The Current Account and the Interest Rate Differential in Canada

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Introduction

The analysis of the current account and the real interest rate differential have been important enterprises. From a policy-maker's point of view, the current account is important, because it provides information about the amount of foreign resources that must be borrowed to fund domestic investment, and as such, it informs on the changes in foreign indebtedness. The interest differential is important, because it yields information on the real cost of borrowing at home, relative to the real cost of borrowing abroad. It is generally agreed that (monetary) stabilization policies must alter the interest differential to affect the course of the business cycle in open economies.

Interestingly, the vast majority of academic studies ignore the relationship between the current account and the interest differential. This is surprising, because current accounts and interest rates should jointly adjust to ensure the equilibrium of the world capital market. Instead, most of the literature on the current account aims to either test the intertemporal approach to the balance of payments (which generally assumes a constant interest rate) or to test the extent of international capital mobility. Likewise, most of the literature on the interest differential aims at testing real interest parity and at investigating the role played by the real exchange rate.

There are notable exceptions, however. The empirical studies of Bernhardsen (2000) and Lane and Milesi-Ferretti (2002) do link the current account and the interest differential. Using panel data for 12 European countries, Bernhardsen finds that a deterioration in the current account raises the interest differential. Using panel data for 66 countries, Lane and Milesi-Ferretti find that the interest differential is inversely related to the net foreign asset position. This suggests that a deterioration of the current account that worsens the net foreign asset position raises the interest differential. Our own previous theoretical work, Boileau and Normandin (2003), studies the relationship between the business cycle fluctuations of the current account and those of the interest differential. We show that a simple multi-country model, where international financial markets are incomplete and costly to operate, yields an interest differential that is inversely related to the net foreign asset position. We also show that our multi-country model provides a good description of the relationship between the current account and the interest differential in 10 developed countries.

In this paper, we study the joint business cycle fluctuations of output, the current account, and the interest differential in post-1975 Canadian data. It is often argued that the Canadian economy is better represented as a small open economy rather than a large economy. If this is the case, our two-country model might not apply to the Canadian case. For this reason, we study a small open economy model of Canada similar to those in Letendre (2004) and Nason and Rogers (2003). The small open economy is populated by a representative consumer, a firm, and a government. Agents in the small open economy have access to world international financial markets. In using these markets, agents generate movements in the current account. In their international financial transactions, however, agents face a country-specific real return on their holdings of (world) foreign assets. The difference between the country-specific return and the world return is the interest differential. In using international financial markets, agents also affect movements in the interest differential.

We study three versions of the model of the small open economy. The first version uses our baseline parameterization. It assumes that the interest differential depends exclusively on the net foreign asset position. As in Senhadji (1997), we assume that a worsening of the small open economy's net foreign asset position raises the country-specific return above the world return and thus raises the interest differential. That is, agents in the small open economy face an upward sloping supply of foreign funds. When the small open economy borrows on financial markets (a current account deficit), it can do so at an increasing cost of borrowing. This assumption is supported by the empirical work on capital flows by Lane and Milesi-Ferretti (2002).

The second version uses the debt-output-ratio parameterization. The debt-output-ratio version modifies the baseline version by assuming that the interest differential depends on the net foreign asset to output ratio. We study this version of the interest differential because it is widely used in the literature (see, for example, Letendre (2004), Nason and Rogers (2003), and Schmitt-Grohé and Uribe 2003). In this version, the interest differential worsens with a deterioration in the net foreign asset position. A rise in home output, however, improves the ability to support a higher foreign debt and reduces the foreign premium or interest differential.

Finally, the last version uses the habit-formation parameterization. The habit-formation version modifies the baseline version by assuming that the preferences of consumers exhibit habit formation. We study this version of consumer preferences because it has been shown to be important in understanding asset returns and the business cycle (see, for example, Boldrin, Christiano, and Fisher (2001)). Habit formation is often perceived as essential in explaining observed asset returns. It would then seem an important component to explain the interest differential.

We find that the baseline version of the model offers a good description of the joint business cycle features of output, the current account, and the interest differential for post-1975 Canadian data. In particular, the baseline version correctly predicts that the current account and the interest differential are less volatile than output, and that the current account is countercyclical while the interest differential is procyclical. The baseline version also correctly predicts the shape of the cross-correlation functions between the current account and the interest differential, between output and the current account, and between output and the interest differential. Importantly, it correctly predicts that correlations between lags of the current account and the interest differential are negative, while the correlations between leads of the current account and the interest differential are positive. This asymmetric shape of the cross-correlation function resembles a horizontal S. This S-curve encompasses the negative relationship between the current account and the interest differential discussed in Bernhardsen (2000), Boileau and Normandin (2003), and Lane and Milesi-Ferretti (2002). Admittedly, the baseline version is not perfect. In particular, it underpredicts the relative volatility of the current account and overpredicts the relative volatility of the interest differential.

In contrast, we find that the debt-output-ratio version and the habit-formation version do not offer a good description. The debt-output-ratio version incorrectly predicts that the interest differential is almost as volatile as output and that it is countercyclical. The habit-formation version of the model also incorrectly predicts that the interest differential is almost as volatile as output. In addition, it incorrectly predicts that the current account is procyclical.

Overall, our baseline version of the small open economy model offers the best description of the business cycle fluctuations of output, the current account, and the interest differential in post-1975 Canadian data. Our results contrast with those in earlier work in two directions. First, the baseline model is driven almost exclusively by productivity shocks. That is, government expenditures and world real interest rate shocks play only a small role. This contrasts with Nason and Rogers (2003), who argue that government expenditures and world real interest rate shocks are important to explain the Canadian experience. Second, the baseline model assumes that the interest differential is inversely related to simply the net foreign asset position. This contrasts with Boileau and Normandin (2003), where the differential is as in the debt-output-ratio version of the model.

Section 1 presents the small open economy model of Canada. The three versions of the model correspond to three distinct parameterizations. Section 2 presents simulation results for the three versions of the model. We first study the dynamic responses of output, the current account, and the interest differential to the various shocks in the model. We then examine the business cycle statistics generated by the three versions of the model, and we compare these statistics to those of post-1975 Canadian data. Finally, we study the robustness of these results for the baseline model. The final section concludes.

1 A Small Open Economy Model

In this section, we develop the small open economy model and discuss its parameterization. The economy is that of a small country open to world financial markets. Financial markets, however, are incomplete. In addition, the agents in the small open economy face a country-specific interest rate on their net holdings of foreign (world) assets.

1.1 The model

The small country is populated by a representative consumer, whose expected lifetime utility is given by

$$E_t\left[\sum_{t=0}^{\infty}\beta^t U(C_t-\psi C_{t-1}, N_t)\right], \tag{1}$$

where E_t is the conditional expectation operator, C_t is consumption, N_t is hours worked, and $0<\beta<1$. Similarly to Letendre (2004), we employ GHH preferences (Greenwood, Hercowitz, and Huffman 1988):

$$u(C_t - \psi C_{t-1}, N_t) = [C_t - \psi C_{t-1} - (\theta/\eta)N_t^{\eta}]^{\gamma}/\gamma, \tag{2}$$

where $\gamma \geq 1$, $\psi \geq 0$, $\theta > 0$, and $\eta > 1$. Importantly, these preferences exhibit habit formation only when $\psi > 0$. GHH preferences play an important role in international business cycle studies. Specifically, Correia, Neves, and Rebelo (1995) show that GHH preferences promote a countercyclical trade balance.

The production technology is constant return to scale in its inputs:

$$Y_t = Z_t K_t^{\alpha} N_t^{1-\alpha}, \tag{3}$$

where Y_t is output, Z_t is the level of total factor productivity, K_t is the capital stock, and $0 < \alpha < 1$. Capital accumulation follows

$$K_{t+1} = I_t + (1-\delta)K_t - \Phi_t K_t, \tag{4}$$

where I_t is investment and $0 < \delta < 1$. The term Φ_t denotes adjustment costs:

$$\Phi_t = \frac{\phi}{2}\left(\frac{I_t}{K_t} - \delta\right)^2, \tag{5}$$

where $\phi \geq 0$. Investment is costly only when $\phi > 0$. As in Baxter and Crucini (1995), we use adjustment costs mainly to contain the relative volatility of investment.

The current account is given by changes in the net holdings of foreign assets or changes in the net foreign asset position:

$$X_t = B_{t+1} - B_t, \tag{6}$$

where X_t is the current account and B_t is the net foreign asset position. Using the definition for the current account, the aggregate resource constraint is

$$X_t = Y_t + (R_t - 1)B_t - C_t - I_t - G_t, \tag{7}$$

where R_t is the country-specific gross return on world assets and G_t is government expenditures. For simplicity, the government runs a balanced budget, funding its expenditures with non-distortionary (lump-sum) taxes.

The country-specific return R_t differs from the world return by

$$D_t = R_t - R_t^{w}, \tag{8}$$

where D_t is the real interest differential and R_t^w is the world return. As in Boileau and Normandin (2003), Nason and Rogers (2003), and Schmitt-Grohé and Uribe (2003), we model the differential as a function of the net foreign asset position:

$$D_t = -\varphi B_t / Y_t^{\xi}, \tag{9}$$

where $\varphi \geq 0$ and $\xi \geq 0$. There is no differential when $\varphi = 0$. Also, the interest differential is only a function of the net foreign asset position when $\xi = 0$. The interest differential is a reduced-form formulation to obtain an upward sloping supply of foreign funds. As in Senhadji (1997), this may occur because of an otherwise uncaptured risk premium. As in Boileau and Normandin (2003), it may also occur because international financial markets are costly to operate.

The model has three shocks: productivity, Z_t; government expenditures, G_t; and the world return, R_t^w. The shocks are generated by

$$z_t = \rho_z z_{t-1} + \varepsilon_{zt}, \tag{10.1}$$

$$g_t = \rho_g g_{t-1} + \varepsilon_{gt}, \tag{10.2}$$

$$r_t^w = \rho_r r_{t-1}^w + \varepsilon_{rt}, \tag{10.3}$$

where $z_t = \ln(Z_t/Z)$, $g_t = \ln(G_t/G)$, and $r_t^w = \ln(R_t^w/R^w)$. The variables Z, G, and R^w are the steady-state values of productivity, government expenditures, and world return. The innovations ε_{zt}, ε_{gt}, and ε_{rt} are uncorrelated zero-mean random variables with variances σ_z^2, σ_g^2, and σ_r^2.

The model is solved using a pseudo planner's problem. The pseudo planner chooses consumption, hours worked, investment, and asset holdings to maximize the expected lifetime utility of the representative consumer (equation (1)) subject to the constraints given by equations (2) to (8). Importantly, the pseudo planner takes the country-specific interest rate as given. The first-order conditions are

$$\lambda_t = U_{ht} - \psi\beta E_t[U_{ht+1}], \tag{11.1}$$

$$U_{Nt} = -\lambda_t(1-\alpha)Y_t/N_t, \tag{11.2}$$

$$\lambda_{kt} = \lambda_t/[1-\phi(I_t/K_t - \delta)], \tag{11.3}$$

$$\lambda_t = \beta E_t[\lambda_{t+1}R_{t+1}], \tag{11.4}$$

$$\lambda_{kt} = \beta E_t\left[\lambda_{t+1}\alpha\frac{y_{t+1}}{k_{t+1}} + \lambda_{kt+1}\left(1 - \delta - \Phi_{t+1}\right.\right.$$

$$\left.\left. + \phi\left(\frac{I_{t+1}}{K_{t+1}} - \delta\right)\frac{I_{t+1}}{K_{t+1}}\right)\right], \qquad (11.5)$$

where λ_t and λ_{kt} are multipliers associated with the resource constraint (equation (7)) and the accumulation equation (4). Also, U_{ht} and U_{nt} are the partial derivatives of $U(H_t, N_t)$ with respect to its arguments $H_t = C_t - \psi C_{t-1}$ and N_t:

$$U_{ht} = [C_t - \psi C_{t-1} - (\theta/\eta)N_t^{\eta}]^{\gamma-1}, \qquad (12.1)$$

$$U_{nt} = -[C_t - \psi C_{t-1} - (\theta/\eta)N_t^{\eta}]^{\gamma-1}\theta N_t^{\eta-1}. \qquad (12.2)$$

Equation (11.1) equates the shadow price of consumption to its marginal benefit. The marginal benefit has two components. The first is the rise in utility following an immediate increase in consumption. The second is the reduction in utility coming from the future lowering of consumption below its habit level. Equation (11.2) equates the marginal cost of working an extra unit of time to its marginal benefit of higher production. Equation (11.3) translates the shadow price of new capital into its output price. Equation (11.4) equates the marginal cost of purchasing an extra unit of world assets to its discounted expected marginal benefit. Equation (11.5) equates the marginal cost of purchasing an extra unit of capital to its discounted expected marginal benefit of additional future production.

The system that characterizes the equilibrium for this model includes the set of first-order conditions (11) and the partial derivatives (12). The set is completed by the production function (equation (3)), the accumulation (equation (4)), the definition of the adjustment cost (equation (5)), the definition of the current account (equation (6)), the aggregate resource constraint (equation (7)), the interest differential described by equations (8) and (9), and the laws of motion for shocks (equation (10)).

1.2 Parameterization

The system of equations that characterizes the equilibrium does not yield an analytical solution. The equilibrium must be approximated using numerical methods. For this, we employ the log-linear approximation method described in King, Plosser, and Rebelo (2002). This method linearizes the equations that characterize the equilibrium around the deterministic steady-state equilibrium. This linearization requires that values be assigned to all parameters.

We set a number of parameters to the values discussed in Boileau and Normandin (2003). The subjective discount factor is $\beta = 0.99$, the coefficient of relative risk aversion is $1-\gamma = 2$, the elasticity of labour supply is $1/(\eta-1) = 1.7$, the share of capital is $\alpha = 0.36$, the depreciation rate is $\delta = 0.025$, and the responsiveness of the interest differential to the net foreign asset position is $\varphi = 0.0035$. In addition, we set the share of work parameter θ to ensure that the time devoted to work is $N = 0.30$ in the steady state.

We use the post-1975 Canadian data to set a number of parameters (see Appendix 1). We set the adjustment-cost parameter ϕ to ensure that the ratio of the standard deviation of investment to the standard deviation of output is 2.57 as in the Canadian data. We set the steady-state level of the output share of government expenditures to $G/Y = 21$ per cent as in the Canadian data. We set the steady-state level of the world real interest rate to ensure that the steady-state level of the interest differential is $D = 0.235$ per cent as in our data. Finally, the parameters of the shock processes are set to their ordinary-least-squares estimates. The estimates are $\rho_z = 0.4920$, $\rho_g = 0.5140$, $\rho_r = 0.7209$, $\sigma_z = 0.0180$, $\sigma_g = 0.0120$, and $\sigma_r = 0.0013$.

For the remaining parameters, we explore three cases. Each case represents a particular version of the model. The baseline version assumes no habit formation $\psi = 0$. It also assumes that the interest differential depends only on the net foreign asset position $\xi = 0$, as in Devereux and Smith (2002). The debt-output-ratio version modifies the baseline version by allowing the interest differential to depend on output. For this, we set $\xi = 1$ so that the interest differential depends on the debt-to-output ratio as in Boileau and Normandin (2003). Finally, the habit-formation version modifies the baseline version to allow for habit formation. To do so, we set $\psi = 0.90$ as in Boldrin, Christiano, and Fisher (2001).

2 Results

In this section, we first study the theoretical properties of the model of the small open economy. We then compare the empirical properties of the model to those of post-1975 Canadian data.

2.1 Dynamic responses

To understand the different versions of the model, we first document the dynamic responses of a number of key variables to the different shocks.

Figure 1 displays the dynamic responses in all three versions of the model. The shocks come from positive one-standard-deviation innovations to productivity, government expenditures, and the world interest rate. The key variables are the logarithm of output $y_t = \ln(Y_t / Y)$, the current account (to output ratio) $x_t = X_t / Y_t - X / Y$, and the interest differential $d_t = R_t - R_t^w - D$, where *Y*, *X*, and *D* are the steady-state levels of output, the current account to output ratio, and the interest differential.

At first glance, Figure 1 suggests that the economy is driven mostly by productivity shocks. The responses of the variables are the largest after the productivity shock, small after a government-expenditures shock, and almost non-existent after the world interest rate shock. Also, the three versions generate dissimilar responses after the productivity shock, but very similar responses after a government-expenditures shock and after a world interest rate shock.

In the baseline version, an increase in productivity initially raises output, deteriorates the current account, and (with a period lag) raises the interest differential. The higher productivity stimulates both aggregate saving and investment, but saving does not rise enough to fully fund the investment boom. The result is a deterioration of the current account. The deterioration worsens the country’s net foreign asset position and eventually pushes up the interest differential. Over time, the investment boom subsides, the current account improves, and the interest differential returns to its steady state.

An increase in government expenditures generates a deterioration of the current account, an eventual reduction in output, and an increase in the interest differential. Importantly, the shock does not immediately affect output. As discussed in Devereux, Gregory, and Smith (1992) and Letendre (2004), this occurs because GHH preferences ensure that output depends only on productivity and the (predetermined) capital stock:

$$Y_t = \left[\frac{(1-\alpha)}{\theta}\right]^{(1-\alpha)/(\eta-(1-\alpha))} (Z_t K_t^{\alpha})^{\eta/(\eta-(1-\alpha))}. \tag{13}$$

That is, output does not initially react, because neither productivity nor the capital stock initially responds to the increase in government expenditures. The higher government expenditures reduce aggregate saving and investment, but the effect is larger on saving. The result is a deterioration of

Figure 1
Dynamic responses

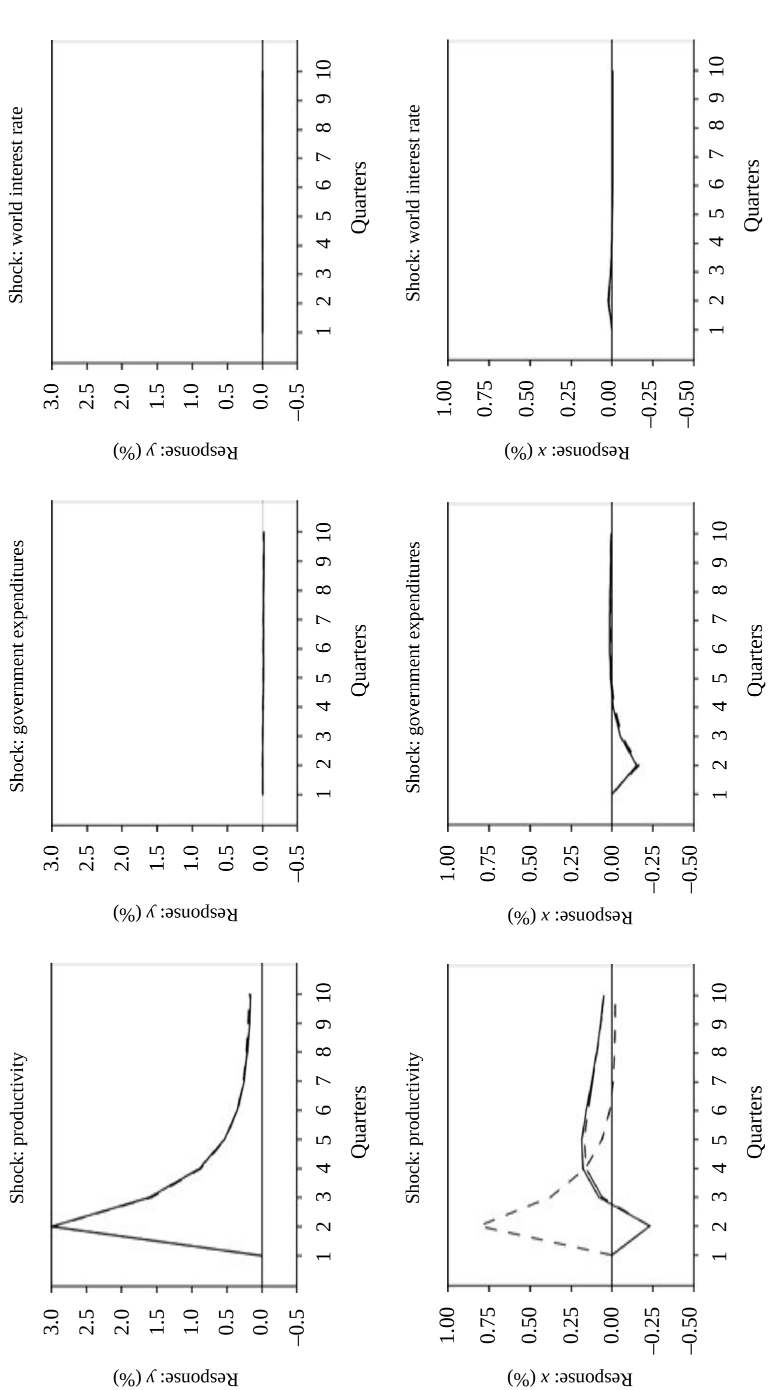

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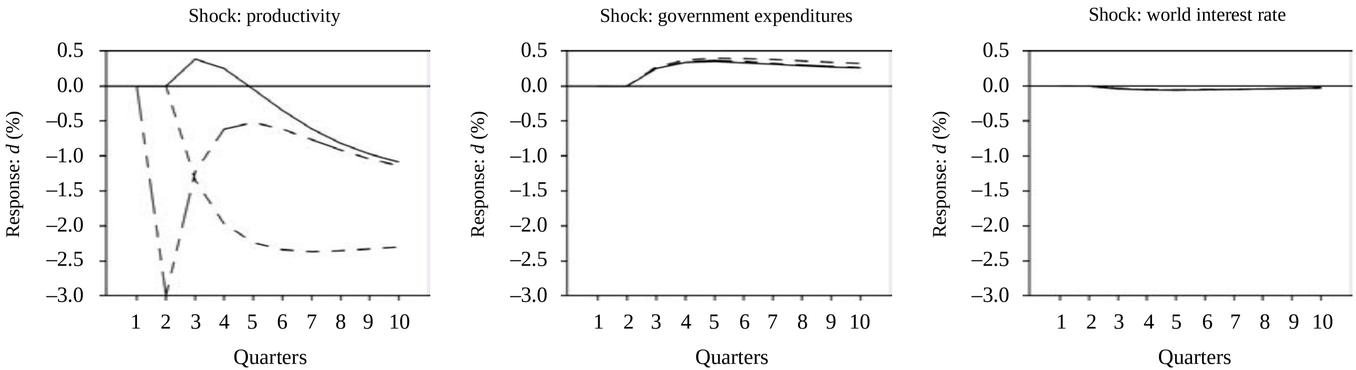
Figure 1 (cont'd)
Dynamic responses



Notes: The solid (dashed) [dotted] lines represent the dynamic responses of y, x, and d predicted by the baseline (debt-output-ratio) [habit-formation] versions. The variables are the demeaned logarithm of output (y), the demeaned ratio of the current account to output (x), and the demeaned interest differential (d).
There are three lines per graph:
——— "solid" → baseline version;
— - - — "dashed" → debt-output-ratio version;
– — — – "dotted" → habit-formation version.

the current account. As before, the deterioration eventually worsens the net foreign asset position and raises the interest differential. Facing higher expected home interest rates, firms reduce investment to lower the capital stock. This eventually lowers output. Over time, the increase in government expenditures subsides, the current account improves, and the interest differential returns to its steady state.

Finally, an increase in the world interest rate improves the current account. It eventually lowers output and reduces the interest differential. The increase in the world interest rate makes foreign saving more attractive, and this improves the current account. The improvement of the current account also improves the net foreign asset position, which lowers the interest differential. The home interest rate, however, is raised, as the rise in the world interest rate dominates the reduction in the interest differential. Facing higher expected home interest rates, firms reduce investment to lower the capital stock, which eventually lowers output. Over time, the increase in the world interest rate subsides, the current account deteriorates, and the interest differential returns to its steady state.

In the debt-output-ratio version, an increase in productivity also raises output and deteriorates the current account. The increase in productivity, however, reduces the interest differential. As in the baseline version, the higher productivity generates a deterioration of the current account, which worsens the net foreign asset position. This, however, does not increase the interest differential, because the interest differential is a function of the debt-to-output ratio. The increase in output works to reduce the interest differential, while the worsening of the net foreign asset position works to raise the interest differential. Overall, the rise in output dominates, and the productivity shock generates an initial reduction in the interest differential. As in the baseline version, an increase in government expenditures generates an eventual and negligible reduction in output, an initial small deterioration of the current account, and an eventual small increase in the interest differential. Also, an increase in the world interest rate eventually reduces output, improves the current account, and eventually reduces the interest differential.

In the habit-formation version, an increase in productivity again raises output, but the rise in output is accompanied by an improvement in the current account and an eventual reduction in the interest differential. The increase in productivity raises saving by more than investment. This occurs because the habit-formation motive forces the consumer to smooth consumption. That is, the increase in productivity raises consumption, but does little to avoid the hangover that a future large reduction in consumption would bring. The result is that saving rises more than investment. The improvement in the current account also improves the net foreign asset position, and this eventually reduces the interest differential. As in the baseline version, an increase in government expenditures generates an eventual and negligible reduction in output, an initial small deterioration of the current account, and an eventual small increase in the interest differential. An increase in the world interest rate eventually reduces output, improves the current account, and eventually reduces the interest differential.

These responses hint at important predicted features. First, they suggest that the economy is driven mostly by productivity shocks in all three versions. The responses of the key variables are the largest after the productivity shock, small after a government expenditures shock, and almost non-existent after the world interest rate shock. Second, the importance of productivity shocks suggests that output is more volatile than the current account in all three versions. That is, the responses of output are always larger than those of the current account. Third, the responses also suggest that output is much more volatile than the interest differential in the baseline version, but only slightly more volatile in the debt-output-ratio version and in the habit-formation version. The response of output is larger than the response of the interest differential in the baseline model, but not clearly so in the debt-output-ratio version and in the habit-formation version. Fourth, the importance of productivity shocks also suggests that the current account is countercyclical in the baseline version and the debt-output-ratio version, but procyclical in the habit-formation version. That is, the large initial positive response of output is accompanied by a deterioration of the current account in the baseline version and in the debt-output-ratio version, but an improvement of the current account in the habit-formation version. Fifth, although this is less clear because of the lag, the interest differential appears procyclical in the baseline version and countercyclical in the debt-output-ratio version and in the habit-formation version. The initial response of output is accompanied by an eventual rise in the interest differential in the baseline version, but a sharp current reduction in the debt-output-ratio version and an eventual reduction in the habit-formation version.

Overall, the dynamics of the model's key variables provide intuition behind the predicted business cycle features of output, the current account, and the interest differential.

2.2 Business cycle features

We now compare the business cycle features of post-1975 Canadian data to those of the three versions of the small open economy model. The Canadian quarterly data are described fully in Appendix 1. In the data, we construct the different variables to reflect the variables from the model. In particular, output y_t is the detrended logarithm of real gross domestic product, the current account x_t is the detrended current account, and the interest differential d_t is the detrended difference between the ex ante country-specific real interest rate and the ex ante world real interest rate. As in Taylor (2002), the current account (to output ratio) is the ratio of the current account and gross domestic product. As in Boileau and Normandin (2003), the ex ante real interest rate is the difference between the short-term nominal interest rate and the expected inflation rate. As in Nakagawa (2002), the short-term nominal interest rate is the rate on short lending between financial institutions. As in Barro and Sala-i-Martin (1990), the expected inflation rate is the one-quarter-ahead predicted inflation rate from a univariate ARMA(1,1) process. Also, the world interest rate is a weighted average of the country-specific interest rates for 10 developed countries, where the weights reflect the country's share of the overall real output of the 10 countries. The variables are detrended as in Hodrick and Prescott (1997).

Table 1 reports the salient features of the business cycle fluctuations of consumption, investment, the current account, and the interest differential. These features are presented for Canadian data and the three versions of the model. The table shows relative volatility and contemporaneous correlations. The relative volatility corresponds to the ratio of the sample standard deviation of a variable to the sample standard deviation of output. The correlations are the sample contemporaneous correlation between a variable and output.

In the Canadian data, consumption, the current account, and the interest differential are all less volatile than output. Investment, however, is more volatile than output. In addition, consumption, investment, and the interest differential are procyclical, while the current account is countercyclical.

The simulated statistics from the baseline version replicate those of the Canadian data remarkably well. That is, consumption, the current account, and the interest differential are less volatile than output, but investment is more volatile than output. Also, consumption, investment, and the interest differential are procyclical, while the current account is countercyclical. The main discrepancies are that the current account is not as volatile as in the data, and that the interest differential is much more volatile than in the data. The simulated relative volatility of the current account is only 25 per cent that of the historical relative volatility. The simulated relative volatility of the interest differential is 2.7 times larger than the historical relative volatility.

The simulated statistics for the debt-output-ratio version do not replicate those of the Canadian data very well. Recall that the model assumes that the

Table 1
Business cycle statistics

	Relative volatility				Correlation			
	c	*i*	*x*	*d*	(*c*, *y*)	(*i*, *y*)	(*x*, *y*)	(*d*, *y*)
Data	0.72	2.57	0.53	0.17	0.83	0.78	–0.15	0.54
Baseline	0.80	2.57	0.13	0.46	0.99	0.98	–0.42	0.44
	(0.00)	(0.03)	(0.01)	(0.05)	(0.01)	(0.00)	(0.07)	(0.06)
Debt-output ratio	0.80	2.57	0.13	0.91	0.99	0.98	–0.46	–0.90
	(0.00)	(0.03)	(0.01)	(0.03)	(0.00)	(0.00)	(0.07)	(0.02)
Habit formation	0.17	2.57	0.28	0.91	0.42	0.99	0.97	0.14
	(0.01)	(0.01)	(0.01)	(0.08)	(0.01)	(0.00)	(0.00)	(0.04)

Notes: Entries under relative volatility and correlation refer to the standard deviation of the variable relative to the standard deviation of *y* and to the contemporaneous correlation between variables. Entries in parentheses are the standard deviations of the business cycle statistics. The variables are the detrended logarithms of output (*y*), consumption (*c*), and investment (*i*), as well as the detrended ratio of the current account to output (*x*), and the detrended interest differential (*d*). The detrending method is the Hodrick-Prescott (1997) filter. The interest differential is constructed from ex ante real interest rates, using a one-quarter-ahead predicted inflation rate from an ARMA(1,1) process.

interest differential is a function of the net foreign asset position to output ratio, instead of simply the net foreign asset position. The influence of output on the interest differential appears to deteriorate the ability of the model to explain the Canadian data. In particular, the added output more than doubles the already too large relative volatility of the interest differential. The result is that the simulated relative volatility of the interest differential is now 5.4 times larger than the historical relative volatility. In addition, adding output implies that the simulated interest differential wrongly becomes countercyclical.

The simulated statistics for the habit-formation version also do not replicate those of the Canadian data well. The main benefit of the habit-formation assumption is to raise the too-low relative volatility of the current account. The simulated relative volatility is now 53 per cent that of the historical relative volatility. This benefit, however, comes at a high cost. The assumption of habit formation seriously reduces the relative volatility of consumption, while raising that of the interest differential. The simulated relative volatility of the interest differential is 5.4 times larger than the historical relative volatility. The habit-formation assumption also lowers the procyclicality of consumption and the interest differential, while it wrongly makes the current account procyclical.

To further explore the co-movements between output, the current account, and the interest differential, Figure 2 displays the dynamic cross-correlation functions between these variables. It shows the cross correlations between

Figure 2
Cross-correlation functions

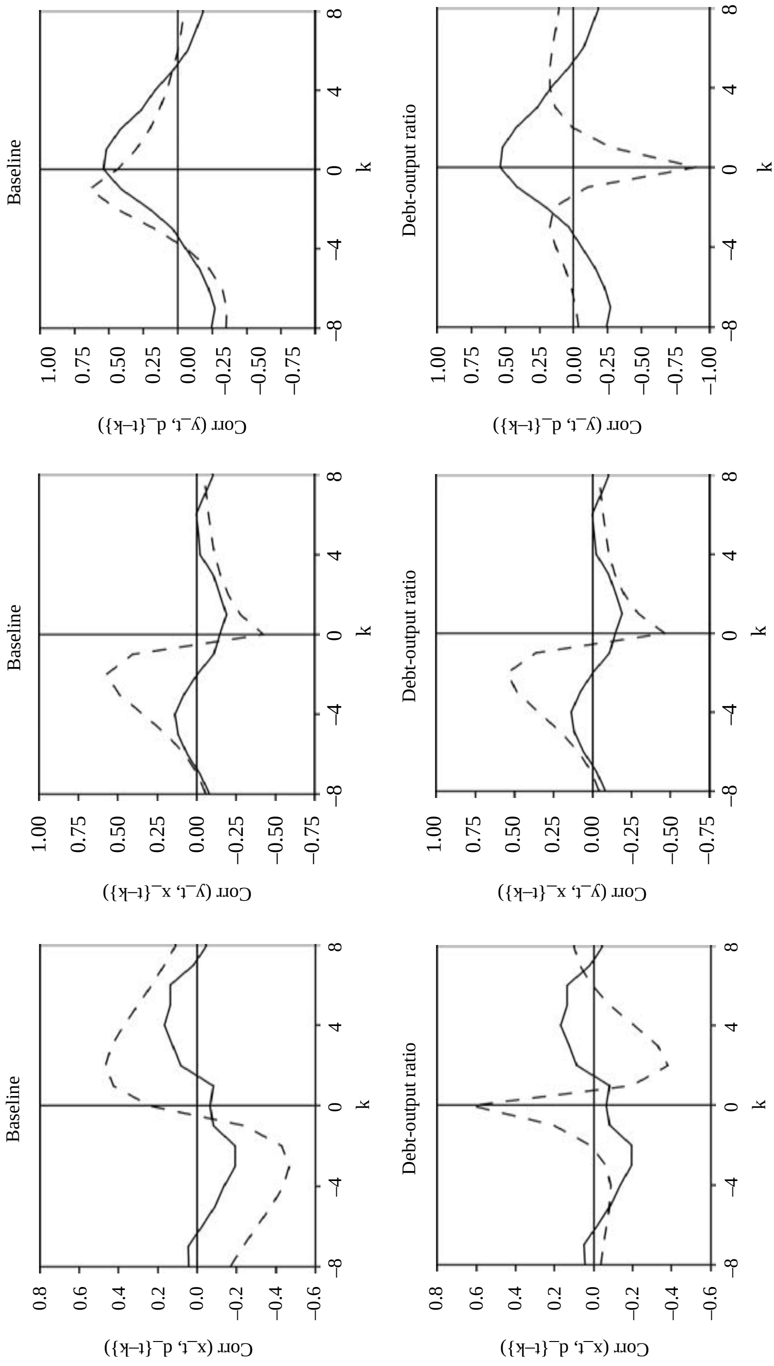


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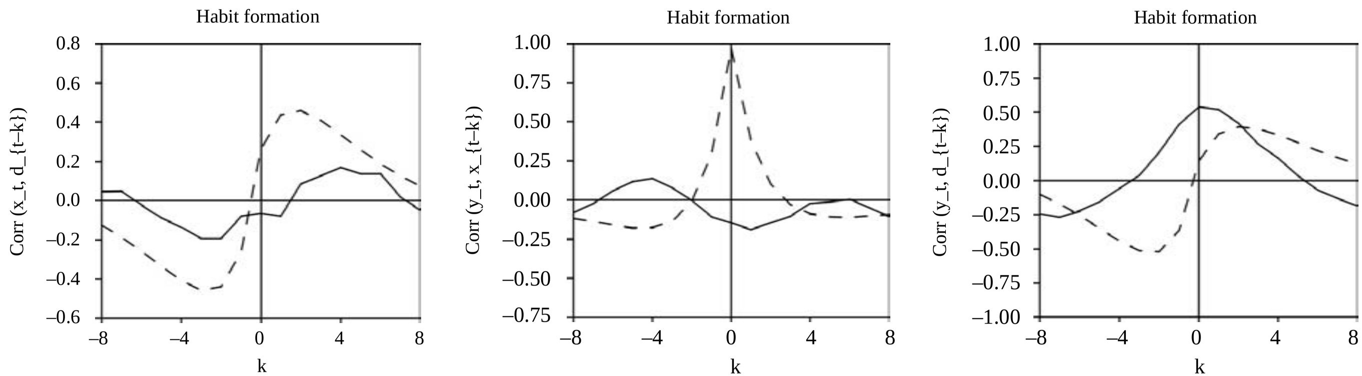
Figure 2 (cont'd)
Cross-correlation functions



Notes: The solid lines are cross correlations computed from the Canadian data. The dashed lines correspond to the cross correlations predicted by three versions of the model.

There are three lines per graph:

——— "solid" → baseline version;

— - - — "dashed" → debt-output-ratio version;

– — — – "dotted" → habit-formation version.

the current account to output ratio and the interest differential, between output and the current account, and between output and the interest differential. The different panels present both the historical cross correlations and the simulated cross correlations produced by the different versions of the model.

In the Canadian data, the cross-correlation function between the current account and the interest differential forms an asymmetric shape, reminiscent of a clockwise rotated S or a horizontal S. That is, the correlations between lags of the current account and the interest differential are negative, but the correlations between leads of the current account and the interest differential are positive, with the turning point occurring at the two-quarter lead. The cross-correlation function between output and the current account also has an asymmetric shape. The correlations between lags of output and the current account are mostly positive, while correlations between leads of output and the current account are negative. The turning point occurs at the two-period lag. Also, the current account is a leading indicator of the business cycle (i.e., the largest absolute correlation appears at the one-period lead). Finally, the cross-correlation function between output and the interest differential resembles a bell with a peak at no leads or lags (the contemporaneous correlation). That is, the interest differential is a coincident indicator of the business cycle.

The simulated cross-correlation functions for the baseline version again match those of the Canadian data remarkably well. The model predicts a sharp S-curve for the cross-correlation function between the current account and the interest differential. In particular, the predicted correlations between lags of the current account and the interest differential are negative, and the correlations between leads of the current account and the interest differential are positive. The turning point, however, occurs at the contemporaneous correlation. The model also predicts a sharp asymmetric shape for the cross-correlation function between output and the current account. The correlations between lags of output and the current account are positive, while correlations between leads of output and the current account are positive. The turning point again occurs at the contemporaneous correlation. Finally, the cross-correlation function between output and the interest differential resembles a bell with a positive peak at the two-quarter lag.

The simulated cross-correlation functions for the debt-output-ratio version fail to match those of the Canadian data. The model does not predict an asymmetric S-curve for the cross-correlation function between the current account and the interest differential. Instead, it displays a positive peak at the contemporaneous correlation. The debt-output-ratio version predicts an asymmetric shape for the cross-correlation function between output and the current account that is very similar to that of the baseline version. The cross-correlation function between output and the interest differential resembles an inverted bell. Instead of a peak, it has a trough at the contemporaneous correlation.

Finally, the simulated cross-correlation functions for the habit-formation version also fail to match those of the Canadian data. The model predicts an asymmetric S-curve for the cross-correlation function between the current account and the interest differential. The model, however, predicts a tent-shaped cross-correlation function for output and the current account. The function peaks at the contemporaneous correlation. Also, the model predicts an asymmetric S-shape for the cross-correlation function of output and the interest differential.

Overall, the simulated business cycle features of the baseline version of the model match the features of the Canadian data remarkably well. The simulated features of the debt-output-ratio model and of the habit-formation model, however, fail to match the features of the Canadian data.

2.3 Robustness

We finally verify the robustness of the business cycle statistics produced by the baseline version of the model. For this purpose, we conduct several experiments with alternative parameterizations of key parameters in the baseline version. Unless otherwise indicated, we let $\phi = 0.393$ as in the baseline parameterization, instead of varying ϕ to match the relative volatility of investment. The different experiments are reported in Table 2 and Figure 3.

The first experiment verifies the effects of changing the coefficient of relative risk aversion. For this experiment, we retain the baseline calibration, but lower the coefficient to $1 - \gamma = 1$ (logarithmic utility) and raise it to a high of $1 - \gamma = 10$. These values are consistent with the range studied in Mehra and Prescott (1985). The simulated business cycle statistics and cross-correlation functions are very robust to changes in the coefficient of relative risk aversion. Raising risk aversion merely lowers the relative volatility of consumption, but has otherwise few effects. In part, little occurs because changes in risk aversion do not affect the world real interest rate.

The second experiment verifies the effects of changing the elasticity of labour supply. For this, we lower the elasticity to $1/(\eta - 1) = 0.2$ and raise it to $1/(\eta - 1) = 2.5$. These values are consistent with the range discussed in Greenwood, Hercowitz, and Huffman (1988). Lowering the elasticity of labour supply seriously reduces the volatility of consumption. To absorb the extra consumption smoothing, both investment and the current account

Table 2
Business cycle statistics: Sensitivity of the baseline parameterization

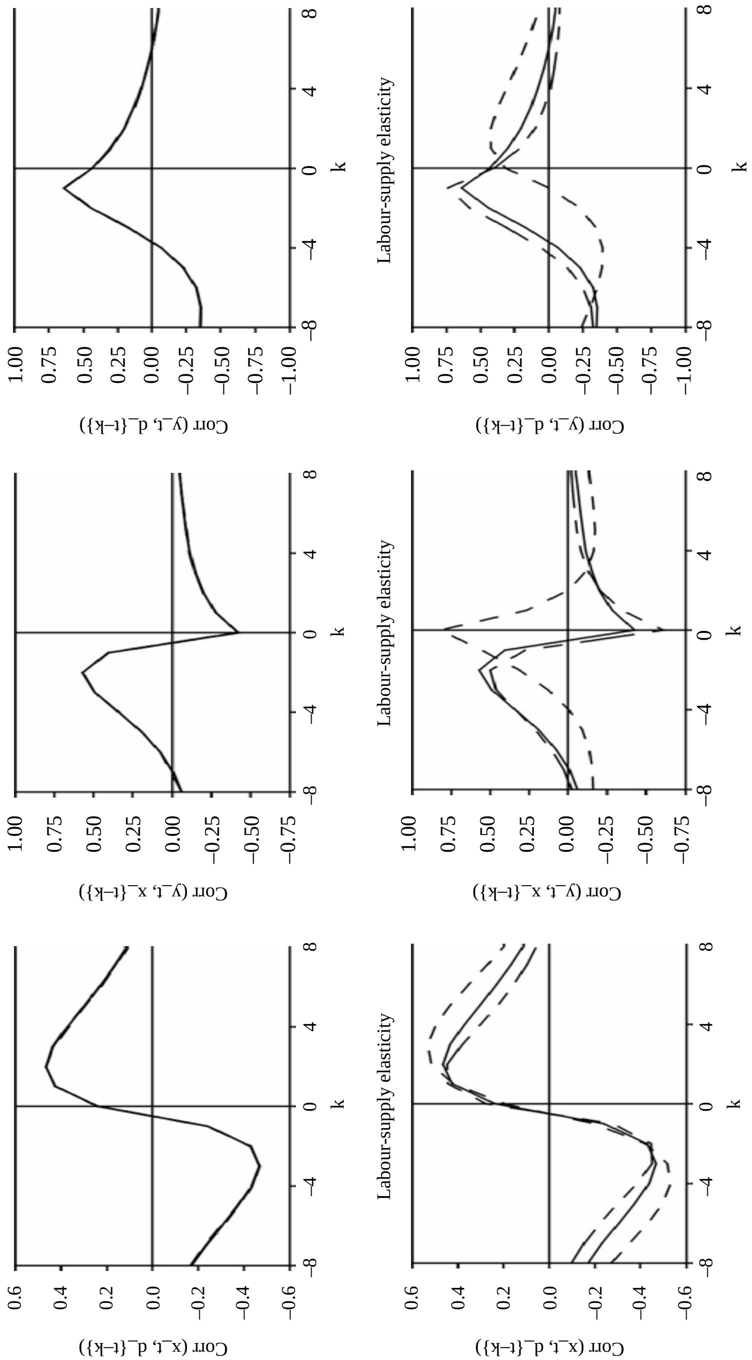
	Relative volatility				Correlation			
	c	***i***	***x***	***d***	**(*c*, *y*)**	**(*i*, *y*)**	**(*x*, *y*)**	**(*d*, *y*)**
Baseline	0.80	2.57	0.13	0.46	0.99	0.98	–0.42	0.44
	(0.00)	(0.03)	(0.01)	(0.05)	(0.01)	(0.00)	(0.07)	(0.06)
Risk aversion								
Low $(1-\gamma = 1)$	0.80	2.56	0.13	0.46	0.99	0.98	–0.43	0.43
	(0.00)	(0.03)	(0.00)	(0.05)	(0.00)	(0.00)	(0.07)	(0.06)
High $(1-\gamma = 10)$	0.79	2.58	0.13	0.46	0.99	0.98	–0.42	0.44
	(0.00)	(0.03)	(0.01)	(0.05)	(0.00)	(0.00)	(0.07)	(0.06)
Labour-supply elasticity								
Low $(\frac{1}{\eta-1} = 0.2)$	0.27	2.75	0.18	0.77	0.97	0.99	0.82	0.32
	(0.00)	(0.03)	(0.01)	(0.09)	(0.01)	(0.00)	(0.02)	(0.04)
High $(\frac{1}{\eta-1} = 2.5)$	0.90	2.55	0.16	0.48	0.99	0.98	–0.61	0.40
	(0.00)	(0.03)	(0.00)	(0.04)	(0.00)	(0.00)	(0.05)	(0.07)
Investment adjustment costs								
Low $(\phi = 0)$	0.79	14.73	3.15	4.68	0.99	0.49	–0.37	0.55
	(0.00)	(0.87)	(0.19)	(0.05)	(0.00)	(0.02)	(0.03)	(0.05)
High $(\phi = 0.786)$	0.80	1.67	0.15	0.50	0.99	0.99	0.92	0.19
	(0.00)	(0.01)	(0.01)	(0.05)	(0.00)	(0.00)	(0.01)	(0.04)
Interest differential responsiveness								
Low $(\varphi = 0.001)$	0.82	2.55	0.16	0.20	0.99	0.97	–0.28	0.45
	(0.00)	(0.03)	(0.01)	(0.03)	(0.00)	(0.01)	(0.08)	(0.06)
High $(\varphi = 0.01)$	0.79	2.53	0.10	0.80	0.99	0.98	–0.50	0.43
	(0.00)	(0.03)	(0.00)	(0.06)	(0.00)	(0.00)	(0.06)	(0.06)

Notes: Entries under relative volatility and correlation refer to the standard deviation of the variable relative to the standard deviation of *y* and to the contemporaneous correlation between variables. Entries in parentheses are the standard deviations of the business cycle statistics. The variables are the detrended logarithms of output (*y*), consumption (*c*), and investment (*i*), as well as the detrended ratio of the current account to output (*x*), and the detrended interest differential (*d*). The detrending method is the Hodrick-Prescott (1997) filter. The interest differential is constructed from ex ante real interest rates, using a one-quarter-ahead predicted inflation rate from an ARMA(1,1) process.

become more volatile. Unfortunately, as in the habit-formation version, this translates into a more volatile interest differential and a procyclical current account. The result is that the cross-correlation functions resemble those of the habit-formation version of the model.

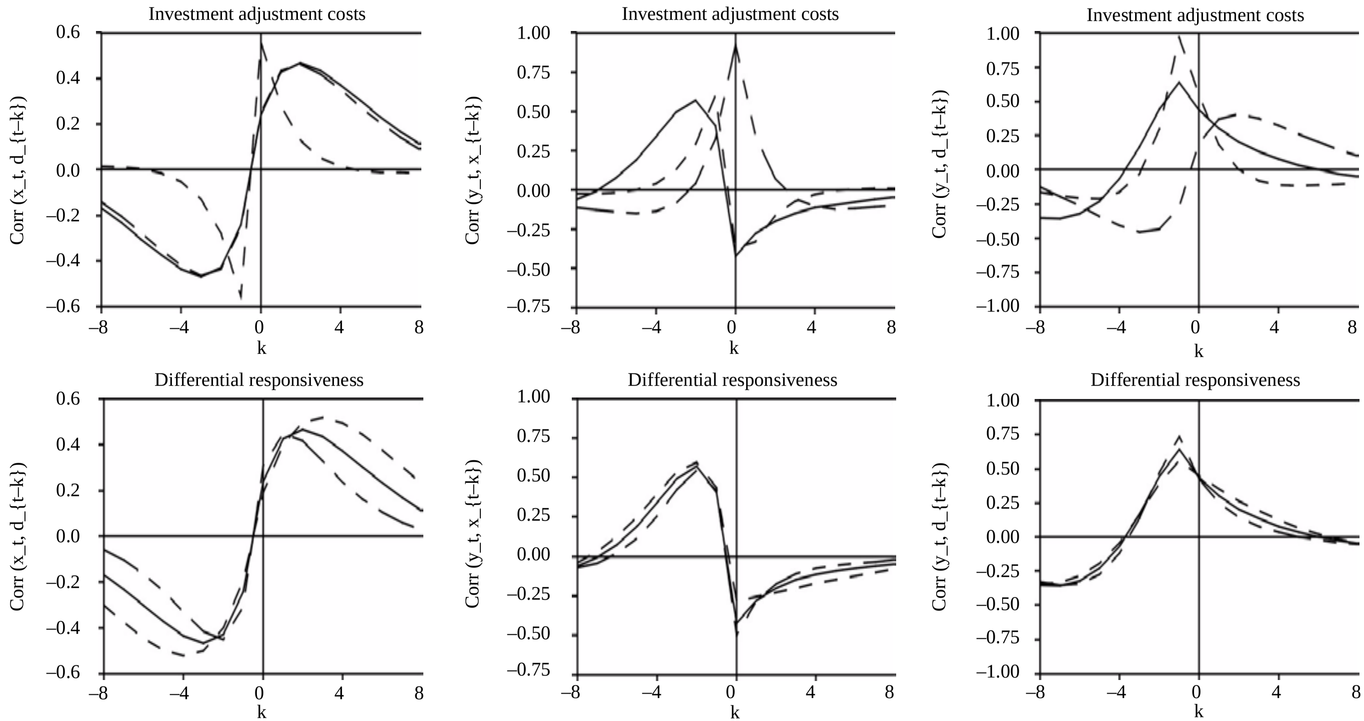
The third experiment verifies the effects of changing the cost of adjusting the capital stock. For this experiment, we lower the cost by setting $\phi = 0$ and raise it by setting $\phi = 0.786$. These values either eliminate the cost or double it (for a given investment). As expected, reducing the cost of adjusting the capital stock substantially raises the volatility of investment. This magnifies the volatility of the current account and of the interest differential. It also sharpens the shapes of the cross-correlation functions.

Figure 3
Cross-correlation functions: Sensitivity of the baseline parameterization



(cont'd)

Figure 3 (cont'd)
Cross-correlation functions: Sensitivity of the baseline parameterization



Notes: The solid lines are the cross correlations computed using the baseline parameterization. The dashed (dotted) lines are the cross correlations predicted by alternative parameterizations involving low (large) values of key parameters.
There are three lines per graph:
——— "solid" → baseline version; — - - — "dashed" → debt-output-ratio version; – — — – "dotted" → habit-formation version.

Finally, the last experiment verifies the effects of changing the responsiveness of the interest differential to the net foreign asset position. We lower the responsiveness to $\varphi = 0.001$ and raise it to $\varphi = 0.01$. These values are consistent with those found in Lane and Milesi-Ferretti (2002) and used in Devereux and Smith (2002). The increase in the responsiveness raises the relative volatility of the interest differential and lowers the relative volatility of the current account. It also makes the current account more countercyclical. Finally, the increase in the responsiveness has little effect on the cross-correlation functions.

In sum, these experiments confirm that changes in the parameterization do not substantially improve the fit of the baseline version of the small open economy model.

Conclusion

The analysis of the current account and the real interest differential have been important, but separate, enterprises. This is surprising, because current accounts and interest rates should adjust jointly to ensure the equilibrium of the world capital market.

For post-1975 Canadian data, we have documented the joint behaviour of output, the current account, and the interest differential at the business cycle frequency. We have also interpreted the joint behaviour using a simple, small open economy model. Our model assumes that agents have access to world international financial markets, but face country-specific interest rates on their holdings of world assets. In our framework, the interest differential depends negatively on the country's net foreign asset position.

The small open economy model of Canada is admittedly simple, and can easily be extended. Here is a list of extensions. First, the empirical work in Baxter (1994) suggests that business cycle fluctuations in the real exchange rate are linked to fluctuations in the real interest differential. A potential extension to our analysis would be to explore this link as part of a small open economy model. Second, the empirical work in Lane and Milesi-Ferretti (2002) specifies that the real interest differential is negatively related to the net foreign asset position to exports ratio. A simple extension would be to verify whether this improves the ability of the model of the small open economy to explain the business cycle fluctuations of the current account and the interest differential. This requires that the model distinguishes between imports and exports, which is similar to the model in Senhadji (1997). Third, the empirical and theoretical work in Normandin (1999) suggests that current account deficits and government budget deficits are linked and form twin deficits. Another extension would be to study the relationship between the government budget, the current account, and the interest differential.

Appendix 1
Data

The quarterly seasonally adjusted measures are constructed for Canada over the 1975Q1 to 2001Q2 period. The measures are computed from the International Financial Statistics (IFS) released by the International Monetary Fund, as well as from the Main Economic Indicators (MEI) and the Quarterly National Accounts (QNA) published by the Organisation for Economic Co-operation and Development.

Output

Output is measured by the weighted nominal gross domestic product (GDP) in national currency (source: QNA), deflated by the all-item consumer price index (CPI) for the base year 1995 (source: MEI). Following Backus, Kehoe, and Kydland (1992), the output weight is a constant chosen to match the average of our quarterly values of output in 1985 to the yearly data on real GDP obtained from the international prices for 1985, reported by Summers and Heston (1988) (source: variables 1 and 2 in their Table 3).

Current account

The current account is the product of the output weight, the nominal current account in US dollars (source: IFS), and the nominal exchange rate of national currency units per US dollar (source: IFS), divided by the CPI. The current account is further regressed on quarter dummies, because published current account data are not seasonally adjusted.

Interest differential

The interest differential is the difference between the Canadian interest rate and the world interest rate. The country-specific interest rate is the nominal interest rate minus the expected inflation rate. The nominal interest rate is the one-quarter interbank rate (source: IFS). The expected quarterly inflation rate is the one-quarter-ahead forecast formed from a univariate ARMA(1,1) process. The world interest rate is the sum of the country-specific interest rates weighted by the country's share of the total output of 10 developed countries. As a group, these countries account for 55 per cent of the overall 1990 real gross domestic product of the 116 countries for which data are available in the Penn World Tables (Mark 5.6a). The individual countries are Australia, Austria, Canada, Finland, France, Germany, Italy, Japan, the United Kingdom, and the United States. Germany refers to West Germany and Unified Germany for the pre- and post-1990 periods.

Consumption, investment, and government expenditures

Consumption is the output weight times nominal private final consumption expenditures in national currency (source: QNA), deflated by the CPI. Investment is the output weight times nominal gross fixed capital formation in national currency (source: QNA), deflated by the CPI. Government expenditures are the output weight times nominal government final consumption expenditures in national currency (source: QNA), normalized by the CPI.

Productivity

Total factor productivity is constructed from the production function (equation (3)) using the capital share $\alpha = 0.36$, and measures of output, capital, and employment. Capital is computed from the capital-accumulation equation (4), the adjustment-cost equation (5), the depreciation rate $\delta = 0.025$, the adjustment-cost parameter $\phi = 0.393$, the steady-state value of capital (for the initial period), and investment. Employment is calculated as the civilian employment index for the base year 1995 (source: MEI) times the population in 1985 reported by Summers and Heston (1988) (source: variable 1 in their Table 3).

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Discussion

*Talan B. İşcan**

In international macroeconomics, the present-value model is a popular and elegant framework in which to consider the current account. According to this model, the current account is the saving of a country vis-à-vis the rest of the world, and movements in the current account reflect the expected *transitory* changes in domestic income, net of investment and government spending. This interpretation is the international finance analog of the permanent-income hypothesis in consumption, whereby the only motive for saving is "for a rainy day," or the life-cycle motive.

Despite its intuitive appeal, however, the present-value model of the current account is grossly inadequate for interpreting the data for Canada, a quintessential small open economy, because the model has been repeatedly rejected by formal tests.[1] While the baseline model is stylized for a number of reasons, one of its key assumptions stands out: the interest rate faced by domestic residents is equal to the exogenous world interest rate, which in turn is equal to the subjective discount rate. On empirical grounds, for both emerging and industrial countries, a constant world interest rate applicable to borrowing and lending under *all* circumstances is no doubt a poor approximation of reality. On theoretical and computational grounds, it is also often necessary to differentiate between world and domestic interest rates to generate stationary long-run equilibrium in small open economy models. Therefore, previous literature has linked domestic and foreign interest rate differentials to domestically held net foreign assets, the change

1. See, for example, Sheffrin and Woo (1990), Otto (1992), İşcan (2002), and Nason and Rogers (2003).

* Thanks to Jim Nason for very useful comments and to Cornell University for its hospitality during the writing of this discussion.

in which is the current account. However, the relationship between net foreign assets and the interest differential is typically imposed in an ad hoc fashion. Hence, Boileau and Normandin address the extent to which alternative specifications of the link between net foreign assets and the interest differential matter for interpreting the joint behaviour of the Canadian current account and the interest rate differential.

Main Findings

Boileau and Normandin use a standard real-business-cycle framework adapted to a small open economy. Table 1 summarizes the alternative specifications they consider and their main findings. They argue that a model in which the interest differential depends on net foreign asset (NFA) positions, preferences are isoelastic, and technology shocks[2] are the primary drivers of the Canadian current account and interest rate differentials performs "well." They conclude that the model:

(i) matches relative magnitudes of some but not all volatilities; and

(ii) incorporates dynamics that match the shape of the empirical cross-correlation functions between the current account and the interest rate differential, between output and the current account, and between output and the interest rate differential.

While some economists may find this moment-matching exercise archaic and may have quibbles with filtering of the current account and the interest differential data, I think the results are interesting. The exercise chooses the most parsimonious model and gives a mono-causal explanation for the fluctuations in at least three key variables. The results are likely to be controversial, because: (i) partial-equilibrium, habit-formation models do a better job in predicting the relative volatility of the current account (Gruber 2004; but see Kano 2003); (ii) shocks to world interest rates matter significantly in other carefully calibrated equilibrium models (Nason and Rogers 2003); and (iii) how the model is closed seems to matter dramatically for short-term current account dynamics, and this is in sharp contrast to the models examined by Schmitt-Grohé and Uribe (2003). Overall, the findings are remarkable.

2. Boileau and Normandin refer to these as "productivity" shocks. However, in their model economy, these shocks represent exogenous and unexpected changes in total factor productivity or technology. Consequently, throughout this discussion, I label them as "technology" shocks.

Table 1
Framework and findings

Interest differential depends on	Preferences	
	Isoelastic	Habit formation
Net foreign assets (NFAs)	Preferred	Poor
NFA-GDP ratio	Poor	Not simulated
Shocks		
Technology (preferred)	World interest rate	Government spending

Interpretation of the Results and Reservations

To highlight the economic significance of the results, let me sketch the main mechanisms related to consumption and the current account embedded in the model. First, as in the present-value model of the current account, there is the consumption-smoothing motive over time and across states. There are only two assets: physical capital and a risk-free bond (markets are incomplete). The novel feature here is the consumption-tilting motive because of the variable interest rate. The main contribution of the paper can thus be defined by two related objectives: (i) to determine whether the consumption-tilting motive is sufficiently important to account for Canadian current account movements; and (ii) to determine whether the variable interest rate is due to world or country-specific shocks.

With isoelastic utility and income uncertainty, there is no known analytic solution for the consumption function and current account. So, to isolate the key issues, let consumption (C) growth be log-normally distributed. Then, the following approximation holds:

$$E_t[\log(C_{t+1}/C_t)] \approx \sigma(r_t - \rho) + \frac{\operatorname{var}\Delta C_{t+1}}{2\sigma}, \qquad (1)$$

where r_t is the one-period interest rate payable in period $t+1$, ρ is the discount rate, σ is the elasticity of intertemporal substitution, and $\operatorname{var}\Delta C_{t+1}$ is the conditional variance of consumption growth, $\log C_{t+1}/C_t$. Consumption growth, and by implication, the current account, depend on the interaction between the elasticity of substitution and the real interest rate. In general equilibrium, r is endogenous. Consequently, any desire to tilt consumption over time will have an immediate impact on the interest rate, and vice versa.

Next, the authors link the Canadian interest rate to the world interest rate (r^w) plus a risk premium (or interest differential, D), which is a decreasing function of Canadian net foreign assets, B:

$$r = r^w + D(B). \tag{2}$$

Finally, the domestic interest rate must be equal to the marginal-value product of capital $F_K(K, ZL)$, net of rate of depreciation (δ):

$$r = F_K(K, ZL) - \delta, \tag{3}$$

where Z is the level of labour-augmenting technology, which the authors consider stochastic, and K and L are capital and labour services, respectively.

Competing shocks

Equations (1) to (3) suggest that in this model a positive transitory technology shock resembles a negative world interest rate shock. In both cases, keeping capital stock constant, consumption initially increases because of an intertemporal substitution motive and then reaches its steady-state value from above (equation (1)). At the same time, the country accumulates capital and runs transitory current account deficits. This in turn leads to a higher level of foreign liabilities, and thus a higher risk premium. There is only one consumption-tilting mechanism that is not shared by responses to both shocks. This is the initial endogenous response of the domestic interest rate to technology shocks resulting from a change in the marginal-value product of capital (equation (3)).

This raises the question of how one discriminates between the relative importance of world interest rate shocks and country-specific technology shocks. The authors tend to side with the technology-shock interpretation, because these shocks generate more "realistic" current account movements. I have several concerns, however. First, very little of the output dynamics are endogenous to the model (Cogley and Nason 1995). Across the three calibrated models, the dynamic-impulse response of output to technology shocks is virtually indistinguishable (see Boileau and Normandin's Figure 1, column 1). The basic weakness of internal-propagation mechanisms is also evident in the dynamic responses to the other two shocks considered. Since the estimated volatility and persistence in government spending and interest rate shocks are small relative to technology shocks, none of the policy shocks generates interesting dynamics.

A second concern is that, by setting the pre-shock level of Canadian net foreign assets to zero, the authors essentially rule out potentially significant wealth effects resulting from world interest rate shocks. This raises the possibility that world interest rate shocks are not given a fair opportunity in this "horse race." Third, their inference techniques do not allow for the simultaneous influence of multiple shocks, which is the more realistic scenario.

Also note that the current account and interest differential exhibit vastly different impulse responses to technology shocks. This is important in ruling out preferences with habit formation and the model in which the interest differential depends on the NFA-GDP ratio. Yet, the three models exhibit visually identical impulse responses of the current account and interest differentials to government and interest rate shocks. This has a perplexing implication that modelling details are inconsequential in understanding the impact of policy shocks, but not technology shocks, in the context of small open economies.

Identifiable shocks

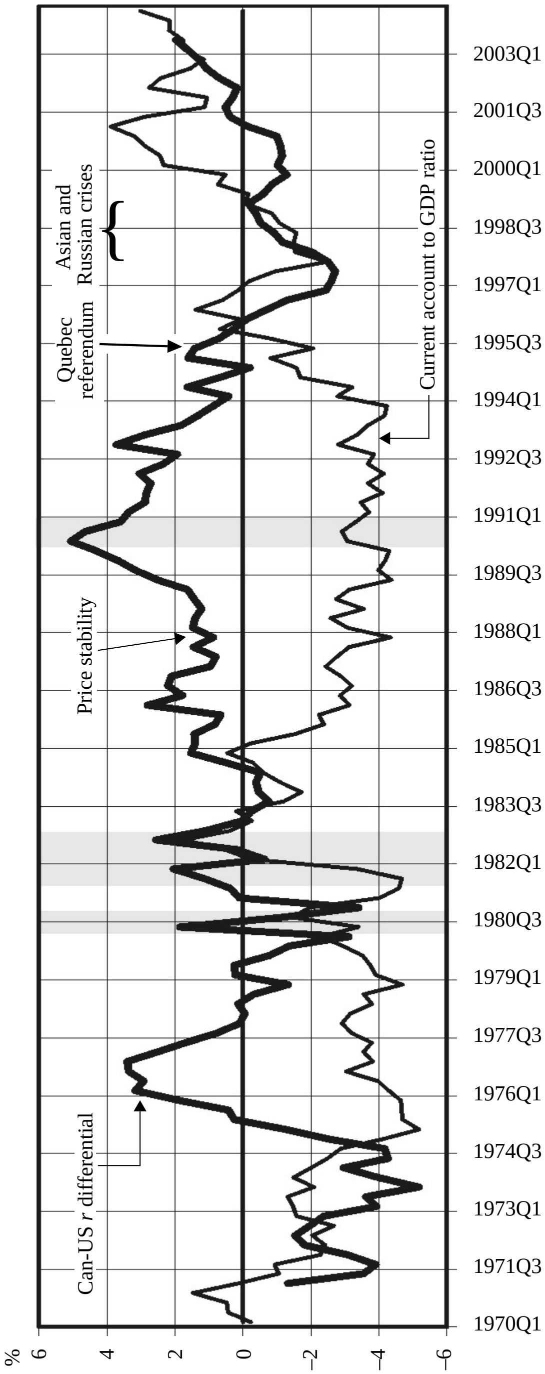
Are technology shocks really much more significant relative to policy, terms-of-trade, and nominal shocks? Skeptics point out that, if these technology shocks were so important *and* frequent, we would have heard about them. These concerns are legitimate. Moreover, we *do* often hear about swift changes in monetary and fiscal policy, as well as sudden stops in financial capital inflows.

Indeed, interest rate differentials appear to respond to identifiable changes in policy stance and to external shocks. Figure 1 labels three such identifiable, large shocks: the announcement by Bank of Canada Governor John Crow of "price stability" as the primary objective of monetary policy in Canada (1988Q1); the run-up to the Quebec referendum (1995Q3); and the Asian and Russian crises and the concomitant "flight to quality" (1997Q2–1998Q3).[3] The reader can easily think of other disturbances, both domestic and global, that have influenced interest differentials. Note that, by contrast, the current account seems to be driven much less by sudden policy reversals or even external shocks.

A technology-shock-driven explanation of the risk premium has a dramatically different interpretation, which I think is counterintuitive: a country-specific, positive technology shock stimulates investment and foreign borrowing, which in turn increases the interest differential, *D*.

3. All data are quarterly and seasonally adjusted (except interest rates) on an annualized basis, and are obtained from CANSIM II. To calculate the real interest differential, I (unrealistically) endowed agents with perfect foresight. One would like to use survey forecasts, but unfortunately, these are not available for the entire sample period. Specifically, I used the 91-day treasury bill rate for the Canadian dollar and the three-month LIBOR for US-dollar interest rates. To calculate inflation rates, I used the actual year-over-year change in CPI, all goods.

Figure 1
Current account and real interest differential



However, it is difficult to think of a higher interest premium as a sign of "good news," as the model of Boileau and Normandin would have us believe.

As well, the emphasis on technology shocks and frictionless equilibrium in accounting for the link between the Canadian current account and the real interest rate differential in the short run potentially overlooks important issues. In particular, Canadian data seem an exciting choice to examine this link in the medium run when adjustment to large and identifiable shocks is rather "sluggish." Figure 1 shows that there are notable medium-term swings in the current account (normalized by GDP), and some of these swings are closely associated with the "dance" of the real interest rate differential. The movements in the two series are fairly synchronized in the early 1980s and throughout the second half of the 1990s, when an increase in the Canadian interest rate relative to its US-dollar counterpart is associated with improvement in the current account. One would have expected a slightly different correlation from a Mundell-Fleming model and the standard elasticity approach (rising interest rate differentials, appreciation of the Canadian dollar relative to the US dollar, and an increase in current account deficits). By contrast, the rest of the period (especially from 1985 to 1995) seems to concur well with the conventional story, whereby a positive interest rate differential is associated with deterioration in the current account. Providing a coherent explanation for these medium-run movements is challenging. But, it would be interesting to see whether a frictionless general-equilibrium model can account for these correlations without falling back onto mysteriously large aggregate technology shocks.

Determinants of the risk premium

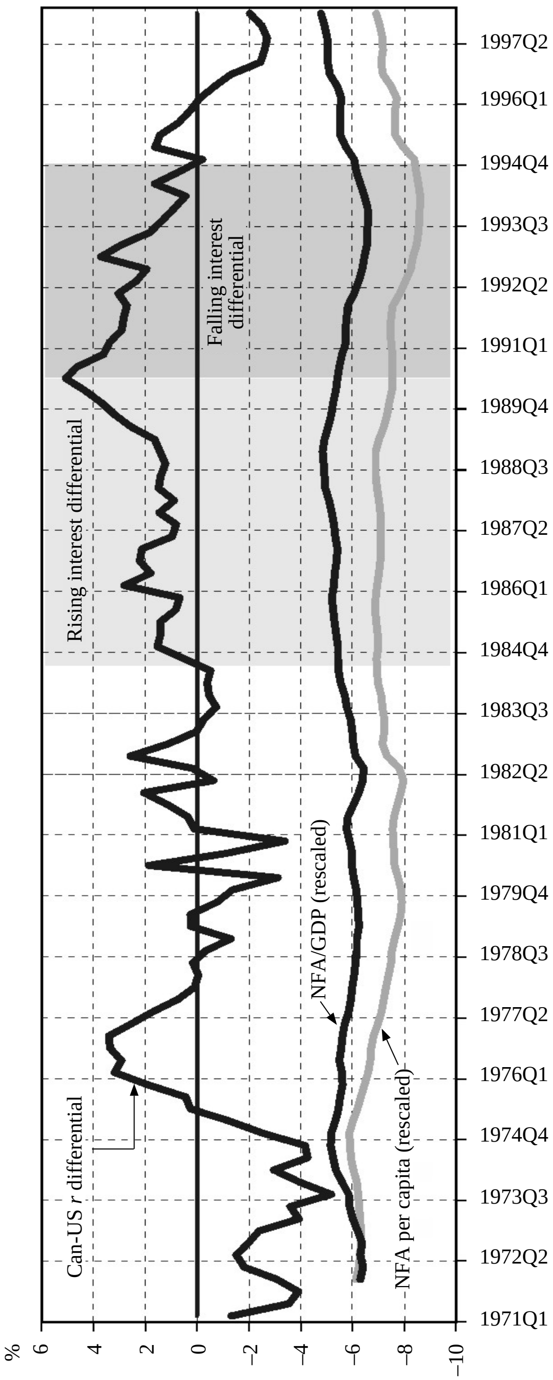
The second aspect of the Boileau-Normandin model is the proximate determinants of the real interest rate differential. They consider the following specification:

$$D = -\varphi B / Y^{\xi} \quad \text{with} \quad \varphi \geq 0, \quad \xi \geq 0. \tag{4}$$

For $\xi > 0$, the interest rate differential depends on the net foreign asset to GDP (Y) ratio. For $\xi = 0$, only the size of net foreign assets matters for the interest rate spread. The data simulated from these alternative theoretical models suggest that the specification with $\xi = 0$ matches the moments of the actual data "better."

This finding is surprising, because the raw data do not seem to discriminate that well between the two alternatives. Figure 2 presents both NFAs to

Figure 2
Net foreign assets and real interest differential



output ratio and per capita NFA for Canada against the real interest differential. As expected, the stock values are much smoother. But note the high correlation between NFA-output ratio and per capita NFA: about 0.50 for the period 1971Q4–1997Q4 and 0.74 for the period 1975Q1–1997Q4, which corresponds to Boileau and Normandin's sample period.[4] Evidently, the simulated data from the theoretical models are considerably more discriminating about the precise specification of the interest rate differential (equation (4)). The raw correlations between per capita NFA and the interest rate differentials are more supportive of the view that links interest rate differential to net foreign assets, but the correlations are not particularly high, especially after the first oil shock (–0.048 for per capita the NFA versus –0.029 for NFA-GDP ratio).

What's Next?

At least three interesting observations follow directly from this paper:

- There is a growing consensus in the literature that the variable real interest rate is an important source of fluctuations in the current account, though there is considerable disagreement on the ultimate driver of the domestic interest rate.
- There is an urgent need for a better empirical understanding of the link between net foreign assets and interest rate differentials. There is, however, no guarantee that this relationship has been stable over time, especially during periods of domestic or global financial turmoil and fiscal extravaganza.
- There is active research on the optimizing models of the current account with emphasis on explaining its short-run fluctuations. However, there are strong empirical grounds to build tractable equilibrium models of the current account for the medium run with realistically calibrated frictions.

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4. NFA data are quarterly, in Canadian dollars deflated by CPI, and were kindly provided by Christopher Baum, who extended the original data compiled by Lane and Milesi-Ferretti (2001).

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General Discussion*

Takashi Kano agreed with Gregor Smith’s comments on the need to study investment dynamics to understand current account fluctuations, though this would make the analysis more complicated. In response to Talan Iscaņ̇’s comments on the distinction between the two net foreign asset measures in his paper, Michel Normandin pointed out that while there may not be much difference in the two measures, the model has different properties and generates quite different outcomes, depending on the measure chosen.

Lawrence Schembri was surprised at the strength of the rejection of the present-value model, given that it seems to track the data fairly well. Kano replied that in future research he wanted to look at the test statistics more carefully. David Johnson asked how fiscal policy fit into the Bouakez-Kano model, what its role was. He wondered about the absence of a government sector, since there is a lot of work showing that fiscal policy affects the current account. Hafedh Bouakez added that Michel Normandin has written a paper with an overlapping-generations model in which the government deficit has an effect because his model has finite-lived agents. Their paper, on the other hand, can’t explain fiscal policy effects because they use an infinite-horizon model, and Ricardian equivalence holds. Thus, it does not matter how the government finances the public deficit.

Andrew Rose remarked that Normandin’s claim that his baseline model fits the data “remarkably well” was contradicted by the large discrepancies reported in Table 1. Normandin replied that when you look at the means, the model performs quite well, but perhaps they should have said that their preferred model fits the data “better.”

* Prepared by Robert Lafrance.