Post-Keynesian Approaches to International and Development Economics

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This presentation is based on portions of Chapters 8–10 our new book:

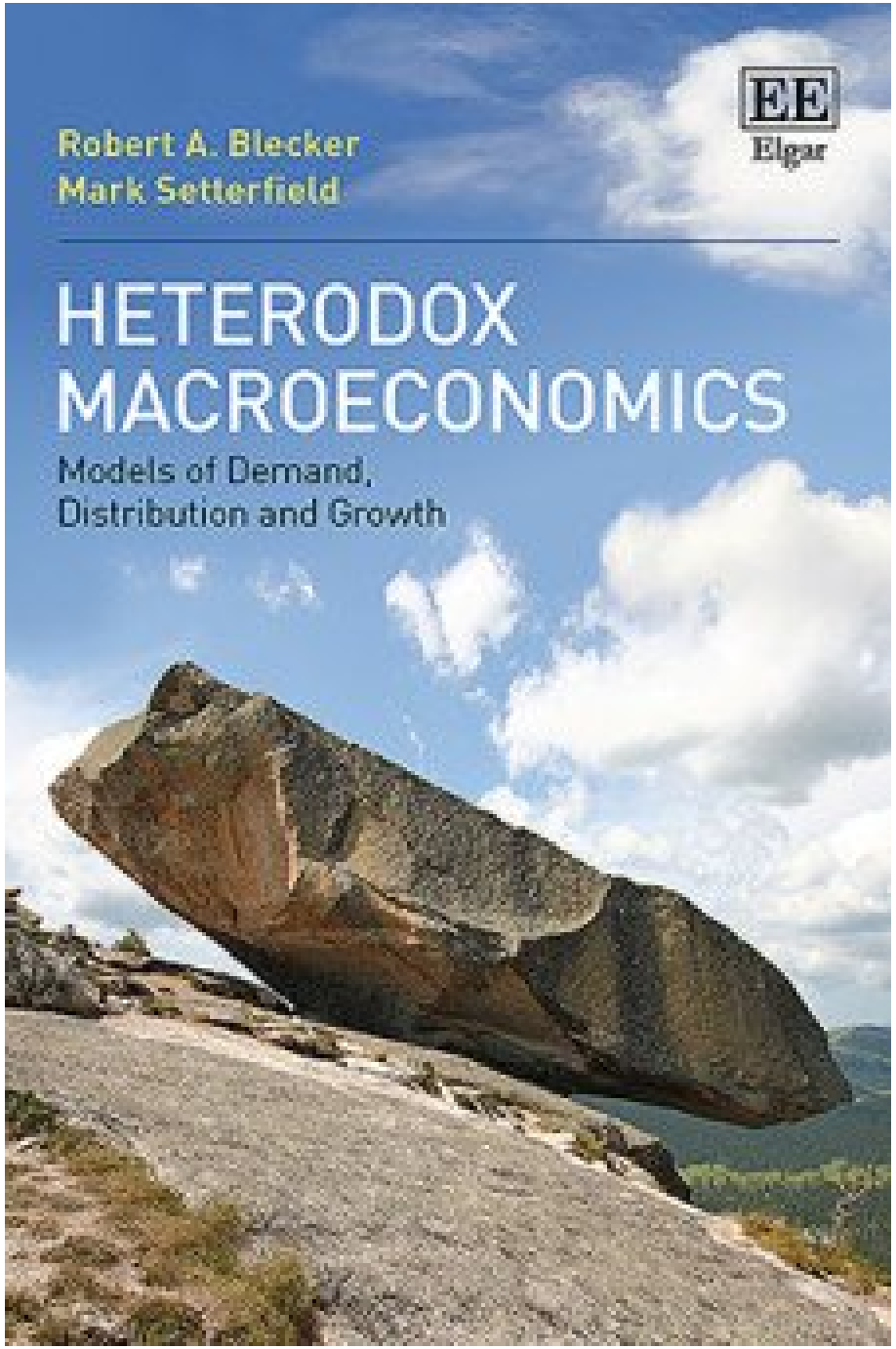
Forthcoming, October 2019, from Edward Elgar Publishing Ltd.

These chapters cover Kaldorian approaches to international trade and long-run growth, along with critiques and alternative perspectives

Notes on notation:

Lower-case letters are growth rates of quantities (x is the growth rate of X)

Circumflexes are used for rates of change in nominal variables ($\hat{P}$ is the rate of increase in P)



Outline

- The Kaldorian theory of export-led growth and cumulative causation (ELCC) (ELCC)
  - Kaldor's "growth laws" (stylized facts)
  - The canonical Dixon-Thirlwall model
  - Implications: convergence vs. divergence, conflictive trade relations
  - The role of relative prices (unit labour costs) and the Beckerman alternative
    - (if time permits) Rodrik's model of structural change
- Balance-of-payments-constrained growth (BPCG) models
  - The basic model and Thirlwall's Law
  - Extensions: large countries, structural change
  - Critiques and alternatives: near-tautology, endogenous elasticities, small countries
  - Reconciling Thirlwall's Law with ELCC and the "natural rate of growth"
    - The role of relative prices (real exchange rate) once again

Export-led cumulative causation (ELCC)

Covered in Chapter 8

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 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 growth models and disequilibrium views (1960s-80s)
  - Explaining why the UK lagged relative to West Germany and Japan (Kaldor 1966, 1971)
  - Static and dynamic increasing returns to scale, induced innovation (Kaldor 1972, 1981)
  - Export-led growth as formalized by Dixon and Thirlwall (1975), Setterfield and Cornwall (2002)

Four of "Kaldor's growth laws"
(according to Thirlwall, *JPKE*, 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 Growth with Cumulative Causation

(inspired by Dixon-Thirlwall 1975; Cornwall 1977; Setterfield and Cornwall 2002)

Faster labor productivity growth, $\uparrow q$

Based on mark-up pricing over unit labor costs, taking nominal wage increases as given

Improved external price competitiveness or real currency depreciation, $\uparrow (\hat{P}_f + \hat{E} - \hat{P})$ <u>or</u> EP_f/P

Export demand function with a high relative price elasticity

More rapid export growth , $\uparrow x$

Keynesian multiplier effects, increased utilization rates, stimulus to investment

Faster output growth, $\uparrow y$

Increasing returns to scale, induced technological innovation, R&D ("Verdoorn's Law") – in manufacturing

This is a "virtuous circle"—or, with the opposite changes, a "vicious circle."

"Success breeds more success, failure breeds more failure"

Two important qualifications

- It's a model of "regional growth"
  - For individual countries or groups of countries (or possibly regions within countries)
  - It does ***not*** explain global growth, for which more abstract models of closed economies may be more appropriate
- Labor supply is assumed to be endogenous and not a binding constraint on output growth (Cornwall 1977), due to:
  - Labor-saving technological change in some industries releases labor for other sectors
  - Transfers of labor from agriculture to manufacturing and manufacturing to services
  - Migration, guest workers, and changes in gender norms or retirement ages
  - All of these may be endogenous responses to rising labor demand and upward pressure on wages

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

Note: lower-case Roman letters are quantities in growth rate form.

1) Export demand: $$x = \varepsilon_X (\hat{P}_f - \hat{P}) + \eta_X y_f$$

Assuming $\hat{E} = 0$ or E is constant

Export growth depends positively on changes in relative foreign prices and foreign income growth

2) Mark-up pricing: $$\hat{P} = \hat{W} - q$$

Price inflation = wage inflation – labor productivity growth (assuming the markup rate does not change in the long run)

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

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

4) Output growth: $$y = k_X (\omega_X x + \omega_A g_A)$$

Note: The basic version omits the $\omega_A g_A$ term, so $\omega_X = 1$.

Where k_X is the Keynesian multiplier, g_A is the growth rate of exogenous *domestic demand, and the ω's are weights reflecting the export and domestic shares of autonomous demand*

NOTES: A subscript *f* indicates a foreign variable. P_f is measured in foreign currency and equation (8.9') is used for output growth.

*Based on Chapter 8 in Blecker & Setterfield (2019), Dixon and Thirlwall (1975), and Setterfield and Cornwall (2002), with minor modifications.

Parallel equations for the “foreign” country (rest-of-world)

- Assuming a similarly-specified model for the “foreign” country:
  - Markup pricing (with a constant markup): $\hat{P}_f = \hat{W}_f - q_f$
  - Verdoorn’s Law: $q_f = q_0 + \rho_f y_f$
  - Some simplifying assumptions (factors assumed to be equal across countries):

$$\hat{W} = \hat{W}_f, \quad q_0 = q_{f,0}$$

ELCC model solution

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

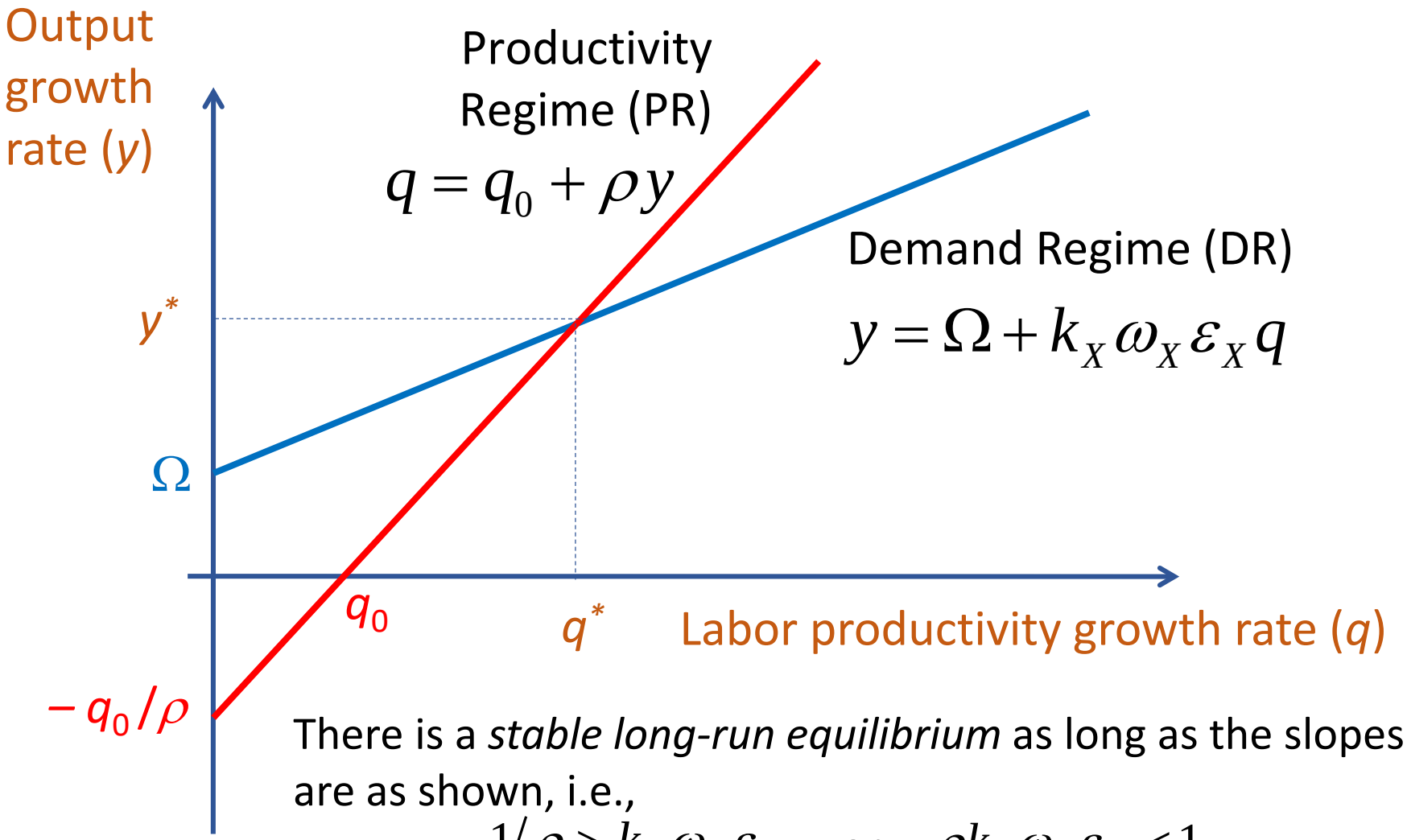
The Verdoorn equation or
"Productivity Regime" (PR): $$q = q_0 + \rho y$$

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

with intercept $$\Omega = k_X \left(\omega_A g_A + \omega_X [(\eta_X - \rho_f \varepsilon_X) y_f - \varepsilon_X q_0] \right)$$

Equilibrium solution: $$y^* = \frac{\Omega + k_X \omega_x \varepsilon_x q_0}{1 - \rho k_X \omega_x \varepsilon_x}$$

Figure 8.2: Graphical Solution of ELCC Model



There is a *stable long-run equilibrium* as long as the slopes are as shown, i.e.,

$$1/\rho > k_X \omega_X \varepsilon_X \quad \text{or} \quad \rho k_X \omega_X \varepsilon_X < 1$$

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

Theoretical and policy implications I:

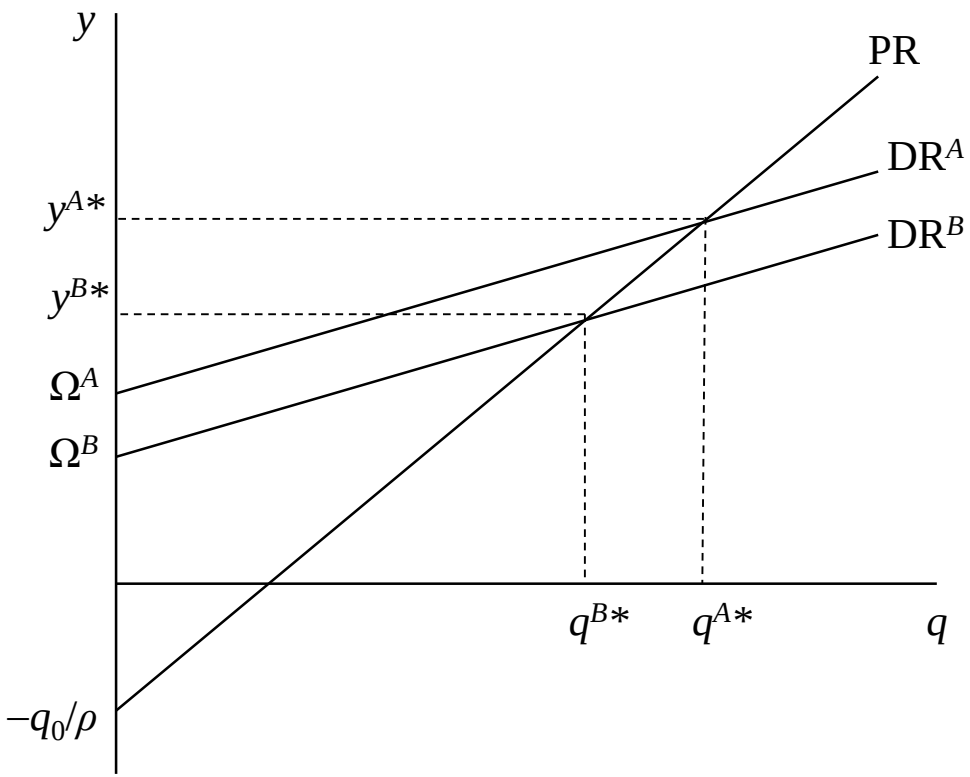
- Export demand is the main force driving the growth process
  - Other components of demand are not modeled explicitly
  - Investment must be driven by an accelerator mechanism to keep up with output growth
  - Supply conditions also matter in regard to productivity growth and changes in relative costs
- *Either* supply-side *or* demand-side policies, both domestic and foreign, can increase growth of output, exports, and productivity *in the long run*
  - R&D subsidies, improved education, etc. boost productivity growth ($\uparrow q_0$) and shift PR to right
  - Fiscal stimulus, infrastructure spending, etc. stimulate domestic expenditures ($\uparrow g_A \Rightarrow \uparrow \Omega$) and shift DR up, as does faster foreign growth ($\uparrow y_f$) – must be higher *growth rates*

Theoretical and policy implications II:

- In spite of Kaldor's (1972) anti-equilibrium views, there *can* be a stable ELCC equilibrium as long as the forces of cumulative causation are *not too strong*
  - But it's demand-driven, not supply-driven as in Solow or other neoclassical models
    - A growth *rate* that would increase or decrease without limit is not plausible
  - It's only a "provisional equilibrium" as the underlying parameters are expected to change endogenously (Setterfield 2002)
    - Chapter 8 gives examples of path dependence in which a DR-PR growth regime is self-destroying after some period of time, for example, because of the exhaustion of a technological paradigm that a country is "locked into"
- The model is consistent with conditional convergence
  - Countries that are initially farther below their long-run equilibria will grow faster in the transition to the equilibrium, controlling for other factors identified in the model (Roberts 2007)
- But it can also predict absolute divergence, depending on initial conditions

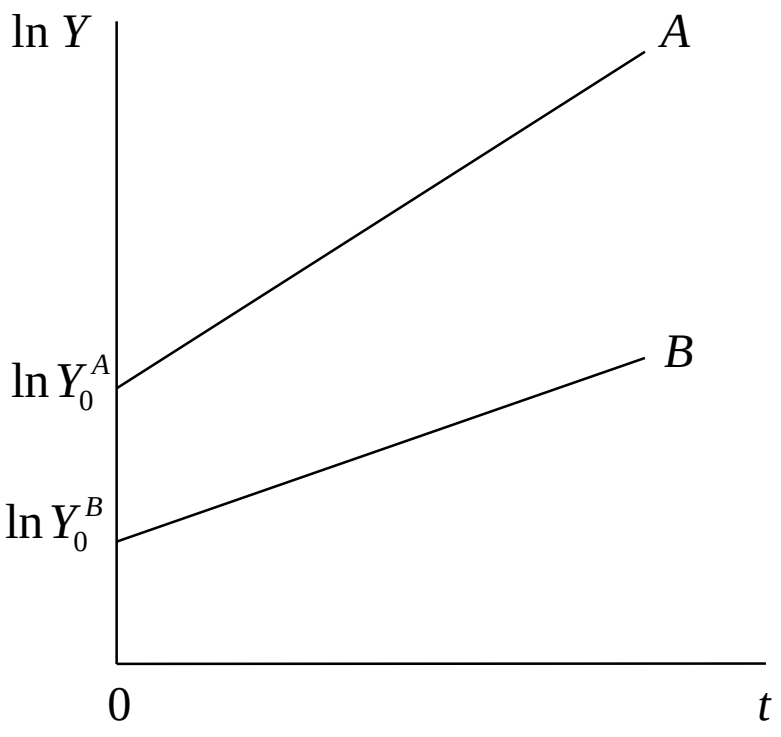
Causes of unequal growth

- Suppose two countries, *A* and *B*, have the same PR but differ in their DR
  - Suppose *A* has a higher income elasticity of export demand: $\eta_X^A > \eta_X^B$
    - This is only an example; other parameters could also differ.
  - Holding all else equal, *A*'s DR curve has a higher intercept ($\Omega^A > \Omega^B$) and *A* has a higher equilibrium growth rate: $y^{A*} > y^{B*}$

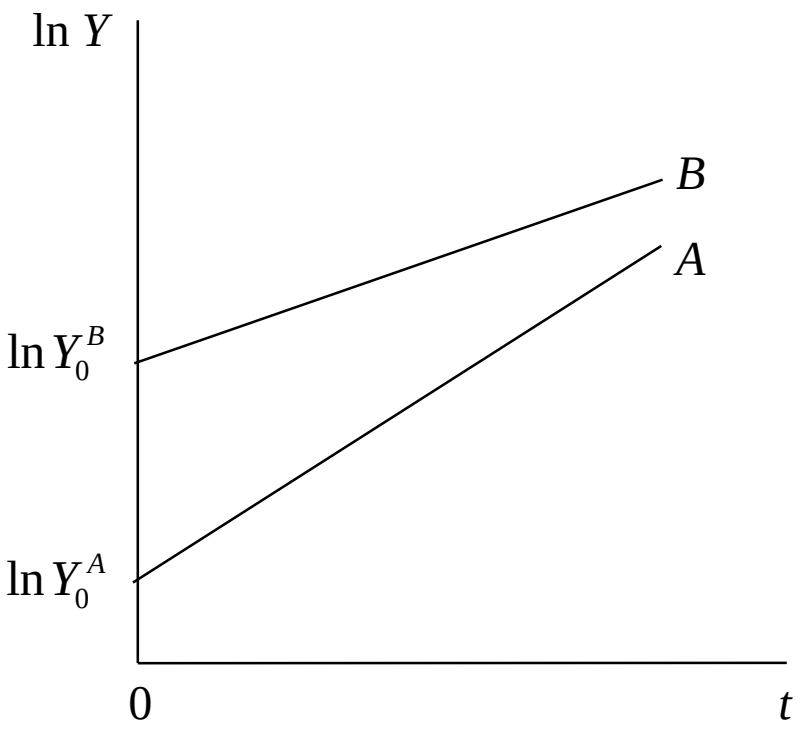


International divergence (or convergence)

If country *A* starts out ahead, it will increase the proportional gap vis-à-vis *B* (**divergence**)



Whereas if *A* starts out behind, it will close the gap with *B* (**convergence** or **catch-up**)



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, based on micro-level "gains from trade" in efficiency
  - Greater *foreign* technological dynamism (stronger foreign Verdoorn effects) *lowers* the *home* country's growth rate by slowing its export growth
  - Thus one country's faster growth comes at the expense of another country's slowdown
  - Formally, this a negative effect on the intercept Ω in the DR equation:

$$\Omega = k_X \left(\omega_A g_A + \omega_X [(\eta_X - \rho_f \varepsilon_X) y_f - \varepsilon_X q_0] \right)$$

    - where q_0 here is actually the foreign $q_{f,0}$ and I've corrected a typo in the text (+ sign on ω_X)

- But there is also room for international cooperation via expansionary Keynesian demand policies that raise y_f, assuming $\eta_X > \rho_f \varepsilon_X$

Sympathetic critiques

- *Too many positive self-reinforcing effects*, and not enough offsetting effects, to be realistic
  - Wage increases, currency appreciation, or spill-overs of technology to other countries can eventually limit or reverse the gains for a rapidly growing country
  - Too much emphasis on *continuous changes* in relative costs (not realistic or supported by data)
- A country may never reach the steady-state equilibrium before conditions change
  - The equilibria depicted by the ELCC model are "provisional" or "conditional" equilibria that are subject to path-dependent shifts
  - Any particular growth regime (DR + PR) can generate *endogenous* changes in the underlying conditions that in turn alter the long-run growth path
- This model is aggregative and does not reflect structural change
  - The Verdoorn relationship between output growth and productivity growth is supposed to apply ***only*** in manufacturing (and perhaps "modern services" too)
  - Applying Verdoorn to total output growth could be misleading for policy purposes

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

- Early empirical tests of Kaldor's ELCC model were not favorable
  - Estimated elasticities of exports with respect to the change in the relative price had the wrong sign ($-\varepsilon_X > 0$ instead of < 0) in cross-sectional data
  - This was labeled "**Kaldor's paradox**"; various explanations were offered
    - For example, reverse causality: faster export growth causes greater demand for labor, which raises wages and makes home country products more expensive (real appreciation)
- Kaldor (1981) was convinced by this evidence to abandon his own ELCC model
  - He concluded that price or cost competitiveness didn't matter
  - Only "**non-price competitiveness**" (quality, service, etc.) mattered
- But was the evidence really convincing? Did Kaldor abandon his own theory too quickly?
  - León-Ledesma (*CJE*, 2002) found the opposite result: $-\varepsilon_X < 0$, after controlling for investment rates and R&D expenditures (but Kaldor had died in 1986)

The alternative approach of Beckerman

- What Kaldor (1971) originally said (quoted in Boggio and Barbieri, 2017):

  "[T]he main autonomous factor governing both the level and the rate of growth of effective demand of an industrial country with a large share of exports in its total production and of imports in its consumption is the external demand for its exports: and the main factor governing the latter is international competitiveness, which in turn depends on the ***level*** of its industrial cost relatively to other industrial exporters." (emphasis added)

  - Note he said "level," <u>not</u> growth rate!

- In Beckerman (1962), the growth rate of exports was assumed to be a function of the ***level*** of a country's prices (or unit labor costs) relative to other nations':

$$x = z + \gamma(1 - \Gamma)$$

  where z is the growth rate of total world trade, γ is a positive parameter, and Γ is a measure of relative competitiveness (real exchange rate or relative unit labor cost, **<u>in levels</u>**)

- Since this can be rewritten as $x - z = \gamma(1 - \Gamma)$, it's really an equation for *the rate of change in a country's **share** of world exports*

Boggio and Barbieri (*CJE*, 2016)

- They revive Beckerman's (1962) approach
  - They also draw on empirical work on exports by evolutionary/Schumpeterian economists, who focus on technology variables and have tested relative costs in levels
    - Verspagen (1993), Amendola et al. (1993), Amable and Verspagen (1995), Verspagen and Wakelin (1997)
- They show that Beckerman's export share equation is mathematically equivalent to a "replicator equation" in evolutionary biology
  - The growth of a variety's share in the total population of a species is a function of its fitness
  - I will skip the replicator math for reasons of time
- They argue that the Beckerman/replicator formulation is more consistent with Kaldor's original quote from 1971 than the KDT model
- They provide new empirical evidence linking changes in export ***shares*** to the ***level*** of competitiveness, measured by relative unit labor costs ("fitness")
  - Levels of this variable are significant; growth rates are not (robust result)

Samples of Boggio and Barbieri's 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.

Conclusions on ELCC

- Relative price effects were seen as unimportant based on "Kaldor's paradox"
  - Based on early evidence about *rates of change* in prices (wrong sign or insignificant)
    - An example of how a particular mathematical specification can limit or bias our thinking!
- Boggio and Barbieri show that this was premature; relative unit labor costs (*in levels*) ***do*** significantly affect the growth of countries' export shares
  - Consistent with much empirical research showing the importance of real exchange rates (levels of over- or under-valuation) in affecting growth
    - Gala (2007); Rodrik (2008); Berg et al. (2012); Rapetti et al. (2012); many others
- But first, let's turn to the neglected aspect of structural change
  - This was key to Kaldor's views, but is omitted in the aggregative models of Dixon-Thirlwall and Boggio-Barbieri
  - I will briefly present a simple model from a leading "mainstream dissenter," Dani Rodrik

Rodrik's model of structural change

(in "Past, Present, and Future," 2014 book chapter)

- Aggregate productivity (Q = real output per worker) is a weighted averaged of sectoral productivities:

$$Q = \alpha_m Q_m + \alpha_s Q_s + \alpha_t Q_t$$
$$= \alpha_m Q_m + \alpha_s Q_s + (1 - \alpha_m - \alpha_s)$$

- Q_i = labor productivity (with growth rate q_i), $\pi_i = y_i/y$ = relative productivity, and α_i = share of employment in each sector i
  - Sectors: m = Manufactures, s = Services (modern), t = Traditional (informal, agriculture, etc.)
  - By definition $\alpha_t = 1 - \alpha_m - \alpha_s$, and we assume $Q_t = 1$ and $q_t = \hat{Q}_t = 0$ for simplicity
    - Normalize output so that it equals the product of one t-sector worker, which is constant
- Rodrik defines Θ as the "fundamentals" (institutions, macro policies, rule of law, education, human capital, R&D, etc.) emphasized in neoclassical and neo-institutionalist approaches
  - We could substitute other "fundamentals" based on post-Keynesian theory, such as infrastructure, innovative capacity, competitive real exchange rates, expansionary monetary and fiscal policies, etc.

Productivity growth by sector

- Manufacturing productivity growth has both unconditional and conditional components:

$$q_m = \hat{Q}_m = \beta\left(\ln Q_m^* - \ln Q_m\right) + \xi\left[\ln Q^*(\Theta) - \ln Q\right]$$

  - where y_M^* is "the global productivity frontier in manufacturing" (advanced country level) and $y^*(\Theta)$ is the country's own steady-state level of productivity based on its institutions/fundamentals
  - Even if a developing country has weak fundamentals, it can still benefit from unconditional convergence in manufacturing (Rodrik, *QJE*, 2013)
    - With strong fundamentals, manufacturing productivity can increase even more rapidly
- Services productivity growth depends only on economy-wide fundamentals:

$$q_s = \hat{Q}_s = \xi\left[\ln Q^*(\Theta) - \ln Q\right]$$

Unconditional convergence in manufacturing
(from Rodrik 2013)

Total economy

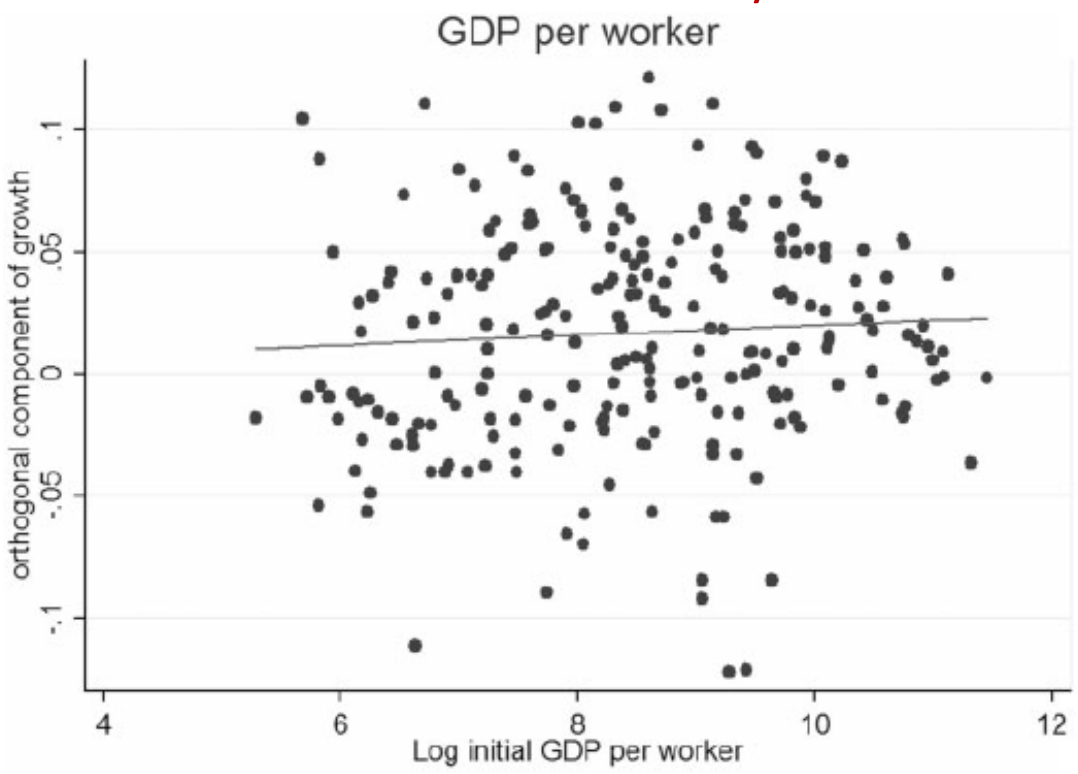


FIGURE I

Lack of Convergence in Economy-wide Labor Productivity

Variable on the vertical axis is growth of GDP per worker over four separate decades (1965–1975, 1975–1985, 1985–1995, 1995–2005), controlling for decadal fixed effects. Source of data: PWT 7.0. Sample is restricted to countries included in the manufacturing convergence regressions.

Manufacturing only

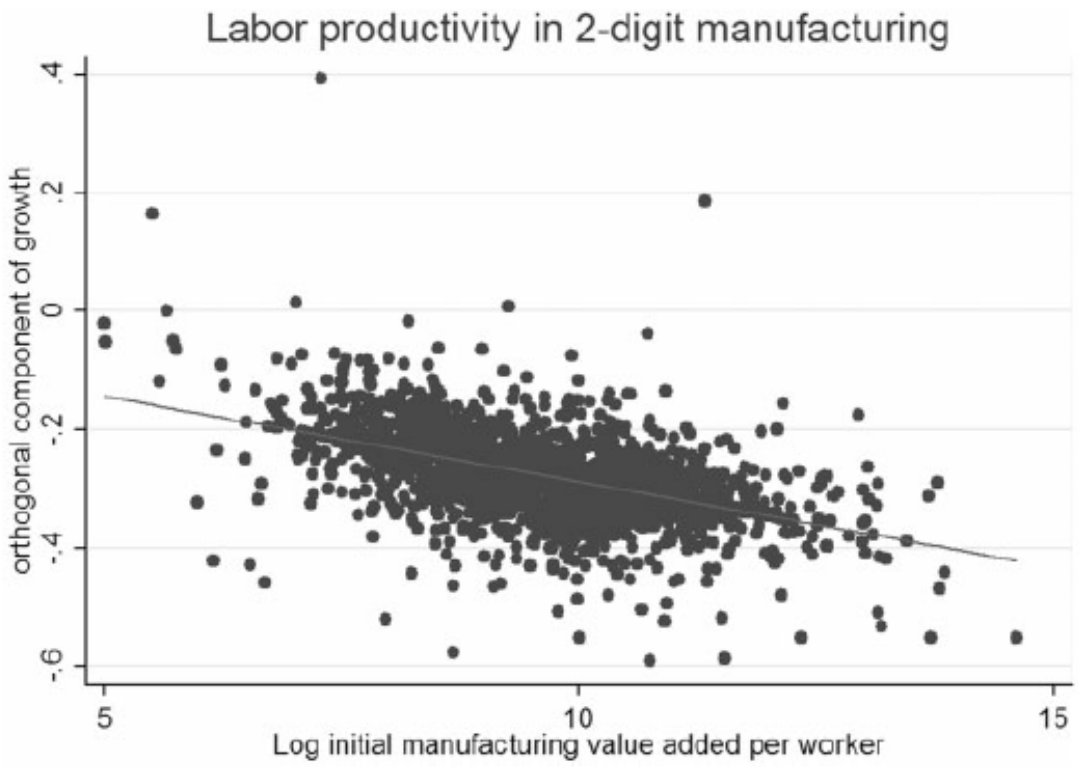


FIGURE II

Unconditional Unconditionce in 2-digit Manufacturing Sectors

Variable on the vertical axis is the growth of value added per worker in 2-digit manufacturing industries, controlling for period, industry, and period × industry fixed effects, where for each country the latest decade over which data are available is included. Source of data: INDSTAT2. For further details on data and methods, see text.

Decomposing average productivity growth (four channels)

$$q = (\alpha_m \pi_m + \alpha_s \pi_s) \cdot \xi \left[\ln Q^*(\Theta) - \ln Q) \right] \qquad \text{(a)}$$

$$+ \alpha_m \pi_m \cdot \beta (\ln Q_m^* - \ln Q_m) \qquad \text{(b)}$$

$$+ (\pi_m - \pi_t) d\alpha_m \qquad \text{(c)}$$

$$+ (\pi_s - \pi_t) d\alpha_s \qquad \text{(d)}$$

(A) = conventional conditional convergence based on “fundamentals”

(B) = unconditional convergence in manufactures (emphasized by Rodrik)

(C) = “structural change bonus” from reallocation of labor from traditional activities to manufacturing (emphasized by Kaldor, Szirmai, etc.)

(D) = reallocation of labor to modern services

Rodrik's policy implications

- All developing and emerging countries can benefit from (B) and (C), i.e., structural change oriented toward industrialization
  - Even countries with weak institutions and other "fundamentals"
    - Contrary to the Washington Consensus/neo-liberal economics
  - Contrary to the orthodox view that it doesn't matter which goods a country produces
  - Nevertheless (A) is important for emerging countries to reach advanced country status
    - We can disagree on what the right "fundamentals" are, or if there is even a unique set
- His analysis is broadly supportive of the Kaldorian/structuralist view of the importance of the manufacturing sector
  - Rodrik accepts the importance of the "structural change bonus" (Szirmai 2012)
  - His formulation of unconditional convergence within manufacturing is different from Verdoorn's Law, but supports the view that manufacturing offers special advantages

Critical comments on Rodrik

- He assumes a neoclassical framework in which the long-run “natural” rate of growth is supply-determined by productivity
  - He does not conceptualize a demand-driven growth rate
- Yet, his framework allows us to think about how demand-side factors could have feedback effects on the supply-side “natural rate” of growth
  - Demand-side factors could influence structural change
    - Exports, investment, etc. can impact the share of manufactures
  - Then the potential (“natural”) rate of growth is endogenous to demand-side factors

Balance-of-payments constrained growth (BPCG)

Covered in Chapters 9–10

Post-Keynesian critiques of ELCC approach

- ELCC relies too much on *continuous* changes in relative costs or RER depreciation
  - These are not realistic in the long run
- Early empirical evidence (1970s) did not support changes in relative prices or RERs explaining export growth (Kaldor's paradox)
  - It appeared that exports were driven mainly by qualitative or "non-price competitiveness"
- The ELCC framework ignores imports and the balance of payments
  - The ELCC model could imply persistently increasing trade (CA) imbalances (surpluses or deficits) in a long-run "equilibrium," requiring ever-increasing net financial flows
    - Net outflows for a surplus or net financial inflows for a deficit
    - This would not be sustainable
  - In the long run, a country must either keep its trade balanced (on average) or else maintain a sustainable level of financial inflows or outflows

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

- Originated by Thirlwall (1979), Thirlwall & Dixon (1979)
- Key assumptions:
  - 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
  - Relative prices (RERs) are either constant (on average, in the long run) or else have little impact (elasticity pessimism)

➢ 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 financial flows)

Note: the nominal exchange rate *E* is explicitly included now since it is no longer assumed fixed.

- Export demand: $x = \varepsilon_X (\hat{E} + \hat{P}_f - \hat{P}) + \eta_X y_f$
- Import demand: $m = -\varepsilon_M (\hat{E} + \hat{P}_f - \hat{P}) + \eta_M y$
- Balance of payments equilibrium (assuming zero net financial flows so CA = 0):

$$\hat{P} + x = \hat{E} + \hat{P}_f + m$$

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

  - Note $\hat{E}$ is the rate of nominal depreciation of the home currency (percentage increase in home currency/foreign currency)

- Some standard Marshall-Lerner assumptions:
  - One home and one foreign good which are imperfect substitutes, prices are fixed in seller's currency (no partial pass-through), exogenously given price & income elasticities

General model solution

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

$$(\varepsilon_X + \varepsilon_M - 1)(\hat{E} + \hat{P}_f - \hat{P}) - \eta_M y + \eta_X y_f = 0$$

- But which variable is the endogenous one that adjusts to maintain BP equilibrium?
  - For a small country, foreign income growth y_f can be taken as exogenously given
- Thirlwall's **"Keynesian" solution** is to assume that relative prices are either constant or change at an exogenously given rate in the long run, so domestic income growth y must adjust
  - An alternative "neoclassical" solution would take y as an exogenous "natural rate of growth", in which case the change in the real exchange rate $(\hat{E} + \hat{P}_f - \hat{P})$ would have to adjust.
  - Krugman (1989) and others have claimed that the income elasticities η_X and η_M could adjust

Solving for "Thirlwall's Law"

- Under Thirlwall's <u>Keynesian</u> assumptions, we solve for the BP-constrained growth rate of output:

$$y_B = \frac{(\varepsilon_X + \varepsilon_M - 1)(\hat{E} + \hat{P}_f - \hat{P}) + \eta_X y_f}{\eta_M}$$

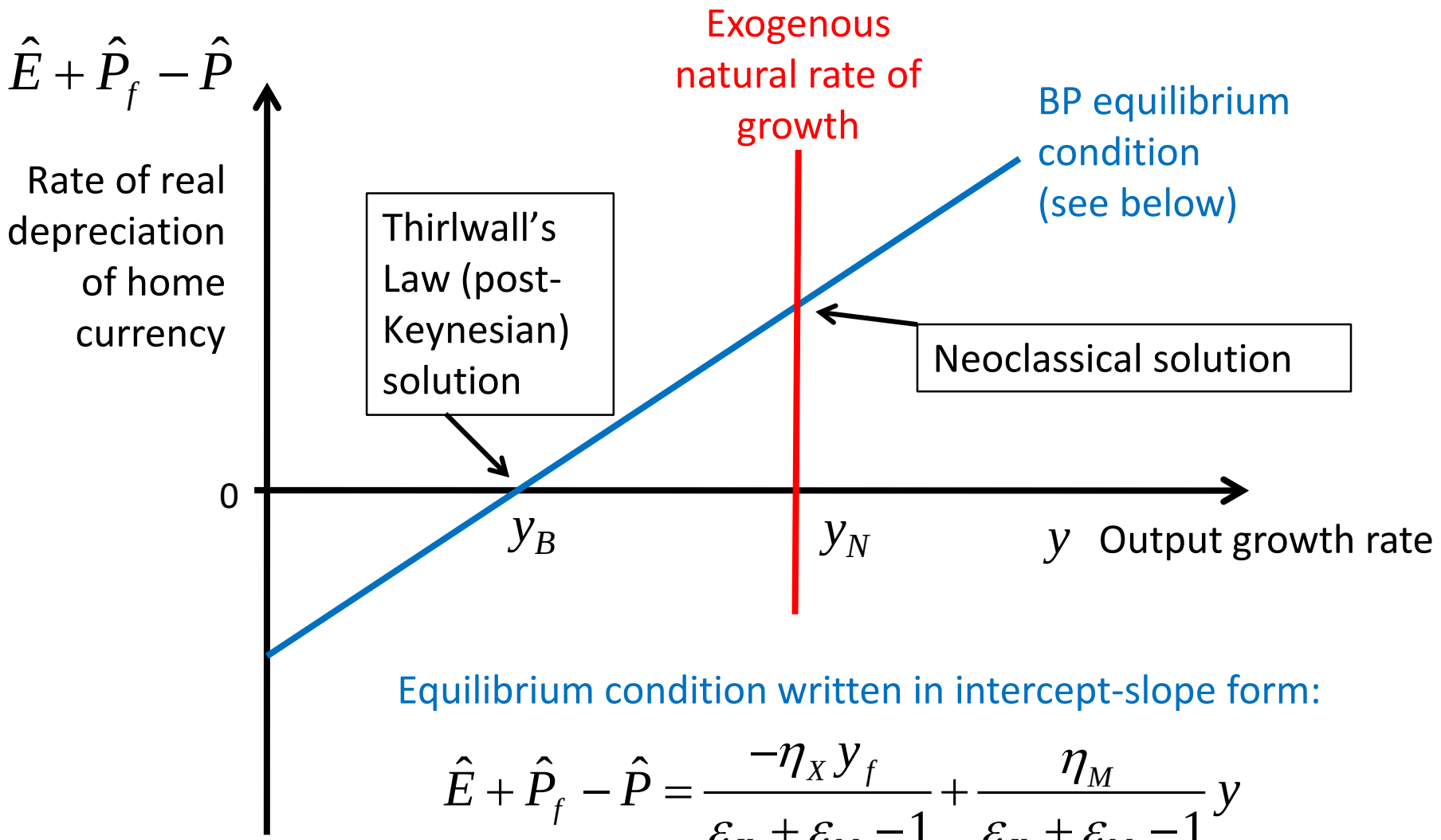
most general form (includes price effects)

- Thirlwall further assumes that relative price effects don't matter because of <u>either</u>
  - Elasticity pessimism: $\varepsilon_X + \varepsilon_M \approx 1$ <u>or</u>
  - Constant relative prices (RER): $\hat{E} + \hat{P}_f - \hat{P} = 0$

Implying two versions of Thirlwall's Law (Perraton 2003):

- Then the solution simplifies to $y_B = \eta_X y_f / \eta_M$ "strong form"
  - Under constant RER, we can also simplify to $y_B = x / \eta_M$ "weak form"

Graphical representation of a BP-constrained economy



Equilibrium condition written in intercept-slope form:

$$\hat{E} + \hat{P}_f - \hat{P} = \frac{-\eta_X y_f}{\varepsilon_X + \varepsilon_M - 1} + \frac{\eta_M}{\varepsilon_X + \varepsilon_M - 1} y$$

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

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

- Exports are still vital to LR growth, as in ELCC, but *for a different reason:*
  - To obtain the foreign exchange to finance necessary imports without a growing trade deficit
- Non-price or qualitative competition (reflected in the income elasticities η_X and η_M) is more important than price or cost competition
  - This is controversial; at best, it is likely to vary by type of goods (manufactures vs. primary commodities, innovative vs. standardized manufactures)
- Although the model is (external) demand-driven, supply factors also play a role
  - Greater domestic productive capacity reduces η_M; also investment and innovation in export industries can increase η_X
    - Industrial and technology policies can help in this regard
  - But these factors operate ***only*** via their effects on income elasticities

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

- In contrast to the extended ELCC model, expansionary *domestic* policies ***cannot*** increase *long-run* equilibrium growth under a BP constraint
  - They can work in the short run, but eventually result in increasing trade deficits, which require adjustments (e.g. fiscal contraction) leading back to the BPCG solution
- "Mercantilist" trade policies (export-promotion *cum* import restrictions, or selective import liberalization) ***can*** make sense
  - ***If*** such policies effectively boost η_X <u>relative</u> to η_M
  - But <u>not</u> pure protectionism, 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 <u>lower</u> 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

Extensions of the BPCG model

- International capital flows
  - Assuming *either* a given growth rate of net capital inflows *or* a sustainable ratio of CA deficit (or external debt) to GDP, the Thirlwall's law solutions are modified
    - Thirlwall and Hussain (1982); McCombie and Thirlwall (1997); Moreno-Brid (1998-99); Blecker (2013)
  - Bhering, Serrano, and Freitas (2019): assuming an external constraint on the debt-***exports*** ratio, capital inflows affect the ***level*** of output but **not** the growth rate in the long run (Thirlwall's law holds)
- Partial pass-through of domestic and foreign prices into prices of exports and imports
  - See Blecker (1998); Godley (1999); Godley and Lavoie (2007); Lavoie (2014)

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

- It is not plausible for the long-run, BP-equilibrium growth rate to differ from the "natural rate of growth," $y_N = n + q$
  - If $y_B < y_N$, we would observe continuously increasing unemployment
  - If $y_B > y_N$, the labor force would eventually be exhausted
- <u>Proposed solutions</u>:
  - **Palley (2002):** y_B will adjust 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 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
  - **Setterfield (2006):** $y_N = n + q$ will adjust toward y_B because of Verdoorn effects
    - q will fall in a slow-growing economy ($y_B < y_N$), and rise in a rapidly growing economy ($y_B > y_N$)
  - **Oreiro (2016):** the RER (level) has to adjust 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

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

- Due to Araújo and Lima (2007), Gouvêa and Lima (2010).
  - Extended to imported intermediate goods by Blecker & Ibarra (2013), Ibarra & Blecker (2016)
- This formalizes the idea (already expressed by Thirlwall, McCombie, and others) that the aggregate income elasticities of export and import demand are weighted averages of industry-level elasticities:

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

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

Some features of the MSTL

- Structural change is modeled by changes in the industry shares of exports and imports, $\alpha_{j,t}$ and $\beta_{j,t}$
  - Shifting the composition of exports or imports to goods with higher (lower) income elasticities raises (lowers) the average elasticities
- As a result, the BP-equilibrium growth rate $y_{B,t}$ ***varies over time***
  - Hence, an important part of a growth strategy is to emphasize both exports and domestic production of goods with high income elasticities, so as to raise average η_X and lower average η_M
  - This simple formulation ignores relative prices, but in some later extensions relative cost competitiveness (the real exchange rate) affects industrial composition, i.e. the weights $\alpha_{j,t}$ and $\beta_{j,t}$, and thereby raises or lowers the BP-equilibrium growth rate

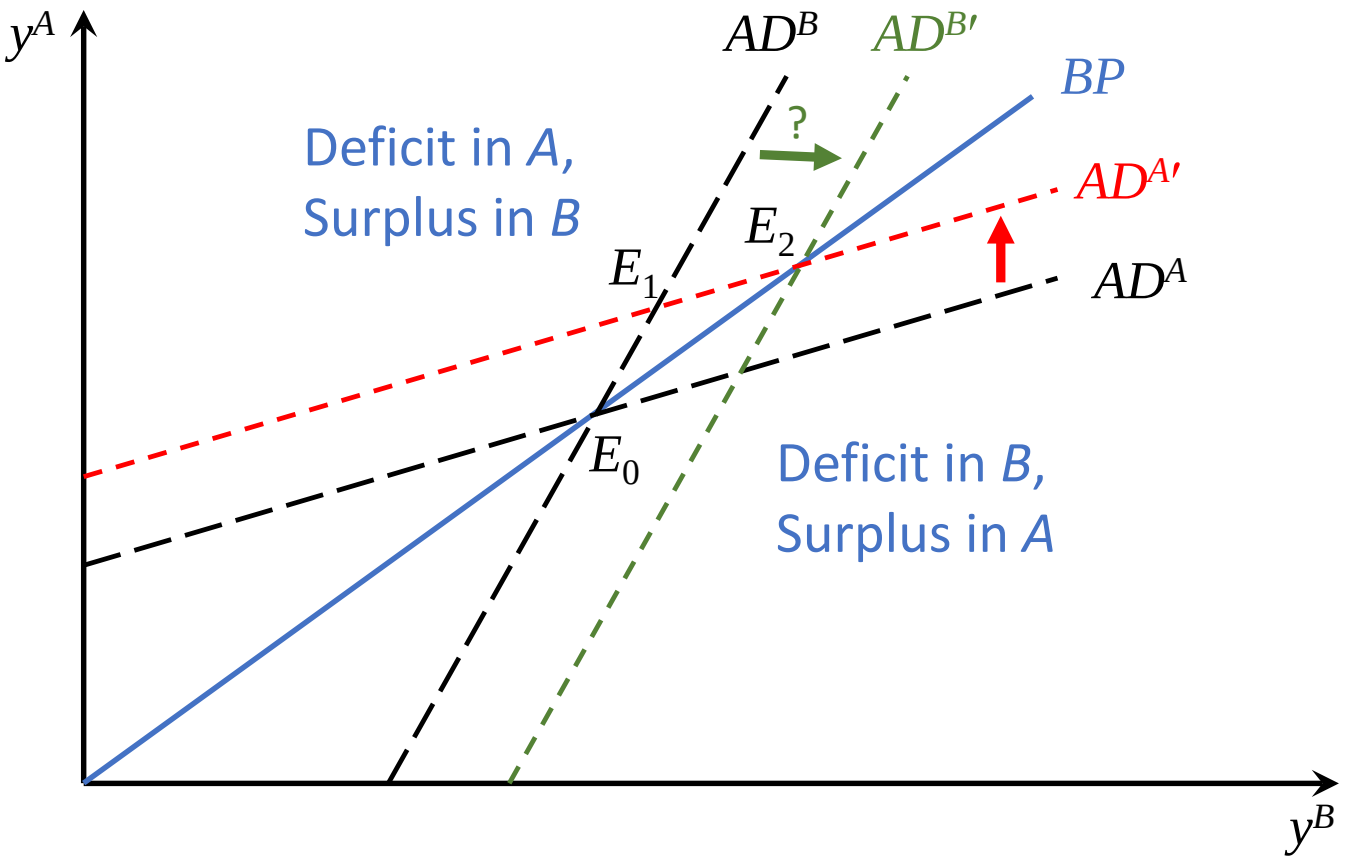
The BPCG model with two large countries

- Simplified version of McCombie's (1993) model, ignoring relative price effects
- Two countries, *A* and *B*
  - For example, US and EU, Northern and Southern Europe, etc.
- Each one's exports are the other one's imports
- BP-equilibrium growth rates (BP line on graph): $$y^A = \frac{\eta_M^B}{\eta_M^A} y^B$$
- Actual growth rates of output are weighted averages of domestic and export growth:

$$\left.\begin{aligned} y^A &= k_A^A g_A^A + k_X^A x^A = k_A^A g_A^A + k_X^A \eta_M^B y^B \\ y^B &= k_A^B g_A^B + k_X^B x^B = k_A^B g_A^B + k_X^B \eta_M^A y^A \end{aligned}\right\}$$

Each country's growth depends on the other's

Effects of a demand stimulus in country *A*



This case assumes no relative price (RER) effects and no supply or other exogenous constraints

Can one country succeed with a domestic demand stimulus?

- Suppose A raises domestic autonomous spending growth g_A^A
  - For example, through a fiscal stimulus or private investment boom
- The equilibrium shifts from E_0 to E_1, where *A* has a (growing) trade deficit and *B* has a surplus
  - This is unsustainable in the long run
- **The "global Keynesian solution":** If *B* also adopts expansionary policies, then the equilibrium is at E_2, both countries grow faster
  - This cooperative solution is sustainable because it's on the BP equilibrium line
- If B does not cooperate, A will eventually be forced to adopt contractionary policies (or could run up against a borrowing constraint), forcing it back to E_0
  - This could be called **"global austerity"**
- **The model depicts demand-driven growth at the global level**

Empirical tests of BPCG ("Thirwall's Law")

- Much of the popularity of the model stems from its apparently strong empirical support
  - It's relatively easy to estimate income elasticities and use data on export growth
- Many studies have found that estimated BP-equilibrium growth rates (y_B) are close to actual long-run average growth rates for most countries
  - Using a wide variety of econometric techniques
- Critics argue that these are weak tests, because they are really testing a near-tautology or near-identity
  - McCombie (1981), who later recanted; Ros (2013); Clavijo and Ros (2015); Razmi (2016); Blecker (2016); see McCombie (2011) for a defense

The near-identity (or near-tautology) critique

- Estimated income elasticities should approximate the ratios of the growth rates of exports or imports to the appropriate income growth rate, foreign or domestic:

$$\eta_X \approx x/y_f \qquad \text{and} \qquad \eta_M \approx m/y$$

- Substituting these into the solutions for the strong or weak form of Thirwall's Law $\Rightarrow$

$$\frac{y_B}{y} \approx \frac{x}{m}$$

- Thus, statistical tests of whether $y = y_B$ are merely testing whether exports and imports grow at about the same rate ($x = m$)
  - In the long run, the vast majority of countries have roughly equal growth rates of exports and imports, regardless of whether Thirlwall's model applies or not.
  - Even in the US, in spite of a 3.4% of GDP decline in the trade balance for goods & services from 1968 to 2015 – see data in Chapter 10 (also Blecker 2016).

Alternative econometric approaches

- The above critique implies that standard tests of whether $y = y_B$ have weak power to reject the null hypothesis that they are equal
  - But it does ***not*** necessarily invalidate Thirlwall's Law
  - Rather it implies that *more powerful tests are needed*
- The "Law" is really the proposition that *income growth rates (not relative prices or RERs) are what adjust to maintain BP equilibrium in the LR* (Pérez-Caldentey, 2015)
  - Therefore, instead of testing for equality of actual and BP-equilibrium growth rates, it is better to test for *which variable adjusts* to a BP *dis*equilibrium: income growth or relative prices?
    - See Alonso & Garcimartín (*JPKE*, 1998-99), who used a simultaneous equations framework
    - Also later work using cointegration methods (Moreno-Brid; Razmi; Lima & Carvalho; others)
    - These studies generally find that output growth rates adjust, not relative prices

Theoretical critiques of the BPCG model - I

- Foreign income vs. domestic capital accumulation as the main driver of growth
  - The BPCG model implies that foreign income growth y_f is a strong predictor of countries' long-run growth
  - Critics contend it is driven more by domestic capital accumulation – which in turn affects or constrains export growth
- Country size
  - The model assumes a hybrid "Keynesian small country"
    - Too small to affect foreign income but has infinitely elastic supply of exports (instead of demand, as in a pure small country)
  - Various alternative models of "large" or "small" economies have been proposed

Theoretical critiques of the BPCG model - II

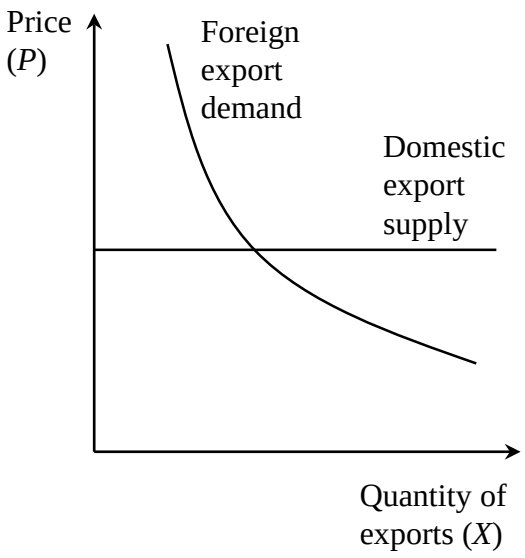
- Levels vs. rates of change in relative prices (RERs)
  - Similar to the debate about Kaldor's paradox in the ELCC models, BP-equilibrium growth could be affected by *levels* of relative prices or cost competitiveness, rather than rates of change
  - This parallels Boggio-Barbieri's critique of ELCC
- Endogeneity of income elasticities
  - Income elasticities are seen as fundamental, exogenous parameters in the original BPCG model
  - Krugman (1989) modeled income elasticities as functions of exogenously given natural rates of growth (reverses the causality)
  - In BPCG models incorporating MSTL, (weighted average) income elasticities reflect the composition of exports and imports which may be affected by *levels* of relative prices or RERs

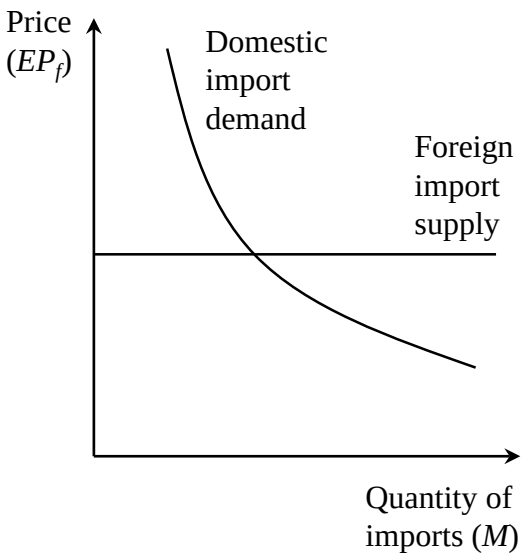
Razmi (*CJE*, 2016) – Small country BPCG model

- He assumes a "small open economy" (pure price-taker)
  - This again assumes an infinitely elastic supply of imports (similar to BPCG)
  - But it assumes instead perfectly elastic **demand** for exports at a given price (TOT)
  - Hence exports are supply-constrained
- A small country *is* BP-constrained
  - But the chief constraining factor is capacity (capital accumulation) in export industries, not foreign income
  - Foreign demand matters only via its effects on world prices (taken as given)
- Export capacity depends on investment, which depends on the profit rate and hence on the real exchange rate (RER) in an open economy
  - Therefore the **level** of the RER matters to LR growth
  - Consistent with recent empirical evidence

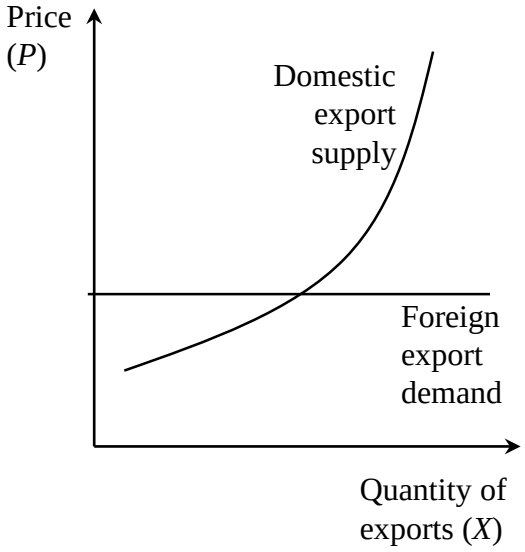
Alternative assumptions about market structure

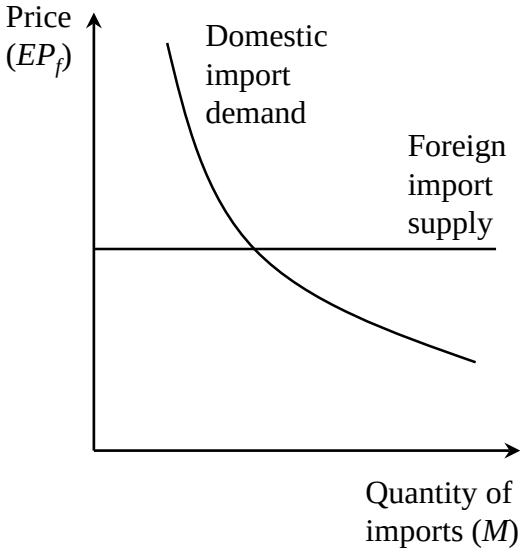
Small Keynesian open economy: infinitely elastic *supplies* of exports *and* imports; prices are fixed in seller's currency. Assumed in Marshall-Lerner condition, **Thirlwall BPCG model**





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.





Simplified version of Razmi's small-country model, in modified notation

- Export **supply** function $x = \gamma_X \hat{P} + \delta_X g$
- Import demand function $m = -\varepsilon_M (\hat{E} + \hat{P}_f - \hat{P}) + \eta_M y$
- BP equilibrium condition $\hat{P} + x = \hat{E} + \hat{P}_f + m$
- Capital accumulation function $g = g\left(\frac{EP_f}{P}\right)$
- General model solution: $y = \frac{\gamma_X \hat{P} + \delta_X g + \varepsilon_M (\hat{E} + \hat{P}_f - \hat{P})}{\eta_M}$
- Price assumptions (small country, price-taker): $\hat{P}_f = 0, \quad \hat{P} = \hat{E}$
- **Small-country (SC) solution:** $y_S = \frac{\gamma_X \hat{E} + \delta_X g(EP_f / P)}{\eta_M}$

Note: γ_X is price elasticity of export supply; δ_X is capital stock elasticity of export supply; and $g = I/K = \hat{K}$

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

Conclusions and policy implications from Razmi

- Small, open economies are not constrained by global demand *per se*
  - Except insofar as it affects world prices of exported commodities
- These countries do face BP constraints and need to promote exports
- But the key to their export success is capital accumulation (broadly defined) that expands export capacity
  - This could include infrastructure, “human capital,” etc.
- To attract firms to locate in any given country, it must have a competitive real exchange rate
  - In levels (not a continuous real depreciation!)
  - Price competition does matter, not via demand functions, but via its impact on industry location
- Thirlwall’s Law does not apply to small countries!

Caveats and critiques for Razmi's model

- The pure small country model is quite extreme, and may not be realistic
  - It requires that domestic exports and foreign goods are perfect substitutes
    - This could be realistic for primary commodities, but may be less realistic for manufactures
  - Even if prices are set globally, costs are set in domestic currency (especially labor costs), and these can affect the location of production within global supply chains
- Fallacy of composition (Blecker & Razmi, 2008, 2010)
  - Even if one small country by itself faces an infinitely elastic demand curve for its exports, a large *group* of such countries does not
- Export supplies are much more elastic in the long run than in the short run
  - Capital accumulation in export sectors can be an endogenous response to export opportunities
    - Defenders of Thirlwall's Law argue that the causality is reversed: $\hat{X} \rightarrow g = \hat{K}$

A BPCG model incorporating structural change

- Cimoli and Porcile's (2014) model of South-North trade and convergence
  - South (*s*) = developing/emerging economies, North (*n*) = developed/advanced economies
  - Reflecting the Latin American structuralist tradition along with Kaldorian and Schumpeterian theory
- The relative growth rate of the South is: $y = y_s / y_n$
- I will cover only a highly simplified version of the model due to time constraints
- The point is to show another mechanism through which the level of relative labor costs can affect income elasticities and growth rates

Relative productivity, wages, and trade

- Let W^j = nominal wage rate and $a_{0i}^j = L_i^j / Y_i^j$ = labor coefficient in sector (good) i in country j ($j = s, n$).
  - Let E be the nominal exchange rate of the South (pesos/dollar, rupees/pound, etc.); a <u>higher</u> E is a Southern <u>depreciation</u>
  - Wages are assumed equal across industries *within* each country (for simplicity)
  - Note labor productivity is the reciprocal, $1/a_{0i}^j$
- According to a Ricardian trade model with multiple goods, the South will produce and export all goods for which Southern unit labor costs are lower or equal to Northern: $W^s a_{0i}^s \leq E W^n a_{0i}^n$

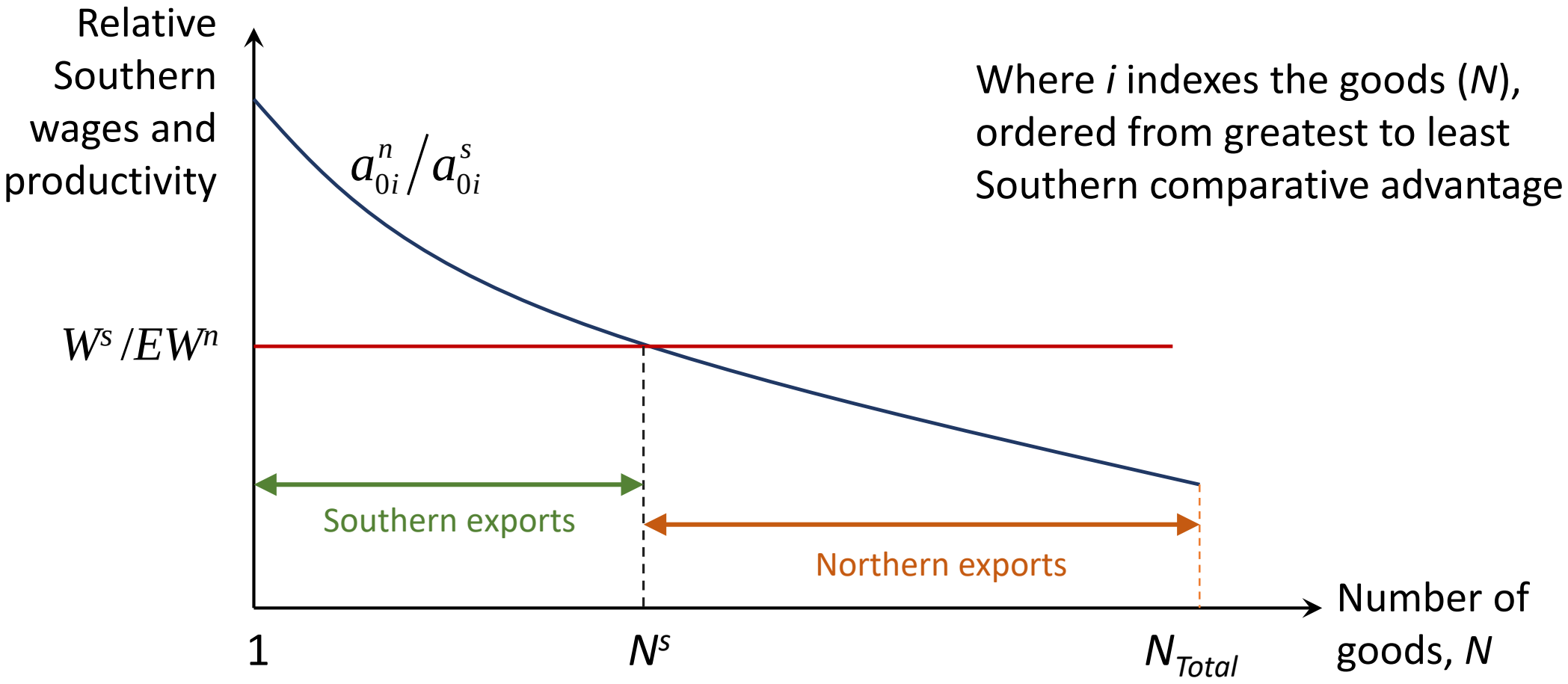
More about trade and Southern specialization

- Equivalently, the South produces/exports the goods for which its relative productivity exceeds its relative wage:

$$\frac{a_{0i}^{n}}{a_{0i}^{s}} \geq \frac{W^{s}}{EW^{n}}$$

- This shows the importance of the South's real exchange rate (RER) in terms of wages, EW^{n}/W^{s}: a higher RER (real depreciation) means that *the South gets to produce a wider range of goods*
- Let the goods produced by the South be $N = 1, 2, 3, \ldots, N^{s}$
  - These start with goods of the least technological intensity (more resource- or labor-intensive), and become progressively more technological intensive (also requiring more capital and skill/education) as N rises.

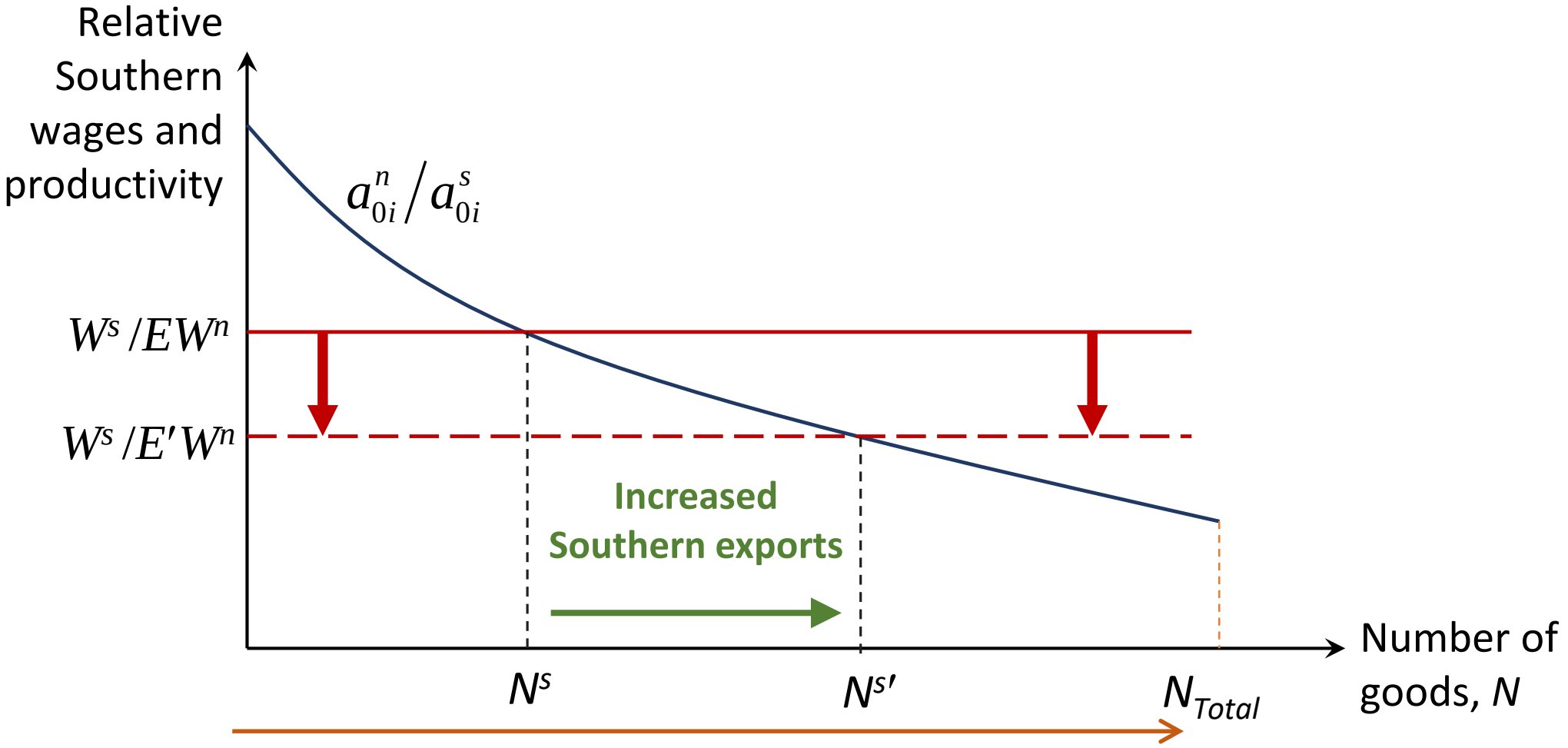
The Dornbusch-Fischer-Samuelson (1977) Ricardian trade model, applied to North-South trade by Cimoli-Porcile (2014)*



Where *i* indexes the goods (*N*), ordered from greatest to least Southern comparative advantage

*Based on an earlier adaptation by Dosi and Soete (1990).

A real depreciation of the Southern currency (lower relative wage) increases the range of goods produced by the South



Key assumption: The income elasticities of the goods η are increasing as we move toward the goods typically produced in the North

Incorporating Thirlwall's Law

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

$$y^s = \frac{\eta_X y^n}{\eta_M}$$

  - where η_X and η_M are the South's income elasticities of demand for exports and imports
    - The same as the North's income elasticities of demand for imports and exports
- This is equivalent to the following solution for the *relative* Southern growth rate:

$$y = \frac{y^s}{y^n} = \frac{\eta_X}{\eta_M} = \eta$$

Linking export diversification to relative growth

- As the number of southern exports $N^s = N^*$ increases, the South moves into goods of higher quality or greater technological intensity, for which income elasticities are higher
- Thus the relative income elasticity of southern exports rises and relative Southern growth increases accordingly:

$$y = \eta(N^s), \quad \eta' > 0.$$

Actually this isn't obvious, it's based on an implicit assumption*

- The more goods the South produces, the faster it grows relative to the North
  - You can think of N^s as a simple indicator of "export diversification" for the South
  - Initially, the South needs a competitive real exchange rate (higher EW^n/W^s) to widen its range of exports, grow relatively more rapidly, and close the technological gap (converge)
  - Eventually, once Lewis-type "surplus labor" is eliminated, the Southern relative wage increases and there is a real appreciation (W^s/EW^n rises, or EW^n/W^s falls)

*The numerator and denominator of $\eta = \eta_X/\eta_M$ both rise, so Cimoli & Porcile are assuming that the numerator rises proportionally more than the denominator.

Reconciling ELCC with BPCG

- Even if BPCG governs in the very long run, can ELCC explain growth in shorter time periods?
  - Yes, according to Ribeiro, Lima and McCombie (2017)
- Key assumptions:
  - Verdoorn's Law holds (aggregate level)
  - Imported intermediate inputs are a constant proportion of output
  - Markups are flexible in response to changes in RER à la Blecker (1989, 2002)
  - Income distribution (labor share) and workers' bargaining strength are incorporated in the model
- Wage-setting behavior varies by time horizon:
  - Nominal wage growth is exogenously given in the short run
    - So faster productivity growth improves competitiveness
  - There is partial pass-through of productivity growth into the real wage in the medium run
  - In the long run, the real wage grows at the same rate as labor productivity

Main results from Riberio et al. (2017)

- Relative price changes matter in the short and medium runs
  - In the long run, the relative price is constant (by assumption)
- **Short run:** BP-equilibrium growth is affected by changes in relative unit labor costs
  - Rates of change in the nominal wage, labor productivity, and exchange rate all matter
- **Medium run:** BP-equilibrium growth is affected by Verdoorn's Law effects
  - Productivity growth affects cost competitiveness because the wage only partially adjusts
- **Long run:** Thirlwall's Law holds ($y_B = \eta_X y_f / \eta_M$)
  - The real wage grows at the same rate as productivity $\Rightarrow$ the labor share and RER converge to constant levels; relative price effects (in rates of change) drop out

➢ Currency depreciation has complex and ambiguous effects that vary by time period, because of the endogeneity of wages, prices, productivity, and the labor share

Tentative evaluation of Ribeiro et al. (2017)

- It's a major theoretical contribution
  - But the long-run results appear to be imposed by assumption
  - If long-run adjustments are weak, a country could get stuck in a "medium-run" state for a long time
- They take a "traditional" ELCC/BPCG approach by focusing on rates of change in relative prices (RER), not on levels
  - Rates of change matter in the short and medium run, but not in the long run
  - In other recent work, levels of relative prices or RERs do matter, via income elasticities
- They ignore level effects
  - It is possible that the long-run equilibrium growth rate can converge to the Thirlwall's Law (BPCG) rate at ***different levels*** of output, productivity, and per capita income
  - In this sense, factors that appear to matter "only" in the short or medium run could have persistent long-term effects (similar to Bhering et al. 2019 on capital flows)

Summary: the role of relative prices reconsidered

- The impact of relative prices (or the real exchange rate = RER) on growth is increasingly being recognized in both ELCC and BPCG models
  - Contrary to Kaldor's paradox and the original Thirlwall's Law, in which relative prices or the RER (measured in *rates of change*) have no long-run impact
- Many studies find significant effects in levels rather than growth rates
  - Boggio-Barbieri: relative ULC levels affect growth of export shares
  - Razmi: RER overvaluation reduces growth, controlling for other factors
- This is incorporated in theoretical models:
  - Labor cost competition in Boggio-Barbieri's revival of Beckerman (1962)
  - Via capital accumulation in Razmi's model of a small exporting country
  - Via income elasticities in Cimoli-Porcile's model of North-South trade and Oreiro's explanation of how y_B is reconciled with y_N (many other examples)

But the debate continues:

- Ribeiro et al. (2019): the effect of RER undervaluation on growth is insignificant after controlling for technological capabilities and income distribution
  - The effect can be negative if the impact on the wage share exceeds the impact on technological capabilities (assuming growth is wage-led)
- Ibarra (2018) finds that RER effects on capital accumulation are asymmetrical *and* vary over time in Mexican data
  - Overvaluations have big negative effects; undervaluations have smaller positive effects
  - Depreciations are contractionary in the short run, expansionary in the long run
- On the theoretical side: does BPCG put too much emphasis on income elasticities of export and import demand?
  - “The income elasticities are becoming a container of all that is important for export and import growth (and, we might add, for growth in general)” - Jaime Ros, email of October 1, 2018

More critical thoughts and research questions

- How does domestic demand adjust?
  - Much work has focused on relative price adjustment (Oreiro 2016; Gabriel et al 2016; Ribeiro et al. 2017; many others)
  - But what is going on with domestic savings and expenditures (consumption, investment, fiscal policy)?
    - BPCG can be considered a supermultiplier model in which exports are the exogenous driver of demand (so does investment automatically adjust?)
- Thirlwall always said that some countries had to be unconstrained in order for the rest to be BP-constrained
  - Which ones are unconstrained? Japan in 1960s-70s. USA and China today? Germany in the EU? What determines *their* growth?
- There is room for much more research!