THE OUTPUT GAP AND THE CURRENT ACCOUNT

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Estimates of the output gap are useful for identifying the sustainable level of non-inflationary output growth in countries with a flexible exchange rate regime. For nations with a fixed exchange rate, however, domestic prices are inexorably linked to the prices of its main trading partners and are likely to bear little relation to the output gap. This paper shows that a positive output gap in a small open economy with a fixed exchange rate is more likely to be reflected in an imbalance on the external current account. Both theoretical and empirical evidence is presented to support this conclusion. (JEL F32, E30, F41)

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I. INTRODUCTION

Potential output can be conceptualised as the maximum output of goods and services an economy can produce, given the full or optimum use of all available resources and in the absence of short-term economic fluctuations. It is possible for an economy to produce above its potential in the short run through high levels of labour force participation, productivity growth and capacity utilisation. In the long run, however, actual output usually reverts to its potential, since the persistence of such high rates of factor utilisation exerts upward pressure on factor prices and forces firms to reduce demand. As such, estimates of potential output relative to the level of actual output (the output gap) can provide a guide as to whether economic policy should focus on short-term measures designed to reduce aggregate demand or whether there should be more stringent structural reforms designed to correct imbalances over the medium to long term.

Over the years, there has been a proliferation of methods used to estimate potential output and the output gap. Chagny and Dopke (2001) categorise the available approaches into three broad groupings: non-structural or univariate, structural and multivariate. In general, univariate methods attempt to identify productive potential based solely on the past behaviour of the output series, ignoring changes in the contemporaneous use of productive inputs in the economy, while structural methods consider the evolution of other key macroeconomic variables (such as inputs in the production process) when estimating potential output.

Previous research in this area has focused on using estimates of potential output and its derivative the output gap to predict domestic inflationary pressures (see Guarda, 2002; Giorno, Richardson, Roseveare and Noord, 1995). In an open economy with a fixed exchange rate, however, changes in the domestic price level are more likely to be related to import price inflation rather than (excess) aggregate domestic demand, as the exchange rate can not change to offset fluctuations in aggregate demand. Therefore, the existence of a persistent and large positive output gap in small, open fixed exchange rate economies need not result in higher domestic inflation. Although 90 (inclusive of some OECD nations, which are members of the Euro Area) of the 187 countries surveyed by the International Monetary Fund have a fixed exchange rate regime or some variant there of, there is very little research on this issue.

To address this deficiency in the literature, this article outlines a monetary economy model that allows examination of the behaviour of the external current account when actual output deviates from potential output. This relationship is then empirically investigated – using annual data for Barbados over the period 1975-2002 – by comparing the relationship between non-structural and structural estimates of the output gap with the current account balance. The organisation of the study is as follows. Following the introduction, Section 2 outlines a theoretical model that shows a hypothesised link between the output gap and the current account, which forms the basis of the study. Section 3 discusses the empirical methodology and the data used to estimate the output gap. Section 4 presents the regression estimates and Section 5 concludes.

II. THE MODEL

Consider a monetary economy that consists of four goods: money, output of traded and non-traded goods, and labour. There are four agents: firms in the traded and non-traded sectors, an aggregate household that consumes a portion of the output of firms in each industry and benefit from the distributed profits, and from the provision of government services. Markets are assumed to be frictionless: trades are equal to the minimum of supply and demand. The model is similar to those presented by Bénassy (2002) and Neary (1980), but extends these frameworks to explicitly consider the role of the output gap in the determination of the current account balance.

For simplicity, it is assumed that household behaviour may be represented by the maximisation of a single utility function (U), defined over consumption of non-tradables (C_{nt}) and tradables (C_{tr}), and end-of-period holdings of money balances M:

$$U = \alpha_{nt} \log C_{nt} + \alpha_{tr} \log C_{tr} + (1 - \alpha_{tr} - \alpha_{nt}) \log\left(\frac{M}{P^e}\right) - V(N) \quad (1)$$

where α_{nt} and α_{tr} are the propensities to consume in the nontraded and traded sectors of the economy, P^e is the expected price level and $V(N)$ is the disutility of labour, with $V'(N) > 0$ and $V''(N) > 0$, where the first and second order conditions indicate that disutility rises as the worker supplies more labour. Equation (1) is an indirect utility function, representing the satisfaction from consumption of goods and leisure in both present and future periods. It depends on the expectations of future prices, unemployment and goods rationing, assuming the household lives two periods, earns income in period 1 and, therefore, must save in order to consume in the second period (see Benassy, 2002).

Households have an initial endowment of money, $\overline{M}$, receive wage income related to the amount of labour they supply, N, and the economy-wide wage rate, W, dividend payments, Π, and pay taxes (in real terms), T. The consumer's budget constraint is therefore:

$$\sum_i P_i C_i + M = WN + \Pi + \overline{M} - PT \quad (2)$$

where $i = nt, tr$ and P is the aggregate price index defined as $P = \alpha_{nt} P_{nt} + \alpha_{tr} P_{tr}$. Firms are profit maximisers, with a strictly concave production function, $F(N_i)$, where the only variable input is labour:

$$\Pi_i = P_i Y_i - WN_i . \quad (3)$$

Firm profits are fully redistributed to households and the only choice of the representative firm in each sector is employment.

The government purchases various quantities of each good, G_{nt} and G_{tr}, from taxes and printing money. Subsequently, the government's budget constraint can be expressed as:

$$M - \overline{M} = P(G - T) \quad (4)$$

where $G = G_{nt} + G_{tr}$. The government does not engage in production, intervene in the labour market or directly influence household utility.

In addition to the government's budget constraint, other accounting relationships must hold *ex post*. The market for the non-traded good must clear, $Y = C_{nt} + G_{nt}$, and the excess supply of the traded good must equal the balance of trade, $S = Y_{tr} - C_{tr} - G_{tr}$. Moreover, although the labour market must clear, $N = N_{nt} + N_{tr}$, this does not rule out the possibility of involuntary unemployment.

The model is first derived under the Walrasian assumptions that the wage rate and the price of the nontraded good change in order to equate supply and demand but there is a fixed price for traded goods, P_{tr} (the exchange rate). Maximisation of the firms' profits for the given production function provides an expression for the demand for labour:

$$N_i^d = \frac{W}{F_i' P_i} \quad (5)$$

and a supply function of the form:

$$Y_i^s = F\left[\frac{W}{F_i^{'} P_i}\right]. \tag{6}$$

The maximisation of the household's utility function (Equation 1), subject to the budget constraint (Equation 2) yields a set of first order conditions:

$$\frac{\alpha_i}{C_i P_i} = \frac{1-\alpha_{nt}-\alpha_{tr}}{M} = \frac{V'(N_i)}{W} \tag{7}$$

which, together with Equations (5) and (6) and the ex-post identities can then be used to obtain values for the endogenous variables. Defining the current account balance (S) as $S = Y_{tr} - C_{tr} - G_{tr}$ and using Equations (6), (7) and the national income accounting identities, the country's external balance under Walrasian assumptions (when actual output is equal to potential) can be expressed as:

$$S = F(N_{tr}) - \frac{\alpha_{tr} F'(N_{tr})}{V'(N_{tr})} - G_{tr} \tag{8}$$

(see Appendix for derivation).

Potential output can be defined as the level of output that would result if prices and wages are completely flexible, i.e. the Walrasian equilibrium. However, distortions such as taxes and imperfect competition can result in actual output being above or below potential. In this paper, the authors therefore endogenise wages: the household sets the price of labour (firms are still assumed to be price takers). In this case, the household perceives the labour demand curve of the form $\psi W^{-\eta}$, where ψ is a position parameter and $\eta > 1$ is the elasticity of labour supply. The consumer's problem is now expressed as:

$$U = \alpha_1 \log C_{nt} + \alpha_2 \log C_{tr} + (1-\alpha_1-\alpha_2)\log\left(\frac{M}{P^e}\right) - V(N) \tag{9}$$

$$\sum_i P_i C_i + M = WN + \Pi + \overline{M} - PT \tag{10}$$

$$N_i \leq \psi W^{-\eta} \tag{11}$$

with the following first order conditions:

$$\frac{\alpha_i}{C_i P_i} = \frac{1-\alpha_{nt}-\alpha_{tr}}{M} = \frac{\eta-1}{\eta}\frac{V'(N_i)}{W}. \tag{12}$$

The expression for the current account is therefore:

$$S^* = F(N_{tr}^*) - \frac{\eta}{\eta-1}\frac{\alpha_{tr} F'(N_{tr}^*)}{V'(N_{tr}^*)} - G_{tr}^* \tag{13}$$

Examining the equation for the current account balance when the output gap is zero (Equation 8) and that when there are market imperfections (Equation 13), one notices that the equations differ by the factor $\frac{\eta}{\eta-1}$: the elasticity of the supply of labour. Note that Equation (13) approaches that obtained under Walrasian assumptions when $\eta \to \infty$. Equation (13) shows that if there are labour market imperfections and an excess demand for traded goods, the current account balance would deteriorate, implying that there is a direct relationship between the output gap and the current account. The short run policy recommendations in this scenario are standard: either increase private or public sector net savings. In the medium to long run, however, policymakers can also address structural balance of payments difficulties through reforms that increase labour flexibility (i.e. increase η). The remainder of the paper attempts to evaluate the relationship between the current account and the output gap using data for Barbados.

III. Methodological Approaches and Data Issues

A. Linear Time Trend (LTT)

The simplest univariate method used in the applied literature to estimate potential output is the linear time trend approach. This technique estimates potential output (y_t) in period t by assuming that output expands at a constant exponential rate (β):

$$\ln y_t = \mu + \beta t + e_t \quad (14)$$

where μ is a constant and e_t is a residual error term assumed to have normal statistical properties. This framework allows the trend growth (βt) to change between the cycles, but not within the cycle. Potential output in period t is therefore given by $\mu + \beta t$. Provided that the errors are independently and identically distributed, with mean zero and constant variance, ordinary least squares can be used to derive efficient estimates.

B. Hodrick-Prescott (HP) Filter

An alternative univariate method is the Hodrick-Prescott (1997) filter, which assumes that output consists of trend and cyclical components. The cyclical component simply represents deviations from the trend in output growth, which are assumed to average to zero over long time periods. The trend component, on the other hand, is extracted by minimising the following loss function:

$$\sum_{i=1}^{T}(\ln y_t - \ln y_t^*)^2 + \lambda\sum_{i=2}^{T-1}\left[(\ln y_{t+1}^* - \ln y_t^*) - (\ln y_t^* - \ln y_{t-1}^*)\right]^2 \quad (15)$$

where y^* is the smoothed series and λ is a weighting factor. The first component of the function represents the penalty for deviations from the trend, while the penalty for sharp changes in the trend output is captured by the second component. Note that when $\lambda \to \infty$, the trend becomes a straight line and thus gives the same result as the linear time trend technique.

It has become standard practice in the applied literature to use a value of $\lambda = 100$ for annual data and $\lambda = 1600$ for data with quarterly frequency. The somewhat arbitrary choice of λ, which determines the variance of the trend output estimate, implies that two different researchers, using the same data set, can obtain significantly different estimates of potential output. In addition, the 'industry standard' of 100 was derived from data for the US and assumes that the business cycle lasts between two to eight years (Burns and Mitchell, 1944).

The HP method also suffers from the "so-called" end-point problem. This problem occurs, since if one fits a trend line through a given series and the beginning and the end of the series are not at the same point on the cycle, the trend might be over or underestimated for the first few and last few observations. A final criticism of the HP approach is that it ignores structural limitations on production that might be present in the economy over a period.

C. Aggregate Production Function (APF)

The final technique used in this study is the aggregate production function approach. Using this method, potential output is derived as the level of output that should be obtained when all factors of production are being fully utilised. This approach is employed by a number of international organisations such as the IMF (see De Masi, 1997) and the OECD (see Giorno, et al., 1995), since it explicitly takes into consideration structural constraints within the economy. The method used in this study is similar to that outlined in Giorno, et al.

The technique assumes that business sector output (total output less government output) represented by y_t is of the form:

$$\ln y_t = \ln a + \alpha \ln n_t + (1-\alpha)\ln k_t + \ln \eta_t \qquad (16)$$

where a is a constant, α is the average labour share of output, n is the business sector labour input, k is the amount of capital used by the business sector and η is total factor productivity. Equation (16) is estimated econometrically.

For a given value of α, the productivity series, η, is smoothed using the HP filter to obtain an estimate of trend productivity. Additionally, an estimate of potential employment, n^*, is derived via the following relation:

$$n_t^* = lf_t(1-u_t^*) - n_t^g \qquad (17)$$

where lf is the trend labour force value, u^* is the non-accelerating wage rate of unemployment and n^g is the level of employment in public sector.

To derive u^*, the authors use the method recommended by Elmeskow and Mackfarlan (1993), which assumes that the rate of change in wage inflation is proportional to the gap between actual employment and u^*:

$$\Delta^2 \ln w_t = -c(u_t - u^*), \qquad c > 0 \qquad (18)$$

where w is the level of wages and Δ is the first difference operator. An estimate of c can be approximated by $-\Delta^3 \ln w_t / \Delta u_t$, which implies that u^* is derived as a residual. The estimated u^* is then smoothed using the HP filter to obtain the underlying trend in unemployment. To estimate potential output, the values for n^*, trend productivity and actual capital inputs are substituted into Equation (16).

D. Data Sources and Issues

The production function approach is quite sensitive to changes in factor inputs, such as capacity utilisation, which is a proxy for capital operated below its full potential and labour quality. Therefore, the production function estimated allows for quality changes in factor inputs by using indices that capture variations in the quality of the capital stock and the labour force, which make them more productive (see Jorgenson and Grilliches, 1967; Young, 1995).

Labour, n, is measured as the total number of persons employed less public sector employees, since the services provided by the central government cannot be easily valued at market prices[1]. To account for changes in the quality of labour, the level of labour is multiplied by a quality index, z^n, calculated as the weighted average of labour with different levels of education:

$$z_t^n = \sum_{j=1}^{4} w_j (n_j / n) \qquad (19)$$

where the weights w_j are the relative wages in 2000, with j representing employees at the primary, secondary, technical or university levels. These data are obtained from Barbados Population and Housing Censuses for 1980, 1990 and 2000.

[1] Value-added in the public sector is usually measured using the wages paid to civil servants. This means that the share of labour income in total public output is likely to be close to one, thereby biasing the estimates for the elasticity of labour.

The stock of capital is notoriously difficult to measure. Therefore, capital is assumed to accumulate according to the following relation:

$$k_{t+1} = (1-\delta)k_t + I_t \tag{20}$$

where δ is the rate of depreciation and I is gross investment. Using firm-level data of companies listed on the Barbados Stock Exchange from the database used by Moore, Craigwell and Maxwell (2003), the authors find that δ can be adequately proxied using a value of 0.02 for buildings and 0.08 for machinery. Nominal estimates of investment in machinery and equipment and investment in structures are available from the National Accounts Statistics published by the Barbados Statistical Service. The deflator used for investment in structures is the housing component of the retail price index, while the export price index for machinery from the US is employed to deflate the equipment and machinery investment series, given that most capital goods are imported from this country.

To obtain an estimate of the change in the quality of capital, z^k, the approach proposed by Christensen, Cummings and Jorgenson (1980) is applied:

$$\ln z_t - \ln z_{t-1} = \sum_{i=1}^{2} v_i[\ln k_{i,t-1} - \ln k_{i,t-2}] - [\ln k_{t-1} - \ln k_{t-2}] \tag{21}$$

where the weights v_i are the relative capital rental rates. Since data on the rental rates of capital (R) are not available for Barbados, they were derived via the following relation:

$$R_{i,t} = (1+\rho_t)P_{i,t} - (1-\delta)P_{i,t+1} \tag{22}$$

where ρ is the economy-wide real interest rate, proxied by the total loan rate minus the inflation rate, and P is the price for capital item i.

The remaining data series are taken from various issues of the Annual Statistical Digest of the Central Bank of Barbados. In the case of wages, the published wages index is discontinued in 1994. Therefore, this series is updated using wage settlement data from the Barbados Employer Confederation and published in various IMF Article IV Consultation Reports for Barbados available on their website.

The actual and quality-adjusted series for labour and capital inputs are presented in Figure 1. The quality-adjusted capital stock series does not vary significantly from the actual series. A plausible explanation for this observation is that the differences in 'vintages' (machinery with differing levels of technological advances) are captured by the residual total factor productivity series. In contrast, there is a sharp upward shift in the quality-adjusted labour series from around the mid-1990s, reflecting a significant increase in the number of persons obtaining technical and university level qualifications during this period.

IV. EMPIRICAL RESULTS

A. Estimates of Potential Output

Table 2 presents the estimated production function using the annual data described in the previous section for the period 1975 to 2002. The first regression, which is the control equation, does not adjust the labour and capital variables for quality changes. As a result, the estimated share of labour in output (0.935) is quite large. When labour and capital are adjusted for quality changes, as shown in the second regression, the estimated coefficients on the capital and labour variables assume more realistic values, with labour's share estimated at 0.462 and the share represented by the capital input is 0.538.

In the same table, regression Equation (16) augments the model with a dummy variable to capture the break in trend output in 1975 and 1976, resulting from the oil price shocks. The inclusion of this dummy improves considerably the explanatory ability of the model, as reflected by the reduction in the regression standard error and a higher adjusted R^2. The estimated labour share falls marginally to 0.456, which is somewhat smaller than those obtained in more developed countries. However, in Barbados where capital is more expensive than labour, due to high interest rates and scare investment finance, this result is not surprising. The cointegration statistic indicates that the residuals from regression 3 are stationary, therefore this equation is employed in the remainder of this study to estimate potential output using the APF approach.

Table 3 provides estimates of potential output growth and the output gap during various sub-periods. These results show that actual average annual growth was marginally below potential over the entire sample period. The APF method estimates that average growth should have been 1.9% per year, while the HP and LTT techniques estimate potential output growth to be slightly lower at 1.6% and 1.7%, respectively. Figure 2 illustrates that the univariate techniques did not capture the structural constraints faced by the domestic economy from 1981-1982 and 1990-1992. For example, during the period 1990-1994, because of a contraction in employment, potential output growth, based on the APF method was –0.9%, while the HP method generated an estimate of 0.6% and the LTT –0.6%.

These estimates of potential output were then used to approximate the output gap as a percent of potential output over the period analysed (see Table 3 and Figure 3). The plots of the output gap show that the three estimates generally produced similar results, with the HP and LTT methods, generally, underestimating the gap. All three techniques generated a positive output gap during the periods when the economy was generally deemed to have been overheating (1985-1989 and 1995-1999), which prompted a stricter monetary policy stance by the Central Bank of Barbados to control credit expansion and foreign reserves losses (see Worrell, 1997). Current estimates using APF technique reveal that in 2002, the economy is 0.7% above its potential, owing in large part to the counter-cyclical fiscal policies implemented by the Government of Barbados in the wake of the negative impact of 9/11 on the local tourist industry.

B. Evaluating the Usefulness of the Potential Output Estimates

As Section II shows, in countries with labour market imperfections an excess demand for traded goods is likely to have higher current account deficits. To test this hypothesis the output gap estimates are included in a simple model of the current account, along with a lagged dependent variable. The equations are estimated using OLS techniques and annual data over the period 1981 to 2002 and the results are presented in Table 4. As expected, the output gap is a significant determinant of external current account developments for the regression models using the aggregation production function and Hodrick-Prescott filter techniques. However, the explanatory power of each model and the coefficient estimates on the output gap differs. For the LTT model, the adjusted R-squared is just 0.229, while the adjusted R-squared for the HP and APF approaches are quit similar, approximately 0.374.

To evaluate the predictive ability of each model the Thiel Inequality coefficient is also presented in Table 4. Using this statistic, the authors find that the output gap estimates based on the Hodrick-Prescott filter techniques and aggregate production function approaches are better able to predict current account developments. However, a definitive statement regarding the superiority of either approach based on forecast and model evaluation statistics could not be obtained.

A simple model of inflation in Barbados is also augmented with the estimates of the output to test the hypothesis that inflation in fixed exchange rate regimes does not respond to significantly to movements in the output gap. The basic model expresses inflation in Barbados as a function of US inflation (the exchange rate anchor country). The output gap estimates are then added to this model to test whether they significantly predict inflation changes. The results given in Table 4 show that the output gap estimates derived from APF and HP techniques are insignificant in the inflation regression. The output gap estimate from the LTT approach, on the other hand, is significant over the full sample period but is not robust to changes in the sample period.

V. CONCLUSIONS

This paper investigates the relationship between potential output and the current account in a fixed exchange rate economy. A monetary model of an open economy is first developed which shows that in the presence of market imperfections, the current account can differ from that obtained under Walrasian assumptions and depends critically on the labour supply elasticity. This therefore implies that output gap estimates can be an important indicator of future movements in the external current account of fixed exchange rate countries. The model also shows that the impact of the output gap on the current account, however, depends on the labour supply elasticity. If elasticity is relatively large, then the current account balance obtained may approach that achieved under Walrasian conditions. Where the labour supply elasticity is small, however, then the balance can differ significantly from that under Walrasian assumptions. In these cases, structural balance of payments difficulties can be addressed through reforms that improve labour market flexibility and/or reductions in government consumption of traded goods.

The paper then empirically examines the link between the current account and the output gap using data for Barbados over the period 1975 to 2002 and using the HP filter, the linear time trend model and aggregate production function approaches to estimate potential output and its derivative: the output gap. The output gap estimates derived from these various approaches suggest/confirm the theoretical results derived and also show that the HP and APF are superior methods to capture output gap developments. However, a definitive statement regarding the superiority of either approach could not be made.

The key implications arising from this paper are that fixed exchange rate economies should incorporate expectations of the output gap into their forecasts of the current account. If the impact of potential output is ignored it could increase forecast errors and lead to erroneous policy recommendations. The study also shows that over the long run, one means of reducing current account imbalances is to increase labour market flexibility through labour market reforms.

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Table 1: Barbados' Growth Experience

	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	2000-2002	*1975-2002*
Agriculture	2.9	-0.2	-4.4	-2.1	2.5	-3.3	*-0.8*
Industry	9.3	1.0	1.0	-1.5	3.7	-1.9	*1.9*
Services	3.1	0.3	4.4	-1.8	3.5	0.0	*1.6*
of which is Tourism	12.0	-2.4	7.9	-0.8	2.2	0.2	*3.2*
Total Real GDP Growth	3.8	0.3	3.2	-1.8	3.4	-0.5	*1.4*
memo:							
Caribbean	4.7	1.8	4.7	2.9	3.3	1.2	*3.2*

Table 2: Production Function Estimates

	Regressions		
	(1)	(2)	(3)
Variable			
n	0.935	0.462	0.456
	(0.021)**	(0.050)**	(0.039)**
k	0.065	0.538	0.544
	(0.001)**	(0.058)**	(0.047)**
c	-0.134	0.449	0.383
	(0.095)**	(0.072)**	(0.042)**
trend		0.024	-0.021
		(0.003)**	(0.002)
D	-	-	0.251
			(0.071)**
Summary Statistics			
Adjusted R^2	0.892	0.532	0.776
D.W. Statistic	0.541	0.353	1.384
S.E. of Regression	0.040	0.083	0.058
Cointegration Tests			
ADF	-2.862**	-2.326*	-2.679*

Notes: (1) **, * indicates significance at the 1 and 5% levels, respectively.
(2) D is a dummy variable which captures a break in trend in 1990.

Table 3: Esimates of Potential Output Growth and the Output Gap

	Growth			
	Actual	HP	LTT	APF
1975-1979	3.8	2.8	4.3	5.0
1980-1984	0.3	1.8	1.2	1.9
1985-1989	3.2	1.0	1.6	1.6
1990-1994	-1.8	0.6	-0.6	-0.9
1995-1999	3.4	1.7	2.7	2.5
2000-2002	-0.5	1.7	0.8	1.1
Average	1.5	1.6	1.7	1.9
	Output Gap			
		HP	LTT	APF
1975-1979		-0.7	0.5	2.5
1980-1984		0.3	-3.0	1.9
1985-1989		2.9	3.3	4.5
1990-1994		-3.2	-0.4	1.0
1995-1999		0.9	0.6	4.4
2000-2002		0.2	-1.4	1.0

Table 4: Evaluation of Output Gap Estimates

Dependent Variable:	*Current Account Balance (% of GDP)*			*Inflation (%)*		
	APF	HP	LTT	APF	HP	LTT
ca_{t-1}	0.638	0.507	0.591	-	-	-
	(0.181)**	(0.179)*	(0.209)*			
$y - y^*$	-0.540	-0.434	-0.151	0.271	0.150	0.397
	(0.249)*	(0.200)*	(0.300)	(0.139)	(0.107)	(0.151)*
Δp^{US}	-	-	-	1.246	1.227	1.149
				(0.422)**	(0.456)*	(0.395)*
c	0.972	-0.334	-0.292	-1.754	-0.934	-0.958
	(1.022)	(0.849)	(0.942)	(1.348)	(1.478)	(1.263)
Summary Statistics						
Adjusted R^2	0.374	0.373	0.229	0.450	0.392	0.530
D.W. Statistic	2.268	2.097	2.058	2.756	2.613	2.573
S.E. of Regression	3.967	3.971	4.404	1.799	1.892	1.664
Theil Inequality Coefficient	0.436	0.435	0.518	0.231	0.245	0.212

Notes: (1) **, * indicates significance at the 1 and 5% levels, respectively.

Figure 1: Actual and Quality-Adjusted Labour and Capital Stock Series 1975-2002

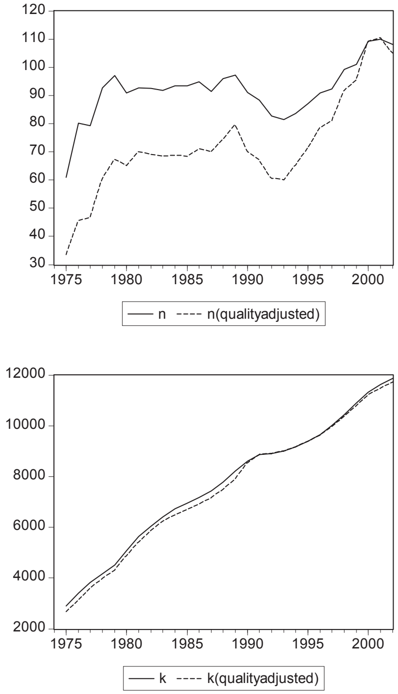


Figure 2: Potential Output 1975-2002

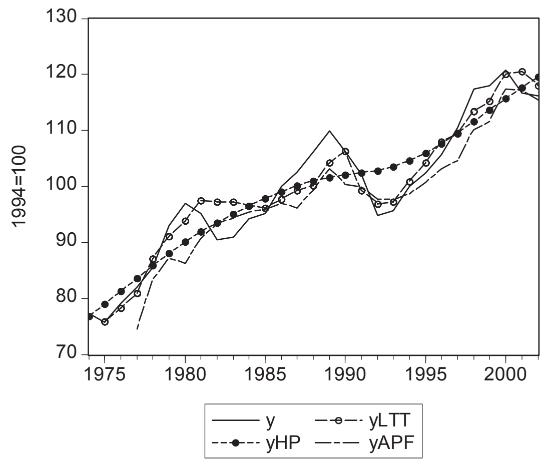
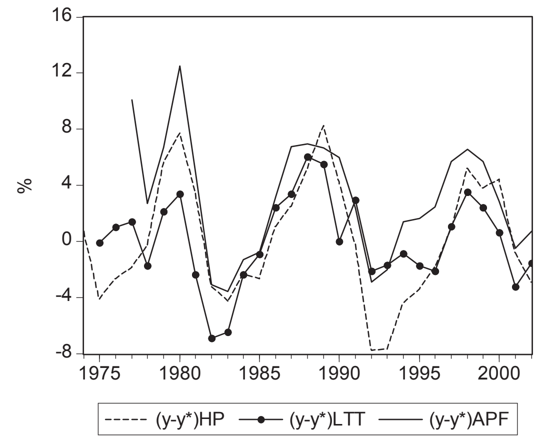


Figure 3: Output Gap Estimates 1975-2002



APPENDIX

From Equation (7):

$$C_{tr} = \frac{\alpha_{tr} W}{V^{'}(N_{tr}) P_{tr}} .$$

(A1)

Substituting Equation (5) into (A1) gives the following expression for consumption in the traded sector:

$$C_{tr} = \frac{\alpha_{tr} F^{'}(N_{tr})}{V^{'}(N_{tr})} .$$

(A2)

Equation (A2) and the definition of the current account $S = Y_{tr} - C_{tr} - G_{tr}$ gives:

$$S = F(N_{tr}) - \frac{\alpha_{tr} F'(N_{tr})}{V'(N_{tr})} - G_{tr} .$$