Economics and Policy of Innovation

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Innovation and Catching-up (Chapter 19)

Catching-up or falling behind?

- As we have already seen, innovation and economic growth are closely linked: after Industrial Revolution, the whole world experienced the highest increase in productivity and in living conditions.
- However, we might want to understand whether this is true for all countries, or just for a small group of them.

Catching-up or falling behind? (2)

- Some theories (recall what said about Solow, 1956) suggest that Technology and Innovation will lead to the convergence of all countries.
- In other words, the catching-up process is expected to be always true.
- Other theories (Abramovitz, 1986) deny this convergence mechanisms and show how some countries are instead falling behind;
- or (Baumol et al., 1989) believe it is true only for few countries, the “convergence clubs”.

Catching-up or falling behind? (3)

- Historically, the catching-up process has started already in the XIX century: the UK was the leading country, but in the second half other countries (Germany and the US) managed to catch-up.
- Same has happened during the XX century, mostly with the Japanese catching-up process.
- In all cases, not only imitation mechanisms take place, but also wider innovations (e.g. the organisational ones) help this process.

Organisational innovations and catching-up

- Germany: improvement in the R&D process of specific sectors (chemicals and engineering).
- US: development of the mass production (also with a new firm structure, e.g. the General Motors M-form, Multidivisional form, already at the beginning of XX century).
- Japan: the "just-in-time" organisational innovation (Toyota).

Technology and catching-up

- Some authors (e.g. Veblen, 1915) have recognised the key role of technology in the catching-up process. Veblen believes that such a process is related to the shift from labour-intensive technologies to more capital-intensive ones.
- Catching-up countries have to rely more and more on technology embodied in machineries: this way, a more "codified" knowledge is more easily transmittable also in latecomer countries.

Technology and catching-up (2)

- Other authors (e.g. Gerschenkron, 1962) believe this is only partially true. Besides technology embodied in machineries, also the role of new "institutional instruments" is crucial.
- This view relates generically to the "innovation system approach", although single countries might have used completely different instruments: Gerschenkron mentions the Investment Banks for Germany, as well as the Central State for Russia.

Technology and catching-up (3)

- Of course, also the type of intervention can be very different, across countries.
- For instance, when Gerschenkron cited Russia, there was a non-capitalist State; while in the same period, in a capitalist country like Japan again the State was responsible of important advancements in innovation.
- As we have already seen, the MITI (Japanese Ministry for Trade and Industry) had the major role for the early phase of Japanese catching-up.

the banks (and business more generally) grew more independent, and the role of the state diminished and took on more "normal," Western proportions.

The exact role of the government versus private actors in the various phases of Japanese economic growth is a matter of considerable controversy, and we shall not attempt to resolve it here. Suffice it to say that government/bureaucracy intervention, through activist economic, industrial, and trade policy (protectionism), was very important, especially in the early phases. Although not everything it touched turned into "gold," and sometimes its interventions were strongly resisted by private business (and for perfectly good reasons), there is no doubt that it contributed significantly to focusing the attention of private business to catch-up with the West. An important element in this catch-up process (and the policies that were pursued) was a very rapid but orderly process of structural change, through which industries "of the past" were gradually phased out in favor of technologically more progressive industries, emphasizing in particular the combination of economies of scale, product differentiation, and rapidly growing demand, on the one hand, and continuous improvements of products and processes through learning, on the other. In this way, Japanese industry soon rose to the productivity frontier in its chosen fields, first in the steel industry and in ship-building, and later in cars and (consumer) electronics.[9] Although Japanese innovation in the catch-up phase also included a large number of product innovations, especially of the minor type (adaptations to demand), the main emphasis was on process innovations, particularly of the organizational type, that allowed for simultaneous exploitation of scale economices and flexibility, leading to high through-put, efficient inventory management, high

Technology and catching-up (4)

- Other Asian countries are often used as examples of successful catching-up.
- South Korea and Taiwan have grown strongly over the last decades, although these countries have been more dependant of Foreign Investment than Japan.
- In very recent times, a catching-up in technology has taken place in other Asian countries: China, India, Malaysia etc. However, each case is different from the others.

Catching-up re-shapes the world

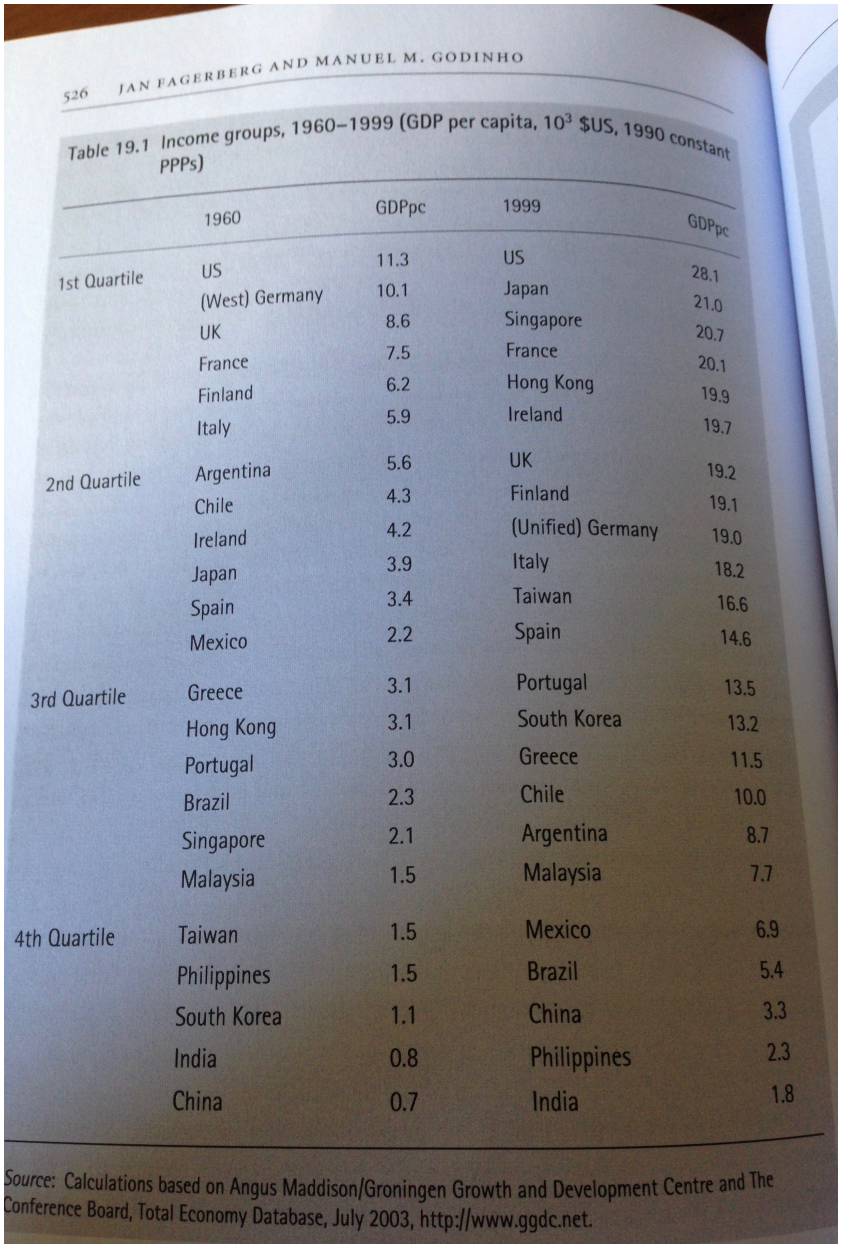
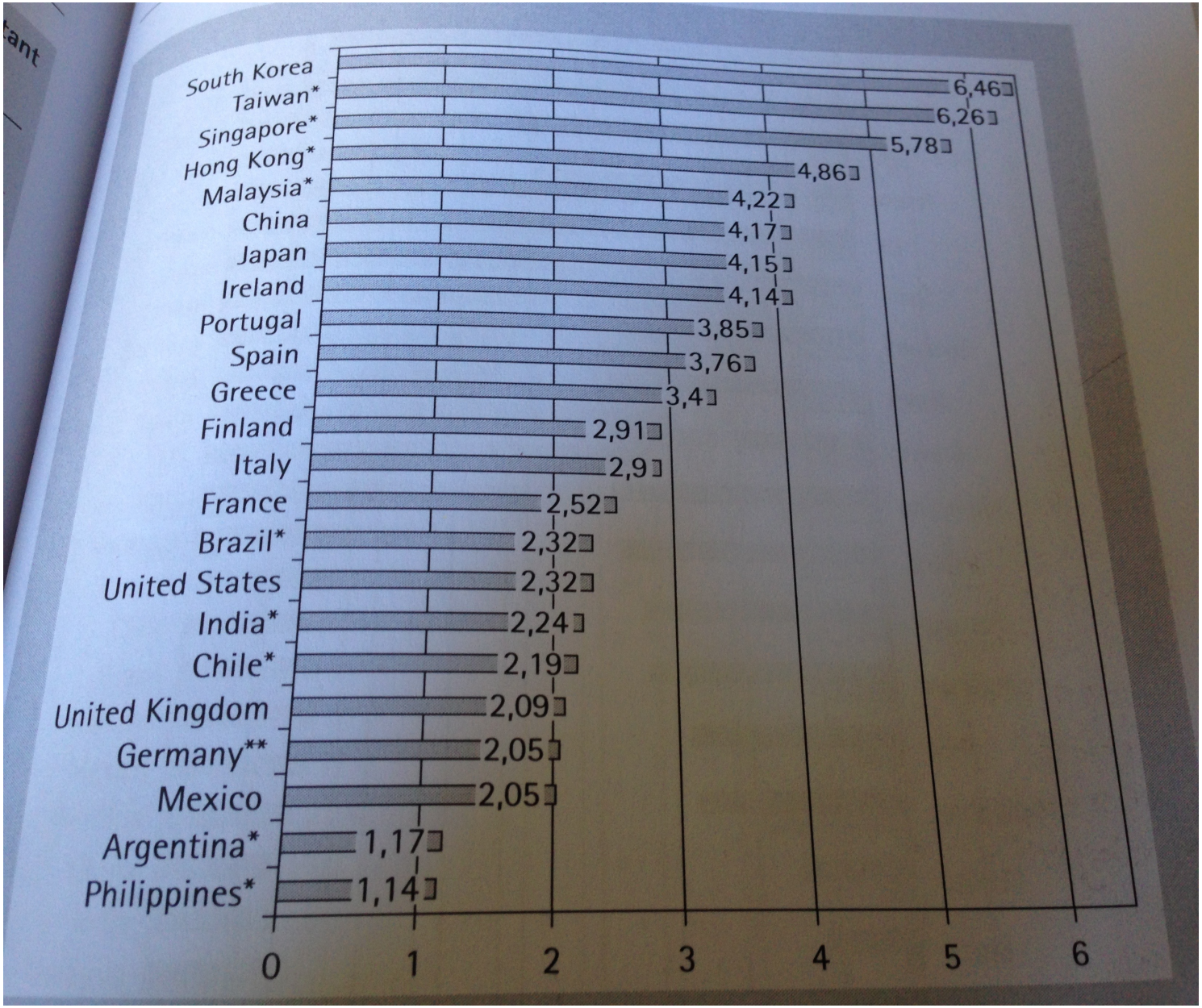


Table 19.1 Income groups, 1960–1999 (GDP per capita, 10^3 $US, 1990 constant PPPs)

	1960	GDPpc	1999	GDPpc
1st Quartile	US	11.3	US	28.1
	(West) Germany	10.1	Japan	21.0
	UK	8.6	Singapore	20.7
	France	7.5	France	20.1
	Finland	6.2	Hong Kong	19.9
	Italy	5.9	Ireland	19.7
2nd Quartile	Argentina	5.6	UK	19.2
	Chile	4.3	Finland	19.1
	Ireland	4.2	(Unified) Germany	19.0
	Japan	3.9	Italy	18.2
	Spain	3.4	Taiwan	16.6
	Mexico	2.2	Spain	14.6
3rd Quartile	Greece	3.1	Portugal	13.5
	Hong Kong	3.1	South Korea	13.2
	Portugal	3.0	Greece	11.5
	Brazil	2.3	Chile	10.0
	Singapore	2.1	Argentina	8.7
	Malaysia	1.5	Malaysia	7.7
4th Quartile	Taiwan	1.5	Mexico	6.9
	Philippines	1.5	Brazil	5.4
	South Korea	1.1	China	3.3
	India	0.8	Philippines	2.3
	China	0.7	India	1.8

Source: Calculations based on Angus Maddison/Groningen Growth and Development Centre and The Conference Board, Total Economy Database, July 2003, http://www.ggdc.net.

Catching-up re-shapes the world (2)



Catching-up and policy

- Since 200 years ago – when the US decided to reduce their gap with the UK – economic policy has been key for catching-up.
- Independently from the approach used (more "free market" vs. more "State directed"), a policy decision stands behind the start of a catching-up process.
- Over the last years, these policies have been more and more directed by the decisions taken in Supra-national institutions (such as the World Bank, the IMF or the WTO).

Catching-up and policy (2)

- Even taking into account such limitations, it is widely acknowledged today that all catching-up countries have largely invested in:
  - R&D;
  - Higher education (skills);
  - Infrastructures (including ICT).
- Similarly, it is evident the role that innovative firms play in this process, both in advanced and in emerging countries.

Catching-up and firms

- Especially in emerging countries, firms need to be provided with specific "institutional instruments", in order to sustain the catching-up of the whole country:

1. Links with the technology frontier;
2. Links with markets (and sophisticated users);
3. Supply of needed skills, services and other inputs;
4. The local innovation system/network.

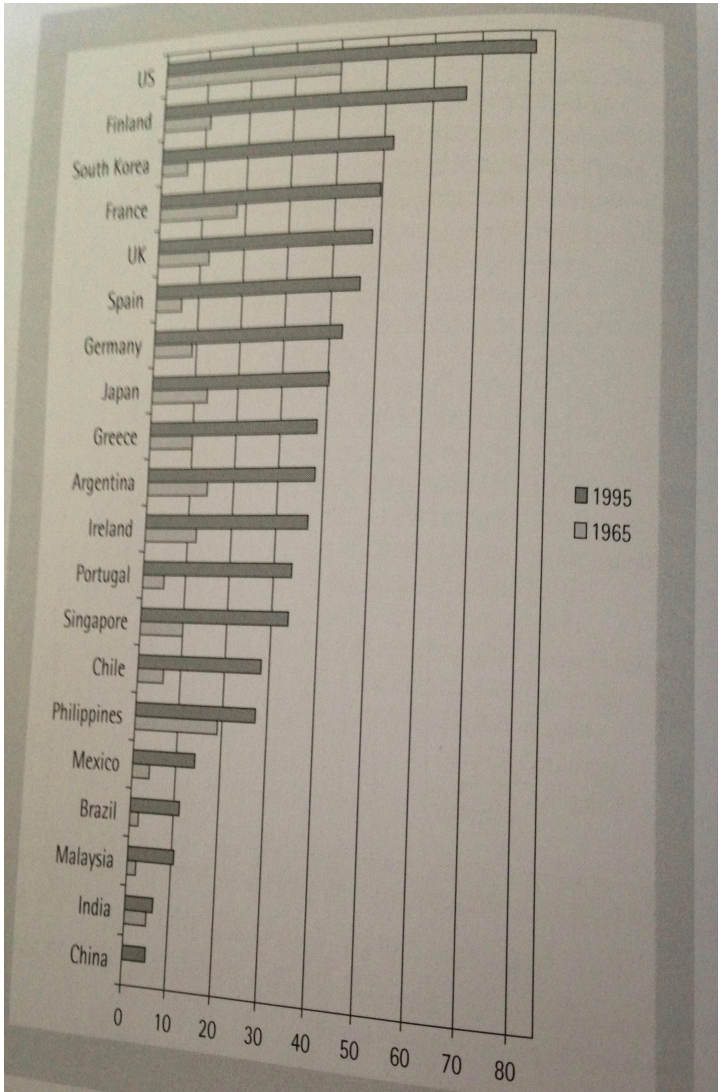


Figure 19.2 Third level enrollment in relation to age group, 20–24 years old (1965–1995)

Source: UN

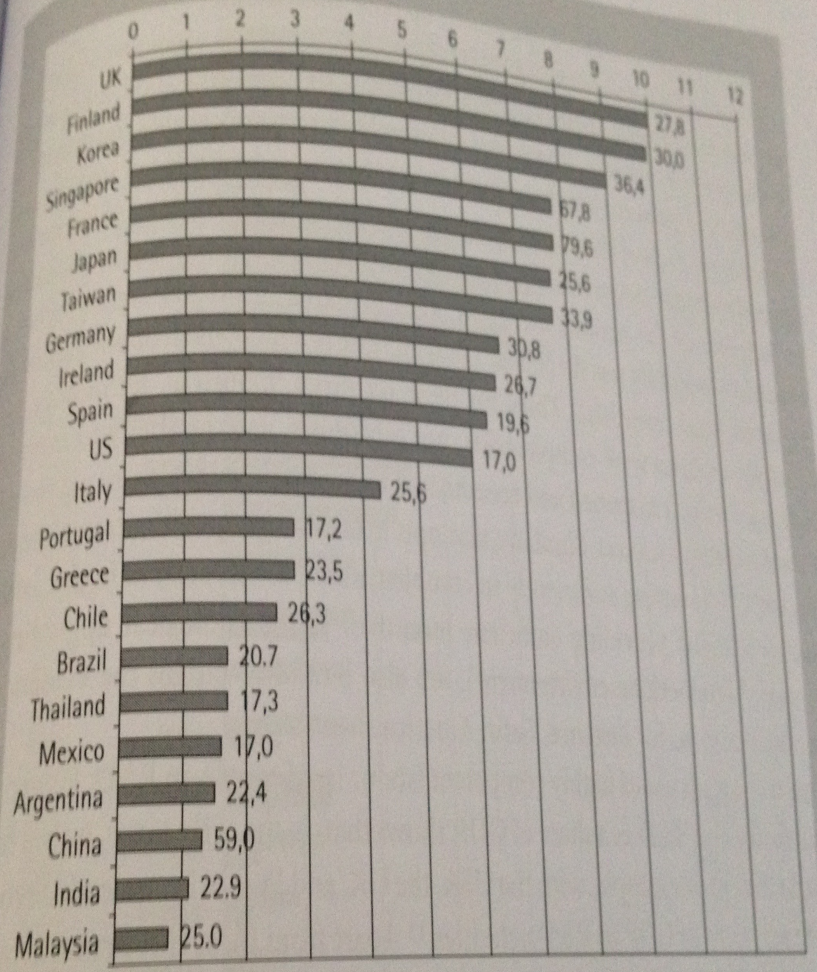


Figure 19.3 Ratio of first university degrees in natural sciences and engineering to 24-year-olds in the population, 1999 (all values in %)

The numbers to the right of the horizontal bars refer to the percentage share

Foreign Direct Investment and Catching-up

- Very often, catching-up of latecomer countries is related to Foreign Direct Investment:
  - Both Inward (foreign multinationals come and make investments in our country);
  - And Outward (multinationals from our country go and make investments abroad).
- Even if not always directly related to R&D and/or Innovation, such investments might lead to technology transfer and spillovers across countries (as we have already seen).

Foreign Direct Investment and Catching-up (2)

- From a “policy point of view”, the most recent and relevant case is that of China.
- Since 1953, the Communist Party of China uses the “five-year plans” (similar to what happened in the USSR) to plan its economic and social activities.
- Over the years, Chinese economy has shifted towards a more market-driven economy.
- However, five-year plans still exist.

Foreign Direct Investment and Catching-up (3)

- The current one is the 12th one; plans are now also complemented by specific "strategies". Some of these are very important for FDI and catching-up:
  - In 1978, the "open door strategy" made it possible for foreign multinationals to enter China → Inward FDI.
  - In 1999, the "go out policy" (or "go global") has started supporting the internationalisation of Chinese multinationals → Outward FDI.

An example: Chinese Outward FDI and performance

- High research interest due to the unconventional pattern of Chinese MNEs:
  - Early internationalization strategies driven by the need to *develop*, rather than *exploit* competitive advantages;
  - Role of SOEs and Government support, especially since the launch of the "Going Out" strategy.
- So far, evidence has focused on location choice and entry modes (Buckley et al., 2007; Amighini et al., 2013):
  - Due to the lack of firm level information, little research on the effects of OFDI, on both the home and the host country.

The aim of this study

- Revealing the home effect of OFDI:
  - on the production efficiency of firms;
  - on their scale and assets (including intangibles);
  - on their financial performance.
- Distinguishing according to the mode of entry (M&A vs. greenfield).
- Focus on investments in advanced markets, as they are more likely to be targeted by asset-seeking FDI and due to higher coordination costs due to distance.

How can OFDI affect firms' performance?

- A number of mechanisms can be considered, including:
  - exploitation of firm- and plant-level scale economies;
  - change in the composition of inputs;
  - sourcing of technological and managerial knowledge.
- Strategy of the study: a set of firms that have invested abroad (Outward FDI, in particular towards the EU) are compared with another set of *similar* firms that have kept investing in China only.
- It is expected to have higher performance (and other characteristics) for the first set of firms.
- In addition: is it the same if firms invest via greenfield FDI or via the acquisition (M&A) of an existing firm?

Main Results:
do OFDI enhance production efficiency?

	(I)		(II)	
t	LAB PROD	N	TFP	N
0	0.0468	2,122	0.0748	2,122
1	-0.0328	1,991	-0.00888	1,991
2	-0.0324	1,707	-0.0261	1,707
3	0.154	1,506	0.15	1,506
4	0.379**	1,349	0.307**	1,349
5	0.582**	1,259	0.469***	1,259

Main Results Greenfield vs. M&A: do OFDI enhance production efficiency?

(Greenfield)			M&A		
	(I)			(I)	
t	LAB PROD	N	t	LAB PROD	N
0	0.329*	1,615	0	-0.0233	1,558
1	0.148	1,601	1	0.16	1,542
2	0.0784	1,466	2	0.0982	1,416
3	0.201	1,293	3	0.0779	1,284
4	0.572**	1,160	4	0.341*	1,178
5	0.507**	1,060	5	0.223	1,052

Main Results Greenfield vs. M&A: do OFDI enhance firms' scale?

(Greenfield)				(M&A)			
(V)		(VI)		(V)		(VI)	
EMP	N	SALES	N	EMP	N	SALES	N
0.352	1,643	0.487*	1,742	0.615**	1,576	0.684*	1,703
0.609**	1,628	0.709**	1,704	0.702**	1,558	0.673**	1,634
0.383	1,493	0.369	1,561	0.678**	1,430	0.817***	1,506
0.839**	1,318	1.008**	1,376	0.517*	1,299	0.632*	1,400
1.205***	1,181	1.776***	1,234	0.258	1,191	0.649*	1,261
1.053**	1,080	1.560***	1,113	-0.233	1,065	0.203	1,108

Main Results Greenfield vs. M&A: do OFDI enhance financial performance?

(Greenfield)

	(VII)	
t	PROF	N
0	-0.0081	1,563
1	0.0166	1,532
2	0.0285	1,414
3	0.0563**	1,246
4	0.00958	1,119
5	0.0625	995

(M&A)

	(VI)	
t	PROF	N
0	-0.0476**	1,538
1	-0.0894***	1,470
2	-0.0780**	1,333
3	-0.0243	1,254
4	-0.0651*	1,138
5	-0.0407	972

Main Results Greenfield vs. M&A: asset-seeking OFDI

(Greenfield)

	(IV)	
t	INT/TOT	N
0	-0.0125	1,134
1	0.00226	1,168
2	-0.0167	1,056
3	-0.0151	923
4	-0.0148	825
5	-0.0208	750

(M&A)

	(IV)	
t	INT/TOT	N
0	0.0215*	1,134
1	0.0157*	1,183
2	0.0049	1,020
3	-0.00562	938
4	0.00694	861
5	-0.0102	752

Conclusions

- Evidence in support to the view that OFDI of EMNES in advanced markets can benefit domestic activities, including:
  - a rise in productive efficiency, which is faster in case of M&As (but at the cost of financial performance?);
  - a rise in sales and employment, especially with organic growth via greenfield FDI
- No strong effects on intangible assets, despite this is an ultimate objective of many M&As
- The catching-up process is therefore strongly related with FDI, although more in terms of performance than of innovation.