INDUSTRIAL PRODUCTION AND THE CURRENT ACCOUNT:

Theory and Panel Data Evidence from the OECD.

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Abstract

This paper looks at the determinants of the current account (as a ratio over GDP) from a long-run perspective. It is motivated partly by the observation (from descriptive statistics of the current account ratio in 22 OECD economies during the post-war period) that there is a probably more long-run variation (in both a cross-section and time-series senses) in the data than the consumption-smoothing variant of the intertemporal approach to the CA can hope to explain. A theoretical model of the CA is developed, based on the variant of the intertemporal approach that stresses the long-term component of the CA; it is argued that the rate of real appreciation and the size of non-tradables sector should be prime candidates in influencing (negatively) the CA ratio. Empirical evidence suggests a (positive) link with the size of the industrial sector (measured by the industrial production-to-GDP ratio).

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1. Introduction

This paper investigates the link between industrial production and the Current Account, both as ratios over GDP, using panel data from 18 OECD countries. The paper is motivated by some stylised observations (described in Section 2) that seem not to have been emphasised by existing literature. Those observations point to considerable (and diverse) medium- and long-term patterns in the CA ratio, as well as short-term variability. We argue that the link is robust empirically and can be theoretically rationalised, but seems to have hitherto been ignored by existing literature.

Most existing empirical work on the CA is based on the "intertemporal approach" to the CA (Obstfeld and Rogoff, 1995, 1996, Ch. 2; Razin, 1995; Sen, 1994). The central insight in this approach is that agents use their lifetime resources so as to smooth their expenditures in the face of transitory shocks. Thus, consumers smooth consumption according to their preferences and the financial incentives they face (interest rates), while firms smooth their investment and hiring/firing decisions so as to smooth the associated costs over time. From National Income Accounting, CA=Y+rB-C-I-G (in obvious notation), so the discrepancy between Y (which is battered by shocks) and C+I (which are smoother) turns up as a CA position (given interest payments from net foreign asset holdings rB). Typically, the formal tests of this procedure fail but informal inspection of the predicted CA series shows it to have considerable explanatory power.[1]

Such longer-run CA patterns as exist in the data, however, point to the importance not only of short-run smoothing incentives by consumers and firms, but also to longer-term patterns of behaviour (such as the "consumption-tilting motive" allowing for considerable deviation of consumption from current resources, as would be the case for instances for economies converging to their steady states of living standards from below). The intertemporal approach to the CA allows in principle for such motives, but most tests so far (Otto, 1992; Sheffrin and Woo, 1990; Ghosh, 1995) have focused on a variant of it based on the "Permanent Income" theory of consumption smoothing which shows consumption to be a martingale and therefore have no longer-term patterns.[2]

In the theoretical model below (Section 3), we take a different approach, emphasising the long-run, consumption-tilting-derived tendency of the current account. We also link the baseline model of the CA to the steady-state rate of real appreciation, showing that such appreciation reduces the consumption-based real interest rate (given an exogenously assumed real interest rate on tradeables). We then argue that, because secular appreciation reduces the real consumption interest rate, it affects the current account. We finally point out the relevance of the industrial and tradeables sector for real appreciation. To preamble, given the price of tradeables, a greater non-tradeables sector increases the rate of real appreciation and worsens the current account.

[1] Other, portfolio-based approaches to the CA include Bussiere, Chortareas and Driver (2002), Dornbusch and Fischer (1980), Kraay and Ventura (2000) and Ventura (2002); the latter two papers also make a big distinction between short-run and long-run determinants of current accounts. However, portfolio considerations are beyond the scope of this paper. Blanchard and Giavazzi (2002) link the discussion of current accounts with international capital mobility and the "Feldstein-Horioka puzzle". The links with such issues are also discussed in Alyousha and Tsoukis (2004) and Tsoukis and Alyousha (2001).

[2] Reliance on the "Permanent Income" model of consumption is just one among the many simplifying assumptions of this line of empirical work. Others include the absence of consumer's durables, investment and hiring/firing costs, etc.

Section 4 describes the empirical work linking the CA and IP ratios. Finally, section 5 concludes.

2. The CA/GDP ratio in OECD economies: Stylised facts.

We begin with a full description of CA facts. Table 1 below lists sample means and standard deviations for CAY≡CA/GDP and DCAY≡Δ(CAY) for 22 (of 24) OECD economies; the sample periods vary: They cover virtually all of the post-war period (from about 1950 to 2002), with annual data.

Table 1

Sample means and standard deviations of CAY and DCAY

Country	CAY Mean	CAY St Dev	DCAY Mean	DCAY St Dev
Australia	-0.033	0.030	-0.0020	0.0364
Austria	-0.001	0.021	0.0009	0.0156
Belgium	0.019	0.026	0.0012	0.0116
Canada	-0.015	0.019	-0.0002	0.0130
Denmark	0.000	0.025	0.0017	0.0160
Finland	0.000	0.035	0.0014	0.0212
France	0.007	0.016	0.0006	0.0111
Germany	0.021	0.015	0.0011	0.0121
Greece	-0.068	0.021	0.0016	0.0198
Iceland	-0.031	0.035	0.0008	0.0388
Ireland	-0.057	0.051	0.0007	0.0358
Italy	-0.007	0.020	0.0004	0.0162
Japan	0.012	0.015	-0.0002	0.0118
Korea	-0.044	0.058	0.0021	0.0347
Lux'bourg	0.159	0.118	0.0013	0.0710
Neth'lands	-0.014	0.313	0.0011	0.4511
NZealand	-0.030	0.034	-0.0008	0.0366
Norway	0.007	0.093	0.0039	0.0546
Spain	-0.038	0.050	-0.0002	0.0291
Sweden	0.006	0.024	0.0009	0.0180
UK	-0.004	0.016	-0.0001	0.0139
US	0.000	0.015	-0.0013	0.0059

Column 2 (CAY st. dev.) perhaps best describes what the literature on the current account based on consumption smoothing mostly are concerned about; that is, the predominantly

short-run time-series variation of the current account ratio.[3] However, as argued below, as neither cross-section analysis takes place nor are the integration properties of the series formally examined, the long-run patterns and determinants of the current account ratio are not touched upon.

A glimpse into such longer-run patterns from a cross-sectional perspective is given by column 2 (CAY mean). A large amount of variation is observed: 12 (of 22) countries have a negative ratio (indeed, the simple mean of the column is –0.051 < 0). Data points range from Germany's 0.021 and Belgium's 0.019, to Greece's –0.068 and Ireland's –0.057.[4] The consumption-smoothing-based theory of the current account is practically silent on what determines the country average (and long-run) current account ratio.

Furthermore, column 3 (mean DCAY) reveals a lot of diversity on the long-run trends of current account ratios in a time series sense. As the CAY *level* is associated with output growth in existing empirical work (which is typically I(0) and does not exhibit much variation), much of the variation in CAY is left unexplained. Intuitively, insofar as the smoothing theory attributes current account improvements on *transitory* movements of saving (due to output growth being *temporarily* above its long-run level), the smoothing approach has very little to say on why mature economies such as Australia, Canada, Japan, the UK and the US (7/22 in all) have had a tendency to see worse current account ratios over the post-war period.

Concluding, from a look at the OECD panel data, there seem to be three relevant types of observation and sets of issues. Firstly, there exist considerable cross-sectional differences, both in sign and the magnitude of the average level of the current account ratio; such diversity could reveal a lot about the long-run determinants of current accounts. Secondly, another type of issue is the within-country stationarity or not of this ratio as evidence by the mean of DCAY; this may be again be interpreted as revealing medium (i.e., convergence-related) or even long-run trends. Thirdly, the volatility of the CA/DGP ratio is an aspect of the data that most existing empirical models have focused on; it is best characterised as a short-run aspect of the data and as such could yield limited information on the determinants of the CA, beyond helping tracking its short-run dynamics.[5]

Arguably, the consumption-smoothing-based variant of the intertemporal approach to the current account leaves a lot to be desired regarding the first two sets of issues. In Section 2, we build a model based on the variant of the intertemporal approach that stresses the long-term component of the CA, aiming to shed light on its long-term determinants.

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[3] As mentioned, this literature links, for each country, the current account ratio to GDP (or "net domestic resource") growth, usually in the context of Vector Autoregressions. In many cases, the emphasis is on tracking the dynamics of the current account ratio.

[4] Luxembourg's –0.159 should probably be considered an outlier.

[5] Obviously, the first two points raise important questions about sustainability of the CA, but those are beyond the scope of this – (see Tsoukis and Alyousha, 2001, and Alyousha and Tsoukis, 2004 for relevant discussions).

3. A model of the current account, real appreciation and size of tradables.

3.1 The current account in a representative-agent economy

In this subsection, we review the basic model of the CA based on the infinitely lived representative consumer paradigm (Obstfeld and Rogoff, 1996, Ch. 2). In the analysis, we focus entirely to the "consumption-tilting" motives of the consumer as opposed to the "consumption-smoothing-ones", and therefore we focus entirely on the steady-state growth path and abstract from (transitory) deviations from it. This is because, as has been mentioned, we want to emphasise the long-run aspects of the current account as opposed to its transitory movements (see e.g. Obstfeld and Rogoff, 1996, Section 2.2, for an exhaustive treatment).

We begin by the economy-wide resource constraint:

$$B_{t+1} = (1 + r_t^c) B_t + Y_t - C_t - I_t - G_t \tag{1}$$

The notation and assumptions are as follows:

B_t: Real foreign asset holdings at the beginning of period t;
r^c: Real interest rate on the entire consumption basket, defined as:

$$(1 + r_t^c) \equiv (1 + r) P_{t-1} / P_t \tag{2}$$

r: Real interest rate on tradeables (assumed exogenous – a small-open-economy assumption – and constant; the latter assumption can be relaxed at the cost of more cluttered notation);
Y: GDP in real terms;
C: Consumption basket consisting of tradeables and non-tradeables, in real terms;
I: Real investment;
G: Real government spending - for simplicity assumed to be a constant fraction of GDP, $G=\gamma Y$, $\gamma>0$.

The consumer maximises life-time utility that takes the iso-elastic form,

$$U_t = \sum_{s=t}^{\infty} (1 + b)^{t-s} \frac{C_s^{1-1/s}}{1 - 1/s} \quad , \tag{3}$$

where $\sigma>0$ is the intertemporal elasticity of substitution in consumption and $\beta>0$ is the subjective discount rate.[6]

Maximisation of (2) subject to (1) yields the familiar consumption Euler equation:

$$C_{s+1} = C_s (1 + r_s^c)^s \, (1 + b)^{-w} \tag{4}$$

Throughout this paper, we are going to concentrate on the steady-state, balanced-growth path, in which the general price index inflation is a constant Π:

[6] There is no leisure as an argument in period-subutility, which is also additive over time.

$$\Pi \equiv P_{+1} / P - 1 \tag{5}$$

This inflation rate will be linked to the tradeables-non-tradeables distinction and their productivity growth rates in Section 3.3. Thus, the consumption real interest rate is a constant, approximated by:

$$r^c \approx r - \Pi \tag{6}$$

In this light, the Euler equation (4) can be re-written as:

$$1 + g^c = (1 + r^c)^s (1 + b)^{-w} \tag{4'}$$

In (4'), g^c is the (constant) rate of consumption growth in the steady state. In the balanced-growth path, all output and its components grow at the same rate g^y. Thus, using (4) and (4') into the budget constraint (1), we obtain optimal consumption in the steady state:[7]

$$C_t = \frac{r^c - g^c}{1 + r^c} \left[(1 + r^c) B_t + \frac{1 + r^c}{r^c - g^y} Y_t \left(1 - g - g^K (K/Y) \right) \right] \tag{7}$$

The second term inside the square brackets is nothing but the present value (discounted by $1+r^c$) of the net resource (Y-I-G), which is growing at rate g^y. It is helpful, for later purposes, to indicate the marginal propensity to consume out of lifetime wealth as,

$$MPC \equiv \frac{r^c - g^c}{1 + r^c} \ , \tag{8}$$

and to note its response to r^c, noting (4'):

$$\frac{\partial MPC}{\partial r^c} = (s - 1)(1 + r^c)^{s-2} (1 + b)^{-s} \tag{8'}$$

The magnitude on the RHS reflects the balance between the income and substitution effects.

Thus, the consumption/GDP ratio becomes:

$$C/Y = (r^c - g^c) B/Y + \frac{r^c - g^c}{r^c - g^y} \left(1 - g - g^K (K/Y) \right) \tag{7'}$$

Intuitively, consumption is supported by interest payments from net foreign assets (allowing for the need to finance future growth) and a fraction of net domestic resources, Y-I-G.[8]

To relate this analysis to the current account, consider its aspect as net accumulation of foreign assets:

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[7] It is useful to gather here all the additional notation we have used (all growth rates are in real terms): g^c: Consumption growth rate (given by 4'); g^y: Growth rate of output and its components; g^k: Growth rate of real capital; γ: Share of public spending in GDP; K/Y: Capital/output ratio in the steady state.

[8] In the benchmark case of a closed economy (g^c=g^y) , the latter component consists of the entire domestic resource.

$$CA_t \equiv B_{t+1} - B_t \tag{9}$$

Combining (8) with (1) and substituting for consumption from the optimal rule (7') yields the current account ratio as:

$$CA/Y = g^c B/Y + \frac{g^c - g^y}{r^c - g^y}\left(1 - g - g^K (K/Y)\right) \tag{10}$$

Viewed as net (dis)saving by the aggregate economy (as ratio over GDP), (10) reveals that the current account is made up of two components (represented by the two terms on the RHS): First, part of the interest payments on its net foreign asset holdings – this term will be positive if net assets are positive; second, a fraction of current resources depending on the difference between consumption and output growth. A patient economy will start from a low initial level of consumption and save early on; subsequently, consumption growth will be higher than that of output ($g^c - g^y > 0$) in order to use up all intertemporal resources. Thus, this economy will actually save part of its current resources, and the second term on the RHS of (10) will be positive.

For our purposes, we need to ascertain the effect of real appreciation on CA/Y. In view of (4') and (6) (and keeping foreign assets and output growth exogenous at the moment), we have:

$$\frac{\partial(CA/Y)}{\partial \Pi} = -s\,(1+g^c)^s\,(1+r^c)^{-1} B/Y +$$

$$+\frac{-s\,(1+g^c)^s\,(1+r^c)^{-1}(r^c - g^y) + g^c - g^y}{(r^c - g^y)^2}\left(1 - g - g^K (K/Y)\right) \tag{11}$$

Accordingly, taking the case of an economy which is converging to its living standards from below, so that $B/Y<0$ and $g^c - g^y < 0$ for concreteness, we see the following effects. Real appreciation will reduce the consumption real interest rate, consumption growth and interest payments abroad; in other words, this effect helps the CA to improve. The sign of this effect is reversed in the case of a net creditor economy. Second, the term proportional to σ represents substitution away from current consumption since the relative price of future consumption has fallen. [The income effect has been washed away with part of the wealth effect.] Thirdly, future resources will be discounted less heavily and increase in present value (a wealth effect), so that current consumption will rise. In the case of a net debtor economy, this effect will unambiguously work to worsen the CA/Y ratio. In sum, all these effects work to reduce the CA ratio in the case of an (initially) dissaving economy.

So far, the foreign-assets-to GDP ratio has been treated as exogenous. Obstfeld and Rogoff (1996, Appendix 2A) show that the steady-state B/Y equals:

$$B/Y = -\frac{\left(1 - g - g^K (K/Y)\right)}{r^c - g^y} \tag{12}$$

In the steady state, a small open economy can only hold debt.[9] Inserting into (10) and differentiating again with respect to Π yields:

$$\frac{\partial(CA/Y)}{\partial\Pi} = \frac{-g^{y}}{(r^{c}-g^{y})^{2}}\left(1-g-g^{K}(K/Y)\right) < 0 \qquad (11')$$

Allowing for an endogenous external debt-to-GDP ratio renders the effect of real appreciation on the CA ratio unambiguously negative.

3.2 Overlapping generations of infinitely lived consumers and the current account.

The preceding model of the current account based on the infinitely lived representative consumer faces the difficulty of admitting only net external debt in the steady state, as mentioned; this cannot naturally be true of all economies. The overlapping generations setup has alternatively been used to bypass this difficulty and derive more realistic conclusions more generally. We follow Weil (1989) who assumes the existence of overlapping generations of infinitely lived consumers. The successive cohorts are of size 1, n, n(1+n), $n(1+n)^2$,…, $n(1+n)^{t-1}$, for cohort t. Thus, total population grows at rate n>0 and is of size,

$$N_t = (1+n)^t \quad , \qquad t \geq 0. \qquad (13)$$

Finally, to facilitate aggregation, this model makes the assumption of log utility (σ=1), in which case, from the Euler equation (4'), r^c-g^c=β, to a very close approximation.

Since its cohort behaves exactly like he representative agent of the previous subsection, aggregation of consumption is straigthforward and yields the same consumption and current account ratio as above, except that now output growth rate is *per capita*, since it is per capita net resources that determine cohort consumption:[10]

$$C/Y = bB/Y + \frac{b}{r^{c}-g^{y}+n}\left(1-g-g^{K}(K/Y)\right) \qquad (7'')$$

In view of (7'') and definition the definition of the current account as foreign asset accumulation (9), the aggregate resource constraint readily delivers an expression for the current account as:

$$\frac{CA_t}{Y_t} = (r^{c}-b)\frac{B_t}{Y_t} + \left(1-\frac{b}{r^{c}-g^{y}+n}\right)\left(1-g-g^{K}(K/Y)\right) \qquad (14)$$

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[9] The case of positive net foreign assets is shown to be unstable; see the discussion in Obstfeld and Rogoff (1996, Appendix 2A).

[10] As mentioned, Weil (1989) assumes the existence of *infinitely-lived* overlapping cohorts, ech of fixed size; he shows that it is the arrival of new cohorts, rather than death that is critical for Ricardian equivalence. Weil (1989) builds on Blanchard (1985) who considers the same structure with a constant probability of death within a period, ϕ (and zero population growth). He shows that this augments the effective discount rate individuals face from r to r+ϕ; this will increase the proportion of lifetime resources an individual is prepared to consume currently to β+ϕ (which is intuitive, if the horizon is shortened). This increase will affect (7''), while the rest of our setup remains the same.

It should be pointed out that the consumption function (7'') embedded in (14) is evaluated at the balanced-growth path, so that all growth rates and interest rates are constant. We note here that, given a foreign asset-to-GDP ratio B/Y, the current account ratio is positively affected by the consumption real interest rate and therefore negatively by the rate of real appreciation.

In order to endogenise the asset ratio, definition (9) may be applied again to (14), so that,

$$CA_t / Y_t = b_{t+1}(1+g^y) - b_t \,,$$

with $b_t \equiv B_t/Y_t$ being the foreign asset-to-GDP ratio. This yields the following steady-state ratio:

$$b = \frac{r^c - g^y + n - b}{r^c - g^y + n} \frac{\left(1 - g - g^K (K/Y)\right)}{g^y - r^c + b} \tag{15}$$

Inserting (15) into (14), we obtain the reduced form, steady-state current account ratio:

$$CA/Y = \left(\frac{g^y}{g^y - r^c + b} \right) \left(\frac{r^c - g^y + n - b}{r^c - g^y + n} \right) \left(1 - g - g^K (K/Y)\right) \tag{16}$$

Noting that $g^c = r^c - \beta$ is the per capita consumption growth in our context, we can reasonably make the standard assumptions that aggregate output growth is always higher than per capita consumption one ($g^y - r^c + \beta > 0$), and that the discount rate is higher than per capita output growth ($r^c - g^y + n > 0$, otherwise discounted sums would not converge). Thus, we conclude that:

$$\text{sgn}\{CA/Y\} = \text{sgn}\{r^c - b - g^y + n\} \tag{17}$$

The sign of the steady-state current account ratio depends on the balance between per capita growth rates of consumption and output; the same is also true of the asset ratio (15). A patient economy, with a low early consumption level and higher subsequent growth rate (relative to that of output), saves early on and therefore builds a positive foreign asset position and current account.

Finally, we can examine the response of the current account position to real appreciation. Note that, given output growth, the consumption real interest rate affects unambiguously positively the current account ratio, so that, in view of (6), we have:

$$\frac{\partial (CA/Y)}{\partial \Pi} = -\frac{g^y}{(g^y - r^c + b)^2} \frac{b}{(r^c - g^y + n)^2} \left(1 - g - g^K (K/Y)\right) < 0 \tag{18}$$

An appreciating economy ($\Pi > 0$) will, ceteris paribus, have a lower effective discount rate, consume more early on and build a worse net foreign asset position.

3.3 Technical progress, non-tradables and real appreciation

Having established that real appreciation adversely affects the current account ratio (very likely in the representative agent economy and unambiguously in the overlapping-generations context), we now turn to developing a simple model of real appreciation. The model is again in the spirit of Obstfeld-Rogoff (1996, Ch. 4). It assumes a small open economy, producing a tradable and a non-tradable good, and facing an exogenous tradables-based real interest rate r. Capital is internationally mobile (i.e., both within and between countries, so that rates of return for capital are equalised in all sectors to r), whilst labour is internationally immobile but mobile between sectors (so that there is an economy-wide real wage in terms of tradables equal to w).

Intuitively, the model proceeds as follows. The exogenous rate of return in terms of tradables r determines the capital-labour ratio in the tradables sector, and hence the real wage in that sector. [The link between r and w is termed the factor-price relationship.] Given r and w, equalisation of the marginal products of capital, and labour, respectively, to them determine the capital-labour ratio and the relative rice of tradables.

The model from now is static, hence time-subscripts will be dropped. Let production in the two sectors (tradables and non-tradables, T and N, respectively) be described by the functions:

$$Y_T = A_T K_T^a L_T^{1-a} \tag{19T}$$

$$Y_N = A_N K_N^a L_N^{1-a} \tag{19N}$$

A is the (exogenous) level of technology, while K and L are labour. Constant returns to scale technology applies, and steady-state growth is supported by growth in A; A_T and A_N grow at different rates. Complete symmetry has been assumed across the two production functions (19T, N), with the elasticities in production of the two factors across the sectors; this assumption can be relaxed with a minor modification in the results (to be commented upon below).

Perfect competition in factor markets (a maintained assumption) implies that the marginal product of capital in both sectors equals the respective rates of return; while the rate of return is r in the T sector (exogenously given by world markets due to perfect capital mobility), it is $r_N \neq r$ in the N sector. Riskless arbitrage however ensures that $r_N = r + \pi$, where π is the rate of change of the price of non-tradables in terms of tradables, p; in other words, this is a real type of uncovered interest parity between the sectors. Hence we have:

$$aA_T k_T^{1-a} = r \tag{20T}$$

$$aA_N k_N^{1-a} = r + p \tag{20N}$$

$k_i \equiv K_i/L_i$ is the capital-labour ratio in the two sectors (i=T,N). Likewise, marginal products of capital are equalised to the real wages, each denominated in units of its own goods (T or N):

$$(1-a)A_T k_T^{-a} = w_T \tag{21T}$$

$$(1-a)A_N k_N^{-a} = w_N \tag{21N}$$

Finally, labour mobility (between the sectors) equalises the real wage available in the two sectors, when both are translated into units of tradables using the relative price of non-tradables to tradables (p):

$$w_T = pw_N \tag{22}$$

Solving for k from (20T,N), substituting into 21(T,N) and finally into (22) and log-differentiating, we can finally solve for the rate of change for the non-tradables (π≡dlogp) as follows:

$$p \;= d\log(\, w_T \,/\, w_N \,) = (1-a\,)^{-1}\,(g_{A_T} - g_{A_N}) \qquad (23)$$

The rate of change of the relative price equals the relative growth rates in the two sectors: An economy with faster growth in tradables will also experience a secular increase in the relative price of non-tradables.[11] On the other hand, if the factor intensity in the two sectors differs, then retracing the steps above, it is easy to derive a variant of (23):

$$p \;= (1-a_N\,)^{-1}\Big((1-a_N\,)(1-a_T\,)^{-1}\,g_{A_T} - g_{A_N}\Big) \qquad (23')$$

Ceteris paribus, a higher labour intensity in the non-tradables sector will tend to strengthen the tendency for the relative price of non-tradables to rise. The empirical relevant case is indeed that π>0 in the long term, and (23’) provides a rationale for it, considering that much of the non-tradeables sector consists of services which tend to benefit less by technical progress.[12]

It is straightforward now to link the change in the relative price of non-tradables to overall real appreciation for the small open economy. Assuming a log-linear overall price level in terms of tradables, P, $P = p^{1-g}$, where γ and 1-γ are the shares of T and N goods,[13] respectively, then we have:

$$\Pi = (1-g\,)p \qquad (24)$$

An economy whose non-tradables relative price rises over time will also experience real appreciation over time. Linking this result to the earlier ones, an economy with faster growth in the productivity of tradables (cf. 23’) will experience real appreciation over time. This “Balassa (1964) - Samuelson (1964) effect” parallels the Baumol-Bowen effect. (24) reveals that this real appreciation effect will be stronger, ceteris paribus, the larger is the non-tradables sector of the economy.

3.4 *Implications for the current account*

The foregoing discussion then suggests a number of factors that give rise to real appreciation and should therefore yield a lower current account ratio, as suggested by the discussions in sub-sections 3.1 and 3.2. Higher productivity growth in tradables rather than non-tradables is a prime factor. Moreover, the size of the tradables sector (whether in its labour share aspect, see 23’, or output aspect, see 24) enhances real appreciation; hence, ceteris paribus, countries

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[11] That (the growth in) the terms of trade is supply-determined without reference to demand at all is a consequence of the fact that, due to international capital mobility and unrestricted borrowing/lending of capital in international markets, the domestic economy has a perfectly elastic supply curve in both sectors, without being bound by domestic resource constraints.

[12] This observation has been termed the Baumol-Bowen (1966) effect.

[13] Such a construction of a price level corresponds, of course to a utility function of a Cobb-Douglas form with shares γ and 1-γ for the two bundles of goods. Due to the “law of one price”, tradables prices are equalised world-wide and are for convenience normalised to 1. In other words, as implied in text, tradables are the numeraire in this context (P is denominated in such units).

with higher tradables sectors should have better current account ratios. Empirically, we could proxy the size of the tradables sector with that of the industrial production (as a share over GDP), since this is perhaps the sector benefiting most from productivity growth.

4. Empirical evidence on the relationship between the current account and industrial production (ratios)

We now turn to reviewing the empirical evidence on the relationship between CAY (the current account-to-GDP ratio) and IPY (industrial production-to-GDP ratio) from our panel of annual post-war data from the OECD.[14] Figure 1 gives the overall picture with a pooled regression of all the data (1968-2000). It suggests a generally positive and significant relationship between CAY and IPY (ratios). In fact, this relationship holds for 11 countries (out of 20) individually in a time-series sense.

[14] The current account is constructed as CAY=(GNP-C-I-G)/GDP, in obvious notation. Industrial production commonly refers to the output of the following sectors: Mining and quarrying; manufacturing; gas and electricity. The IP series is given as an index in real terms, 1995=100; The IPY ratio is constructed by taking the IPY ratio for 1995 by actual data on IP and GDP, and updating it using the GDP series and the IP index. Data limitations (mainly non-availability of GNP series) reduced the number of countries to 21. XX were excluded as an outlier, finally limiting the number of countries to 20.

FIGURE 1

POOLED READY ESTIMATION, 1968-2000

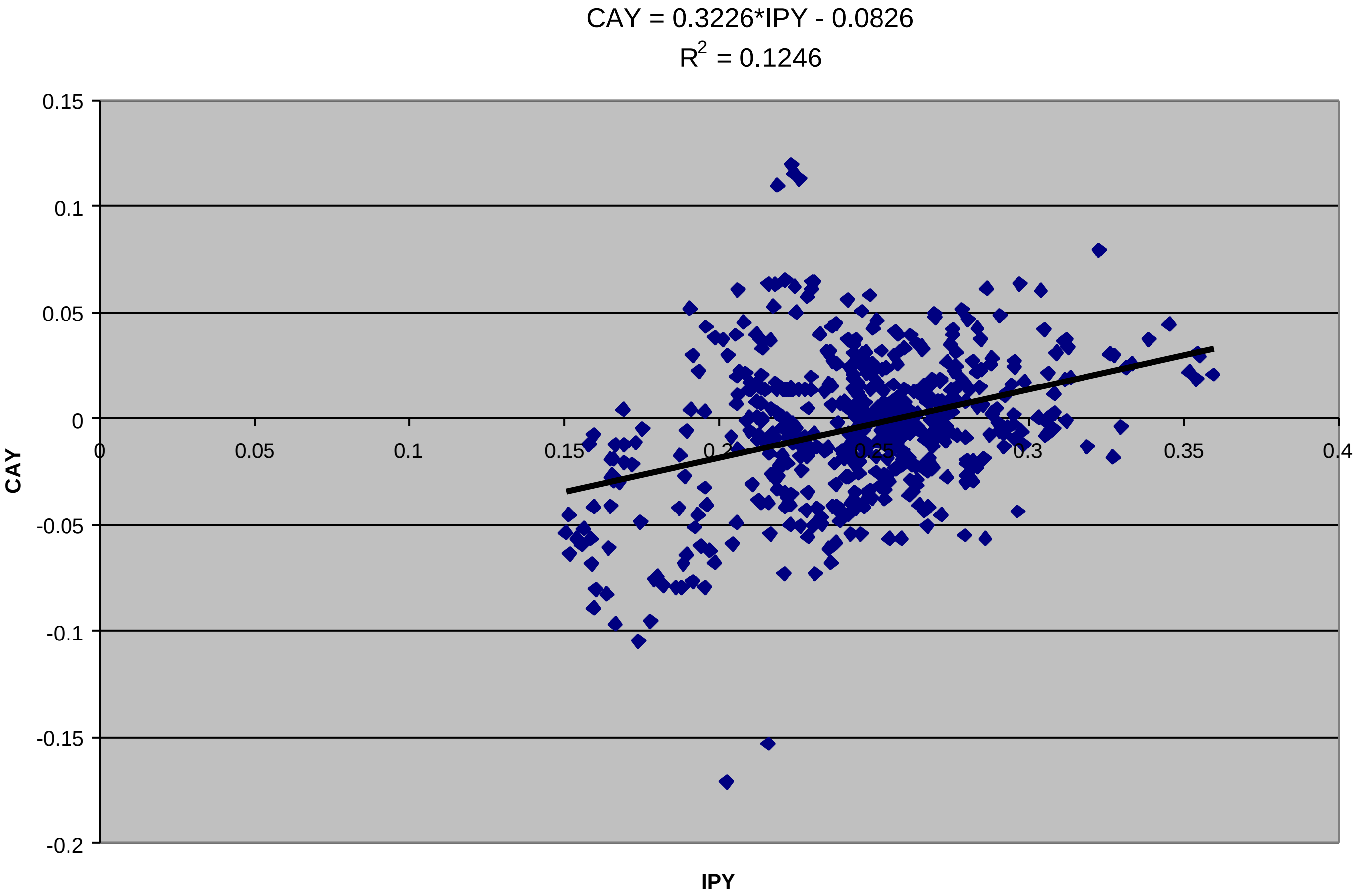

Table 2 summarises the results, overall confirming the positive relationship. While the R^2 statistics generally imply that there are is more to the current account than industrial production, the result has not been highlighted in existing literature and therefore merits further investigation.

Table 2

Static Panel Data Estimation (1968-2000) using 5 yr averages:
Dependent Variable – CAY (Current account/GDP)

Method	Constant	IPY (Industrial Output/GDP)	R-Squared
OLS (Pooled Regression)	-0.08**	0.32**	0.15
OLS (Differences)	0.006***	0.57***	0.13
LSDV (Fixed Effects)	-0.07	0.13	0.63
Within		0.13	0.01
Between	-0.1**	0.39**	0.26
Feasible GLS (w/b)	-0.05**	0.19**	0.04
GLS (using OLS residuals)	-0.05**	0.20**	0.04
ML	-0.05**	0.20**	0.04

Notes: *, ** and *** indicate significance at the 10%, 5% and 1% significance levels, respectively.

Baltagi (1995) reviews the standard estimation methods used in this setting. Let the regressions be summarised by CAY=a+b*IPY + v, where a, b are the intercept and IPY coefficient, and v an error term. Th methods of estimation are as follows:

OLS estimation.
LSDV (least squares dummy variables) estimation uses individual dummies in the OLS regression.
Within estimation replaces CAY and IPY by deviations from time means (i.e.,subtracting the means of each time series).
Between estimation replaces CAY and IPY by the means of each individual (leaving N observations).
Feasible GLS (generalized least squares) estimation replaces CAY and IPY by deviations from weighted time means. The outcome depends on the choice of the weight, q.
ML (maximum likelihood) estimation obtains q by iterating the GLS procedure.

5. Conclusions

This paper looks at the determinants of the current account (as a ratio over GDP) from a long-run perspective. It is motivated partly by the observation (from descriptive statistics of the current account ratio in 22 OECD economies during the post-war period) that there is a probably more long-run variation (in both a cross-section and time-series senses) in the data than the consumption-smoothing variant of the intertemporal approach to the CA can hope to explain. A theoretical model of the CA is developed, based on the variant of the intertemporal approach that stresses the long-term component of the CA; the predictions are that the rate of real appreciation and the size of non-tradables sector should be prime candidates in influencing (negatively) the CA ratio. Empirical evidence suggests a (positive) link with the size of the industrial sector (measured by the industrial production-to-GDP ratio). While the R^2 statistics generally imply that there are is more to the current account than industrial production, the result has not been highlighted in existing literature and therefore merits further investigation.

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