

Catching up and lagging behind in a balance-of-payments-constrained dual economy

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MERIT Conference
27/11/2014

Motivation and Goals

- Study the forces that drive success and failure in the process of economic development.
- Economic development as a process of transformation that take place in two broad dimensions:
 - Sectoral composition (Development pioneers, Post-keynesians and Latinamerican Structuralists)
 - Technological capabilities (Neo-Schumpeterians)
- Main Goals:
 - Set a formal model of catching up between nations that captures both dimensions;
 - Provide theoretical foundations for the emergence of development traps.

The model – Basic Assumptions

- Setting:

2 countries: a poor, technological backward country tries to catch up with a rich, technological advanced country.

2 sectors: the follower has a dual structure in which a traditional sector co-exists with a modern sector.

- Modern sector:

- *Firms produce using capital, labour and technological knowledge for domestic and external demand.*
- *There is a binding restriction on external accounts → Rhythm of production depends on availability of foreign exchange.*

- Traditional sector:

- *Produces for its own demand, using only labour.*
- *Employment is determined as a residual (works as a “reserve army”) → dynamic behaviour ultimately determined by what happens in the modern sector*

The modern sector

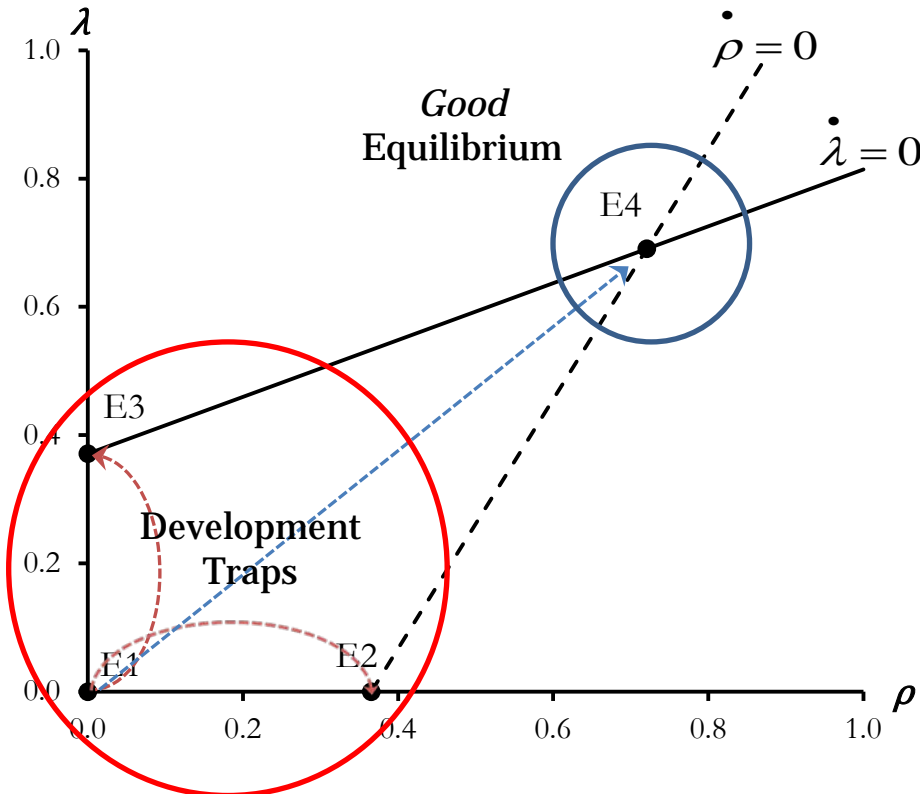
- Output growth: $\hat{Y}_M = \frac{a(\hat{e} + \hat{P}_M^f - \hat{P}_M) - \varepsilon \hat{Z}}{\chi}$
 - **Income elasticity** \rightarrow determined by exog. factors and the technological gap $\varepsilon = \xi - \psi G_M$
 - **Domestic prices** \rightarrow determined by mark-up, productivity and wages $\hat{P}_M = \hat{\tau} + \hat{W}_M - \hat{R}_M$
 - **Wages** \rightarrow determined by exog. factors and the relative size of modern sector $\hat{W}_M = \omega + \theta \lambda$
 - **Productivity** \rightarrow determined by embodied tech. progress, growth and innovation $\hat{R}_M = \mu \kappa + \gamma_M \hat{N}_M + \alpha \hat{T}_M$
 - **Innovation** \rightarrow determined by R&D, the tech. gap and relative size of modern sector $\hat{T}_M = \zeta + c G_M + \beta \lambda$

Output (and Employment) Growth ultimately depends on two **state endogenous variables**: the technological gap (G_M) and the relative size of modern sector (λ)

Dynamic System

$$G_M = 1 - \rho \rightarrow \left(\rho = \frac{T_M}{T_M^f}; \lambda = \frac{N_M}{L} \right)$$

$$\begin{cases} \dot{\rho} = (A + B\rho + C\lambda)\rho \\ \dot{\lambda} = (D + E\rho + F\lambda)\lambda \end{cases}$$



Paper \rightarrow *Examine the conditions under which each SS is viable and stable.*

What are the conditions to escape the development traps and enter into a path towards successful development?

Radical transformation in ε (income elasticity of exports) and σ (absorptive capacity)

But, if only one is improved \rightarrow might end up in other development trap ($E2, E3$).

$E4$ becomes stable only if there is a radical transformation in both parameters!

Conclusions and future steps

- We set up a model of catching-up between nations that acknowledges the dual character of developing economies and the challenges they face to achieve a *productive* absorption of labour.
- Using a simple linear setting, the model is able to provide multiple equilibria that can be associated with different types of development traps that needs to be avoided in order to enter into a path of successful development.
- Possible extensions:
 - Inclusion of non-linearities (international spill-overs, KV-coef.)
 - Inclusion of multisectoral structure in the modern sector (to analyze structural change within the modern sector)

Thanks for your attention!

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The traditional sector

- Output growth: $\hat{Y}_S = \hat{N}_S + \hat{R}_S$
 - **Productivity growth** → *dependant on employment (non-increasing returns)*
$$\hat{R}_S = \iota + \gamma_S \hat{N}_S$$
 - **Employment growth** → *residual (labour force not employed in modern sector)*

$$n = \lambda \hat{N}_M + (1 - \lambda) \hat{N}_S \Rightarrow \hat{N}_S = \frac{n - \lambda \hat{N}_M}{(1 - \lambda)}$$

Output (and Employment) Growth in traditional sector depends on employment absorption in the modern sector

→ ultimately determined by state endogenous variables (technological gap and relative size of modern sector)

Dynamic System

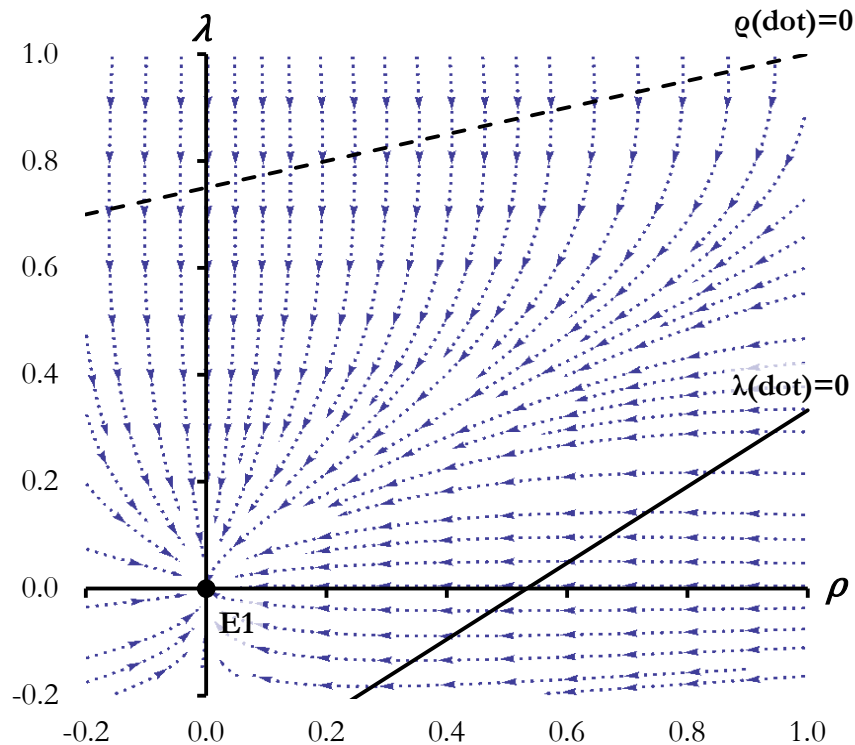
- Technological gap: $G_M = 1 - \rho$; $\rho = \frac{T_M}{T_M^f}$
 - Relative size of modern sector: $\lambda = \frac{N_M}{L}$
 - Growth rates: $\hat{\lambda} = \hat{N}_M - \hat{L}$; $\hat{\rho} = \hat{T}_M - \hat{T}_M^f$
 - Movements through time:
$$\begin{cases} \dot{\rho} = (A + B\rho + C\lambda)\rho \\ \dot{\lambda} = (D + E\rho + F\lambda)\lambda \end{cases}$$
- Solution of system yields 4 steady states
(3 development traps and 1 *good* equilibrium) [[Figure](#)]

Development traps and structural trajectories

- Economic interpretation of the different SS and the trajectories that take place when changes in the parameters lead to changes in the stability conditions of each of them.
- Simulations with simple figures.
- FIGURES

Trajectories

Initial Stage



Exogenous Variables

$$b = 0.01; \hat{Z} = 0.05; \hat{T}_M^f = 0.04; n = 0.02$$

Parameters

$$\hat{Y}_M \Rightarrow a = 0.80; \chi = 1.25$$

$$\varepsilon \Rightarrow \xi = 0.80; \psi = 0.80$$

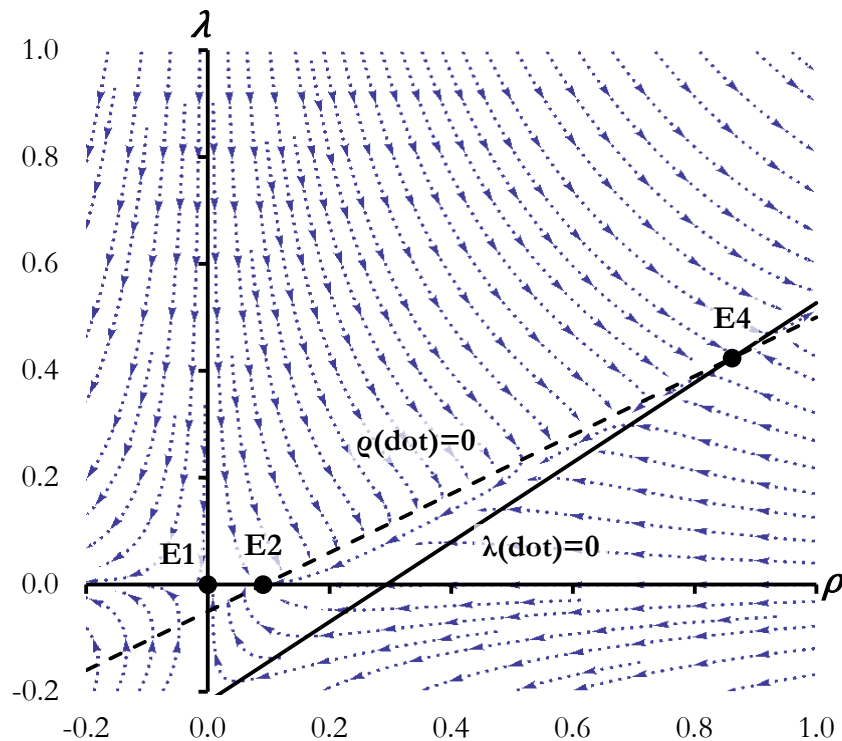
$$\hat{W}_M \Rightarrow \theta = 0.065$$

$$\hat{R}_M \Rightarrow \mu = 0.15; k = 0.00; \gamma = 0.40; \alpha = 0.34$$

$$\hat{T}_M \Rightarrow \zeta = 0.00; \sigma = 0.01; \beta = 0.04$$

Trajectories

Big-Push on Technology



Exogenous Variables

$$b = 0.01; \hat{Z} = 0.05; \hat{T}_M^f = 0.04; n = 0.01$$

Parameters

$$\hat{Y}_M \Rightarrow a = 0.80; \chi = 1.25$$

$$\varepsilon \Rightarrow \xi = 0.80; \psi = 0.80$$

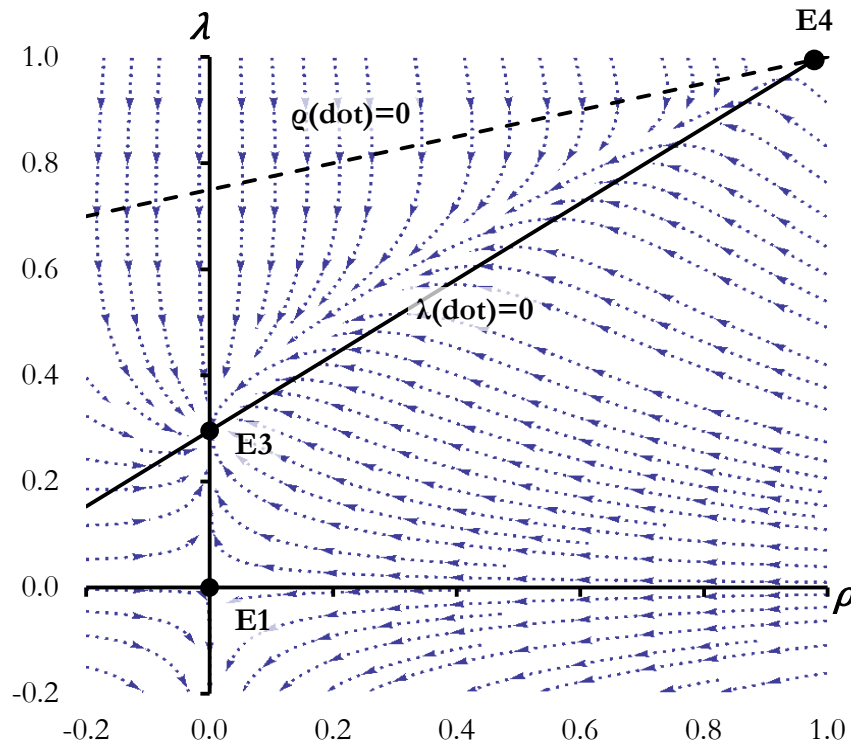
$$\hat{W}_M \Rightarrow \theta = 0.065$$

$$\hat{R}_M \Rightarrow \mu = 0.15; k = 0.00; \gamma = 0.40; \alpha = 0.34$$

$$\hat{T}_M \Rightarrow \zeta = 0.02; \sigma = 0.02; \beta = 0.04$$

Trajectories

Emergence of Modern Exporting Sector



Exogenous Variables

$$b = 0.01; \hat{Z} = 0.05; \hat{T}_M^f = 0.04; n = 0.01$$

Parameters

$$\hat{Y}_M \Rightarrow a = 0.80; \chi = 1.25$$

$$\varepsilon \Rightarrow \xi = 1.30; \psi = 0.80$$

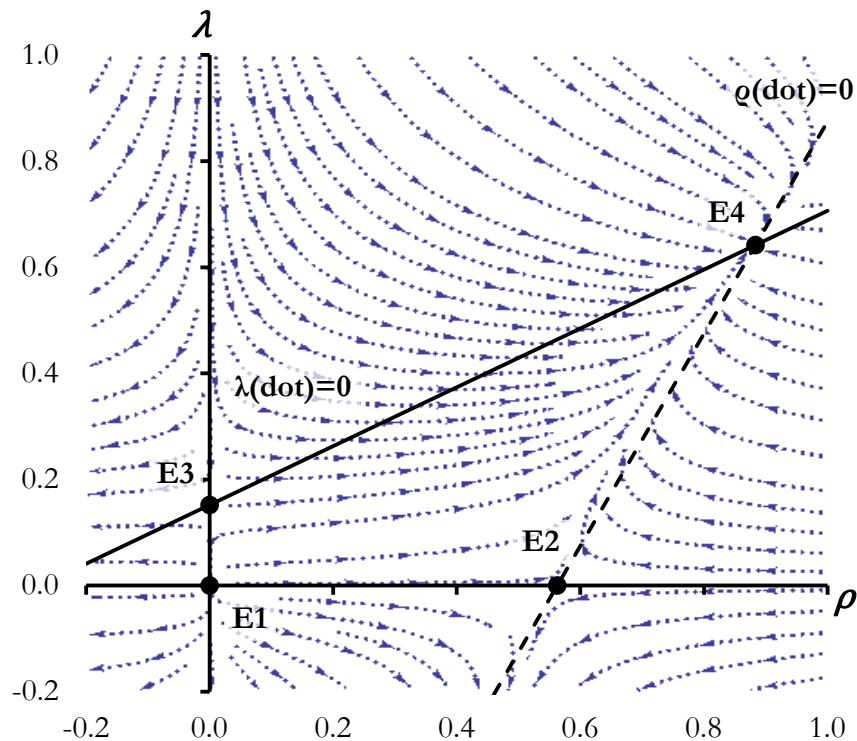
$$\hat{W}_M \Rightarrow \theta = 0.065$$

$$\hat{R}_M \Rightarrow \mu = 0.15; k = 0.00; \gamma = 0.40; \alpha = 0.34$$

$$\hat{T}_M \Rightarrow \zeta = 0.00; \sigma = 0.01; \beta = 0.04$$

Trajectories

Successful Development



Exogenous Variables

$$b = 0.01; \hat{Z} = 0.05; \hat{T}_M^f = 0.04; n = 0.01$$

Parameters

$$\hat{Y}_M \Rightarrow a = 0.80; \chi = 1.25$$

$$\varepsilon \Rightarrow \xi = 1.30; \psi = 0.40$$

$$\hat{W}_M \Rightarrow \theta = 0.065$$

$$\hat{R}_M \Rightarrow \mu = 0.15; k = 0.25; \gamma = 0.40; \alpha = 0.34$$

$$\hat{T}_M \Rightarrow \zeta = 0.005; \sigma = 0.08; \beta = 0.04$$

The real world

- Stylized trajectories can be observed in real data
- Proxies used:
- LAMBDA = share of labour in MMA
- RHO = relative productivity of MMA with respect to the frontier
- Figures: success, poverty trap, lower middle income trap, upper middle income trap

Conceptual Framework

Technology Gap Approach

- *Technology explains differences in per capita income.*
- *Advantages of backwardness, but pre conditions to exploit these advantages*
- *Trade dynamics also depend on technological factors (non-price competitiveness)*

Post Keynesian Approaches

- *Balance-of-Payments Constraint Growth*
- *Kaldor-Verdoorn Increasing Returns*
- *Cumulative Causation (Demand and Productivity regimes)*

Development Pioneers and LA Structuralism

- *Developing economies are characterized by a high degree of duality (or structural heterogeneity) → it is possible to identify sectors with very different levels of productivity, incomes and technological capabilities.*
- *Labour absorption in the modern sector is key to achieve successful development*