The Italian capital stock through the lens of financial accounts

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How financial systems work: evidence from financial accounts

Banca d'Italia, Rome, 30/11-01/12 2017

Motivation

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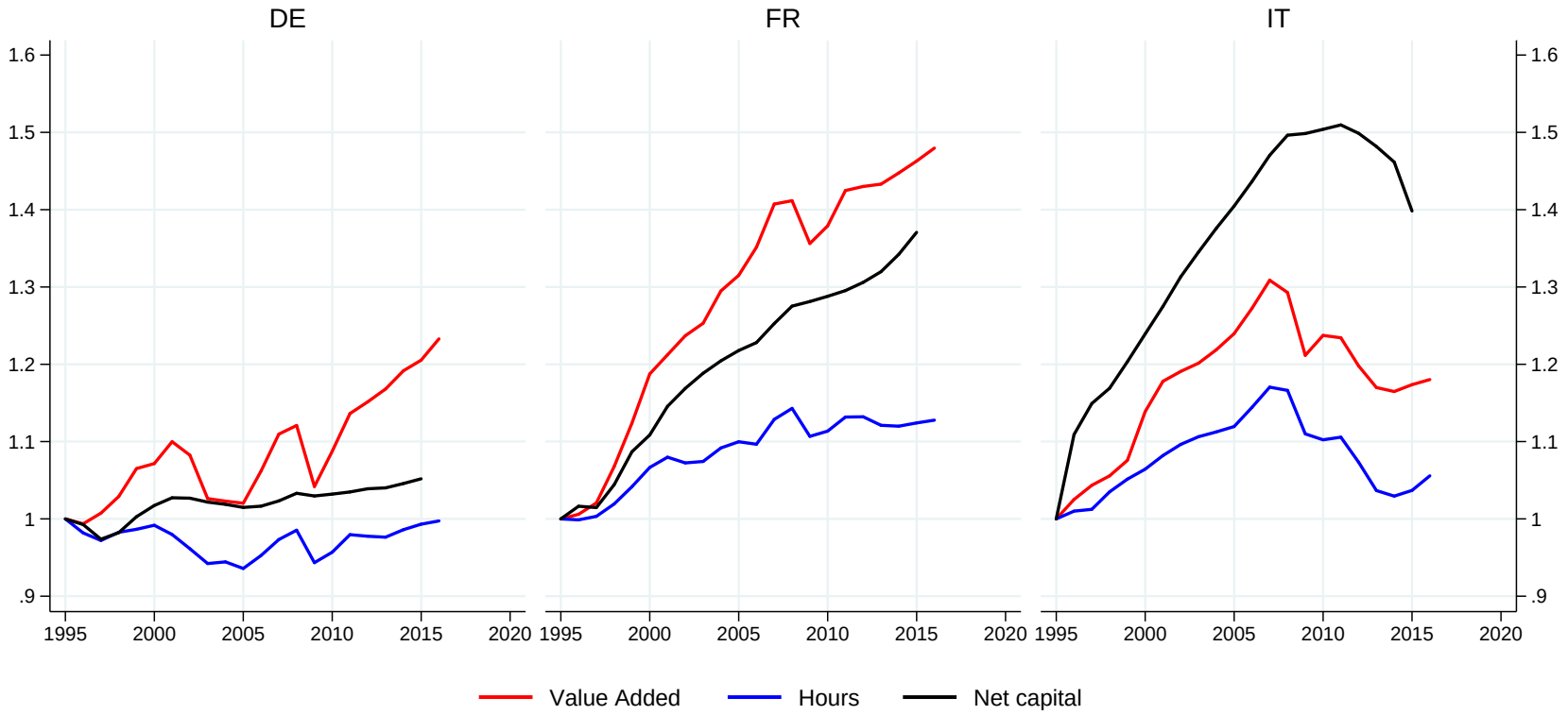
Value added, hours and capital stock (business sector)



Eurostat

Motivation

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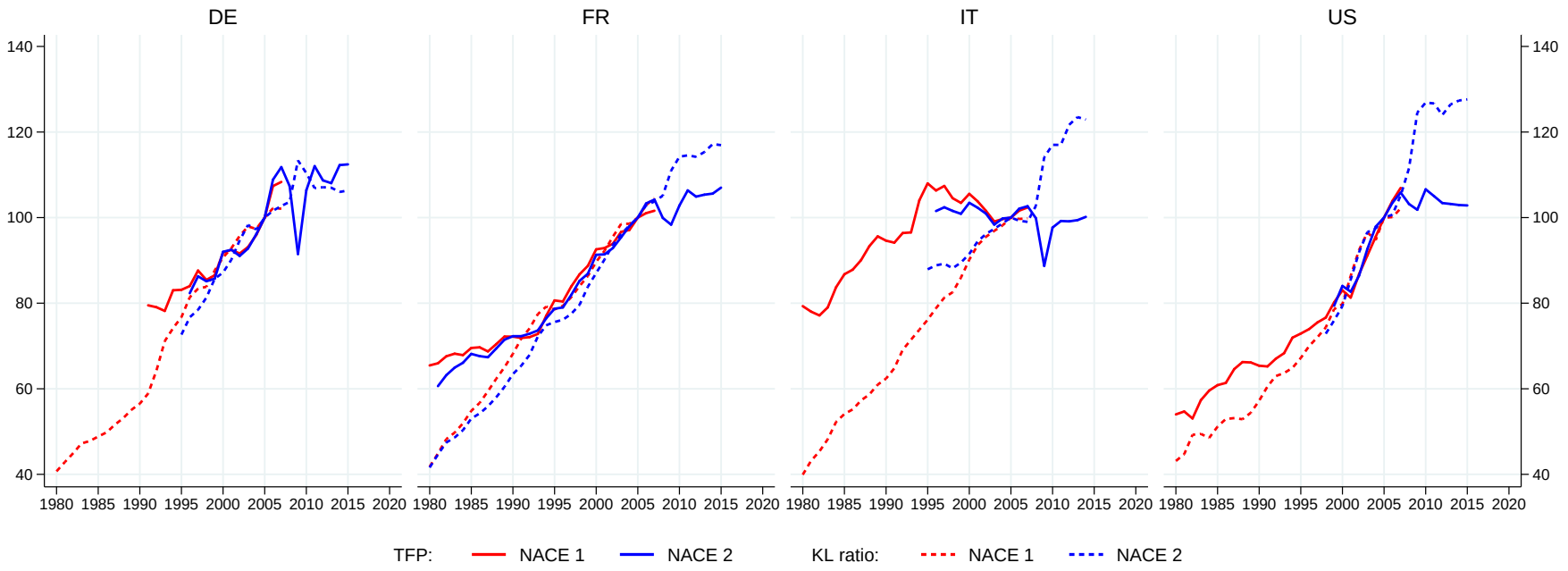
TFP and the capital/labour ratio (manufacturing sector)



EUKLEMS, various releases

Motivation

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Measurement of capital stock involves a number of complex technical assumptions (permanent inventory, service lives of capital goods, depreciation and retirement rates) which might lag behind actual developments, especially at times of rapid changes in technology, market structure and production chains.

Complement official measurement of capital stock, based on those assumptions, with alternative estimates based on market value of business sector (and different assumptions!)

Capital stock and market value

$$V_t = \max_{\{k_t\}_0^\infty} \sum_0^\infty R^{-t} \left\{ \Pi(k_{t-1}) - p_t^I I_t - C(I_t, k_{t-1}) \right\}$$

$$k_t = (1-\delta)k_{t-1} + I_t, \quad C_I > 0, \quad C_{II} > 0$$

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$$\text{FOC} \begin{cases} q_t &= \frac{1}{R}\left(\Pi_K(k_t) - C_K(I_{t+1}, k_t) + q_{t+1}(1-\delta)\right) \\ q_t &= p_t^I + C_I(I_t, k_{t-1}) \end{cases}$$

Capital stock and market value

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Competitive product markets, CRS $C(I, k)$ and $F(k, .)$:

$$q_t = V(k_t)/(p_t^I k_t) = v(k_t)/k_t$$

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$$\gamma k_t^2 + k_{t-1}(1-(1-\delta)\gamma)k_t - v_t k_{t-1} = 0$$

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Are observed v_t and k_t consistent?

Compare official valuation of k with k derived from observed v under alternative choices for δ and γ.

Data

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Financial accounts - market value of NFC sector

Capital accounts - K, I, D by NACE and asset type

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Institutional sectors accounts - NFC FTE by NACE, total consumption of fixed capital and investment expenditure

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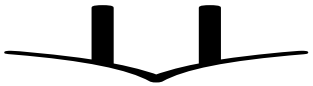

Alternative estimates of NFC's share of non-residential private non financial sector capital stock.

Data

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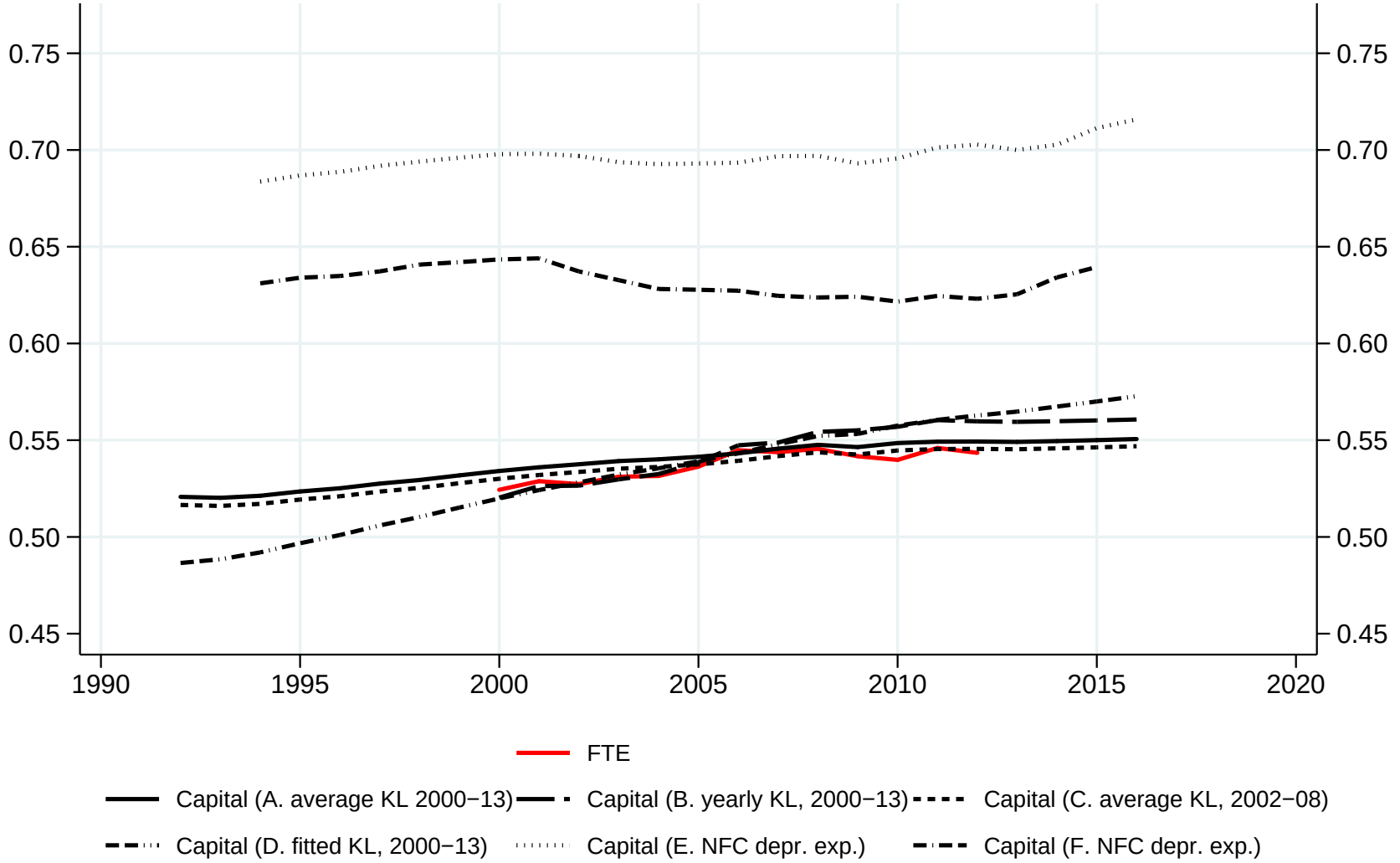
Share of non financial private sector non-residential K of NFC



Results

$$\gamma k_t^2 + k_{t-1}(1 - (1 - \delta)\gamma)k_t - v_t k_{t-1} = 0$$

Initial condition: highest and lowest estimate of k_{1994}^{NFC}.

Consider several combinations of upward (γ^+) and downward ($\gamma^- = \rho\gamma^+$) adjustment parameters such that $\rho \geq 1$.

Compare with highest and lowest direct estimates of k_t^{NFC}.

Results

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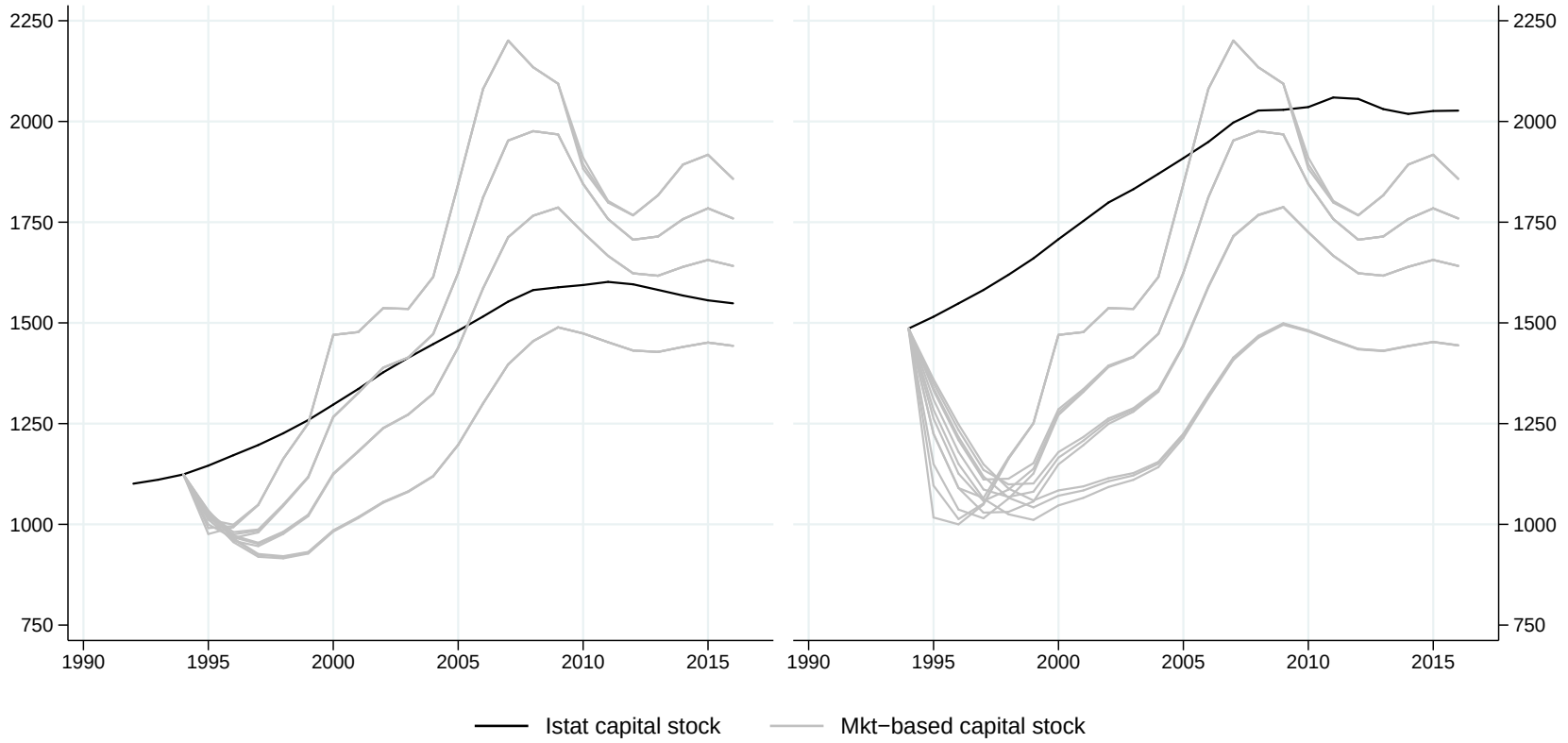
Istat and market-based estimated NFC capital stock



Results

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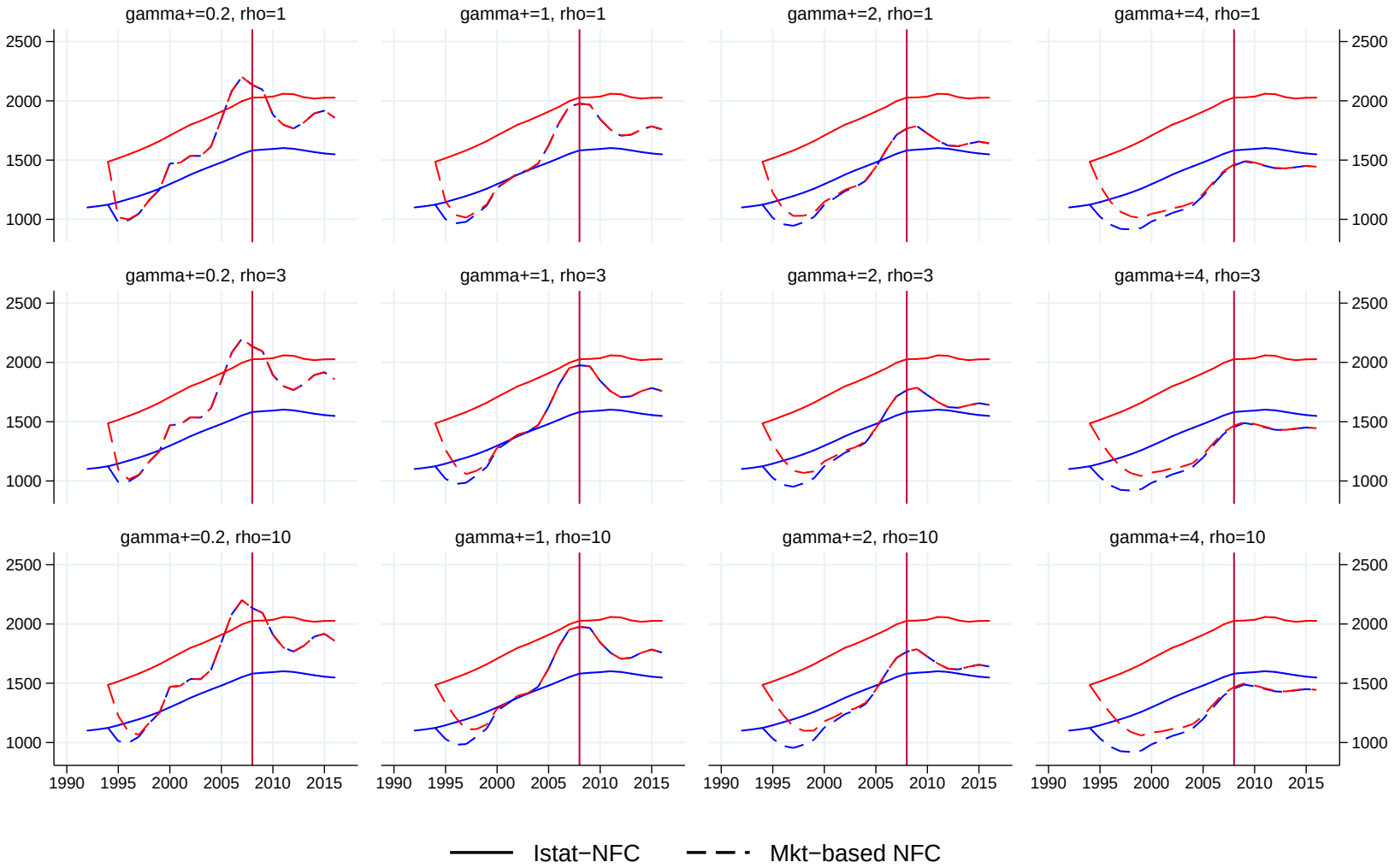
The role of initial conditions and adjustment parameters



Results

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Initial drop likely to be a reflection of overestimation of initial conditions. Market valuations suggest a lower level of the capital stock, perhaps a consequence of the restructuring following the early 90's Lira crisis.

Faster subsequent growth than in official estimates between late 90s and onset of global financial crisis consistently with the signs of restructuring of the Italian economy detected before the crisis.

Drop since the onset of the crisis, stronger than in official estimates and consistent with decline of installed capacity and potential output detectable from other sources.

Conclusions

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Theoretically based accounting exercise to construct alternative estimate of capital stock from market valuations.

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Many assumptions: theoretical (no bubbles, competitive product markets, quadratic costs, CRS technology, freely adjustable inputs other than capital) as well as computational (values of adjustment cost function, share of NFC capital, value of non incorporated businesses) $\Rightarrow$ many potential extensions.