

Economic growth, innovation systems, and institutional change: a trilogy in five parts

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Intro

- ➔ Aim: How do we understand development processes and the realisation of different development patterns?
- ➔ Rapprochement and triangularisation (R. Martin)
- ➔ Three perspectives on development processes
 - ➔ Growth
 - ➔ National Innovation Systems
 - ➔ ... Institutional change
- ➔ Growth limitations:.... —> empirically based qualitative simulation modelling
- ➔ We (almost) all recognise the role of institutions: National Innovation Systems?
- ➔ Institutional behavior and change: the milieu first

An analytical (methodological) claim

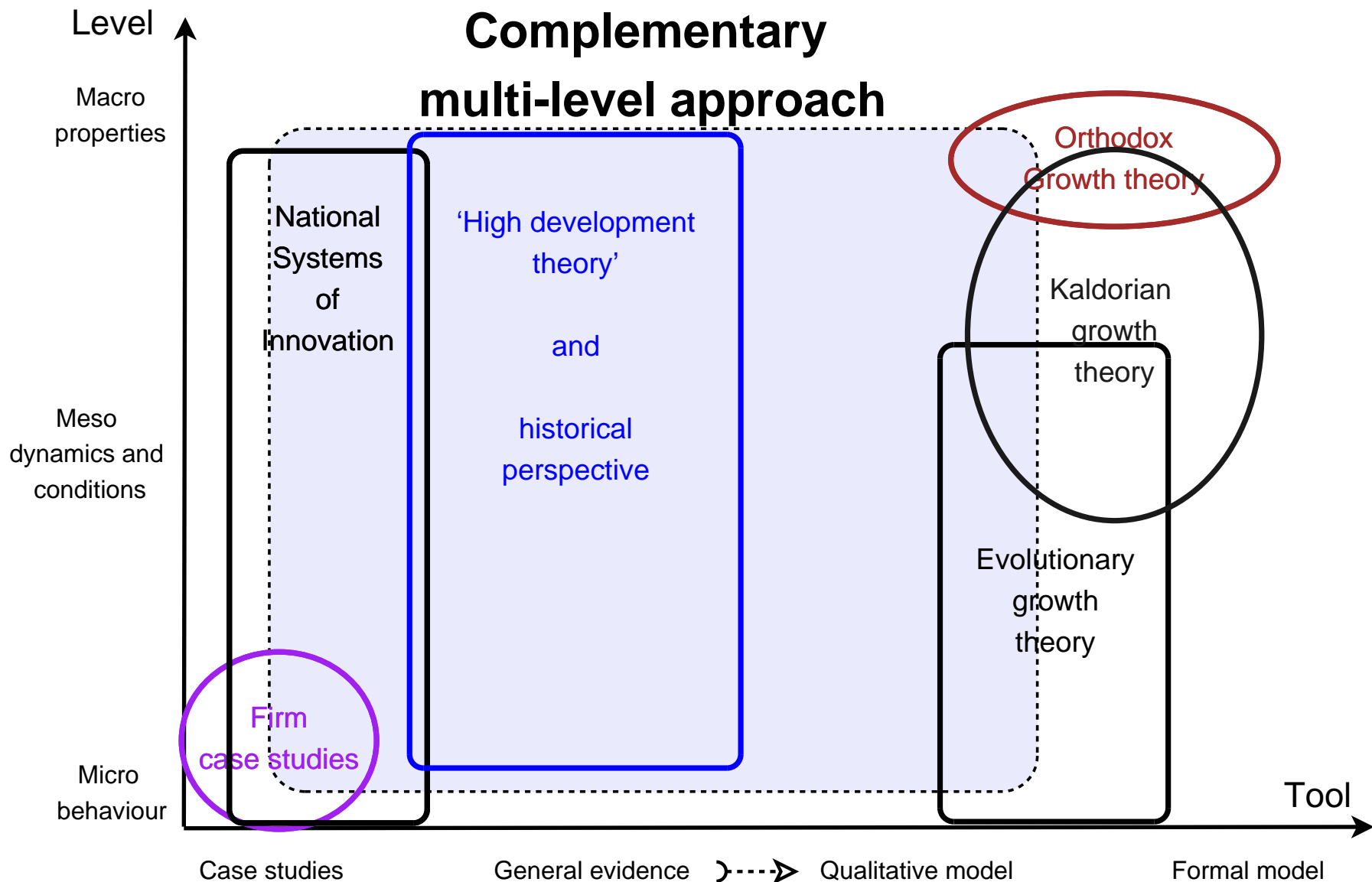
- ➔ Orthodox growth theory *explain* development phenomena?
↔ formal *representation* of *aggregate growth* phenomena.
- ➔ ‘Appreciative theorising’ (narratives) on particular case studies lead to theories?
↔ trade-off between localised and general evidence: *no inference*.
- ➔ Level of socio/economic aggregation studied/represented in the analysis of complex phenomena such as development?



We need both a *complementary* and *multi-level* perspective

- ➔ *Complement* different analytical tools (empirical and theoretical)
- ➔ Analyse the interactions between *different levels economic aggregates* (micro to macro)

An analytical (methodological) claim



An analytical (methodological) proposal

- ✓ Observe empirical regularities and causal mechanisms at different levels of economic aggregation: *ex post* analysis.
- ✓ Build 'virtual worlds' in which actors' behaviour is represented: heterogeneous agents, bounded by normative behaviour, within economic settings. . .

⇓
abduction

- ✓ Explain the mechanisms through which higher level aggregates originate: *emergentism*
- ✓ Observe the effects of higher level changes on lower levels' behaviour, state, and emergence: *second order emergence*

⇓
experimenting

Generalise the phenomena observed by experimenting different initial conditions, paramterisations, stochastic elements, etc.

Industrial development in Costa Rica: empirics

Macro to micro analysis: evolution of *developmental conditions* and micro behaviour that contribute in determining them (Ciarli and Giuliani, 2005)

Macro: i) Dependency of the country on macro variables (external demand and macro stability). ii) Trade dynamics

Meso: i) Main elements of the National Innovation and Learning Systems ii) Pattern of sectoral specialisation ('structural change' in exports)

Micro: Linkages and externalities of Foreign Direct Investors in high technology sectors (Electronic and Medical Devices).

- ➔ Productive linkages
- ➔ Technological externalities and labour mobility
- ➔ Linkages with the NSI.

Industrial development in Costa Rica: empirics

Macro: i) high growth, ii) stable macro iii) volatile growth, iv) increase in consumption, services, non tradables / decrease in investment, v) dependency on external movements \mapsto Low domestic investment, high FDI

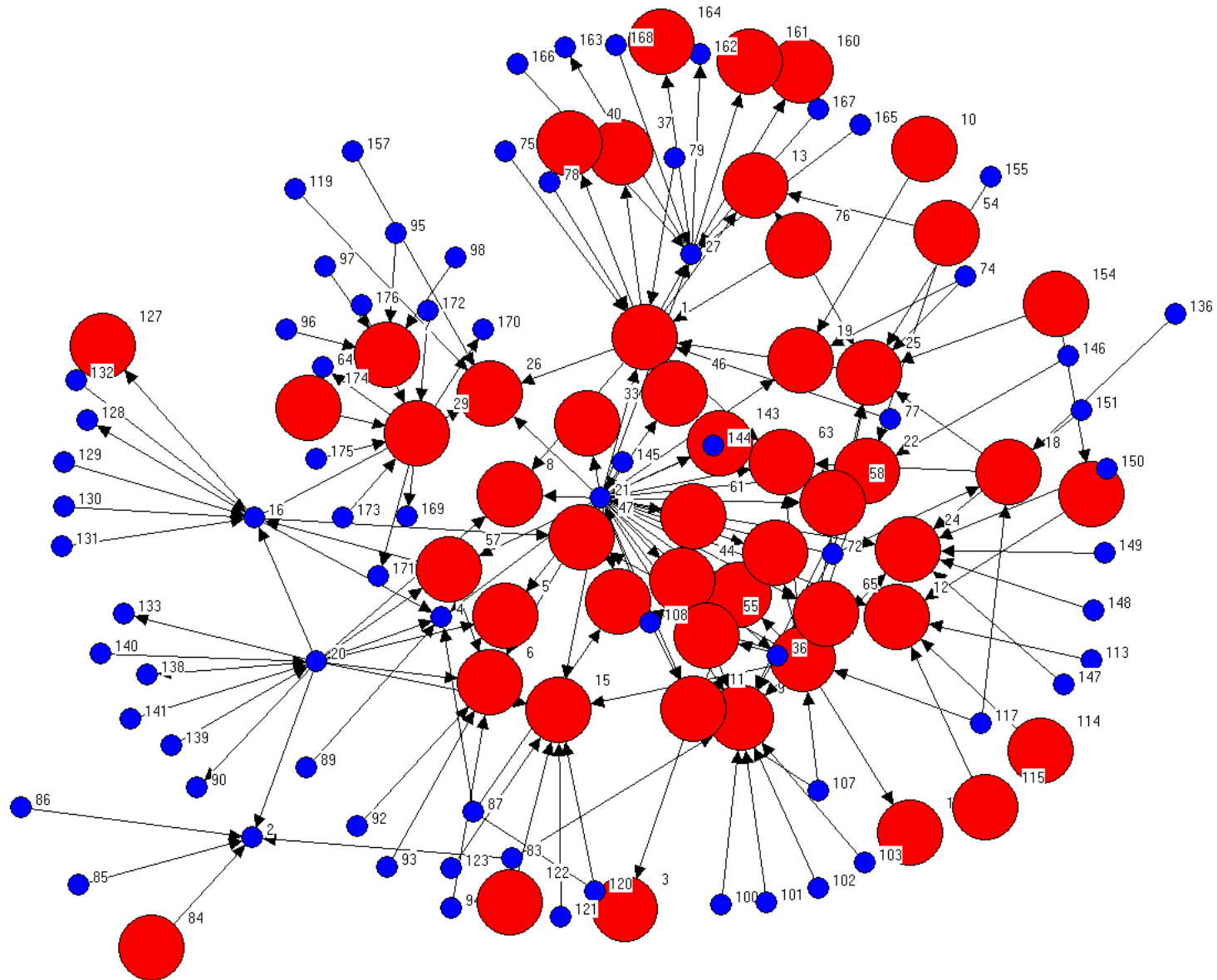
Trade: i) growing exports, linked to FDI in the '90s (> 50%) ii) negative TB, iii) growth (volatility) linked to export \mapsto Relevance of external demand & dependence on export price (ToT)

Institutions: i) high social indicators (HDI), ii) LIS biased toward alphabetisation and tertiary education, iii) poor NIS (& no private innovation) \mapsto No NSI, technology importer, with a qualified but scarce HK

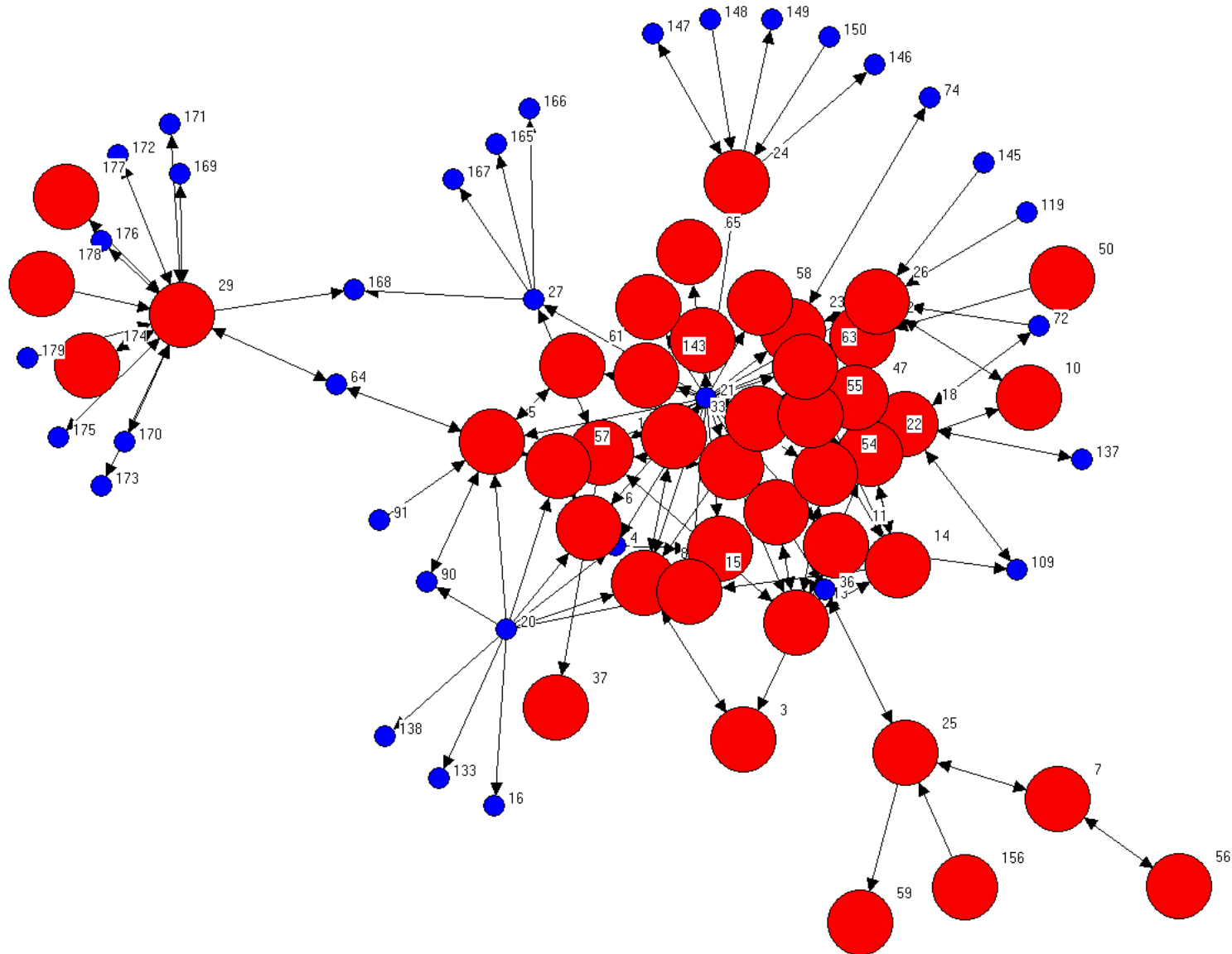
'Structural change' : i) no structural transformation coupled with radical (exogenous) specialisation shift, ii) 5% of domestic exports in high tech \mapsto Dualistic development & structural heterogeneity

MNC behaviour : i) no local innovation ii) limited (5%) and low tech (95%) local procurement, iii) no interactive learning and limited tech transfer, iv) limited work mobility to local firms, v) weak relations with domestic institutions (only Universities).

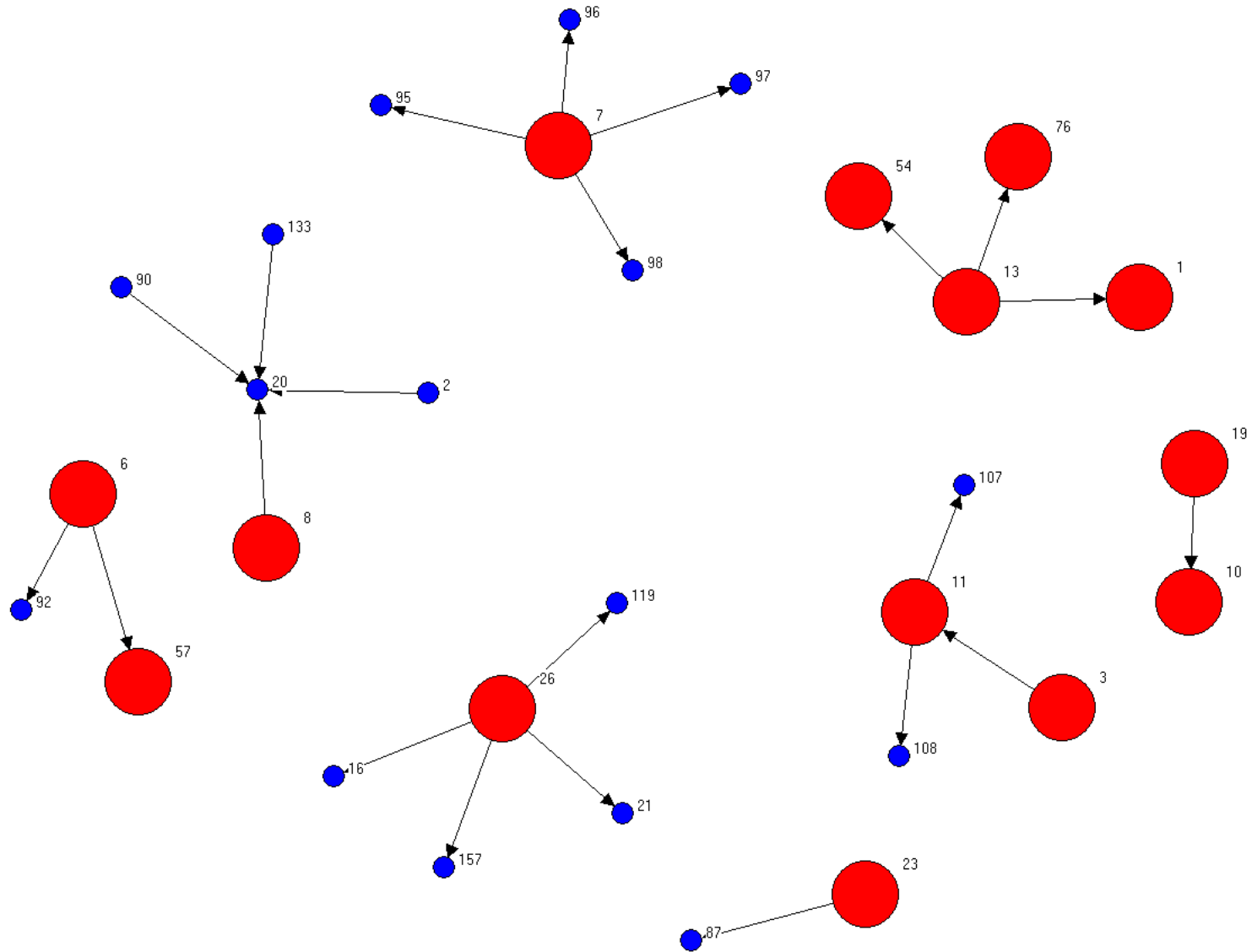
FDI-Domestic production linkages



FDI–Domestic knowledge linkages: weak



FDI–Domestic knowledge linkages: strong



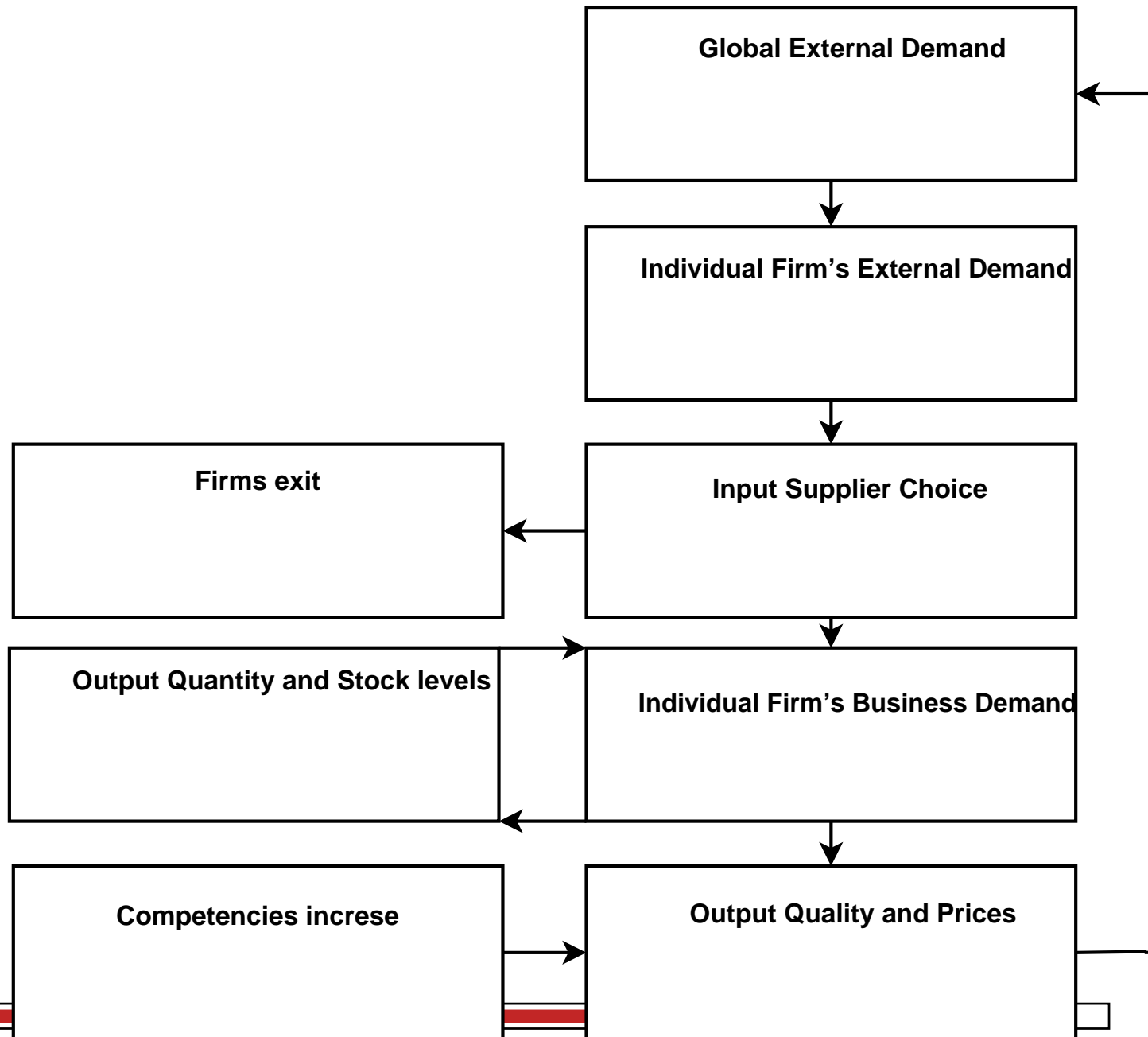


From empirical observations to theoretical
representation

A firm–based input–output growth model

- ✓ The model represents an open economic system composed by several sectors each supplying one product defined over a set of ‘quality’ characteristics. Each sector is composed by an evolving set of firms (industrial dynamics).
- ✓ Firms produce a good defined over the same set of characteristics and use the same type of inputs, also defined over characteristics.
- ✓ Firms sell either to the final (export) D or to ‘intermediate’ D. D depends on the quality of product’s characteristics, price, and buyer’s preferences.
- ✓ Firms produce through a Leontief technology: Q is determined simultaneously for all firms and responds to short periods orders, adjusting to the long period trend. D–S gaps adjust through stocks.
- ✓ Firms competencies increase through learning (path dependent) and innovation. Only firms in the export sector innovate — randomly, involving suppliers with a given probability.

Model dynamics



Analysis and results

- ➔ In depth empirical evidence
- ➔ Implement model mechanisms, heuristics and assumptions
- ➔ Interpret bottom–up aggregation and interaction between levels

Results

- ➔ High variance in growth results: micro & micro–meso interactions
 - ➔ Leontief paradox: relevance of productive specialisation
 - ➔ User–supplier relations: relevance of interactive innovations
- ✓ MNC produce commodities dynamic on the international market, incorporating innovations... So far so good.
 - ✓ Reduced local procurement, sporadic knowledge linkage: high national market concentration... so far less good
 - ✓ Fairly high GDP growth, low domestic output growth, no domestic structural change, low learning effect...

Role of institutions?

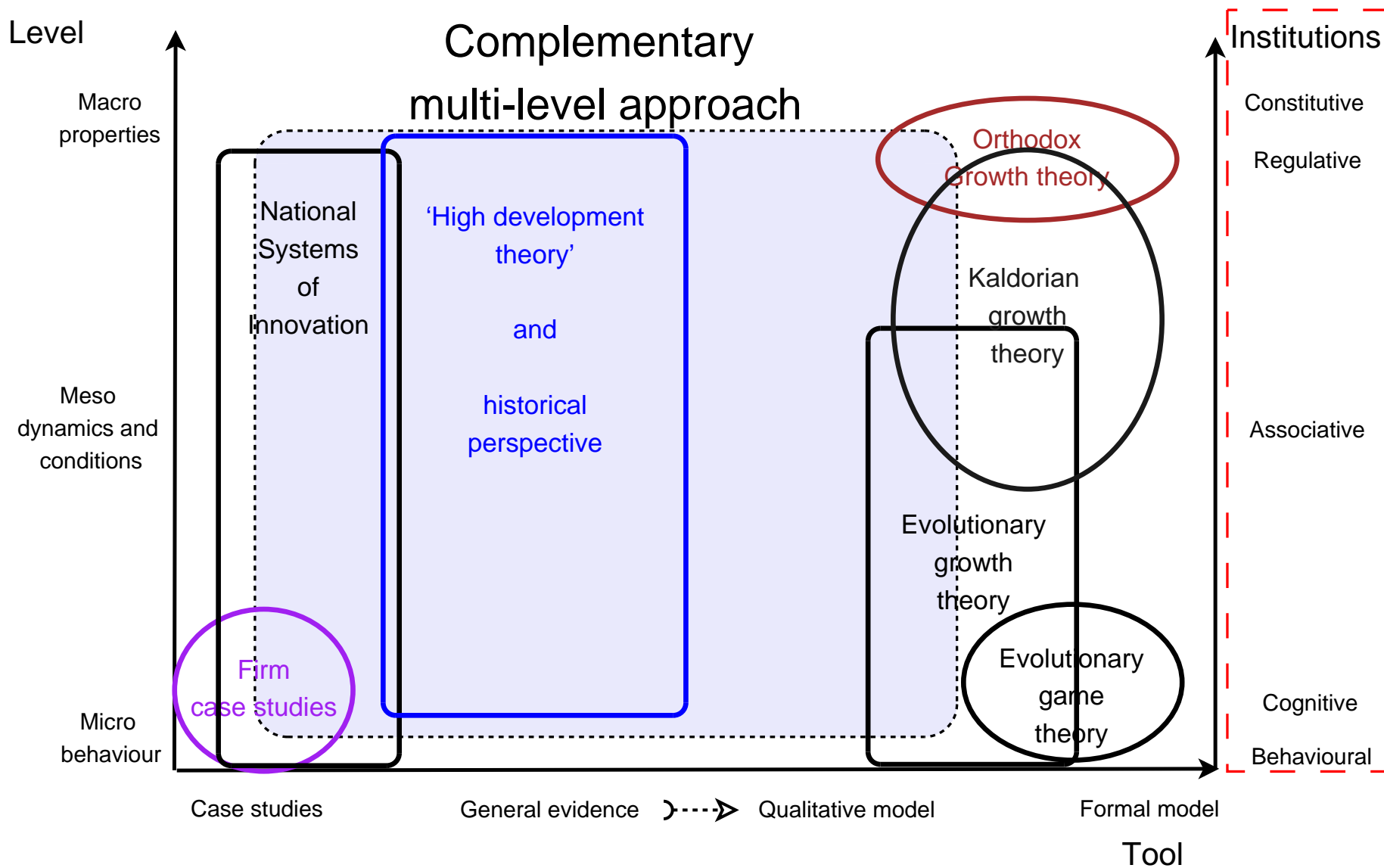
- ➔ NSI and LSI contribution in CR?
 - ➔ Majority of applications of NIS framework to development too prescriptive: transposing the model of a developed country NIS
 - ➔ Prevalence of 'local productive arrangements' in developing countries: lack of "articulation, interaction, co-operation and learning"
 - ➔ Conceptual ambiguity in interpreting the term 'institution' processes
 - ➔ Measurement and systemic relations (S. Iammarino)?

Role of institutional analysis

“The [. . .] link from institutions to [economic] outcomes is of great importance [. . .] as a topic of research. I have to confess that I think I learn more from historical case studies than from economic theory, just as I think I learn more about marriage from reading novels than from economic theory” Solow(1994)

- ➔ Analysing processes of economic development as just described, leaves out some important details despite the use of empirical evidence and ‘stylised facts ’
- ➔ To generate explanatory insights, we have to understand the causal relations
- ➔ To understand causal relations, we have to understand institutions because they shape interactions and transactions

An analytical (methodological) perspective

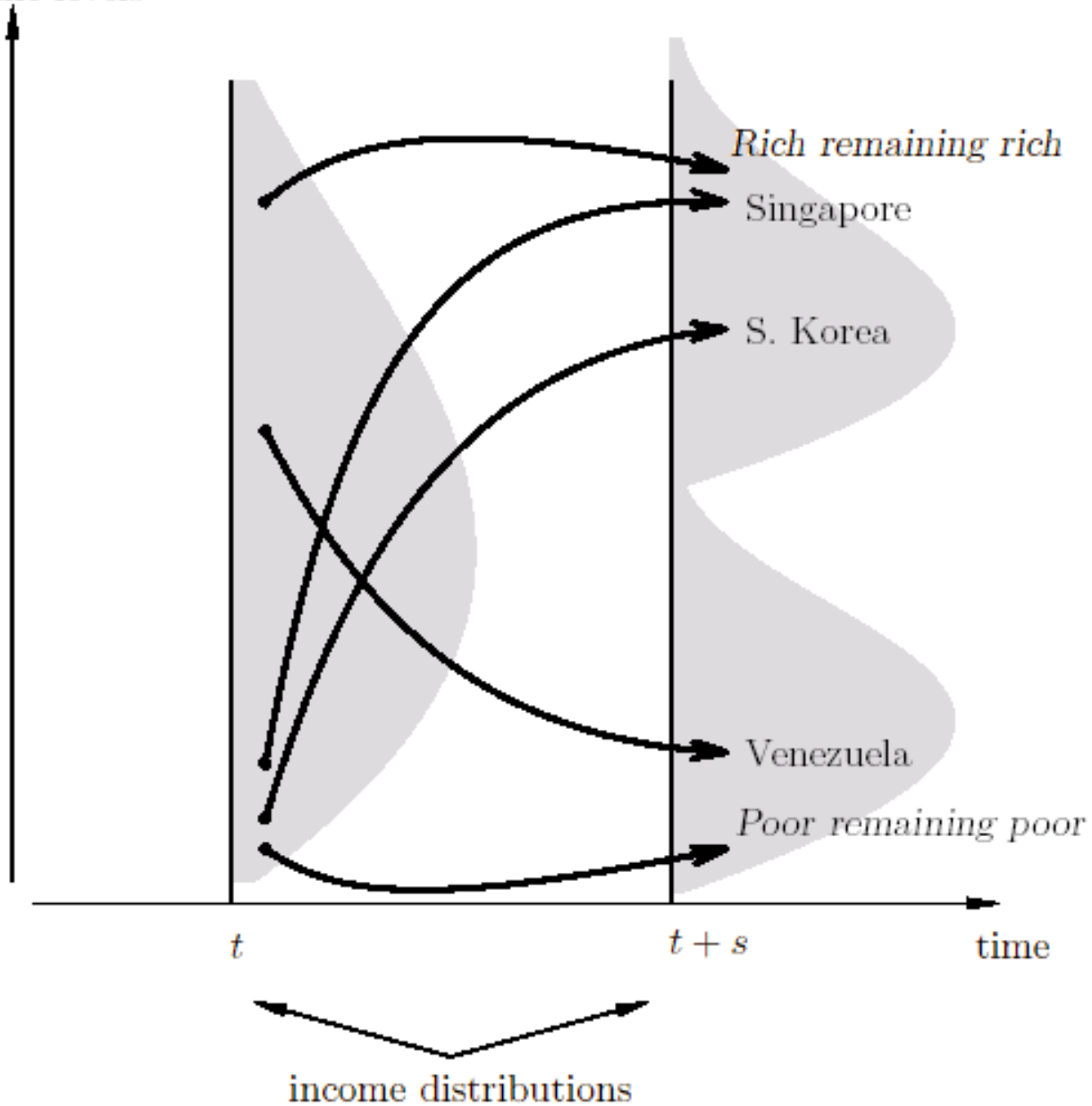


Superimposing institutional typology

Institution Type	Taiwan	Korea
Behavioural	<ul style="list-style-type: none"> - Confucianism (respect for hierarchical structures, valuing hard work and self-improvement) 	<ul style="list-style-type: none"> - Confucianism - Revitalization of Bureaucratic Traditions
Cognitive	<ul style="list-style-type: none"> - Historical Importance of Education, Industrial Orientation (Development Success as an Example for Mainland China) - Importance of Knowledge-based Assets for Exports 	<ul style="list-style-type: none"> - Importance of Education, Industrialization, and Mass Production (Chaebols) - Vision of industrial development - Self-induced Creative Crises due to Export Orientation
Associative	<ul style="list-style-type: none"> - Industrial Associations - Government-business associations through Deliberation Councils - Farmers Associations 	<ul style="list-style-type: none"> - Industrial Associations - Government-business association through Export Promotion Meetings
Regulative	<ul style="list-style-type: none"> - Selective industrial and trade policies (SIT) - Economic Stabilisation Board - State-owned Enterprises - Regulations to cap payment of licensing fees and royalties for imported technology 	<ul style="list-style-type: none"> - SIT - Economic Planning Board - Five-year plans - Nationalized Commercial Banks - Provision of Targeted Loans - Tariff and Tax Exemptions, Accelerated Depreciation - Establishment of State Trading Agency, KOTRA - Linking issuance of import licences to export performance - Weak copyright and patent laws
Constitutive	<ul style="list-style-type: none"> - Land Reform - Geopolitics 	<ul style="list-style-type: none"> - Land Reform - Geopolitics - Developmental State (1961-1980)

Conclusions

income levels



income distributions

References

Ciarli, T. and Giuliani, E. (2005), Structural reforms and structural change in costa rica. industrial dynamics, structural heterogeneity and linkages: The role of FDIs, Report, BID. Presented within the BID-CEPAL seminar 'El Reto de Acelerar el Crecimiento Economico en America Latina y el Caribe', September 2004, Santiago, Chile.