originating foreign loans
  - e.g. Rothschilds, Barings (late 18th century)
- Commercial banks and industrial investment banks
  - joint stock banks allowed in Britain in 1858
  - industrial investment banks more important in the continent
- Saving banks and cooperatives (late 18th century onwards)
  - owned by their members who subscribe to a common fund
  - saving device, banking services to low income people
- Postal banks
  - starting in UK in 1861 (a cheap way to finance the public debt)

Fractional reserve banking

Persson (2010, Ch 7), Ferguson (2007, Ch 1)

- Example: Stockholms Banco was also a *Lanebank*
  - money left on deposits could profitably be lent out to borrowers
  - Ferguson: "since depositors were highly unlikely to ask *en masse* for their money, only a fraction of their money needed to be kept in the bank's reserve at any given time"
  - this is an example of fractional reserve banking

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- Fractional reserve banking brought important benefits
  - allowed the money supply to increase (money multiplier)
  - maturity transformation: "borrowing short, lending long"

Fractional reserve banking

Persson (2010, Ch 7), Ferguson (2007, Ch 1)

- ... and dangers
  - in 1663 the depositors of Stockholms Banco *did* ask for their money *en masse* and the bank collapsed (Palmstruch imprisoned, the state took over and eventually the bank turn into the Riksbanken)
  - many bank runs followed (more about this in the next lecture)

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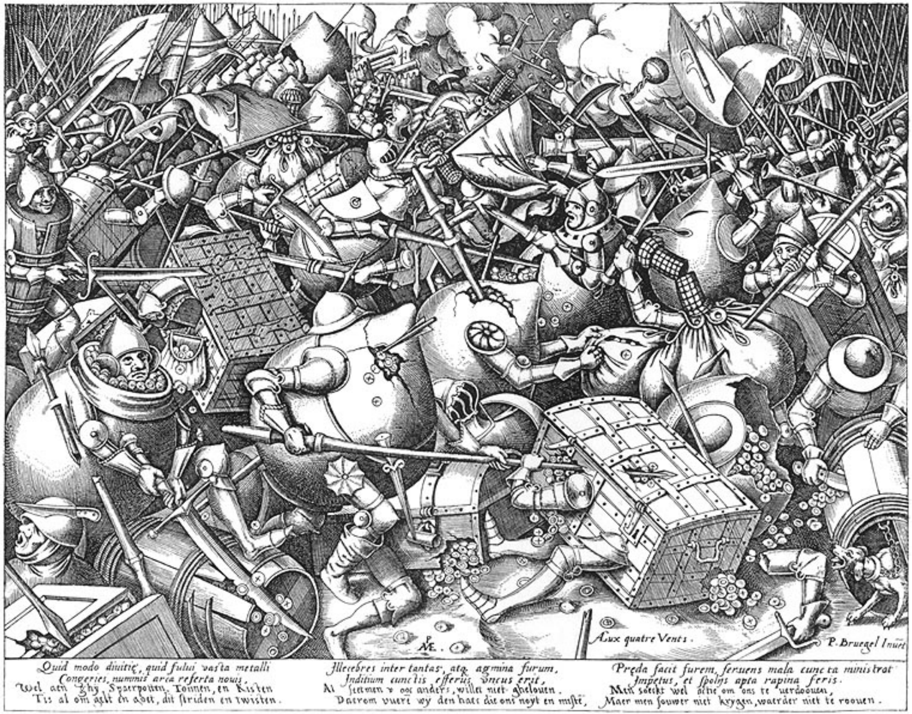
- Solution: central banks
  - Bank of England and Riksbanken gradually developed public functions
  - France (1800), Finland (1812), Germany (1875), USA (1913)
  - Bagehot's dictum (1873): lenders of last resort



The Battle about Money,
1570 Pieter van der Heyden
after Pieter Bruegel the Elder

Government loans (for warfare)

Poterba (2005), Ferguson (2007, Ch 2)

- 12th century Venice (later Florence): forced loans
  - instead of taxes, the wealthy borrowed money to the state
  - forced $\rightarrow$ interest was not usury
  - active secondary market for these bonds
- 13th century France: annuities
  - buyer gets a perpetual stream of annual payments
  - seller could redeem the contract by paying back the principal
- 17th century Netherlands: annuities, lottery loans, tontines...
  - there were more than 65,000 Duch *rentiers* by 1650
  - the financial innnovations adopted in England after the Glorious Revolution (the financiers came with William of Orange)

Age-related annuity pricing

Poterba (2005)

- Suppose you are selling life-time annuity for a fixed price
  - would you rather sell it to someone in her 20s or someone in his 80s?

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  - but how *much* more should she pay?

Age-related annuity pricing

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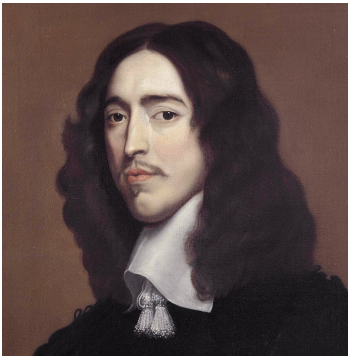
- Suppose you are selling life-time annuity for a fixed price
  - would you rather sell it to someone in her 20s or someone in his 80s?
  - but how *much* more should she pay?
- First answered by Jan de Witt. His work builded on three previous achievements
  - discounting certain income streams
  - development of formal probability theory
  - collection of statistical information on births and deaths



Jan de Witt (1625–1672), a mathematician and key political figure in the mid-17th century Netherlands, published his *Value of Life Annuities in Proportion to Redeemable Annuities* in 1671

Fibonacci and the Financial Revolution

Goetzmann (2005)

- Fibonacci's *Liber Abaci* published in 1202
  - famous for introducing Hindu–Arabic numbers to Europeans (and for the Fibonacci series)
- In fact, it is almost entirely devoted to
  - calculating present value
    (the first part required for de Witt's work)
  - compounding interest, evaluating geometric series, pricing goods and monies (dealing with complex variety of weights, measures and currencies)

Leonardo of Pisa, known as Fibonacci, by unknown artist, Born c. 1170, died c. 1250.

Probability and expected value

Ferguson (2007, Ch 4)

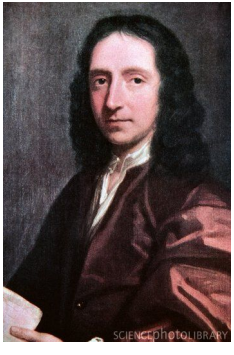
- Probability theory has its roots in gambling
  - Pierre de Fermat and Blaise Pascal first formulated the concept of expected value in 1654 as a reply to a challenge of a gentleman gambler Chevalier de Méré (but didn't publish it)
- Christiaan Huygens (1657)
  - first treatise on probability theory
- Jakob Bernoulli (posthumous, 1713)
  - Law of Large Numbers
- More contributions to this new science, Statistics, followed

Pierre de Fermat (top) and Blaise Pascal (bottom).

Life tables

Poterba (2005)

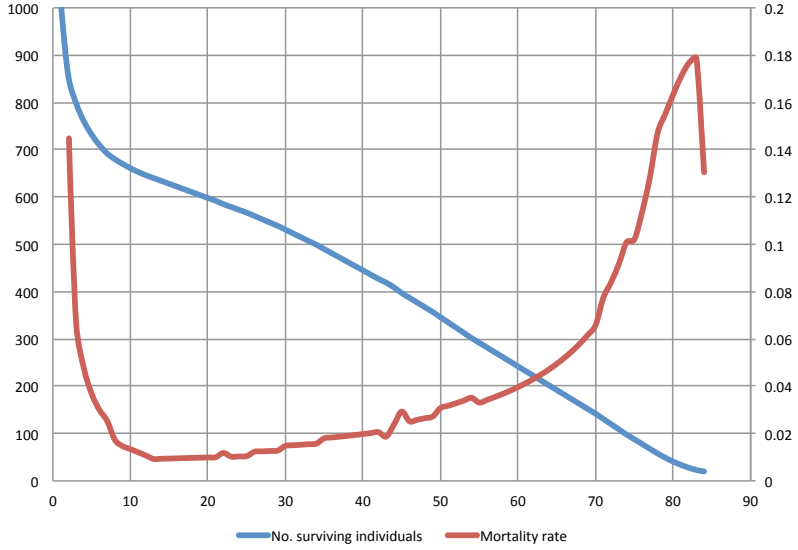
- Early work
  - Jan Hudde: mortality rates using 1,500 annuities sold by Amsterdam in the 1580s
  - John Graunt: estimates of births, deaths, and population size in London
- Halley (1693) An estimate of the degrees of the mortality of mankind, drawn from curious tables of the births and funerals at the city of Breslaw; with an attempt to ascertain the price of annuities upon lives. *Philosophical Transactions* 17: 596-610.
  - analysis of 1,238 births and 1,174 deaths in Breslau



Edmond Halley (1656–1742), an English astronomer, geophysicist, mathematician, meteorologist, and physicist. He also made the critical breakthrough in constructing life tables and thus enabled life insurance and (correctly priced) annuity markets.

Breslau Table

Halley (1693, Transactions)



Annuity pricing table

Halley (1693, Transactions)

Age	Years Purchase	Age	Years Purchase	Age	Years Purchase
1	10.28	25	12.27	50	9.21
5	13.40	30	11.72	55	8.51
10	13.44	35	11.12	60	7.60
15	13.33	40	10.57	56	6.54
20	12.78	45	9.91	70	5.32

Halley (1693, p. 604): "On this depends the Valuation of Annuities upon Lives; for it is plain that the Purchaser ought to pay for only such a part of the value of the Annuity as he has Chances that he is living; and this ought to be computed yearly and the Sum of all those yearly Values being added together will amount to the value of the Annuity for the Life of the Person proposed. [...] This will without doubt appear to be a most laborious Calculation, but it being one of the principal Uses of this Speculation and having found some Compendia for the Work, I took the pains to compute the following Table."

Life insurance: Scottish Widows

Ferguson (2007. Ch 4)

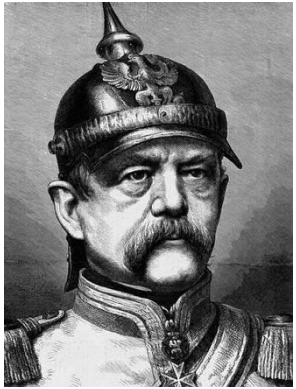
- These innovations also enabled life insurances
  - annuities are really just "reverse life insurance"
- Scottish Ministers' Widows Fund (1743)
  - founded by minister Alexander Webster and Robert Wallace (with the help of professor of mathematics Colin Maclauren)
  - provided life insurance to Scottish ministers (universities of Edinburgh, Glasgow and St Andrews joined right away)
- Novelties
  - probabilities of members deaths carefully estimated
  - invested the annual premiums
- Served as a model for other life insurance funds
  - by mid-19th century England "being insured was as much a badge of respecetability as going to Church on Sunday"

Maritime and fire insurance

- Maritime insurance
  - origins in the maritime loans (Antiquity, 14th century Italy)
  - 1680s: Edward Lloyd opened a coffee house that became popular with ship owners, merchants and captains
  - led to the establishment of the insurance market
  - 1774: Society of Lloyd's (pay-as-you-go, unlimited liability for underwriters)
- 1680: the first fire insurance company in London

Social insurance: Bismark's Germany

- 1883: Sickness Insurance Law
  - only for the industrial laborers
  - workers paid 2/3, employers 1/3
  - minimum medical treatment, sick pay for 13wk
- 1884: Accident Insurance Law
  - paid entirely by the employers
  - replaces the sickness insurance from 14th week
  - medical treatment, pension up to 2/3 of wages
- 1889: Old Age and Disability Insurance Law
  - financed by government, employers, workers
  - pension annuity for workers over 70 years old
  - covered all categories of workers



Otto von Bismark, the father of the welfare state, was a conser- vative Prussian who dominated Germany between 1860s–1890.

Joint-stock companies: early examples

Malmendier (2005), Ferguson (2007, Ch 3)

- *Publicani*s in Roman Republic
  - ran large-scale companies all over Rome's territory
  - mostly public works and services for the government
  - reached their height during the last two centuries BC
- *Société des Moulins du Bazacle*, Toulouse 1250
  - 96 shares traded at a value that depended on the profitability of the mills the society owned
- Stora, Sweden 1288
  - documented stock transfer for 1/8 of the company

Limited-liability joint stock companies: VOC

Ferguson (2007, Ch 3)

- Duch East India Company (VOC) established in 1602
  - merged six smaller, limited term companies
- Novelties of the stucture of VOC
  - limited liability: investors could lose only their investment
  - subscription open to all residents, no upper limit
    $\rightarrow$ unprecendented scale (8*capital of the English East Indian Company)
  - company board (*Heeren XII),* stock holders had little power
  - shares tradeable on the Amsterdam Stock Exchange
- Gave rise to the *Bourse* and the Amsterdam Exchange Bank
  - provided a foundation for a new kind of economy
  - interestingly there never were a VOC bubble

English overseas joint-stock companies

Jha (2015)

- First joint-stock company to trade directly with Indies (1552)
  - enabled non-merchants to take advantage of overseas opportunities, without specializing in commerce
  - no limited liability, no secondary markets
- Great enthusiasm after Drake's circumnavigation (1580)
  - more than 6,366 investors in 1575–1630, including 23% of members of parliament seated in that period
- ... that declined as the companies failed to make profit
  - largely due to the Crown governing foreign trade

King vs Parliamentary Control: England 1640–60

Jha (2015)

Before 1640

- Crown calls/dismisses parliament at will ("Crisis of parliaments" 1629-1640)
- Crown has independent finances, control over customs, foreign policy, war
- England peripheral to European commerce

After 1660

- Parliament can convene itself
- Parliament controls finances and thus foreign policy
- Navigation Acts, rise of English Navy, trade boom
- Trajectory towards increasingly representative government, Bill of Rights

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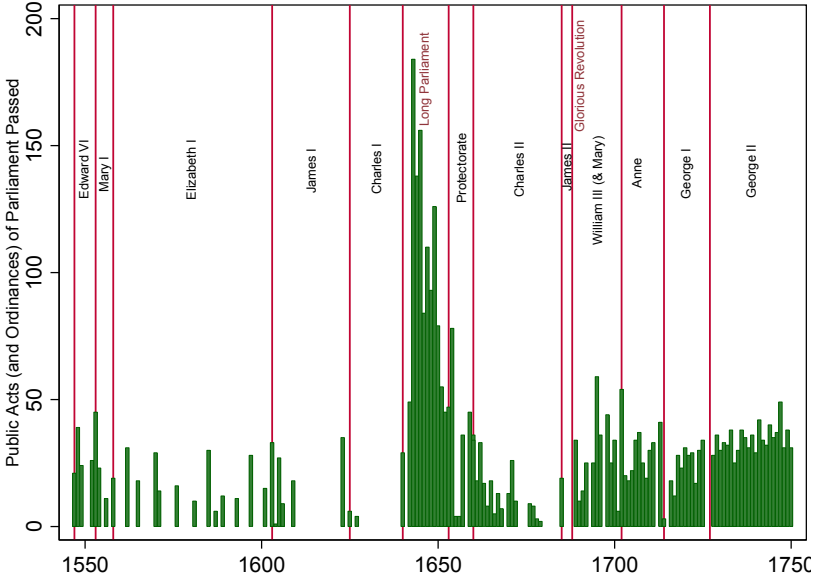
Summoning of the Long Parliament in 1641 $\rightarrow$ a manifesto aimed at instituting parliamentary authority over Crown rights $\rightarrow$ arrest of the MP ringleaders $\rightarrow$ civil war ($\approx$200,000 dead out of 5m)

Timeline: Parliament Acts and Ordinances passed

Jha (2015)



Why civil war?

Jha (2015)

- Hypothesis 1: Political shocks (i.e. gready Stuarts)
  - mobilisation by wealthy to protect (domestic) property (North and Weingast, 1989)
- Hypothesis 2: Economic shocks
  - new constituencies mobilise to protect newly acquired (domestic) property (Brenner 1993, Acemoglu, Johnson and Robinson 2005; Barrington Moore 1969, Tawney 1942, Rajan and Zingales 2003)
- Hypothesis 3 (this paper): Financial innovation
  - shares allowed non-merchants to benefit from new overseas opportunities
    $\rightarrow$ aligned incentives of a broad coalition

- Rebel: biographies of 500+ MPs
- Investor lists of all major joint stock companies, 1575-1640
- Control variables
  - **class/court interests**: father merchant or apprenticed to merchant, inherited ties to court
  - **domestic wealth**: inherited land/large estates,heir, father's titles, father's share investment, family in gentry before Tudors
  - **religion**: Puritan colleges/seminary, Puritan ministers per capita in constituency, Catholic recusants per capita
  - **constituency**: demesne (land attached to a manor), castle, borough, ports, town>5000, population density, County FE, wealth from Tudor lay subsidy survey

Share owners more likely to rebel

Regression: Parliamentary Rebel (0/1)	(1) Probit, dF/dX	(2) Probit, dF/dX	(3) OLS	(4) OLS	(5) OLS
Investor in Overseas Joint Stock	0.215***	0.185***	0.186***	0.218***	0.229***
	[0.055]	[0.056]	[0.062]	[0.073]	[0.077]
Father Merchant or Apprenticed Merchant	0.097	0.084	0.065	0.087	0.088
	[0.084]	[0.083]	[0.082]	[0.087]	[0.089]
Inherited a Manor	0.051	0.03	0.048	0.019	0.02
	[0.054]	[0.057]	[0.060]	[0.063]	[0.064]
Inherited Land	0.054	0.07	0.05	0.08	0.094
	[0.081]	[0.082]	[0.093]	[0.096]	[0.099]
Heir	-0.083	-0.078	-0.089	-0.039	-0.045
	[0.055]	[0.056]	[0.055]	[0.063]	[0.064]
Father Knight or Baronet	-0.024	-0.052	-0.056	-0.045	-0.05
	[0.055]	[0.058]	[0.054]	[0.064]	[0.065]
Father Noble	-0.137	-0.154*	-0.115	-0.123	-0.125
	[0.095]	[0.093]	[0.109]	[0.114]	[0.115]
Gentry prior to the Tudors	-0.057	-0.052	-0.057	-0.082*	-0.083*
	[0.040]	[0.041]	[0.042]	[0.048]	[0.048]
Inherited Court Ties	-0.185***	-0.186***	-0.155***	-0.190***	-0.197***
	[0.044]	[0.049]	[0.050]	[0.058]	[0.059]
Attended Puritan Seminary	0.179**	0.152*	0.127	0.093	0.081
	[0.084]	[0.081]	[0.091]	[0.088]	[0.089]
Sample	LP	LP	LP	LP	LP
Indiv. Wealth and Other Endowment Controls	Yes	Yes	Yes	Yes	Yes
Constituency Controls	No	Yes	Yes	Yes	Yes
Franchise (1628) FE and County of Const. FE	No	No	Yes	Yes	Yes
Log Lay Subsidy Control and sub-Sample	No	No	No	Yes	Yes
Omit Middlesex?	No	No	No	No	Yes
Observations	528	528	528	418	409
(Pseudo) R2	0.08	0.14	0.30	0.31	0.30
Lower Bound Treatment Effect (Oster 2014)			0.05	0.17	0.20

MPs owning overseas shares are 22.9 percentage points more likely to support parliamentary supremacy in comparsion to other MPs who have similar gentry status, parental background, wealth, constituency characteristics (col 5).

Unobservables could affect both share ownership and the propensity to rebel. However, if selection on unobservables is as important as selection on observables, the true effect would be 20 percentage points (last row). Jha interprets this as the *lower bound*.

Shares shift the allegiance of non-merchants

Jha (2015)

Regression (OLS): Parliamentary Rebel	(1)	(2)	(3)	(4)	(5)
Investor in Overseas Joint Stock	0.298***	0.243***	0.275***	0.310***	0.316***
	[0.053]	[0.060]	[0.065]	[0.076]	[0.077]
Investor x Apprenticed or Father Merchant	-0.329***	-0.301***	-0.323***	-0.334***	-0.327**
	[0.102]	[0.110]	[0.115]	[0.122]	[0.136]
Apprenticed or Father Merchant	0.180***	0.159**	0.151**	0.177**	0.176**
	[0.064]	[0.060]	[0.066]	[0.066]	[0.066]
Joint F-test β(overseas joint stock variables)= 0	16.78	8.29	9.57	8.62	8.8
Prob>F	0.00	0.00	0.00	0.00	0.00
Sample	LP	LP	LP	LP	LP
Indiv. Wealth and Other Endowment Controls	Yes	Yes	Yes	Yes	Yes
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Omit Middlesex?	No	No	No	No	Yes
Observations	528	528	528	418	409
R-squared	0.12	0.18	0.31	0.32	0.31

Shares and Revolution: Summary

Jha (2015)

- Context
  - introduction of shares allowed non-merchants to benefit from new opportunities overseas (New World and Asia)
  - Crown constrained domestically ... but controlled "sovereignty" rights overseas
- Impact of the availability of shares
  - aligned incentives of broad coalition in favour of constitutional reforms to acquire overseas rights
- Outcome
  - more representative government
  - investment in public goods overseas (Navy)

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  - more representative government
  - investment in public goods overseas (Navy)
- Similar conclusions also from an IV strategy based on MPs who turned 21 at a time of a stock IPO (see the paper)

Shares and Revolution: General Lessons?

Jha (2015)

- Failure to align the incentives a major cause of civil conflict and underdevelopment
  - In England, the introduction of shares may have allowed a broad coalition of wealthholders that spanned initial social distinctions (merchants, non-merchants; devout, worldly)
- Post-revolutionary US, Meiji Japan
  - banking system provided common exposure to political risk to groups that might have otherwise resisted further reforms
  - perhaps new financial assets could also mitigate contemporary ethnic conflicts (Jha and Shayo 2019)

Papers for essays

- Pascali (2016): Banks and Development: Jewish Communities in the Italian Renaissance and Current Economic Performance. *Review of Economics and Statistics*, 98(1): 140-158.
  - Italien cities that had a Jewish population in 1500 have better financial institutions and higher per capita income today.
- D'Acunto, Prokopczuk, Weber (forthcoming): Historical Antisemitism, Ethnic Specialization, and Financial Development. *Review of Economic Studies*.
  - historical antisemitism in German counties predicts lower contemporary financial development