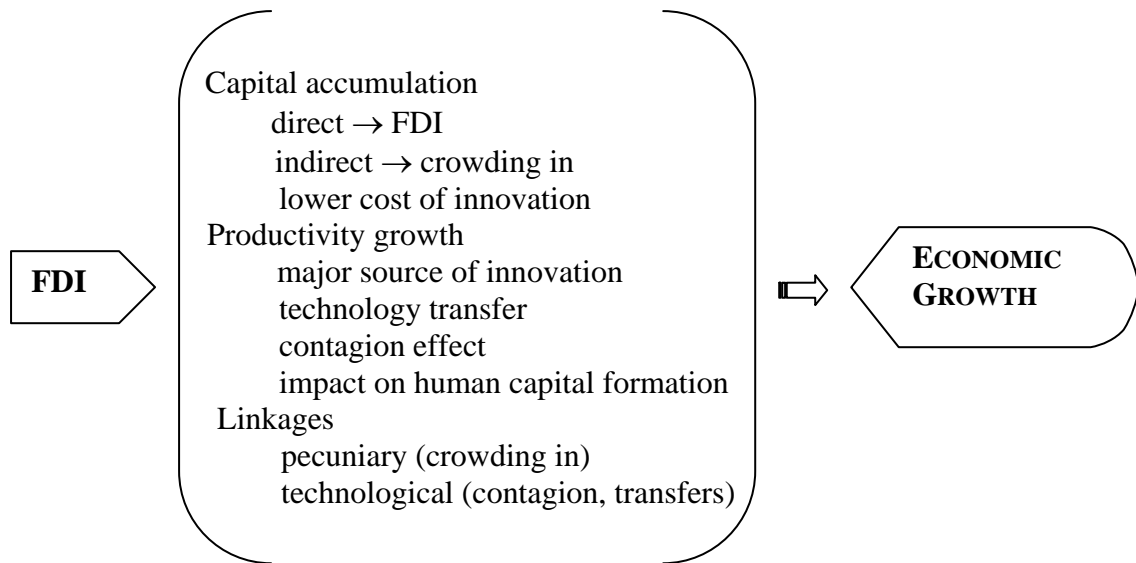


Eduardo Borensztein, José de Gregório and Jong-Wha Lee. 1995. *How does foreign direct investment affect economic growth?* National Bureau of Economic research (NBER) working paper 5057.

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Investment affects economic growth through capital accumulation and productivity increase:

$$\frac{g}{I} = k \frac{P}{I} \quad (1)$$

where  $k$  is the effect of investment on capital accumulation (net of depreciation and substitution, or  $\Delta K/K$ ),  $g$  is the rate of growth of income and  $p$  is some measure of productivity.

Productivity is accelerated by investment through technological change and innovation:

$$\frac{p}{I} = I \left( \frac{\Delta SL + \Delta T + \Delta Om - \Delta A}{I} \right) \quad (2)$$

where  $SL$ ,  $T$ ,  $Om$  and  $A$  constitute technological capabilities and stand for skilled labour, technical change (incorporating transfer of technology, adoption and innovation), a composite variable of management and organizational development; and some composite variable of costs of innovation and new activities.

FDI accelerates capital accumulation directly by increasing total investment and lowering costs of innovation, and indirectly by crowding in domestic investment and scarce resources of the economy. While equation 3 shows a simple, aggregate

relationship between the rate of capital accumulation and FDI, equation 4 disaggregates this relationship into its different major factors:

$$\frac{k}{\Delta FDI} = \Delta FDI \left( \frac{k}{\Delta I} \times \frac{\Delta I}{\Delta FDI} \right) \left( \frac{p}{\Delta FDI} \right) \quad (3)$$

$$\frac{\Delta I}{\Delta FDI} = \Delta FDI \left[ \frac{FDI}{I} + \left( \frac{\Delta DI}{\Delta FDI} \times \frac{DI}{I} \right) - \frac{\Delta A}{\Delta FDI} - \frac{\Delta Z}{\Delta FDI} \right] \quad (4)$$

where Z is a composite financial variable of crowding out effects of  $\Delta FDI$  in capital accumulation (royalties, profit repatriation, interest rates, availability of foreign currency, etc); and A is some composite measure of the costs of innovation and of starting new activities.

The effect of FDI on productivity growth depends on four factors: technology transfers, development of technological capabilities and skills, the threshold of human capital and the index of technological backwardness (the more backward the economy, the more scope for fast catch-up):

$$\frac{p}{\Delta FDI} = \Delta FDI \left( \frac{\Delta T + \Delta SL + \Delta A}{\Delta FDI} \right) (ht) \quad (5)$$

where h and t are the index of human capital at the start (example, the share of skilled labour on total labour force) and the index of technological backwardness (some weighted measure of how far an economy is from the frontier).

Technology transfers occur through four related moments: import of cheap high-tech inputs, equipment and machines; adoption, adaptation and innovation of foreign technology; training and acquisition of new skills; and the contagion effect.

The contagion effect consists on the adoption and generalisation of the best practices: technological change, quality control, adoption of standards and innovation; management and organisation; information systems; training schemes; etc.

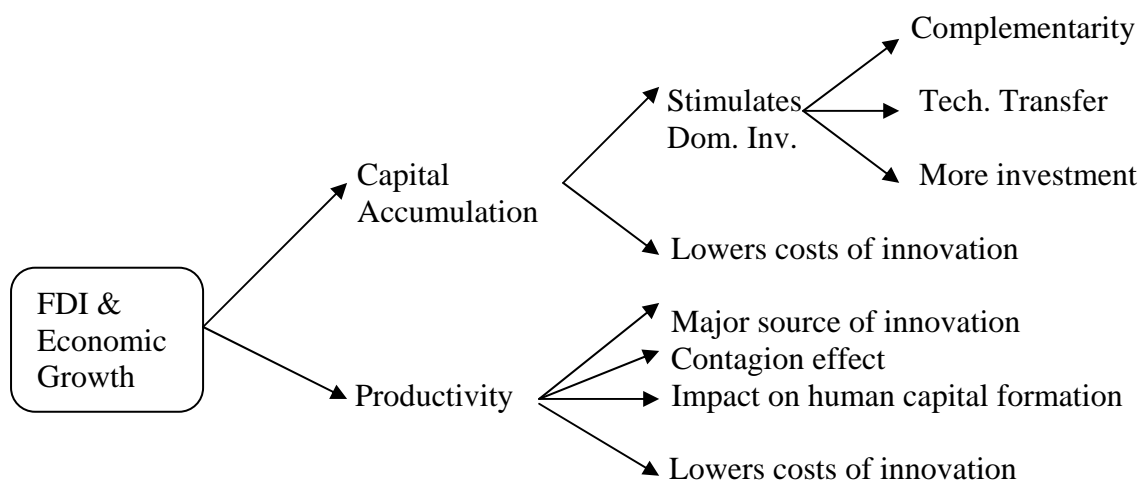
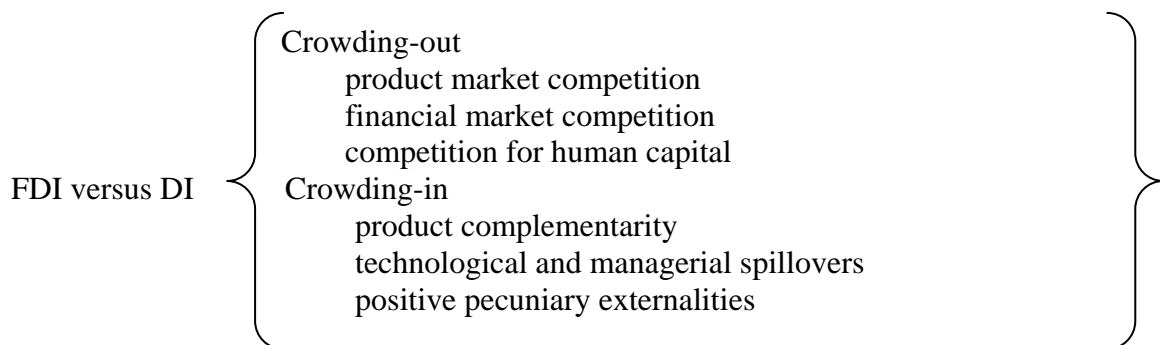
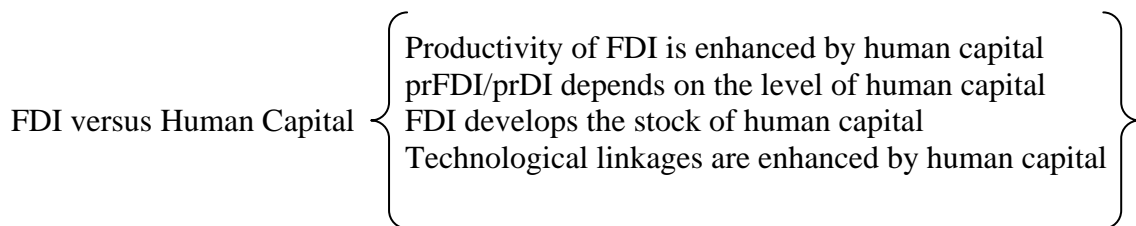
MNEs are a major source of technological transfers because: (i) they are a major source of technological change (R&D and innovation) and standardisation; (ii) they are a major source of FDI; (iii) the scale of their activities gives them a comparative advantage in technology; and (iv) they are a major source of quality and productivity standards.

However, human capital constraints in the host economy reduce the efficiency, viability and intensity of technology transfers.

To sum up, FDI affects economic growth fundamentally by increasing the flows of investment and the productivity of capital. The first effect, capital accumulation,

depends on the amount of FDI but also on its impact on domestic investment and financial variables that affect investment (whether this impact be crowding in or crowding out). The second effect, productivity, is associated with technology transfers, which are constrained by the stock of human capital in the host economy as well as by linkages with domestic firms that allow the contagion effect to take place. For both effects, domestic linkages are very important.

Linkages with the domestic economic are crucial, and mostly occur by means of the interaction between FDI and human capital and the interaction between FDI and DI (domestic investment) via pecuniary and technological externalities.



Thus, FDI can be beneficial to development and economic growth if:

- (i) It adds (net) to capital accumulation – needs to stimulate domestic investment, and this requires complementarities;
- (ii) It is more productive than domestic investment – this requires a minimum threshold of human capital;
- (iii) It transfers technology – which requires linkages to domestic investment as well as human capital;
- (iv) It adds to human capital formation.

Incentives to promote FDI may create a profit opportunity and, in doing so, may attract FDI. But incentives, on their own, are not enough to stimulate efficiency since the mere presence of FDI is no guarantee of efficiency.