Discussion of:

Ellen G. McGrattan and Edward C. Prescott

"Openness, Technology Capital, and Development"

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April 28, 2007

- Paper one of series on "intangible", aka "technology", capital

- Have shown how to use data on securities values, income flows to estimate stock of technology capital in US

- It is large: about 1/6 as large as physical capital stock, 1/2 of annual GDP

- Thesis of paper is that growth, level effects of "openness" due to better access to technology capital

1 Structure of model

- Single good produced in N_i locations in country i

- Unit of technology capital permits firm to operate in all locations

- At each location, produce

$$y_i = \left(k_i^{\alpha} \ell_i^{1-\alpha}\right)^{\phi}$$

- Aggregate production function is

$$Y_i = \left(M_i + \sum_{j \neq i} \omega_{ij} M_j\right)^{1-\phi} N_i^{1-\alpha\phi} K_i^{\alpha\phi}$$

$$Y_i = C_i + X_{ik} + X_{im} + E_i$$

- Diminishing returns to both kinds of capital
- In SS, every country accumulates tangible capital
- But in general, only one accumulates technology capital
- (Exception: $\omega_{ij} = 1$, for all i, j)
- Which one? One with best tax structure $\Leftrightarrow$ largest, for M/P

2 Gains from openness

- SS of model applied to series of well-chosen examples
- Gains from trade are level effects
- Arise from shared use of all technology capital in all countries
- Logic similar to gains in other models
  - shared ability to buy from low cost vendors in Eaton-Kortum
  - shared access to more varieties in Helpman-Krugman

- Magnitudes similar too

- In US/Canada example in M/P, Canadian consumption increases by 21% going from totally closed to totally open

- In Alvarez/Lucas adaptation of E/K, Canadian consumption increases by 18% going from autarchy to costless trade (in a world consisting of US and Canada)

- Should these numbers be added up for total gain of 39%?

- Don't think so: Technology shared in both cases.

- Both estimates much larger than estimates of gains from NAFTA, EU, etc., based on more familiar trade models

- As A/L show, this is due not to different theoretical structure but to artificiality of autarchy/totally open comparison.

- Pre-NAFTA Mexico, pre-EU Spain nowhere near autarchy

- Do not want to match figures in M/P to actual time series (and M/P don't)

- Distinctive features of M/P model not larger gains from opening

- They are (I think)

  - decoupling of FDI from physical capital flows

  - implies major re-interpretation of trade accounts: technology producer/exporter can have permanent current account deficit in SS

  - model of technology production that captures the replicability of technology without also implying unrealistic scale economies

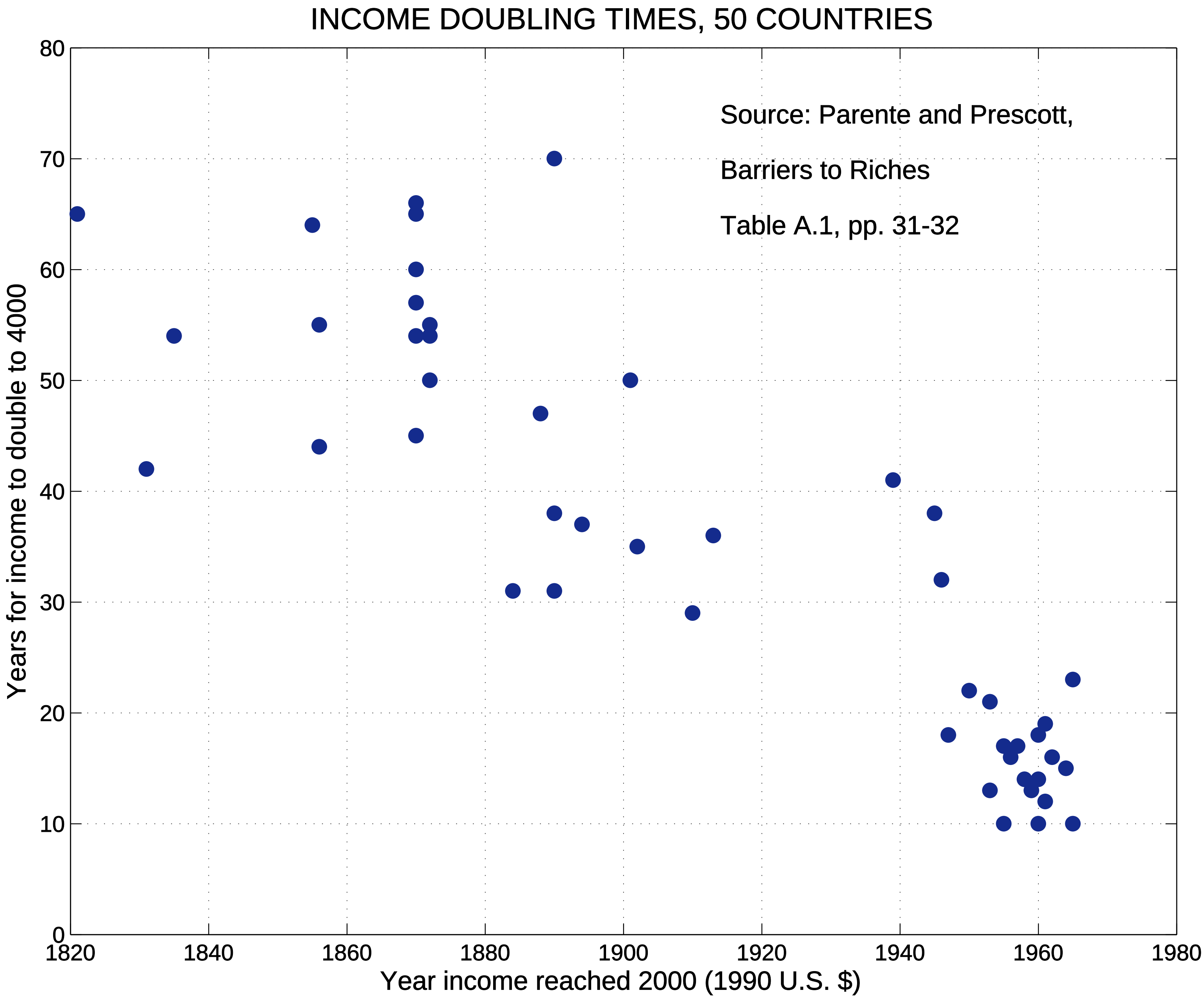
  - ability to export technology raises the return to investing, stimulates more: the Nokia effect

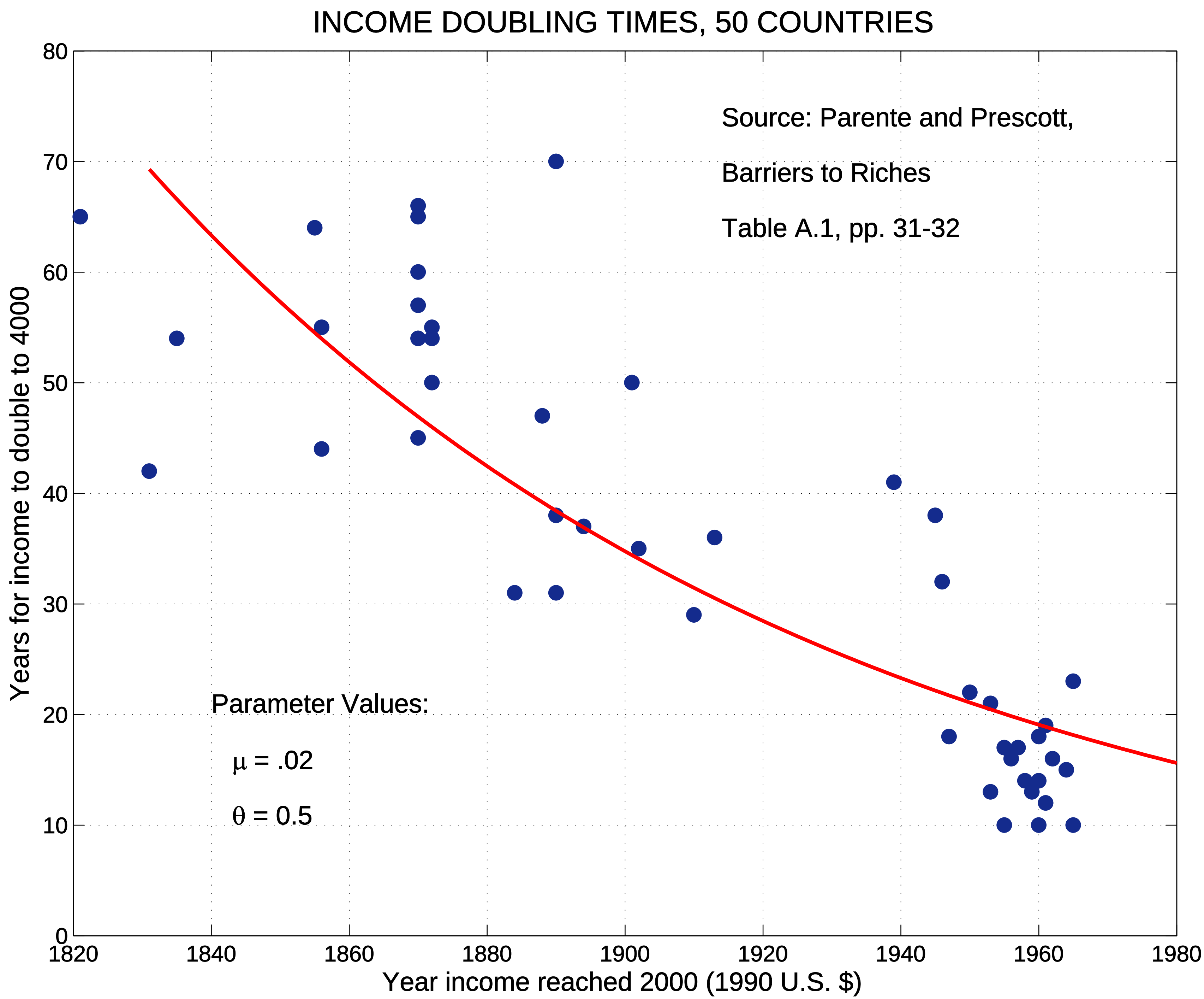
- Last sections contain suggestive discussion of other dynamic possibilities

- Point out need for TFP growth (growth in A_i, not M_i)

- Two different technologies for producing technology? How related?

- Modify investment technology to induce unit root, realistic spillovers?


INCOME DOUBLING TIMES, 50 COUNTRIES
Source: Parente and Prescott,
Barriers to Riches
Table A.1, pp. 31-32
Years for income to double to 4000
Year income reached 2000 (1990 U.S. $)
0
10
20
30
40
50
60
70
80
1820
1840
1860
1880
1900
1920
1940
1960
1980


INCOME DOUBLING TIMES, 50 COUNTRIES
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Barriers to Riches
Table A.1, pp. 31-32
Parameter Values:
μ = .02
θ = 0.5
Years for income to double to 4000
Year income reached 2000 (1990 U.S. $)
0
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