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# Discussion of Peter Howitt's “Competition, Innovation and Growth: Theory, Evidence and Policy Challenges”

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# I. Peter Howitt's keynote address



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## Schumpeterian models

- are based on quality-improving innovation that renders old products obsolete (*creative destruction*): new innovations displace previous technologies and faster growth is associated to higher firm turnover
- country growth depends on distance to the technological frontier
- convergence is caused by knowledge spillovers generated by the frontier

# Schumpeterian models: how does competition affect innovation?

- Considering:
  - “appropriability” effect (competition lowers innovation)
  - “escape competition” effect (competition increases innovation)
- Competition has an inverse-U shape effect on innovation and growth:
  - positive effect in industries where firms are neck-and-neck (in countries close to the frontier), and negative effect in unleveled industries (in countries far from the frontier)
- what matters is ex-ante competition: entry (domestic and foreign) turnover and entry threat
- competition and financial market development are substitutes

## Empirical Evidence: ABGH (2005)

- competition has an inverse-U shaped effect on innovation
- average technological distance between leaders and followers increases with competition
- the inverted-U is steeper when industries are more neck-and-neck

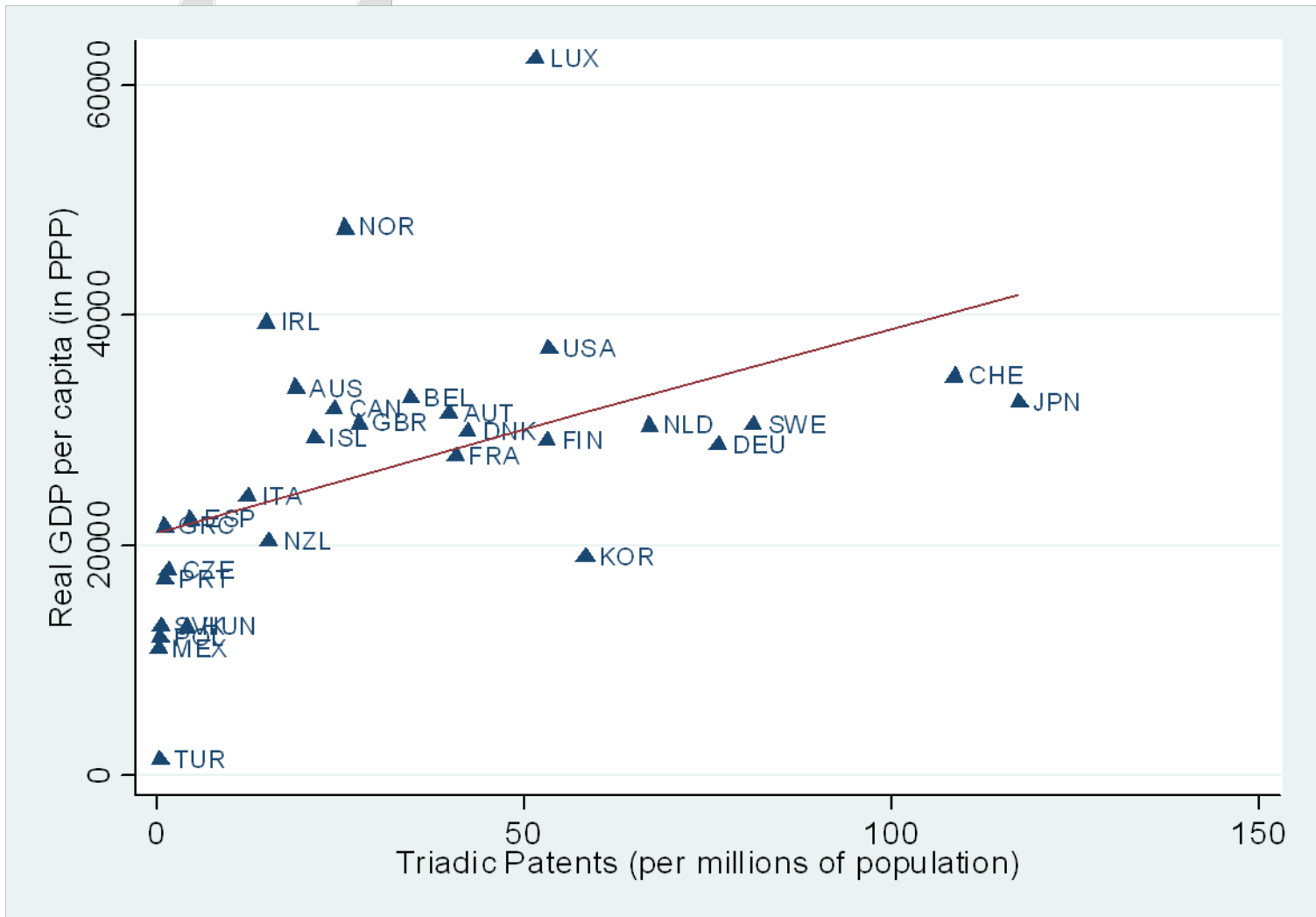


## II. Other Empirical Evidence

# Innovation and Development in OECD countries

- Large heterogeneity in innovation (measured by patents) among OECD countries
- Strong positive correlation between GDP level and patents
- Prime facie evidence that innovation is larger in countries at technological frontier

# Per capita patents and GDP in OECD countries





## Empirical Evidence (I)

Nicoletti and Scarpetta (2003), analyze the effects of pro-competitive regulatory reforms on productivity in *OECD*:

- Private governance and competition tend to boost productivity
- Entry liberalization is estimated to boost MFP growth by 0.1-0.2 pp in countries like Portugal, Greece, and Italy
- Reducing the role of the state in business activities (to OECD average) is estimated to boost MFP growth by 0.7 pp in countries like Portugal, Greece, Austria, France, and Italy

## Empirical Evidence (II)

Jaumotte and Pain (2005) find that:

- reducing the strength of anti-competitive product market regulations provides a significant stimulus to private R&D expenditure, reflecting stronger incentives to innovate
- rigid regulations are also found to adversely affect the level of patenting and the proportion of firms that are successful innovators
- Low restrictions on foreign direct investment improve cross-border knowledge transfers.

Measured in percentage change of the dependent variable

	Business R&D spending	Total domestic patents
<b>Science policies and institutions</b>		
B-index <sup>2</sup>	-1%	-6
Subsidies for private R&D / GDP ratio	4%	-3
Share of business funding in non-business R&D	8%	2½
Non-business R&D / GDP ratio	7%	3%
IPR index	1½	8
USA real wage of researchers	-3%	-¾
Years of education	1	¾
<b>Economic conditions</b>		
Profit / GDP ratio	5%	4%
Private sector credit / GDP ratio	-1½	-3%
Equity financing / GDP ratio	5%	10
Foreign R&D stock / GDP ratio	12%	6
Openness	-5%	-4%
Import penetration	-¾	0
Real interest rate	-5	-2%
Real exchange rate	-3	-1%
<b>Framework policies (decrease)</b>		
Product market regulation	9	4%
FDI restrictions	..	13
Employment protection legislation	1	6%

1) This table is taken from Table 8 of Jaumotte and Pain (2005b). The standard deviation is the average of within-country standard deviations, and the effects of a one standard deviation increase in policy and framework factors are evaluated at the sample mean of the variables.

2) The B-index is defined as one minus the rate of tax subsidy for R&D.

Source: OECD estimates



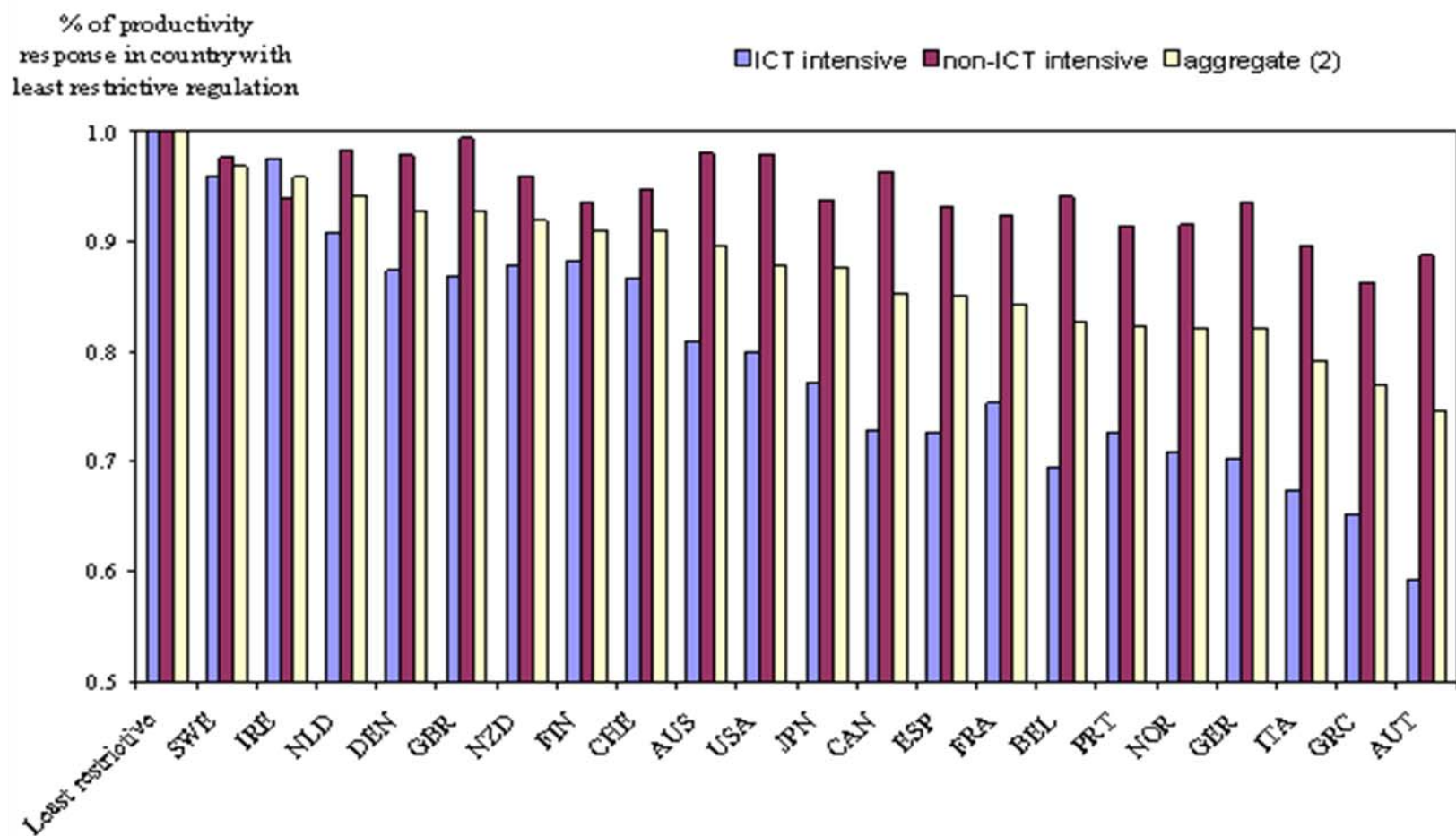
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## Empirical Evidence (III)

Conway and Nicoletti (2007):

- restrictions to competition slow diffusion and adoption of new technologies in *OECD* countries

Figure 8. The effect of regulation on the diffusion of a positive supply shock<sup>1</sup>



1. The increase in the level of aggregate and sectoral productivity 5 years after a positive supply shock to the world technological frontier of an equal magnitude in each sector. The data are expressed as a percentage of the response that would occur in a country with regulation that is least restrictive of competition.

2. Productivity is derived as the average of industry-level productivities weighted with value-added weights.



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## Empirical Evidence (IV)

Sabirianova, Svejnar and Terrell (2005) show for transition economies that larger entry of foreign firms has negative spillover effects on the efficiency of all firms, and positive effects on the efficiency of those firms that are close to the frontier (mostly foreign)

- 10 pp increase in the foreign share of output in an industry reduces efficiency of domestic firms between 11% and 14% in the Czech Republic and between 47% and 50% in Russia
- foreign-owned firms experience positive spillovers from larger presence of foreign-owned firms in their industry, both in the Czech Republic (31 to 43%) and Russia (44 to 54%)
- Consistent with Schumpeterian model

## Empirical Evidence (V)

De Serres, Kobayakawa, Sløk and Vartia (2006) show that regulation that supports more competitive and efficient financial systems has positive effects on growth and entry of new firms in *OECD* countries

- a one standard-deviation rise in financial development leads on average increase in firm entry rates by 0.4 - 0.7 pp.

## Empirical Evidence (VI)

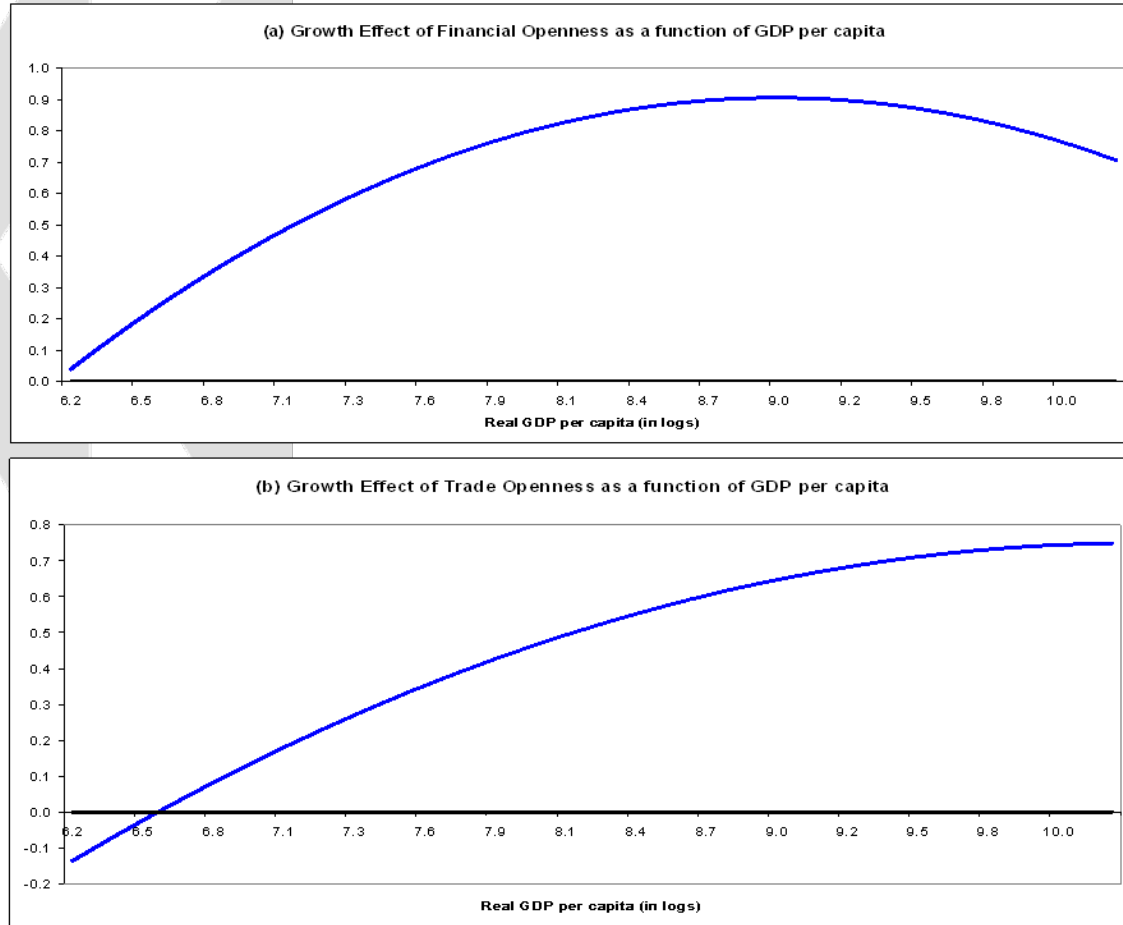
Calderón, Loayza and Schmidt-Hebbel (2005), drawing from non-linear world growth regressions, show that:

- Financial openness raises growth levels (less in poor countries) and reduces growth volatility (less so in middle-income countries). The higher growth-level effect of financial openness in richer countries suggests that financial integration and competition (proxied by GDP per capita) are complements, not substitutes.
- Trade openness raises growth (but not in poor countries) and reduces growth volatility (but mostly in poor countries). This says that growth level effects are larger in rich countries, close to the technological frontier and with stronger competition



# Empirical Evidence (VI)

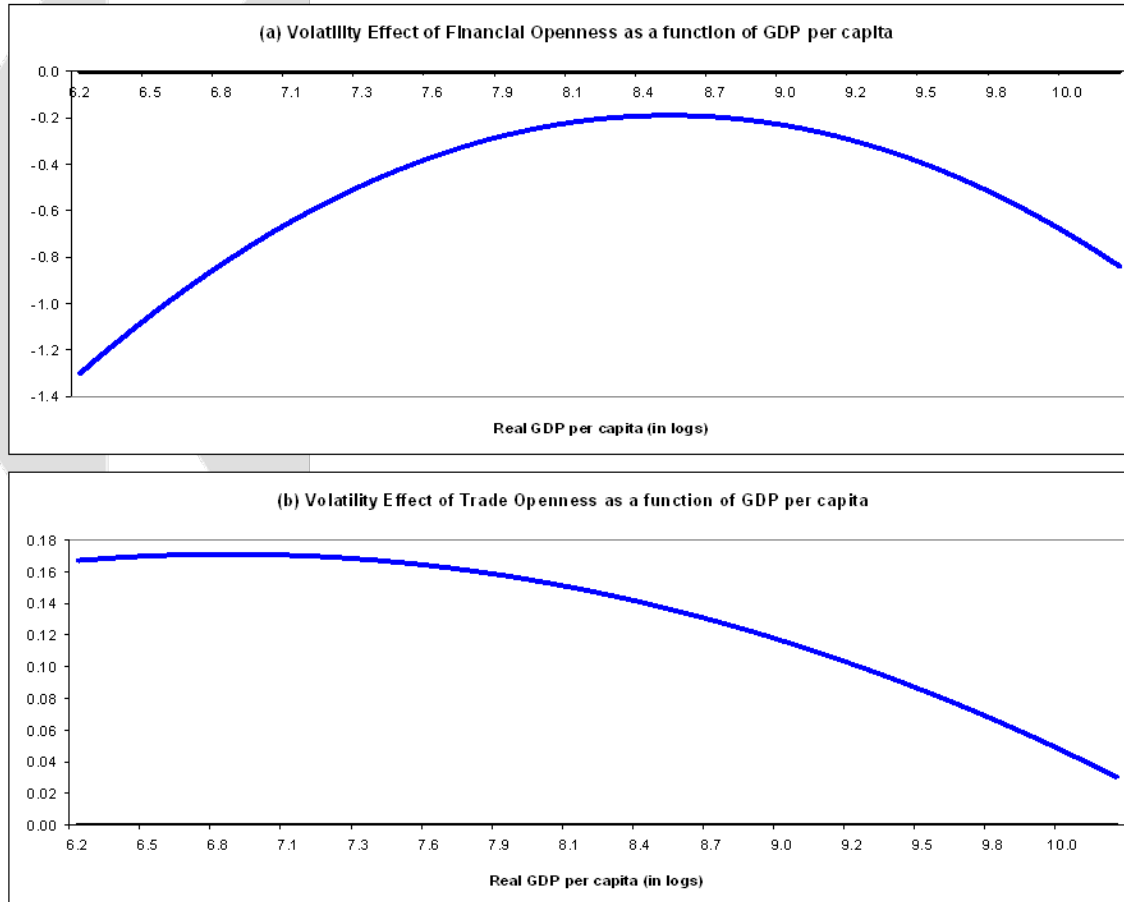
**Figure 2**  
**Growth Effect of Openness as a function to GDP per capita 1/**



1/ Growth effect of a one standard deviation increase in financial and trade openness. See Table A.3 for the computed standard deviations.

# Empirical Evidence (VI)

**Figure 4**  
**Volatility Effect of Openness as a function to GDP per capita 1/**



1/ Volatility effect of a one standard deviation increase in financial and trade openness. See Table A.4 for the computed standard deviations.

## Empirical Evidence (VII)

Chumacero, Fuentes, and Schmidt-Hebbel (2007) identify the contribution of 6 channels by which free-trade agreements affect growth and welfare:

- Among the latter channels, the trade-R&D/intermediate imports-TFP channel identified by Coe and Helpman (1995) and Keller (1998) is the dominant channel in Chile's free-trade agreements with the EU and the US
- It explains 80-90% of Chile's gains in GDP and consumer welfare

## Conclusions

- Peter Howitt's and colleagues' path-breaking research suggests that the relation between competition and innovation (and hence between competition and growth) is non-monotonic (inverse U-shaped) and may differ by industries and countries
- While some evidence (ABGH,2005; Sabirianova et al. 2004) suggests this to be the case, *OECD* evidence seems to suggest that the positive segment of the relation seems to be the dominant one

## Policy Implications (I)

- Pro-competitive regulatory reforms are needed for promoting innovation and growth, especially in those countries with large technology gaps and rigid regulatory settings that inhibit adoption of new technologies
- Policies that remove entry barriers have positive effects on *innovation* for countries close to the frontier and on *adoption* for countries far from the frontier

## Policy Implications (II)

- Policies that promote development, competitiveness, and efficiency of financial markets have positive effects on growth by lowering entry costs, in addition to the standard growth effects of financial development
- catching up with the technological frontier requires to attract know-how from frontier countries through FDI, joint ventures, and access to international patents.