

Development Economics

Slides 10

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Investments and Demand Complementarities

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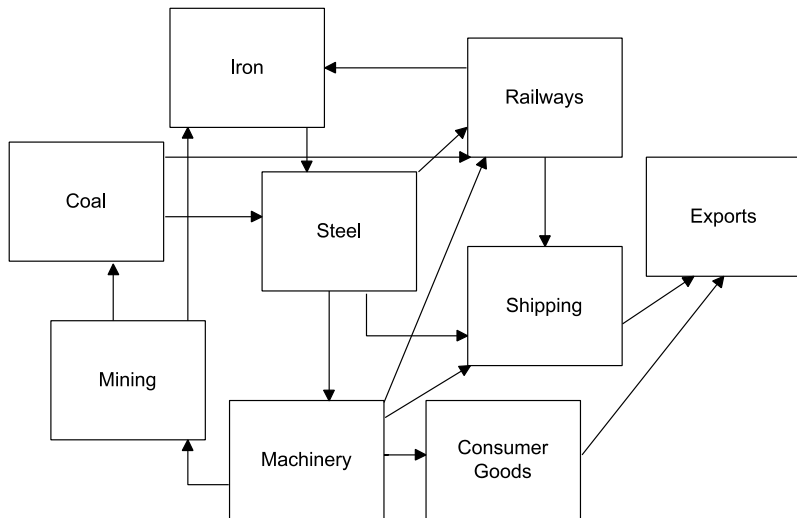
■ **Industrial investment generates externalities:**

1. Firm profit, profit feeds into national income
2. Higher worker wages, feeds into national income
3. Demand for inputs, so profits for other firms $\mapsto$ higher national income.

■ **An investing firm does not care directly about these national effects.**

Investments and Demand Complementarities

- **Intersectoral linkages** Rosenstein-Rodan 1943, Hirschman 1958



The Complementarity Map for Industrialization

- **Firms indexed by $x \in [0, 1]$:**
 - Each can be **dormant** or **investing**.
 - Dormancy $\mapsto$ low profit (o)
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 - Dormancy $\mapsto$ low profit (o)
 - Investment $\mapsto$ revenues $R(n)$: depend on how many firms n invest!
- **Net profits to an investing firm x : $\pi(n, x) \equiv R(n) - s(x)$**
 - where $s(x)$ is firm-specific setup cost.

The Complementarity Map for Industrialization

- Arrange firms from low to high setup costs: $s(x)$ is increasing in x .
- **Complementarity map:**

$$n \mapsto R(n) \mapsto x(n)$$

where $x = x(n)$ is the largest index such that $\pi(x, n) = R(n) - s(x) \geq 0$.

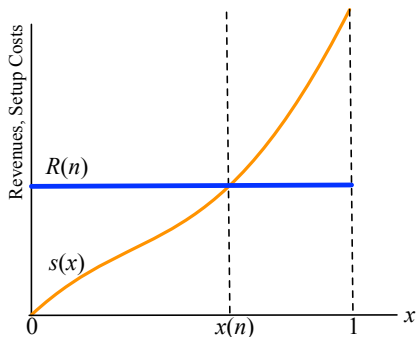
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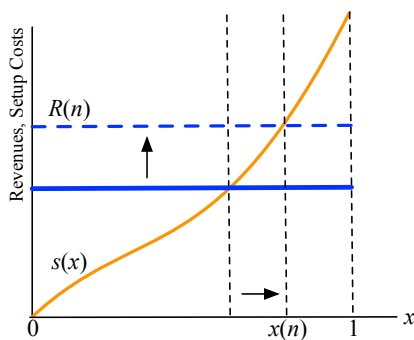
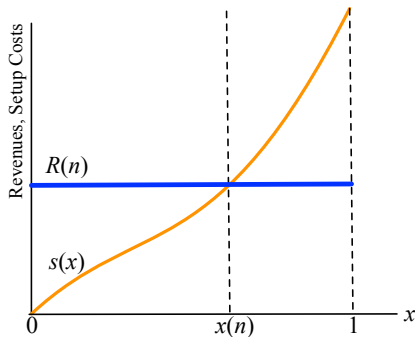
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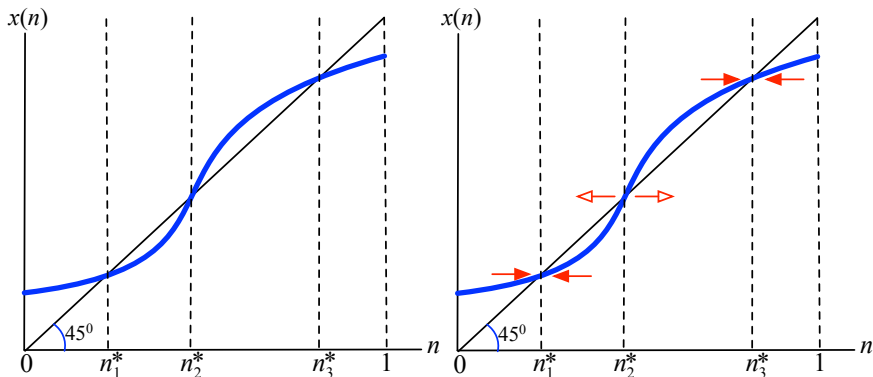
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The Complementarity Map for Industrialization



Notes:

- At the point n_1^* , only firms up to $x(n_1^*)$ want to invest.
- Another self-fulfilling prophecy exists at n_2^* , where everyone is better off.
- But no firm can **unilaterally** reach it from n_1^* .

These models lay a (limited) foundation for policy debates:

- Balanced versus unbalanced growth

Rosenstein-Rodan (1943, 1961), Nurkse (1952, 1953), Hirschman (1958)

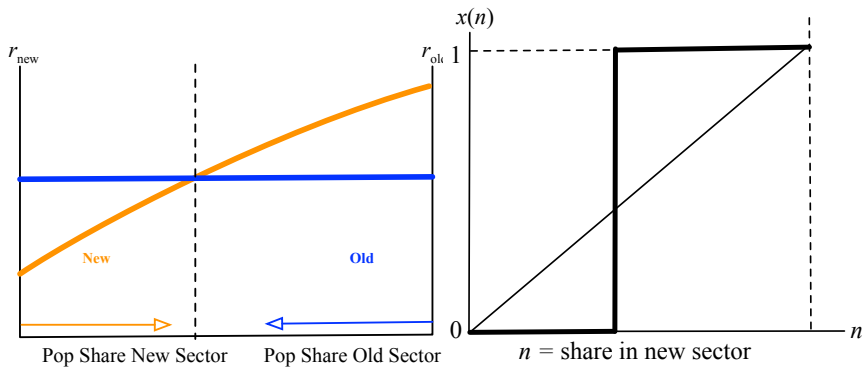
How to choose a leading sector:

- linkages and linkage strength
- investing in the least profitable activity.

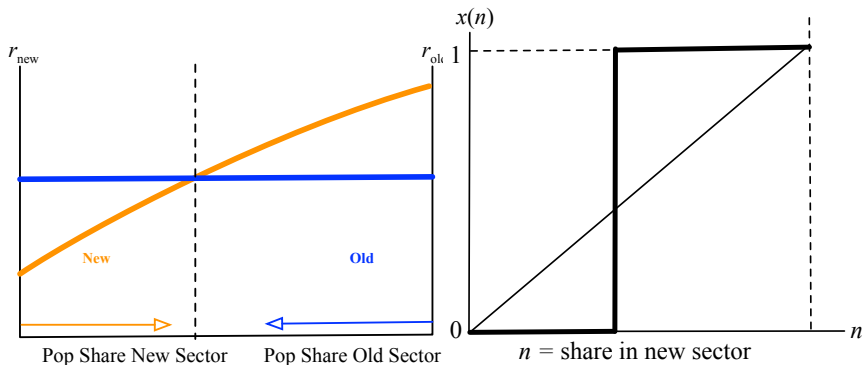
Temporary versus persistent interventions

- Very different effects in single- vs multiple-equilibrium models.

Transitions: Why History Matters

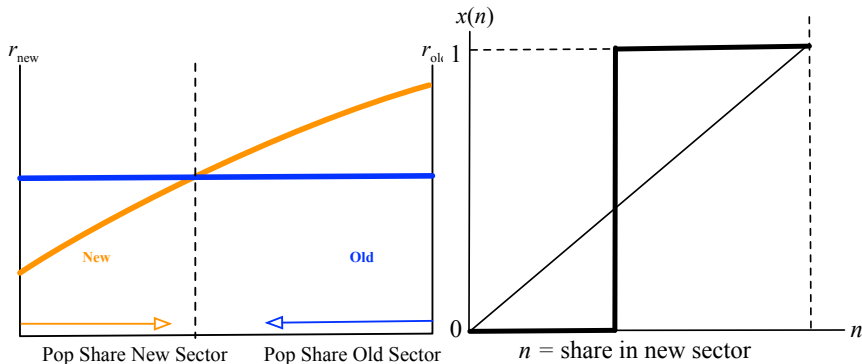


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- Why is QWERTY stickier than fashion?

Equilibrium Transition: Fertility Decline in Bangladesh

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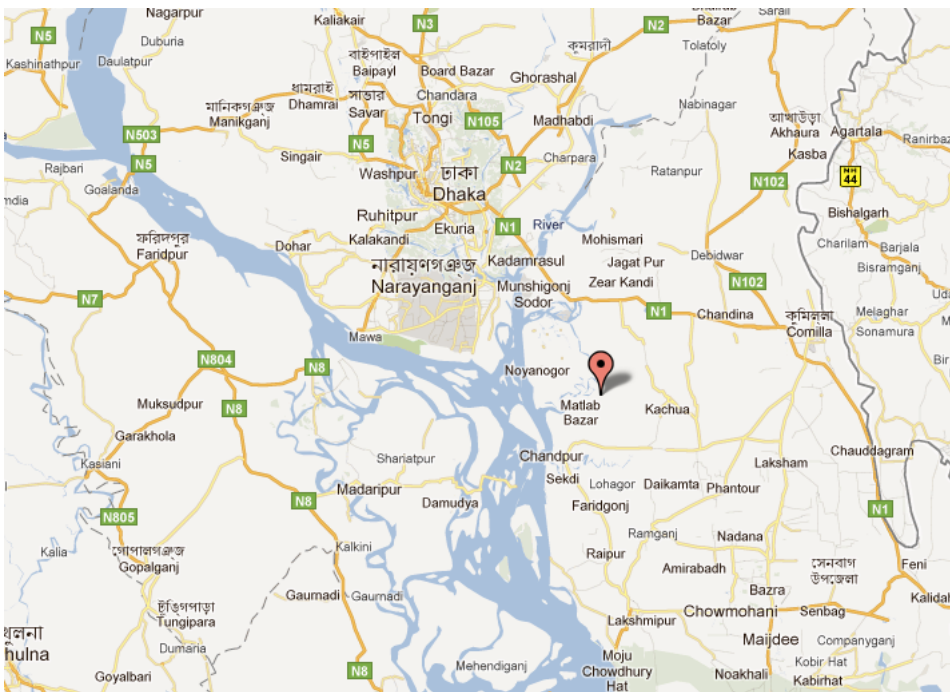
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- “This paper provides a norm-based explanation for two features of the fertility transition that have been observed in many different settings: the slow response to external interventions and the wide variation in the response to the same intervention.”

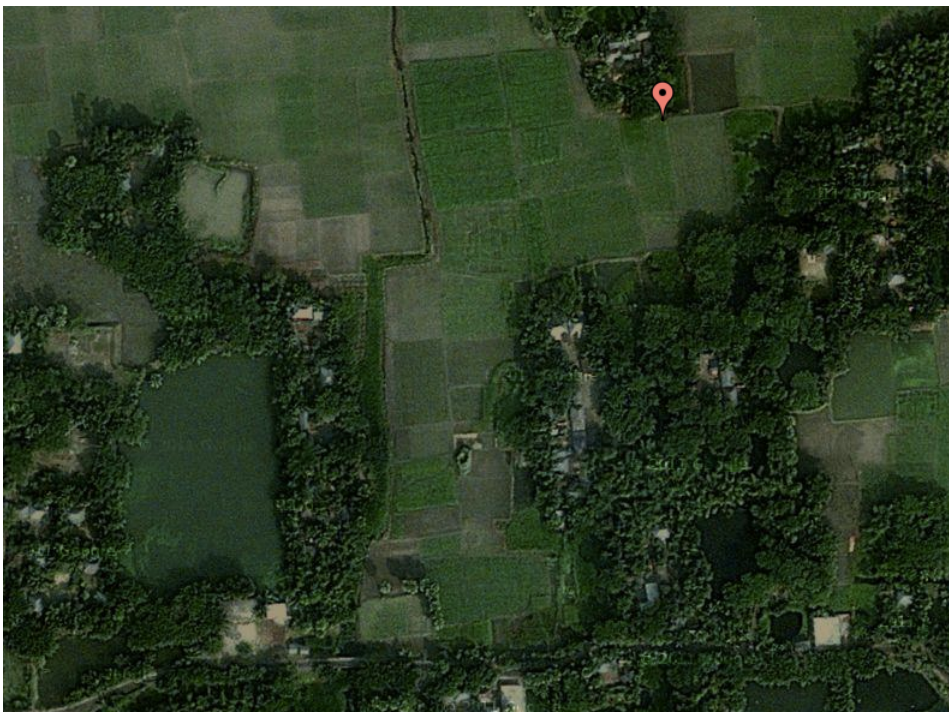
Bangladesh

Period	Birth rate	Death rate	Period	Birth rate	Death rate
1881-91	-	41.3	1961-74	48.3	19.4
1891-01	-	44.4	1976	45.4	19.7
1901-11	53.8	45.6	1980	43.8	13.6
1911-21	52.9	47.3	1986	38.9	11.9
1921-31	50.4	41.7	1989	36.7	10.7
1931-41	52.7	37.8	1994	27.8	8.6
1941-51	49.4	40.7	2000	27.2	7.4
1951-61	51.3	29.7	2010	20.8	6.1

Taken from Cleland and Streathfield, BBS, World Bank







Maternal Child Health - Family Planning Project

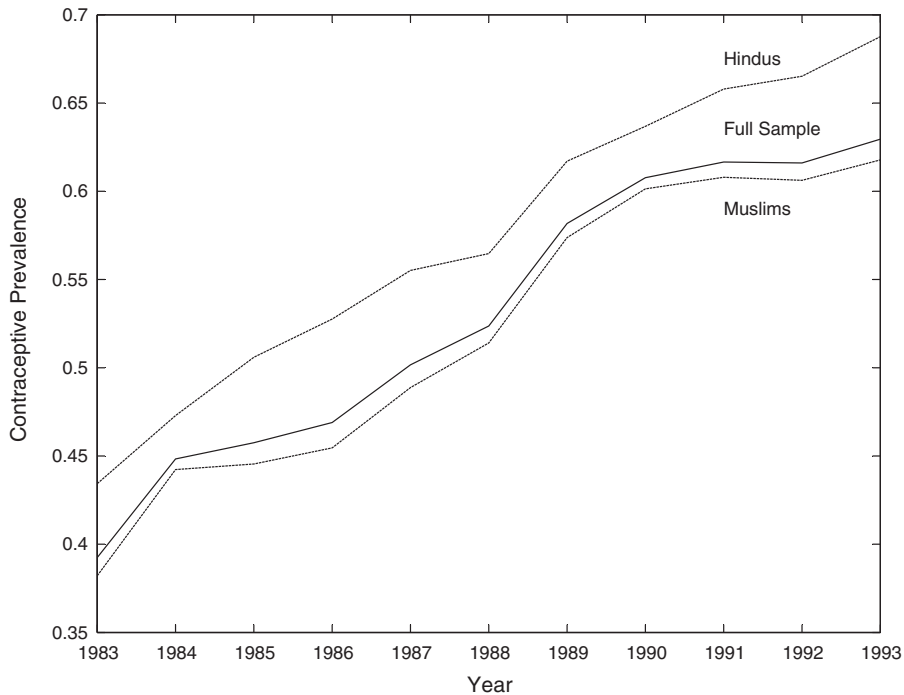
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 - Launched in 1978, 70 villages in Matlab thana, Comilla district.
 - Intensive family planning program
- **Community Health Worker** (CHW) visited each family once every 2 weeks since start of the project in 1978.
 - Contraceptives are provided to them free of cost.
 - Use goes from from 40% in 1983 to 63% in 1993
 - TFR from 4.5 to 2.9 children over that period.

Table 1: Percent distribution of couples using each contraceptive method, Matlab 1998

Method	n	Percent of total
<u>A. Users</u>		
Pill	2,396	19.4
Intra-Uterine Device	171	1.6
Injectibles	4,015	32.6
Condom	605	4.9
Tubal ligation	634	5.1
Vasectomy	16	0.1
Others	287	2.4
<u>B. Non-users</u>	4,186	33.9
All	12,342	100



Limited Village Mobility

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- **Mean score 2.1** (out of a maximum of 8).

Table 2

Descriptive statistics

All married women 15--49 in MCH-FP area, 1983--93

	Full sample	Hindus	Muslims	Illiterate	Literate
	(1)	(2)	(3)	(4)	(5)
<i>Panel A: Individual characteristics</i>					
Age	29.44 (8.01)	29.91 (8.00)	29.34 (8.01)	30.49 (8.18)	27.75 (7.44)
Number of children	2.41 (1.99)	2.18 (1.79)	2.45 (2.03)	2.57 (2.05)	2.14 (1.86)
Education	2.12 (3.12)	1.48 (2.68)	2.26 (3.19)	0.00—	5.53 (2.55)
Husband's education	3.21 (4.00)	3.07 (3.81)	3.24 (4.04)	1.53 (2.62)	5.91 (4.34)
<i>Panel B: Occupation of household head (%)</i>					
Farming	34.48	23.45	36.88	30.32	41.16
Fishing	5.80	26.18	1.37	8.07	2.15
Business	6.75	8.37	6.40	6.30	7.47
Housework	10.46	6.81	11.26	10.00	11.21
Other	42.51	35.20	44.10	45.31	38.01
Total	100.00	100.00	100.00	100.00	100.00
<i>Panel C: Asset ownership</i>					
Land (hectares)	1.00 (2.55)	0.72 (1.39)	1.06 (2.74)	0.82 (2.41)	1.29 (2.74)
Cows	1.06 (1.57)	0.81 (1.42)	1.11 (1.59)	0.91 (1.46)	1.28 (1.70)
Boats	0.55 (0.61)	0.63 (0.76)	0.54 (0.57)	0.55 (0.61)	0.56 (0.60)
No. of Observations	21,570	3847	17,723	13,288	8282
<i>Panel D: Contraceptive prevalence</i>					
Probability of using contraceptives	0.55 (0.50)	0.59 (0.49)	0.54 (0.50)	0.53 (0.50)	0.57 (0.50)
No. of Observations	144,186	26,414	117,772	91,727	52,459

Means (standard deviations) in panel A, panel C and panel D.

The individual is the unit of observation in panels A–C. The individual-year is the unit of observation in panel D.

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- **Is the fertility decline an outcome of complementarities?**
- **Idea:** regress current contraception use on overall contraception
- Identification problem (Manski critique)
- Omitted variable that correlates individual and village-level use?
- **Specification:**

$$y_{it} = A + \gamma y_{i,t-1} + \beta x_{t-1}^{v(i)} + \eta Z_{it} + C_t^{v(i)} + \epsilon_{it}$$

- y_i : 0-1 contraception by couple i , x : village-level use, $v(i)$: person i 's village, Z : individual characteristics, and
- C_t^v is **unobserved omitted variable** for village v at date t .

Complementarities or Omitted Variables?

- C_t^v can be decomposed into three parts.
 - First component only depends on the village: C_1^v .
 - Second component only depends on time: C_{t2} .
 - Third varies in a village-specific way over time.
- Components 1 and 2 dealt with by village and time fixed effects.
 - The last one screws everything up: **identification problem**.

Religion for Attempted Identification

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- **New regression:**

$$y_{it} = A + \gamma_m y_{i,t-1} + \beta_{mm} x_{t-1}^{v(i),m} + \beta_{mh} x_{t-1}^{v(i),h} + \eta_m Z_{it} + C_t^{v(i),m} + \epsilon_{it}$$

- where i is m -household, and m and h labels self-explanatory.
- **For critique to now work**, there has to be an omitted variable which is village-, time- and group-specific.

Religion for Attempted Identification

Table 3
Partitioning the village by religion

	Dependent variable: contraception							
	All villages		More than 5% Hindus/Muslims		More than 15% Hindus/Muslims		Annual data	
	Muslims	Hindus	Muslims	Hindus	Muslims	Hindus	Muslims	Hindus
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lagged contraceptive prevalence (own group)	0.217 (0.013)	0.161 (0.014)	0.193 (0.016)	0.169 (0.017)	0.207 (0.018)	0.168 (0.020)	0.312 (0.023)	0.246 (0.023)
Lagged contraceptive prevalence (other group)	0.008 (0.006)	0.009 (0.007)	0.007 (0.011)	0.024 (0.016)	– 0.001 (0.013)	0.019 (0.024)	0.009 (0.011)	0.006 (0.012)
Lagged contraception	0.698 (0.003)	0.712 (0.005)	0.704 (0.004)	0.710 (0.005)	0.706 (0.004)	0.717 (0.006)	0.498 (0.005)	0.517 (0.008)
R^2	0.513	0.559	0.520	0.558	0.521	0.565	0.281	0.338
Number of observations	139,875	43,101	79,927	29,771	49,730	20,756	70,787	21,419
Box–Pearson Q statistic	0.000	0.003	0.001	0.002	0.002	0.006	0.003	0.008

Standard errors in parentheses.

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- **Complementarities and multiple equilibria (or steady states)**
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- **Warning:** Equilibrium-tipping is a delicate task.