International and Development Economics:

Post-Keynesian Approaches

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9th International Summer School
Forum for Macroeconomics and Macroeconomic Policies (FMM)
and Macroeconomic Policy Institute (IMK)
Berlin, Germany, 1 August 2024

Outline

1. **Export-led growth and cumulative causation (ELCC)**
   - Kaldor's "growth laws" (stylized facts)
   - The Dixon-Thirlwall model (Setterfield-Cornwall version)
2. **Balance-of-payments-constrained growth (BPCG)**
   - The basic model, "Thirlwall's Law", and its implications
   - Reconciling the BP constraint with the "natural rate of growth"
   - Extensions: structural change (multi-sectoral model), relative price (RER) effects, small country version, re-incorporating cumulative causation

- With emphasis on empirical evidence and policy implications for both

Readings

Read in following order:

1. Blecker, R.A. (2024), 'Kaldorian growth models', draft chapter for M. Setterfield (ed.), *Handbook of Alternative Theories of Economic Growth*, 2nd ed., Edward Elgar, forthcoming (revised, June)
2. Blecker, R.A. (2023), 'How important is the real exchange rate for exports and growth?', *European Journal of Economics and Economic Policies: Intervention*, 20(2), 250–265
3. Blecker, R.A. (2022), 'New advances and controversies in the framework of balance-of-payments-constrained growth', *Journal of Economic Surveys*, 36 (2), 429–467

- See also Blecker, R.A. and Setterfield, M. (2019), *Heterodox Macroeconomics: Models of Demand, Distribution and Growth*, Cheltenham, UK: Edward Elgar, Chapters 8–10
  - Errata at: https://www.american.edu/cas/economics/research/upload/errata-blecker-setterfield.pdf

Notation (same as in Blecker, 2024)

- Growth rates of variables are in lower-case Roman, for example:
  - x is the growth rate of exports (X)
  - y is the growth rate of income or output (Y)
  - p is the inflation rate (rate of increase in price level P)
  - e is the rate of nominal currency depreciation (rate of change in the exchange rate E, defined as home currency/foreign currency)

- Subscript f denotes foreign or rest-of-world

1. Export-led cumulative causation (ELCC)

Export-led growth and cumulative causation: intellectual origins

- Adam Smith (1776): the international “division of labour” increases the “wealth of nations”
  - A wider “extent of the market” achieved through exporting fosters greater specialization and more innovation, thereby raising productivity
- Gunnar Myrdal’s (1957) cumulative and circular causation
  - Positive, self-reinforcing feedbacks in growth (or stagnation), leading to ...
  - Virtuous (or vicious) circles, and uneven development between countries
- Nicholas Kaldor’s work on structural change, increasing returns, and unequal growth between “regions”
  - Kaldor (1966, 1970, 1971, 1972, 1981)

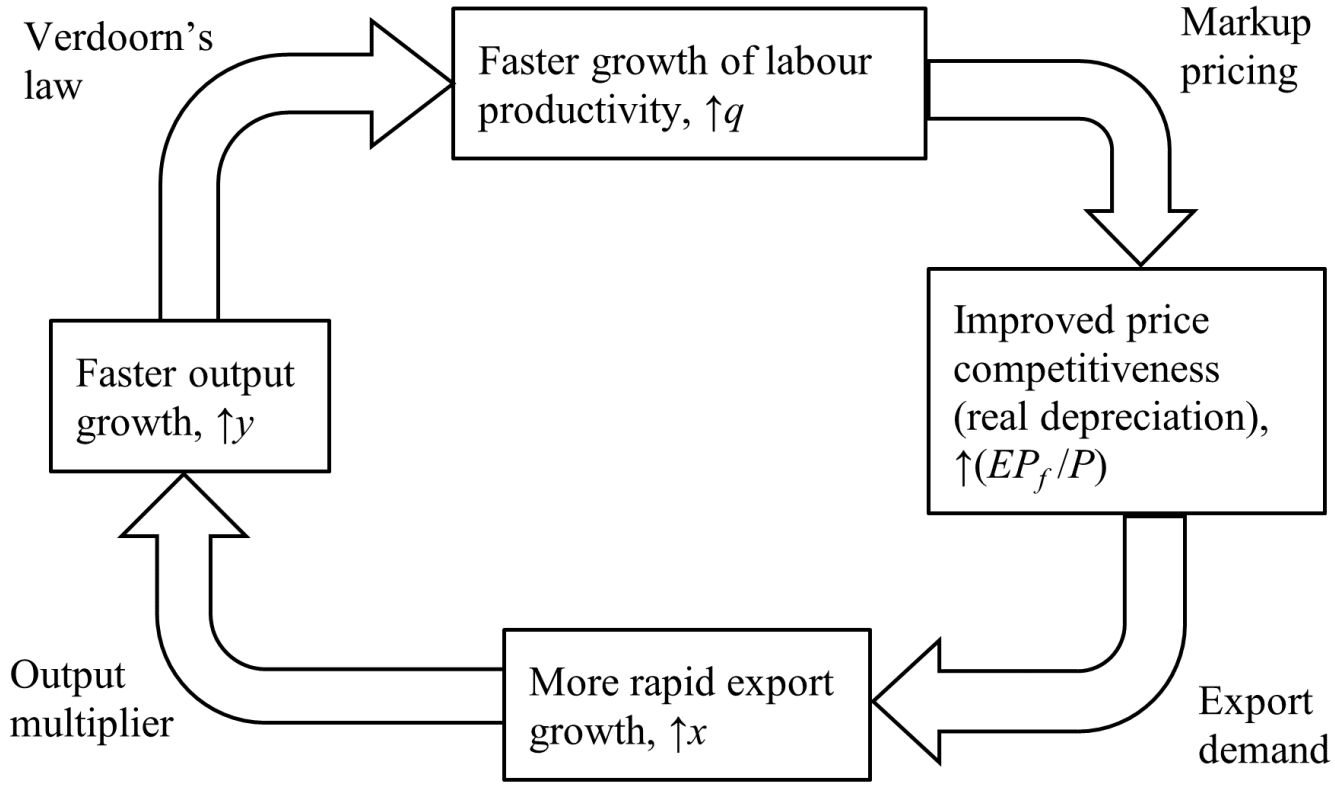
Four of "Kaldor's growth laws"
(as summarized by Thirlwall, 1983, emphasis added)

1. "The faster the rate of growth of the **manufacturing sector**, the faster will be the rate of growth of Gross Domestic Product (GDP)...."
2. "The faster the rate of growth of ***manufacturing*** output, the faster will be the rate of growth of labor productivity *in* ***manufacturing*** owing to static and dynamic economies of scale, or increasing returns in the widest sense...."
   - Called **Verdoorn's Law** (after P. J. Verdoorn, 1949)
3. "The growth of manufacturing output is *not* constrained by labor supply but is fundamentally determined by demand from agriculture in the early stage of development **and exports in the later stages**...."
4. "**A fast rate of growth of exports and output will tend to set up a cumulative process, or virtuous circle of growth**, through the link between output growth and productivity growth."

Export-led cumulative causation (ELCC)

Caveat: This part of the mechanism is supposed to work mostly in the manufacturing sector.

Qualification: This aggregative schema ignores structural change.



Called a "virtuous circle" for increasing growth (↑); a "vicious circle" for decreasing growth (↓).

"international competitiveness ... depends on the ***level*** of [a country's] industrial cost relatively to other industrial exporters" (Kaldor, 1971)

Math for the export-led cumulative causation (ELCC) model*

Note: All equations are in growth rate form.

1) Export demand: $x = \varepsilon_X (e + p_f - p) + \eta_X y_f$

Note the shift from the level to the rate of change in the RER!

Export growth depends positively on rate of real depreciation and foreign income growth

2) Mark-up pricing (constant markup): $p = w - q$

Assuming markup is constant

Price inflation = rate of increase in ULC = wage inflation – labor productivity growth

3) Verdoorn's Law: $q = q_0 + \rho y$

$\rho > 0$ reflects increasing returns to scale and induced technological innovation

Labor productivity growth is an increasing function of output growth (dynamic increasing returns)

4) Output growth: $y = \lambda_X x$

λ_X is the Keynesian (super?) multiplier for exports

Note: ε_X and η_X and are positive price and income elasticities of export demand. Subscript f indicates a foreign variable.

Solving the models: parallel equations for the "foreign" country (rest-of-world)

Assuming a similarly-specified model for the "foreign" country:

- Markup pricing (with a constant markup): $p_f = w_f - q_f$

- Verdoorn's Law (foreign country differs in **intercept**): $q_f = q_{0,f} + \rho y_f$

- Some simplifying assumptions (factors assumed to be equal across countries):

$$w = w_f, \quad \rho = \rho_f$$

➢Note: this is only one way to "close" the model, with some symmetry

  - The countries may still differ in the Verdoorn intercepts q_0 and elasticities ε_X, η_X

ELCC model solution

- For the "home" country, the model boils down to 2 equations in 2 endogenous variables, q and y:

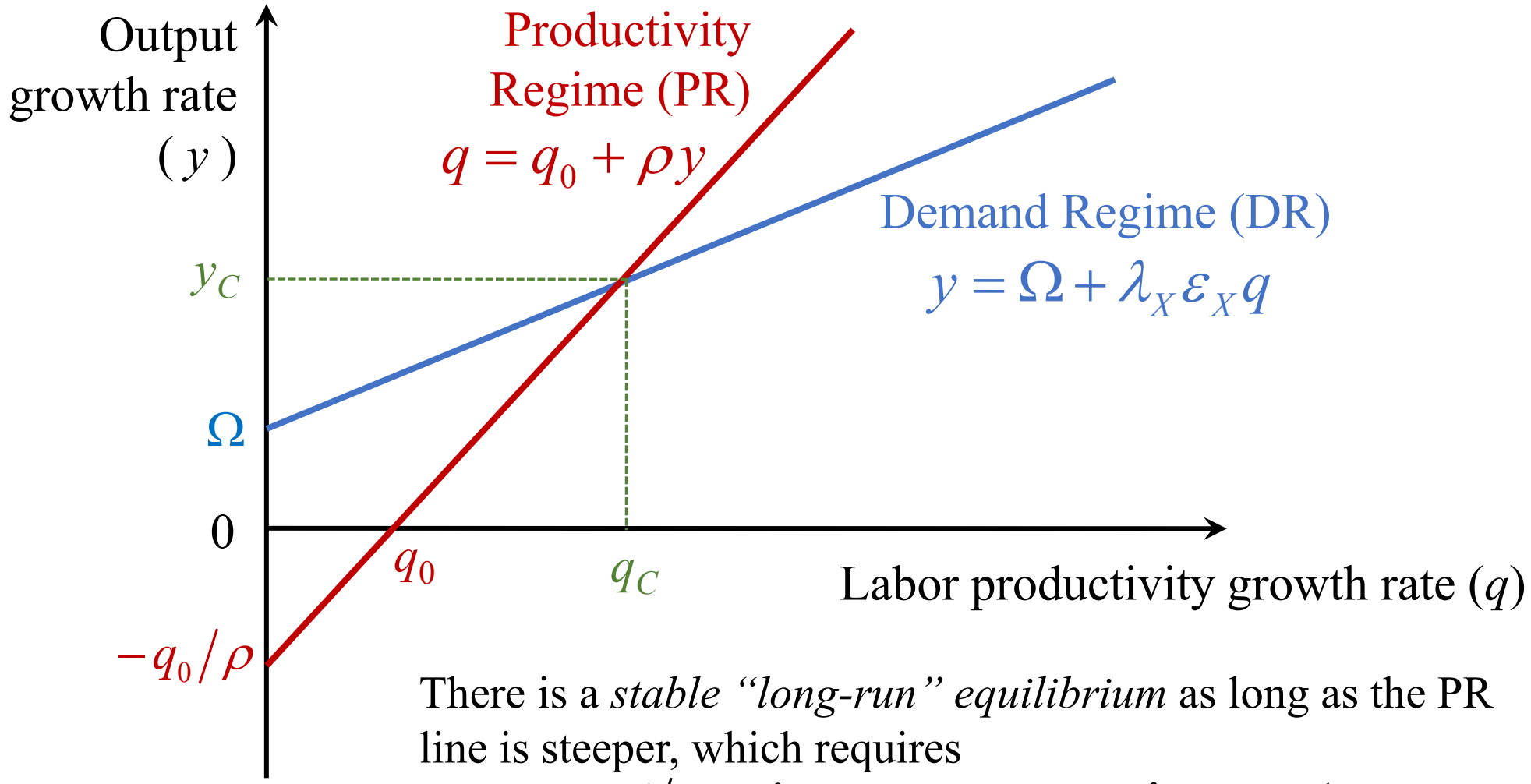
The Verdoorn equation or
"Productivity Regime" (PR): $q = q_0 + \rho y$

The other 3 equations solve for the
"Demand Regime" (DR): $y = \Omega + \lambda_X \varepsilon_X q$

with intercept $\Omega = \lambda_X \left[\varepsilon_X (e - q_{0,f}) + (\eta_X - \varepsilon_X \rho) y_f \right]$

Equilibrium solution: $y_C = \dfrac{\Omega + \lambda_X \varepsilon_x q_0}{1 - \lambda_X \varepsilon_x \rho}$

Graphical Solution of ELCC Model



There is a *stable "long-run" equilibrium* as long as the PR line is steeper, which requires

$$1/\rho > \lambda_X \varepsilon_X \qquad \text{or} \qquad \lambda_X \varepsilon_X \rho < 1$$

in other words, ***not too much*** *cumulative causation!*

Theoretical and policy implications I:

- There ***can*** be a stable equilibrium growth rate as long as the self-reinforcing mechanisms of cumulative causation are ***not too strong***
  - A growth ***rate*** that would increase or decrease without limit is not plausible
  - Empirical estimates suggest that the stability condition is satisfied

- Export demand is the main "autonomous" factor in the growth process
  - Implicitly, investment is induced by an accelerator mechanism to keep up with output growth
    - In the spirit of "supermultiplier" models, with exports as the autonomous demand

Theoretical and policy implications II:

- *Either* supply-side *or* demand-side policies can affect growth of output, exports, and productivity *in the long run*
  - Industrial and innovation policies, improved infrastructure, etc. boost productivity growth ($\uparrow q_0$) and shift PR to right
    - Or could raise ρ and make PR flatter
  - ➢ *Relevant to our discussion of industrial policy tomorrow afternoon!*
- Faster foreign growth shifts DR intercept up: $\uparrow y_f \Rightarrow \uparrow \Omega$
  - In an extended model (Setterfield and Cornwall, 2002), DR is also shifted upward by faster growth of domestic autonomous expenditures ($\uparrow g_A$)
    - Infrastructure spending would have a double benefit (supply and demand side)

Theoretical and policy implications III:

- International trade can have a **conflictive** character at the macro level
  - Not just the mutual benefit seen in neoclassical models of comparative advantage
- *Faster growth of foreign productivity reduces home country growth*
  - This a **negative** effect on the intercept Ω in the DR equation (red circled term):

$$\Omega = \lambda_X \left[\varepsilon_X (e - q_{0,f}) + (\eta_X - \varepsilon_X \rho) y_f \right]$$

- *But there is also a **positive** effect of international **cooperation***
  - Expansionary foreign demand policies would raise y_f and increase Ω, assuming $\eta_X > \rho\varepsilon_X$ (green circled terms)

Sympathetic critiques of Kaldorian ELCC

- *Too many positive self-reinforcing effects*; not enough offsetting ones
  - Wage increases, exchange rate adjustments, technology spillovers (Blecker, 2013)
- ELCC equilibria are "provisional" or "conditional" (Setterfield 2002)
  - Focus on the "traverse" toward the equilibrium growth path, not the equilibrium itself
    - The equilibrium growth solution is a "weak attractor"
- These equilibria are subject to **path-dependent** shifts in addition to exogenous shocks (Setterfield 2013)
  - Any growth regime (DR + PR) generates *endogenous* changes in the underlying conditions
    - Exhaustion of a technological paradigm; changes in class power relations
  - So the equilibrium is never reached, but rather subject to tectonic shifts!

The role of relative prices or real exchange rates: The Kaldor paradox and responses

- "**Kaldor's paradox**": Finding of a wrong sign: $-\varepsilon_X > 0$ instead of < 0
  - Kaldor (1978) found a positive (rather than negative) correlation between relative ULC and export growth in cross-sectional data
    - He attributed this to reverse causality: faster export growth increases demand for labor, which raises wages and unit labor costs (ULC)
- Kaldor (1981, 1986) was convinced by this evidence to abandon his own ELCC model
  - He concluded that price or cost competitiveness was not important
  - Only "**non-price competitiveness**" (quality, service, etc.) matters
    - He admitted that relative prices matter for "'traditional goods' like textiles, shoes, etc."
- But Kaldor abandoned his own theory too quickly!

Empirical evidence for relative cost (RER) effects on exports

- León-Ledesma (2002) found $-\varepsilon_X < 0$ in an extended ELCC model
  - Using panel data in rate-of-change form and 2SLS/3SLS to control for simultaneity
    - Controlling for investment rates, R&D expenditures, and other variables
- Razmi and Blecker (2008, 2010), ARDL estimates for panel of 18 EMDE exporters of manufactures
  - RER depreciation *relative to other exporting nations* increases export growth
- Boggio and Barbieri (2017): changes in export ***shares*** respond negatively to the ***level*** of relative ULC (not the growth rate)

Boggio and Barbieri's (2017) regression results

OLS cross-sectional estimates

Table 1. *OLS estimation of the replicator equation. Cross-section analysis*

Dependent variable: export share growth - *EXPGR*			
Independent Variables	(1)	(2)	(3)
ULCAV	-0.137***		-0.137**
	(0.042)		(0.057)
ULCGR		-0.001	1.60E-05
		(0.001)	(0.001)
const	0.094***	0.010	0.095**
	(0.028)	(0.007)	(0.036)
Number of obs.	33	33	33
R-squared	0.202	0.047	0.202
JB(χ^2)	2.114	3.449	2.119
Reset(χ^2)	1.196	0.043	1.191
White(χ^2)	6.037**	2.216	7.551

1.Data refer to 33 OECD countries.
2.Standard errors are in parenthesis. In the first equation, they are corrected for the presence of heteroskedasticity, given the results of the White test.
3.* Statistically significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

GLS panel estimation with random effects

Table 3. *Random effects GLS regression for panel data*

Dependent variable: export share growth - *EXPGR*			
Independent Variables	(1)	(2)	(3)
ULCAV	-0.088**		-0.084**
	(0.038)		(0.039)
ULCGR		0.0003	0.0002
		(0.0003)	(0.0003)
const	0.065***	0.014**	0.064***
	(0.023)	(0.006)	(0.024)
Number of obs.	440	440	440
R-squared			
– within	0.001	0.002	0.001
– between	0.175	0.013	0.191
– overall	0.036	0.002	0.038
Wald(χ^2)	5.320**	0.750	5.510*

1.Data refer to the 33 OECD countries over the period 1993–2007.
2.Standard errors are in parenthesis. In the first equation, they are corrected for the presence of heteroskedasticity.
3.* Statistically significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

Notes:

- *ULCAV* is the average level of unit labor costs; *ULCGR* is their growth rate.
- Qualitatively similar results are obtained using OLS with pooled data, using lags of the *ULC* variables, and when controlling for R&D expenditures; when controlling for average GDP level, *ULCAV* is not significant but average wages are.

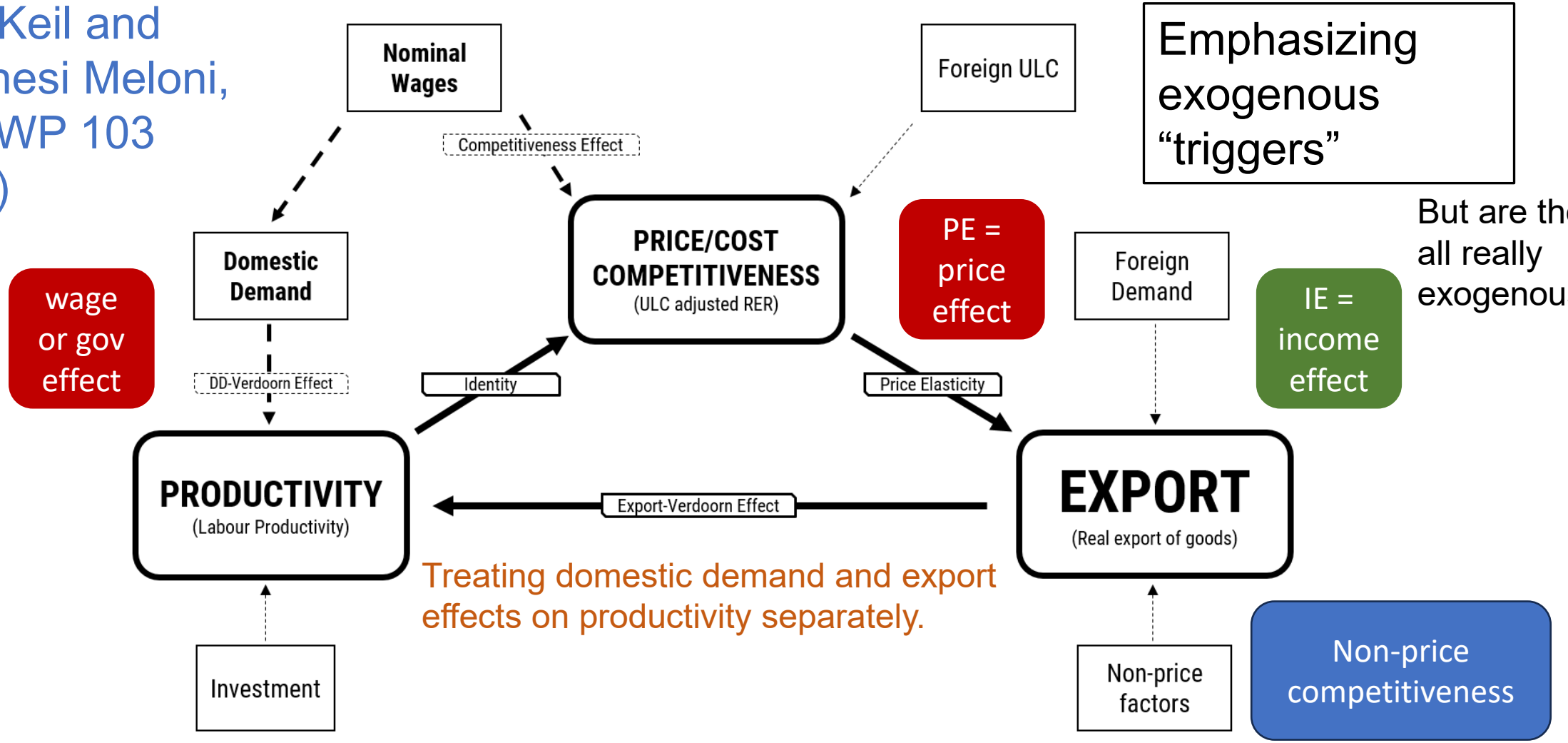
Disaggregated estimates and testing both hypotheses

- RER effects are largest and most significant for manufactures
  - Especially low and middle-technology (or skill) goods
  - Not high tech, not primary commodities (small or insignificant effects)
  - Results are mixed for resource-intensive goods
    - Caglayan and Demir (2019); Bottega & Romero (2021); Palazzo & Rapetti (2023); survey in Blecker (2023)
- ***Both*** relative prices (RER) ***and*** product quality (ECI) affect export performance in OECD countries
  - Pariboni and Paternesi Meloni (FMM, 2022)

FMM Working Paper by Keil and Paternesi Meloni (2024)

- Empirical study of cumulative causation in euro zone economies
  - Good case study because they have fixed exchange rates (can't adjust)
- Estimate export and productivity equations
  - Distinguish domestic vs. external (export) demand effects on productivity
- Control for "exogenous" factors and dynamics (using 3SLS + ARDL)
  - "Triggers" of virtuous (or vicious) circles
  - But are all these variables really exogenous?
- Results are mostly consistent with existence of positive feedbacks
  - Including relative price effects – *but* parameter values are modest
  - *Foreign income effects are more important quantitatively!*

From Keil and Paternesi Meloni, FMM WP 103 (2024)



Emphasizing exogenous "triggers"

But are they all really exogenous?

Figure 1. Model of cumulative causation. *Endogenous variables in ovals, exogenous variables in rectangles. Solid arrows describe the endogenous relationships in the 'inner' virtuous circle, while dashed arrows indicate the effects of exogenous variables on the endogenous ones.*

Long-run effects

Foreign income effects

Relative price effects

Non-price compete-tiveness

Investment (exogenous)

Export demand (endogenous)

Nominal wage (exogenous)

Not valid if F-test is insignifi-cant

	Export equation (DV: X)						Productivity equation (DV: PROD)		
COUNTRY	IE (γ_1)	PE (γ_2)	NPC (γ_3)	ALPHA	F TEST	ARDL	INV (β_8)	X (β_9)	NW (β_{10})
AUT	1.851***	-1.149***	-0.32**	-0.259***	6.69***	(3 3 3 3)	-0.009	0.408***	0.112***
	(0.09)	(0.254)	(0,139)	(0,139)			(0.127)	(0.085)	(0.023)
BEL	1.392***	-0.327	-0,128	-0.232***	10.29***	(3 3 3 3)	0.039	0.366***	0.423***
	(0.071)	(0.274)	(0,089)	(0.05)			(0.03)	(0.036)	(0.012)
FIN	3.002***	-4.217	1,536	-0.094*	5.38**	(3 3 3 3)	1.268***	-0.37***	0.208
	(1.17)	(2.742)	(1,995)	(0.056)			(0.123)	(0.012)	(0.226)
FRAU	0.995***	-1.202***	-0,571	-0.108**	0.98	(2 2 2 2)	0.401***	0.023	0.66***
	(0.344)	(0.459)	(0,508)	(0.042)			(0.138)	(0.067)	(0.05)
GER	2.001***	-0.955***	-0,155***	-0.363***	5.86***	(2 2 2 2)	0.086	0.338***	0.125***
	(0.04)	(0.102)	(0,045)	(0.061)			(0.059)	(0.036)	(0.012)
GRC	1.441***	0.225	-0,64	-0.185*	2.99	(3 3 3 3)	0.055	0.218	0.256***
	(0.397)	(0.743)	(1,125)	(0.091)			(0.051)	(0.142)	(0.035)
ITA	1.052***	-0.198	-0,517	-0.113***	4.29**	(3 3 3 3)	0.338***	0.238***	0.128***
	(0.155)	(0.333)	(0,418)	(0.042)			(0.069)	(0.047)	(0.01)
NDL	1.908***	0.948	0,709	-0.085	3.67*	(3 3 3 3)	0.018	-0.255	0.126***
	(0.313)	(1.76)	(0,737)	(0.054)			(0.02)	(0.239)	(0.022)
SPA	2.028***	-0.175	0.345	-0.195***	5.45**	(3 3 3 3)	0.111*	0.205***	0.633***
	(0.224)	(0.198)	(0,293)	(0.057)			(0.067)	(0.047)	(0.05)
PRT	1.771***	-0.174	0.169	-0.274***	4.7*	(2 2 2 2)	0.033	0.314***	0.068***
	(0.112)	(0.217)	(0.22)	(0.067)			(0.04)	(0.028)	(0.008)

Table 4. *3SLS coefficients. Entire timespan (1996q2-2020q2), model accounting for non-price competitiveness (standard errors in parentheses). Lag length choice according to AKAIKE criterion minimisation.*

Source: Keil & Paternesi Meloni (2024)

Evidence on the government channel from a mainstream dissenter

"This paper studies how firms adapt to demand shocks when facing capacity constraints. I show that **increases in government purchases raise total factor productivity in quantity units at the production line level. Productivity gains are concentrated in plants facing tighter capacity constraints, a phenomenon I call 'learning by necessity.'** Evidence is based on newly digitized archival data on US World War II aircraft production. Shifts in demand across aircraft with different strategic roles provide an instrument for aircraft demand. I show that plants adapted to surging demand by improving production methods, outsourcing, and combating absenteeism...."

- Ilzetski (AER, 2024, Abstract, emphasis added)

Summary on relative price (RER) effects

- Kaldor was too quick in rejecting cost competitiveness as a determinant of export growth
- Numerous recent studies (last 10+ years) have found that cost competitiveness or the RER **does** significantly affect export performance
  - There is also increasing evidence of positive feedbacks to productivity
- But the strength of RER effects varies, especially depending on the type of export product
- Evidence suggests that ***both*** relative prices ***and*** non-price factors (quality, technological superiority) are important

Another problem with the ELCC approach

- When applied to nations, the ELCC framework ignores imports and the balance of payments (BP)
  - The ELCC growth rate could imply persistently increasing trade (current account) imbalances
    - Requiring ever-increasing net financial flows, which would not be sustainable
- In the long run, a country must either keep its CA balanced (on average) ...
  - ... or else maintain a sustainable level of net financial inflows or outflows

➢This concern has led to a shift to models that incorporate a "balance-of-payments constraint"

2. Balance-of-payments constrained growth (BPCG)

The balance-of-payments-constrained growth (BPCG) model: basic version

- Originated by Thirlwall (1979), Thirlwall & Dixon (1979)
- Some key assumptions (of the basic model):
  - Trade must be balanced in the long run
  - Goods are nationally differentiated, imperfect substitutes
  - Supplies are infinitely elastic (prices fixed in seller's currency)
  - Output (growth) is the adjusting variable in the long run

➢The model is only intended for long-run analysis; the equilibrium solutions are not expected to hold in short-run periods

The simplest BPCG model in growth rate form (no "capital" or financial flows)

- Export demand: $x = \varepsilon_X (e + p_f - p) + \eta_X y_f$
- Import demand: $m = -\varepsilon_M (e + p_f - p) + \eta_M y$
- Balance of payments equilibrium (zero net financial flows $\Rightarrow$ CA = 0):

$$p + x = e + p_f + m$$

The value of exports must grow at the same rate as the value of imports

  - Recall: e is the rate of nominal depreciation of the home currency (percentage increase in home currency/foreign currency)
- A "Keynesian small economy" (Branson, 1983):
  - Foreign (rest-of-world) income growth y_f is exogenously given
  - But the country is not a price-taker

The BP constraint

- The condition for maintaining balanced trade is found by substituting the export and import demand functions into the balanced trade condition to obtain:

$$(\varepsilon_X + \varepsilon_M - 1)(e + p_f - p) - \eta_M y + \eta_X y_f = 0$$

- But which is the endogenous variable that adjusts to maintain BP equilibrium?
  - For most countries, foreign income growth y_f can be taken as exogenously given
- Thirlwall's **"Keynesian" solution:** assumes relative prices are either constant or have no effects in the long run $\Rightarrow$ **domestic income growth *y* does the adjusting**
- An alternative "neoclassical" solution: take $y = y_N$ as an exogenous "natural rate of growth"; assume that the change in the real exchange rate $(e + p_f - p)$ adjusts

The Keynesian solution

- Under Thirlwall's Keynesian assumptions, we can solve for the BP-constrained growth rate of output:

$$y_B = \frac{(\varepsilon_X + \varepsilon_M - 1)(e + p_f - p) + \eta_X y_f}{\eta_M}$$

most general solution (includes price effects)

- Thirlwall further assumes that relative price effects don't matter because of either
  - Elasticity pessimism: $\varepsilon_X + \varepsilon_M \approx 1$ or
  - Constant relative prices (RER): $e + p_f - p = 0$
- Then the solution simplifies to one of the following:

Two versions of Thirlwall's law
(Perraton, 2003)

- **Strong form**: assuming ***either*** elasticity pessimism ***or*** constant RER

$$y_B = \frac{\eta_X}{\eta_M} y_f$$

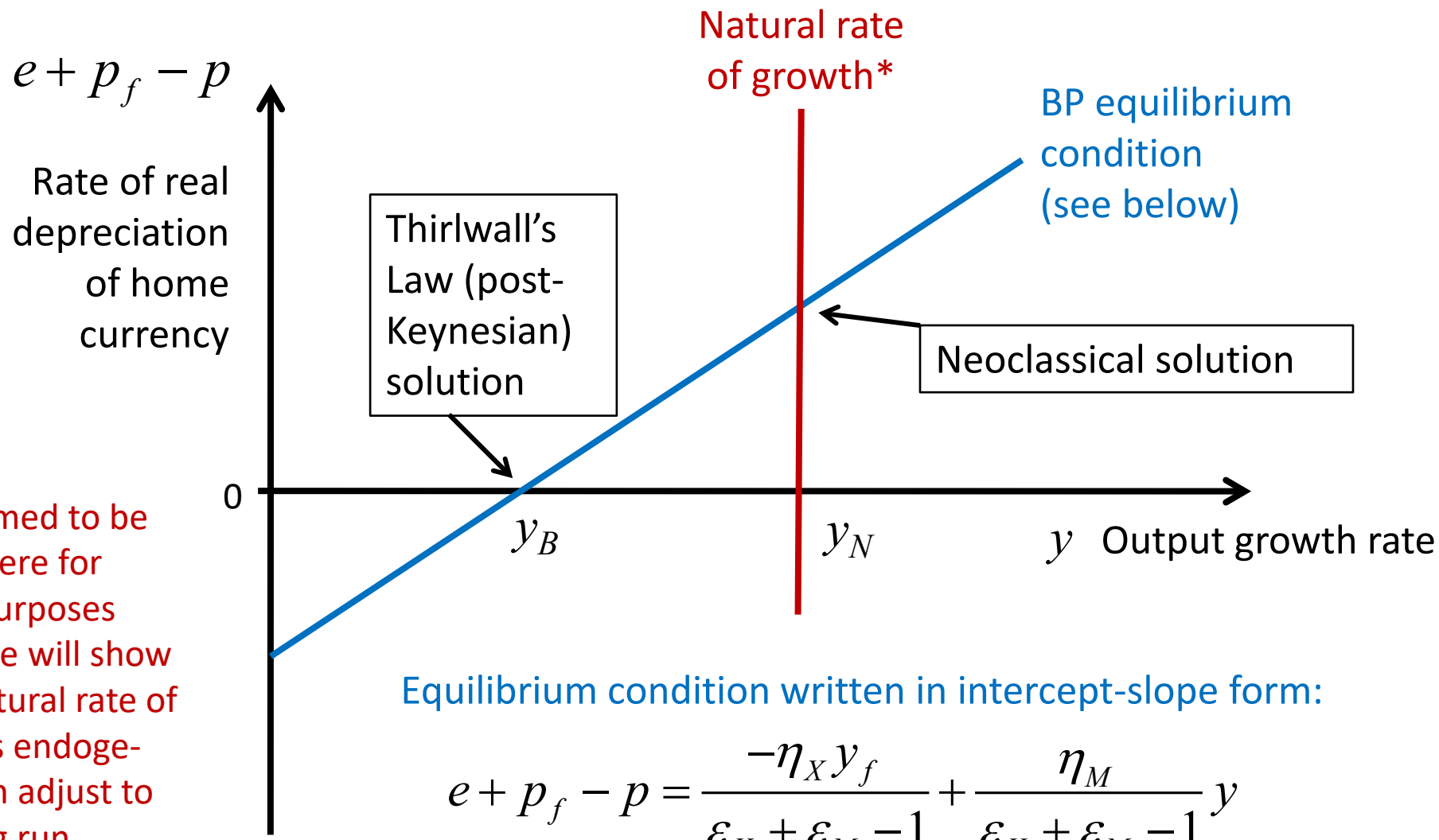
- **Weak form**: ***only*** on the assumption of constant RER $(e + p_f - p = 0)$

$$y_B = \frac{x}{\eta_M}$$

  - Because in this case only,

$$x = \eta_X y_f$$

A BP-constrained economy: PK vs. NC solutions



*Note: Assumed to be exogenous here for illustrative purposes only. Later we will show how the "natural rate of growth" y_N is endogenous and can adjust to y_B in the long run.

Equilibrium condition written in intercept-slope form:

$$e + p_f - p = \frac{-\eta_X y_f}{\varepsilon_X + \varepsilon_M - 1} + \frac{\eta_M}{\varepsilon_X + \varepsilon_M - 1} y$$

Upward sloping assuming that the Marshall-Lerner condition holds: $\varepsilon_X + \varepsilon_M > 1$.

Policy implications of BPCG/Thirlwall's Law (I)

- **Exports** still propel growth, as in ELCC, but **for a different reason:**
  - To obtain the foreign exchange to finance necessary imports without a growing trade deficit and rising foreign debt
- **Only non-price or qualitative competition** (reflected in income elasticities η_X and η_M) matters in the long run
  - Verdoorn's law plays no role; there are no self-reinforcing feedbacks
  - Alternative views are presented below
- Although the model is (external) demand-driven, **supply factors also play a role** (but for different reasons than in ELCC)
  - Investment and innovation in export industries can increase η_X
  - Greater (or more diversified) domestic productive capacity reduces η_M

Policy implications of BPCG/Thirlwall's Law (II)

- Expansionary *domestic* policies ***cannot*** increase *long-run* equilibrium growth
  - They can work (and may be necessary) in the short run
    - Eventually they result in increasing trade deficits, which require adjustments (e.g. fiscal contraction) leading back to the BPCG solution
- Activist trade and industrial policies policies ***can*** make sense
  - Including export-promotion *cum* import restrictions, or selective import liberalization
  - ***If and only if*** such policies effectively boost η_X relative to η_M
  - Not protectionism *per se*, if it simply closes markets and fails to promote exports
    - Enhanced access to foreign markets can raise y_f
- Trade liberalization can **fail** to increase LR (BP-equilibrium) growth – in fact it may even lower y_B – if it increases η_M proportionately more than x or $\eta_X y_f$
  - See Moreno-Brid (1998-99), Santos-Paulino & Thirlwall (2004), Pacheco-López (2005), others

The most important message of BPCG

- "... it is through variations in the level (or growth rate) of income, not by an adjustment in relative prices, that an equilibrium between *x* and *m* is achieved"
  - Pérez Caldentey (2015, p. 58, author's translation)
  - I would add the qualifications, "primarily" and "in the long run"
    - Sometimes, even in the short run
- This is certainly a post-Keynesian view
- It does not, however (in my view), require that relative price changes have no effects when they do occur
  - More about this below

Extensions of the BPCG approach

Not covered here (for reasons of time):

- Capital (financial) flows
- Two large countries
- Partial pass-through of exchange-rate changes (markup adjustments)
- Ecological constraints
- Distributive cycles (neo-Goodwinian)
- Debates about empirical tests

To be covered here (time permitting):

- Reconciliation with “natural rate of growth”
- Multisectoral Thirlwall’s law
  - Structural change
- Alternative channels for RER effects
- Small country version
  - Pure price-taker
  - Relevant for commodity exporters
- Reincorporating cumulative causation (positive feedbacks)

Reconciling BP-equilibrium growth with the "natural" rate of growth

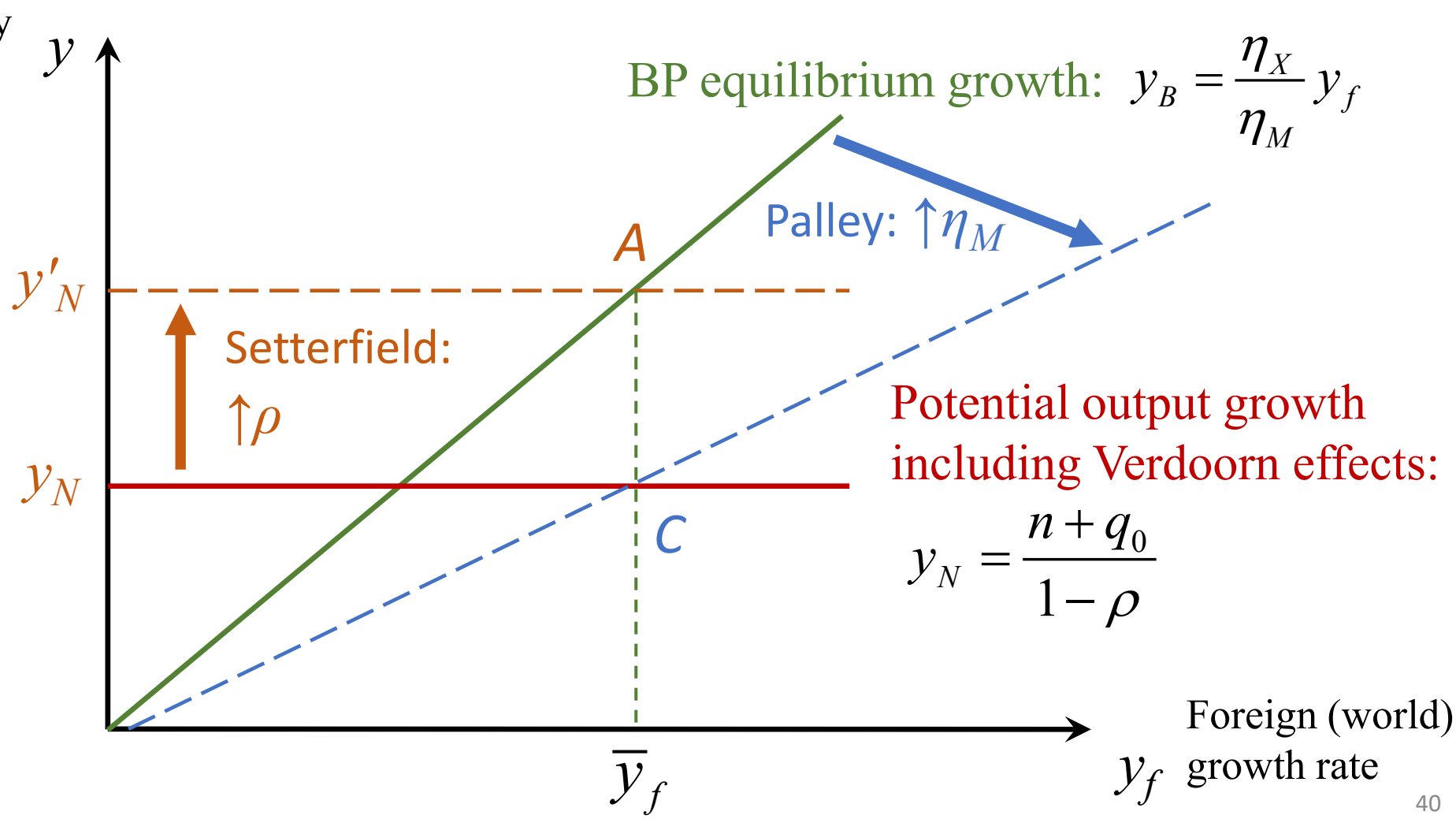
- It is not plausible for the BP-equilibrium growth rate to differ from the "natural rate of growth," $y_N = n + q$, in the long-run
  - n = growth rate of labor supply; q = growth rate of labor productivity
  - If $y_B < y_N$, we would observe continuously increasing unemployment
  - If $y_B > y_N$, the labor force would eventually be exhausted

- Therefore, some adjustment mechanisms must be postulated
  - Some mechanisms make y_N adjust to y_B, some do the opposite
  - If $y_B \rightarrow y_N$ there is not really a BP constraint (the BP-equilibrium rate adjusts)
  - If $y_N \rightarrow y_B$ then the BP constraint is binding and the natural rate adjusts

Proposed ways to reconcile BP-equilibrium growth with the "natural" rate of growth

- **Palley (2002):** y_B adjusts toward y_N because the income elasticity of import demand η_M is positively related to capacity utilization
  - When $y_B < y_N$, low utilization of capacity implies less demand for imports as more goods can be produced at home, so η_M falls and y_B rises; conversely, when $y_B > y_N$, η_M rises and y_B falls
- **Oreiro (2016):** the RER (level) adjusts to a LR equilibrium level to make $y_B \rightarrow y_N$
  - A higher RER (real depreciation) leads to more diversified domestic production and lowers η_M
- **Setterfield (2006):** $y_N = n + q$ adjusts toward y_B because of Verdoorn effects on productivity growth, $q = q_0 + \rho y$; ρ is an increasing function of capacity utilization
  - ρ and q will fall in a slow-growing economy ($y_B < y_N$), and rise in a rapidly growing one ($y_B > y_N$)
- **Porcile and Spinola (2018):** in a dual economy with "surplus labor" in the sense of Lewis (1954), labor supply is perfectly elastic in the modern sector
  - Hence n adjusts and therefore $y_N \rightarrow y_B$

Graphing the Palley and Setterfield adjustments to an initial disequilibrium at point *A*



Setterfield: end up at *A* (potential output grows faster)

Palley: end up at *C* (BP equilibrium growth slows down)

Empirical test of Palley vs. Setterfield by Cordeiro and Romero (2021)

- They estimate the potential output ("natural") growth rate (y_N) using the method of León-Ledesma and Thirlwall (2002)
  - The growth rate at which the unemployment rate U is constant
  - y_N = estimated coefficient $\hat{a}$ in a regression of $y_t = a - b(\Delta\%U_t) + e_t$
- They use a strategy of interactive dummy variables to determine whether the income elasticity η_M (Palley) or Verdoorn coefficient ρ (Setterfield) adjusts when growth is above (or below) potential
  - For Setterfield, they follow a suggestion of McCombie (2011) by estimating an equation for employment rather than for labor productivity, since by definition $q \equiv y - l$
  - They also use alternative econometric methods (OLS-FE, SYS-GMM, PMG)

Results of Cordeiro and Romero (2021)

- Sample of 38 countries for 1992-2014
- Dummy variable $D = 1$ if $y > y_N$ in a given country-year, 0 otherwise
  - An important sensitivity test would be to use utilization rates instead of growth rates
- They can reject the Palley hypothesis of an adjustment in η_M
- They cannot reject the Setterfield hypothesis of an adjustment in ρ
  - Except in the SYS-GMM results, but this method may not be appropriate for their data set
    - They also cannot reject the possibility that adjustments in labor force participation also play a role, along with adjustments in technological innovation
- **Main conclusion**: growth of aggregate supply (potential output) adjusts to growth of aggregate demand (actual output), not vice-versa

Table 4. Testing for the endogeneity of the income elasticity of demand for imports. (Test of Palley)

Independent Variable: Log of Real Imports	OLS		SYS-GMM		PMG	
Log Real GDP	1.750***	(0.078)	1.245***	(0.207)	0.860***	(0.052)
Log PPP	0.050**	(0.020)	0.568	(0.364)	0.077***	(0.016)
Interaction GDP(Dummy)	−0.012	(0.007)	−0.020	(0.046)	−0.020	(0.025)
Dummy	0.334*	(0.195)	0.564	(1.281)	0.492	(0.640)
Constant	−21.358***	(2.085)	−8.672	(6.142)	–	
Error Correcting Term	–		–		−0.097***	(0.030)

Table 5. Testing for the endogeneity of the verdoorn coefficient. (Test of Setterfield)

Independent Variable: Total working hours growth	OLS		SYS-GMM		PMG	
GDP Growth	0.540***	(0.078)	0.692***	(0.164)	0.650***	(0.041)
Interaction GDPg(Dummy)	−0.189***	(0.061)	−0.085	(0.233)	−0.308***	(0.057)
Dummy	0.004	(0.003)	−0.015*	(0.009)	0.009***	(0.002)
Constant	−0.002	(0.001)	−0.002	(0.002)	–	
Error Correcting Term	–		–		−0.820***	(0.050)

Source: Cordeiro and Romero (2021).

Incorporating structural change: The "multi-sectoral Thirlwall's law" (MSTL)

- Original version: Araújo and Lima (2007), Gouvêa and Lima (2010)
  - Extended to global value chains (GVCs) by Trigg (2020)
- Simplified version, from Gouvêa and Lima (2013)
  - Aggregate income elasticities of export and import demand are weighted averages of industry-level elasticities

$$y_{B,t} = \frac{\sum_{i=1}^{N} \alpha_{i,t} \eta_{X,i}}{\sum_{i=1}^{N} \beta_{i,t} \eta_{M,i}} y_{f,t}$$

where i indexes the good or industry, t is time, $\alpha_{i,t}$ and $\beta_{i,t}$ are shares of good i in total exports and imports (respectively) at time t, $\eta_{X,i}$ and $\eta_{M,i}$ are income elasticities of export and import demand for each good i, there are N total industries or goods, both the foreign growth rate $y_{f,t}$ and the domestic BP-equilibrium growth rate $y_{B,t}$ are time-varying, and

$$\sum_{i=1}^{N} \alpha_{i,t} = 1, \sum_{i=1}^{N} \beta_{i,t} = 1$$

Key features of the MSTL

- Structural change is modeled by changes in the industry shares of exports and imports, $\alpha_{i,t}$ and $\beta_{i,t}$
  - Shifting the **composition** of exports or imports to goods with higher (lower) income elasticities raises (lowers) the ***average*** elasticities
  - Structural change can change the BP-equilibrium growth rate, even if the industry-level elasticities remain constant
- As a result, the BP-equilibrium growth rate $y_{B,t}$ ***varies over time***
  - Hence, a growth strategy should emphasize domestic production of goods with high income elasticities, so as to raise average η_X and lower average η_M

➢This provides an argument for well-targeted industrial policies

- For example, encouraging domestic production of computer chips or EVs

Relative price/real exchange rate (RER) effects in BPCG models

- The “canonical” Thirlwall model assumes no role for relative prices or RERs
  - These are assumed to either have a constant trend or negligible effects in the long run
  - Only “qualitative” or “non-price competition” is supposed to matter
- But there is now overwhelming evidence for significant effects of RERs on growth rates
  - Gala (2008); Rodrik (2008); Berg et al. (2012); Rapetti et al. (2012); Levy-Yeyati et al. (2013); Rapetti (2020); Demir & Razmi (2022), etc.
    - Some dissents: Ribeiro et al. (2020), others

How can we reconcile these findings?

- Levels vs. rates of change
  - Empirical studies of RERs and growth usually rely on RER ***levels***
    - Overvaluation (undervaluation) relative to PPP adjusted for Balassa-Samuelson effects
  - Studies of BP-constrained growth focus on ***continuous changes*** in RERs
    - Likely to be close to 0% in the long run and to have negligible impacts (McCombie 2011)

- Different channels
  - Traditional BOP-constrained models only allow RER ***rates of change*** to affect growth of export and import ***demand***
  - But there are ***other ways*** that ***levels*** of RERs can affect the BOP-constrained equilibrium growth rate

Three alternative channels for RER effects (in levels)

1. **Structural change**
   - RER depreciation increases weights α_i on exports with high η_X and decreases weights β_i on imports with high η_M in the "multisectoral Thirlwall's law"
     - Models of Setterfield & Ozcelik (2018); Cimoli et al. (2019)
2. **Capital accumulation**
   - A real depreciation encourages investment in tradable goods industries and hence **relaxes supply-side constraints on exports** in "small open economies" (Razmi 2016)
     - Empirical studies by Levy-Yeyati et al. (2013); Ibarra & Ros (2019); Palazzo (2024)
3. **Qualitative improvement** (Missio et al. 2017; Marconi et al. 2021)
   - A more competitive RER raises **income elasticities** for individual export products $\eta_{X,i}$
   - Export quality improves via induced innovation, technological upgrading (sophistication effect), and encouraging new products (diversification effect)

1. Structural change: connecting Thirlwall's law to structuralist development economics

- The LR equilibrium growth rate of the global South is determined by Thirlwall's Law:

$$y^S = \frac{\eta_X}{\eta_M} y^N$$

Note: This version of Thirlwall's law was stated by Prebisch (1950), 29 years before Thirlwall (1979)!

  - where η_X and η_M are the South's weighted average income elasticities of demand for exports and imports
    - The same as the North's income elasticities of demand for imports and exports, respectively
- A more competitive RERs (lower relative ULC) raises weighted average η_X and reduces weighted average η_M for the Southern economies
  - See Cimoli et al. (2019)

2. **Capital accumulation:** Razmi's (*CJE*, 2016) small country model (very simplified version)

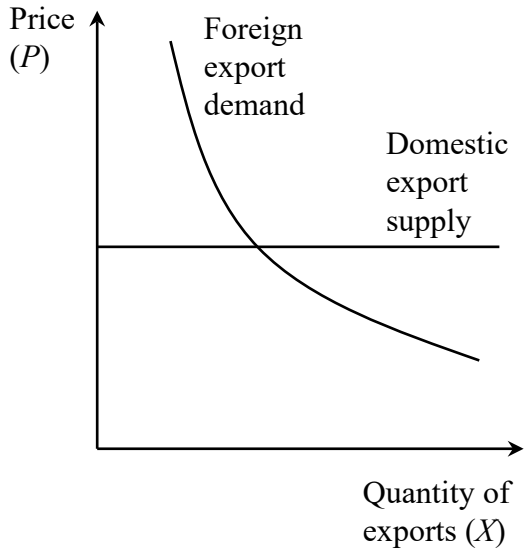
- Considers a "small open economy" (pure price-taker)
  - He assumes an infinitely elastic supply of imports (similar to Thirlwall)
  - But he assumes perfectly elastic **demand** for **exports** at a given price (TOT)
  - Hence **exports are supply-constrained**
- Export capacity depends on investment ($I = \Delta K$), which depends on the profit rate and hence on the real exchange rate (RER)
  - RER depreciation reduces the real wage and increases markups in an open economy
  - Therefore the **level** of the RER matters to BP-equilibrium growth

Alternative assumptions about market structure

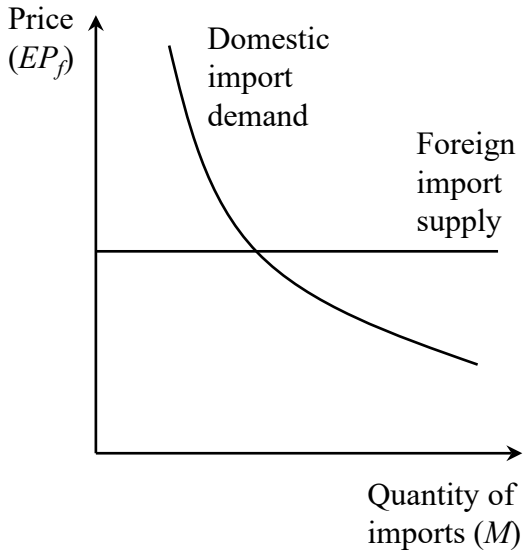
Small Keynesian open economy: infinitely elastic *supplies* of exports *and* imports; prices are fixed in seller's currency. Assumed in Marshall-Lerner condition, **Thirlwall BPCG model**

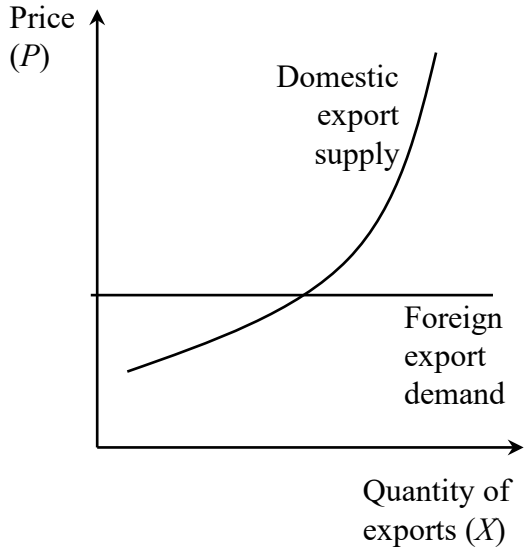
Small open economy model (pure price-taker): *demand* for exports and *supply* of imports (foreign curves) are infinitely elastic. Assumed in **Razmi's alternative model** of BP-constrained growth for a small country.

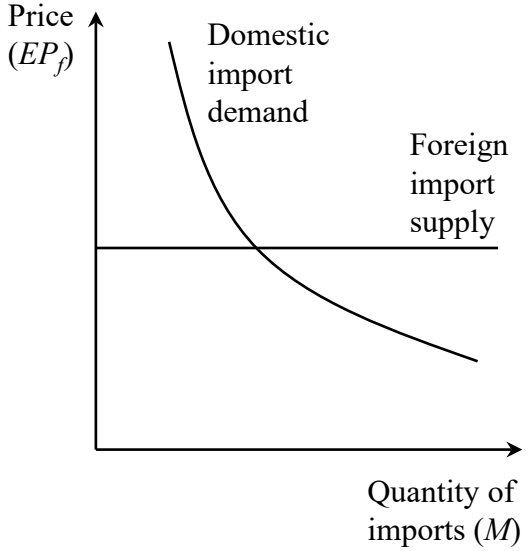
Export market



Import market







Simplified version of Razmi's (2016) small-country model
(in notation from Blecker, 2024)

- Export **supply** function $x^s = \sigma_X g$ where $g = I/K = \hat{K}$
- Import demand function $m = -\varepsilon_M (e + p_f - p) + \eta_M y$
- BP equilibrium condition $p + x^s = e + p_f + m$
- Capital accumulation function $g = g\left(\frac{EP_f}{P}\right), \quad g' > 0$

Note: σ_X is the capital-stock elasticity of export supply

- Price assumptions: $p_f = 0, \;\; p = e$
  - Small country, price-taker
- **Small-country (S) solution:** $y_S = \frac{\sigma_X g(EP_f/P)}{\eta_M}$

BP-equilibrium for a small country depends on the **level** of the RER, not its rate of change

Conclusions and policy implications from Razmi's small-country model

- Small, open economies are not constrained by global demand *per se*
- Yet such countries **do** face BP constraints and need to promote exports
- The key to their export success is capital accumulation that expands export capacity
  - This could include public infrastructure, "human capital," FDI, etc.
- To attract firms to locate in a given country, it must have a competitive RER
  - The RER thus matters in levels, and operates via the supply side
- The **strong** version of Thirlwall's Law does ***not*** apply to small open economies
  - But the **weak** version still holds ($y_S = x/\eta_M$); it really is weak, because it cannot distinguish whether exports are driven by foreign demand or domestic supply (capacity)!

Reintegrating cumulative causation into BPCG

- Recombining ELCC and BPCG by incorporating Verdoorn's law in the latter
  - For a "medium-run" time frame in which (continuous) changes in relative prices (RERs) are plausible
- Araujo (2013) incorporates Verdoorn's law for individual goods (industries) into the MSTL, with relative price effects in a medium-run, North-South framework
  - Holding relative wages and markups constant, relative prices are driven by relative productivity growth q and changes in nominal exchange rates e
- Key take-aways from Araujo (2013):
  - The South benefits more when it exports products with high sectoral Verdoorn coefficients ρ_i
  - Faster productivity growth in either region (North or South) comes at the expense of slower productivity growth in the other region (because of shifts in global market shares)

The three-period model of Riberio et al. (2017)

Relative prices (RERs) matter in the short and medium run, in an aggregative model

1. **Short run:** BP-equilibrium growth is affected by changes in relative ULC
   - Rates of change in the nominal wage, labor productivity, and exchange rate all matter, but are exogenous (similar to an open economy neo-Kaleckian model, but with a BP constraint)
2. **"Medium-to-long run":** BP-equilibrium growth is affected by Verdoorn's Law (positive feedbacks)
   - Productivity growth is endogenous and affects cost competitiveness as the wage only partially adjusts (faster productivity growth depresses the wage share but bolsters exports)
     - Similar to mechanisms in Araujo (2013), formalizes Blecker (2013)
3. **Long run:** Thirlwall's Law holds
   - The real wage grows at the same rate as productivity $\Rightarrow$ the labor share and RER converge to constant levels (there are no relative price changes by assumption)

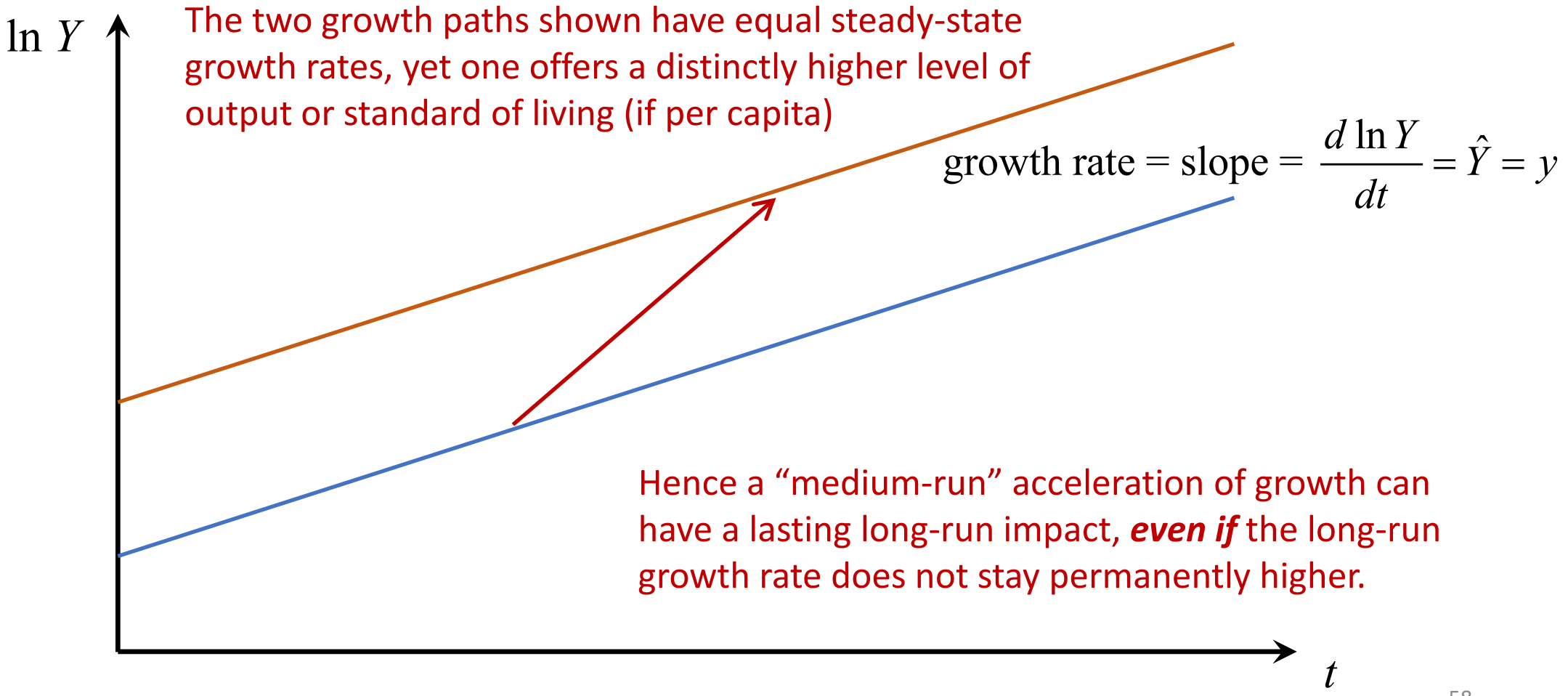
Endogenizing income elasticities: Magacho & McCombie (2020)

- Verdoorn's law holds (feedbacks from output growth to productivity growth exist) at the industry level
  - More rapid productivity growth implies *qualitative improvements that raise income elasticities* for exported goods
    - Changes in industry shares depend on *differences* in income elasticities (e.g. higher $\eta_{X,i}$ relative to average $\eta_X \Rightarrow$ rising share of good *i*), generating positive feedbacks *without* relative price effects
- Under certain assumptions, cumulative causation can be launched by structural change and does not require an initial increase in aggregate growth
  - It can start with faster growth of individual sectors with strong Verdoorn feedbacks and high income elasticities of export demand
    - Since the income elasticities are endogenous, long-run growth can be affected

Conclusions

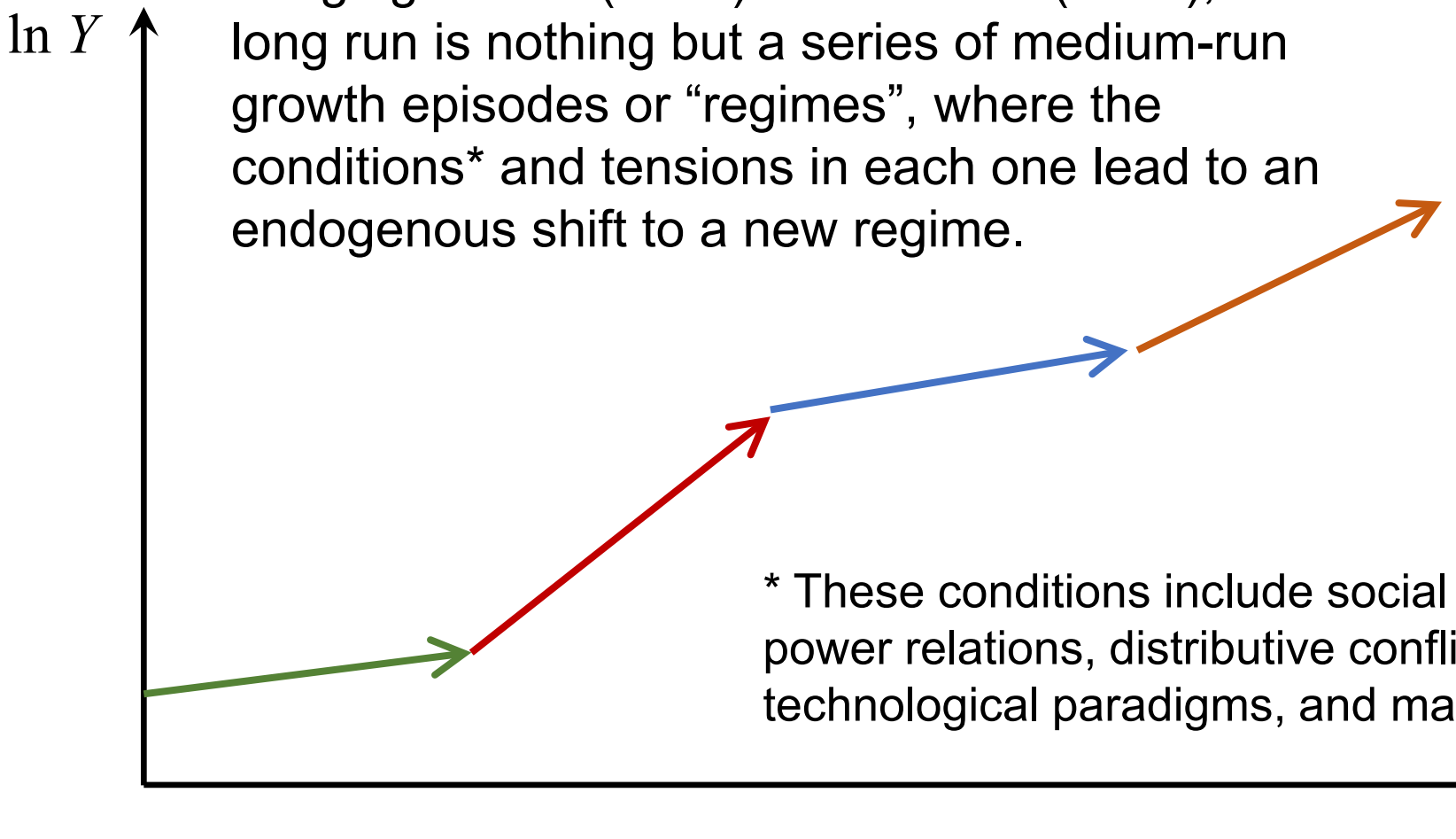
- The BPCG model has become the “workhorse” model for post-Keynesian analysis of trade and growth in the long run
  - It reflects the Keynesian view that output (growth) is the main adjusting variable for the BP
- But the ELCC model can still inform our analysis of medium-run growth ***and*** the long-run ***level*** of the output trend
  - Positive feedbacks do matter!
  - Whether relative prices (RERs) affect long-run growth rates is more controversial

Why “medium run” effects are important: output levels versus growth rates (slopes)



An alternative view: growth is path-dependent; there is no long-run steady-state attractor

Merging Kaldor (1972) with Kalecki (1971), the long run is nothing but a series of medium-run growth episodes or “regimes”, where the conditions* and tensions in each one lead to an endogenous shift to a new regime.



* These conditions include social institutions, power relations, distributive conflict, state policies, technological paradigms, and macro dynamics.

Conclusions – *continued*

- BPCG theorists have put too much emphasis on long-run analysis, and not enough on the "traverse" between steady-states
  - What we care about are income levels (and economic welfare and income distribution, and financial and ecological sustainability), not the long-run average growth rate *per se*
- **Deeper problem for discussion:** if the underlying parameters are endogenous, what is the meaning of saying that long-run growth is "BP-constrained"?
  - Especially if weighted average income elasticities are endogenous (Bresser Pereira, Oreiro, others)

A final note

- ELCC and BPCG are the two main explicitly PK models for analyzing long-run growth and the medium-run "traverse" in open economies
  - Other PK open economy models (e.g. short-run, neo-Kaleckian) were not covered for reasons of time
- Much relevant research is being done in related theoretical and empirical frameworks
  - Neo-Schumpeterian, "Sraffian" Supermultiplier, Latin American Structuralist, (Brazilian) New Developmentalist, Feminist/Gender, "Mainstream Dissenters"
- Cutting-edge research seeks to incorporate ecological constraints, inter-national financial dynamics, income distribution, global value chains, etc.
  - We also need to look "inside the black box" of Verdoorn's law

Study Questions

1. What are the key demand *and* supply factors that drive growth in the export-led cumulative causation (ELCC) model and the balance-of-payments-constrained growth (BPCG) model? How are these growth drivers similar or different in the two models?
2. Why does the relative price (real exchange rate) play a decisive role in the ELCC model, but not in the BPCG model? How have some theorists sought to incorporate relative price (RER) effects into extended BPCG models?
3. Why does it make sense to regard ELCC as a growth model for the medium run or "traverse," and BPCG as a model for the long run? Does this mean that cumulative causation effects are unimportant in the long run? Why or why not?
4. The Kaldorian models were invented a half-century ago (1970s). How well do you think they reflect the realities of international trade and the leading sectors of economic development in the 21st century? What features of today's global economy are *not* captured in these models?