A Simple and Flexible Dynamic Approach to Foreign Direct Investment Growth: Did Canada Benefit From the Free Trade Agreements with the United States?*

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June 2004

* *Thanks to A. Brumwell for comments; however, the authors retain sole responsibility for any errors that remain.*

ABSTRACT

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This paper asks a simple question: Did Wilfred Laurier's dream of free trade with the United States, when it came to fruition in 1989, also have a benefit by increasing foreign direct investment (FDI) into Canada by US multinationals? This paper introduces a dynamic framework, rather than the literature's traditional static framework, and uses a structural break framework, rather than modelling policy changes as an intercept shift alone. Its conclusions are (a) The signing of the free trade agreements between Canada and the United States increased the responsiveness of growth in the Canadian economy on the US FDI decision by a factor of two. (b) Limited dynamics are found in the form of lagged effect of changes in the real Canadian interest rate. (c) The effect of the change in the exchange rate is static and constant over the whole 1955 to 2000 period and was unaffected by the introduction of free trade between the United States and Canada.

(I) Introduction

In the post-war period the world economy has seen the rise and expansion in regional trading blocs. The prime example is the development of the European Union since the early 1950s, but also the creation of Asia-Pacific Economic Co-operation Area in 1989 and the development of the North America free trade area since 1989. While the implication for the trade in goods and services between the partners of an agreement is implied by the very nature of the policy, the effect on foreign direct investment (FDI) is ambiguous.[1] The United Nations Transnational Corporations and Management Division (1993) noted, in the context of the European Union, the effect of these agreements on FDI can be positive or negative in relation to the members of the trading bloc. Rationalisation of production within the free trade area arising from the elimination of tariffs can result in a country within a free trade area gaining or losing FDI from its partner(s) in the agreement.[2] From a behavioural point of view a free trade agreement represents a significant change in the policy environment firms are operating in, and this in itself will affect the foreign investment decision by firms. These arguments imply that the creation of these regional trading blocs will affect the foreign investment decision by firms. The question which this paper attempts to answer is how these free trade agreements affect the foreign investment decision.

To examine the question there are two possible players to be considered: firms inside the free trade area and those on the outside (Buckley, Clegg, Forsans and Reilly 2003). The literature (e.g., Globerman and Shapiro 1999) has the prior that the decision making process will differ across these two groups. Therefore we have narrowed the scope of the paper by

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[1] This ambiguity is reflected in Canada's 10-year evaluation of North American Free Trade agreement the Department of Foreign Affairs (2003) which devotes only 12 pages of the 67 pages to the foreign direct investment issue.

[2] See Buckley, Clegg, Forsans and Reilly (2001) for a discussion of this and other points.

examining only the relationship between the partners of a free trade agreement. Examination of the outsiders' decision is left to future research.

In this paper we use an innovative methodological approach that models FDI in the context of a policy shift, specifically considering the relationship between the USA and Canada. Unlike the case of the EU, the policy environment has been relatively stable. Although these countries have signed two free trade agreements since 1987 (Canada-US: implemented on January 1, 1989 and North American: implemented on January 1, 1994) it is the first agreement that is the critical one for setting the new policy environment. As Globerman and Shapiro (1999: 517-518) point out, while the North American agreement did introduce changes to the investment rules, especially in the area of transparency, the major shift in Canada's policy occurred with the first agreement in 1989. This allows us to follow Globerman and Shapiro (1999) and model this as one change in the policy environment. Our examination will be further restricted to US FDI in Canada for the period 1955 to 2000.

In examining the FDI decision researchers have concentrated on two views of the firm's decision: the stock or level of FDI and the flow or growth of FDI. As is now well recognised (Globerman and Shapiro 1999), there are severe statistical problems in modelling the level of FDI. Generally the series is not stationary, and inferences from an econometric model in this context are misleading at best.[3] In this paper we examine the growth rate of the stock of FDI, which removes the econometric problems of analysing the stock of FDI. This approximates to studying the flow of US FDI in Canada between 1955 and 2000.

In our empirical implementation we also introduce to the literature two empirical innovations in the modelling of foreign investment. Our first innovation is to allow for a simple dynamic structure to the growth in FDI. The previous literature, in both the levels and

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[3] In future research we will be utilising methodologies developed in the Real Business Cycle literature to allow for an examination of the foreign direct investment levels series directly.

flows estimation, uses a static framework in that it is only current values of the independent variables that determine current values of the dependent variable. This viewpoint fails to recognise that there are lags between decision and implementation in the investment process. The observation of today's FDI is the result of yesterday's value of the factors in this process. The simplest way of allowing for this structure to the foreign investment decision is to utilise a distributed lag set-up in the econometric model, which we will implement in this paper.

Traditionally, the literature (e.g., Buckley, Clegg, Forsans and Reilly 2003; Clegg and Scott-Green 1999; Globerman and Shapiro 1999) models a policy innovation as an intercept shift in the estimating equation. This assumes that the policy has no effect on the standard behavioural parameters, such as those for economic growth and the exchange rate, that appear in these equations. Yet, as Lucas (1976) has pointed out in the forecasting context, we should always view the behavioural parameters of an econometric model as conditional on the existing policy environment. Changes in the policy environment can result in changes in the behavioural parameters. Econometric testing should allow for the possibility that the introduction of free trade between the USA and Canada can change the parameters of the FDI equation. In this paper we introduce a methodology, structural break analysis, to allow for such changes in the parameters of the growth in FDI.

The next section reviews the existing literature on the determinants of FDI, with a focus on the flows or growth literature. In particular, it focuses on the results obtained from three of the variables that we will use in this study: growth in gross domestic product changes in the real exchange rate and the host countries' real interest rate. In Section III we examine the time-series pattern of United States FDI into Canada between 1955 and 2000. We show that, at the time of the first free trade agreement, the time series pattern of both the level and growth in US FDI changed significantly. We then demonstrate that the levels series is nonstationary, while the growth series is stationary, so that we can model the latter series in

an econometric framework. The section concludes with a discussion of the two innovations. In the fourth section we present the results of our estimation, and there are three main conclusions; first, the signing of the free trade agreements between Canada and the USA increased by a factor of two the responsiveness of growth in the Canadian economy on the US FDI decision. Second, limited dynamics are found in the form of lagged effect of changes in the real Canadian interest rate; although, interestingly, this factor entered the decision making only after the first free trade agreement was signed. Finally, the effect of the change in the real exchange rate is static and constant over the whole 1955 to 2000 period so that the introduction of free trade has no effect on this behavioural parameter. Our concluding section will discuss the implication of these results for policy and econometric research in the FDI literature.

(II) Inward Foreign Direct Investment Flows and Free Trade

The North American free trade area began its development with the implementation of the Canada-United States Free Trade Agreement on January 1, 1989 and was expanded to include Mexico in 1994. Unlike the EU, its goals are relatively limited: the free flow of goods and services and the minimisation of the barriers that affect the flow of investment across the three borders.[4] Although the area covered by the agreement has expanded, the fundamental policy environment between the USA and Canada in terms of trade and investment rules has been stable since the implementation of the 1989 treaty. This stability is important if the researcher is to identify an effect from the creation of the free trade on FDI. We view the multinational firm's FDI decision as conditional on the policy environment it faces, and in particular that the parameters of its decision-making process are a function of this environment. This perspective leads to two questions for this section. First, what factors have previous

[4] See Globerman and Shapiro (1999, 516-518) for an excellent discussion of this latter issue.

researchers used to model the FDI decision? Second, how have policy changes been incorporated into the estimating equations in the past?

There are two approaches that can be taken in specifying an underlying FDI equation. The first is to follow Stevens and Lipsey (1992) and model a well-specified neoclassical investment process in which the domestic and foreign decisions are jointly determined. While theoretically appealing, and of interest to us in the long run, this structural approach has data requirements that we can not meet at this time.[5] The second approach, which most of the literature uses, is to use a single-equation specification that can loosely be referred to as a reduced-form or hedonic approach to the foreign investment decision. While lacking theoretically purity in terms of predictions on coefficients, it represents a reasonable starting point in the examination of the empirical issues of this paper.

In building the empirical model the researcher starts with the perspective of the representative multinational firm that has a choice of methods in foreign market servicing: direct exports, production licensed to a local firm, or via production in a foreign affiliated firm (Buckley and Casson, 1976, 1981; Dunning, 1977, 1993). As the size of the foreign market share attributable to the firm grows in absolute value terms, the cost of local production (FDI) declines relative to the cost of exporting and licensing (Buckley and Casson, 1981). This local production is better able to avoid the naturally occurring transport costs, as well as artificially-imposed trade barriers such as tariffs and non-tariff barriers. In a simple world, a reduction in either type of barrier, e.g., via transport innovation or through a change in trade policy, will tend to reduce the business case for local production and strengthen that for exports. Nevertheless, as the firm's sales in the host market grow, a point will arrive beyond which FDI minimises total cost. At this point a standard investment demand function suggests

[5] In particular as Stevens and Lipsey (1992: 45) point out you require a consistent domestic and foreign investment series which is not generally available. Further, the data series they use (McGraw-Hill Company)

that market size becomes a key driver of FDI in developed countries. This suggests that we should follow the literature and model the FDI decision as conditional on Gross Domestic Product (GDP), which is a reasonable proxy for market size.

Results on the estimation of Canada-US FDI flows show a significant positive effect of market growth on FDI as measured by the change in GDP (Globerman and Shapiro, 1999). Using industry level data for Japan, Farrell, Gaston and Strum (2003) also find a positive coefficient on a real GDP variable.[6] The results for the EU are in general negative. Clegg and Scott-Green (1999) find predominantly insignificant effects (for US FDI) or significant negative impacts for Japanese FDI. Previous EU studies (Pearce, Islam and Sauvant, 1993; Aristotelous and Fountas, 1996) came to similar conclusions to the Clegg and Scott-Green study. However, these European studies include potentially nonstationary regressors (e.g., level of GDP) and so cannot be treated as strong evidence against the market growth hypothesis.

The standard expectation in the literature is that an appreciation in the host country currency relative to the home currency will lead to a decrease in FDI inflows (Cushman, 1985). To date, the weight of empirical work has concentrated on the USA as the host country (Bailey and Tavlas 1991; Caves 1990; Cushman 1985; Ray 1989). The overall evidence suggests an inverse relationship between the exchange value of the host currency and FDI inflows (Stevens, 1993). However, Stevens (1977) developed three alternative models of FDI behaviour to show that a dollar devaluation (US as home country) could assume either a positive or negative sign. The theoretical impact of the exchange rate on FDI is also complicated by the fact that there are likely to be several simultaneous influences

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does not provide country breakdowns of the foreign investment decision and thus would not be able to examine the US-Canada decision, which is the goal of this paper.

[6] Though it should be point out that the result disappears when a country fixed effect is included in the pooled regressions.

having opposite effects, even for a single firm. As a consequence, it is difficult to make a solid prediction without making an assumption about the dominant character of FDI in question. For instance, market-seeking (import substituting) FDI would associate a host exchange rate appreciation negatively with FDI inflows during initial market entry into the host country. The logic is that a host appreciation both renders imports cheaper in terms of host currency and host assets more expensive in terms of foreign currency, thereby reducing the profitability of FDI (Logue and Willet, 1977; Kohlhagen, 1977). As the exchange rate is often proxied in empirical testing (as it is in our study) by the number of units of host country currency that can be bought with one US dollar, this would suggest an expected positive sign in the case of market seeking FDI. The empirical evidence therefore suggests that the dominant FDI motive is market seeking.

A variable for the opportunity cost of investment is necessary in the model as a control variable which impacts upon real investment expenditure. While theoretically important, such a measure has not been included in the study of FDI. The ideal specification for this model is to include both the Canadian bond rate and US bond rate, but we are precluded from doing this because they are highly co-linear. Therefore we choose only the Canadian bond rate because this provides an additional test of our fundamental hypothesis that certain control variables become significant behavioural variables after integration under the free trade agreement.

As noted above, the relative interest rate is also included as a control variable. When financial markets are to some extent segmented, the international spread in the cost of borrowing should theoretically impact upon the financial component of FDI, so capturing the portfolio-type refinancing of FDI. If the host country cost of borrowing rises relative to that in the home, then foreign affiliates will tend to reduce their local borrowing and increase their borrowing from the parent firm, thereby increasing the FDI stock and outflow (Boatwright

and Renton, 1975). This behaviour falls within the corporate treasury function of MNEs, and is a mimicking of the behaviour of portfolio investment in the external market, which exploits short-lived international differentials (Gilman, 1981). However, most of the impact on FDI of interest rate spread changes occur within relatively short periods, certainly less than a year, and are temporary, affecting only the *timing* of FDI flows rather than the eventual *amounts* of real investment expenditure (Boatwright and Renton, 1975). With only annual (e.g., as compared with quarterly) data, much of the variation in this variable is lost. General insignificance is therefore not surprising, e.g., as found by Culem (1988) and Clegg and Scott-Green (1999) for US FDI in the EU. To date little support has been found for this hypothesis although it remains theoretically valid.

At this point, unlike many researchers in the area (e.g. Globerman and Shapiro 1999; Clegg and Scott-Green 1999), we will refrain from adding any further variables to our FDI equation. Especially prominent in variables that we are excluding are controls for corporate taxation and wage costs and this is for two reasons. First, while in each case a theoretical argument can be made for their inclusion there exists no evidence in either the North American or European context that at the aggregate level these extra variables have a significant effect on FDI flows. This implies that our results are unlikely to be subject to omitted variable bias. The second reason is that to over-parameterise the equation, as many researchers do, significant effects are being lost due to the increase in the standard errors arising from either partial collinearity between independent variables or a dearth of degrees of freedom effect, or both. For these reasons we feel justified in pursuing a strategy of limiting the independent variables in our FDI equation.

Finally, we turn to modelling the change in policy effect in the FDI equations that are estimated. Traditionally, authors such as Globerman and Shapiro (1999), Clegg and Scott-Green (1999), and Buckley, Clegg, Forsans and Reilly (2001, 2003) have used a dummy

variable to capture the policy changes brought about by free trade. The dummy variable in this context measures the effect of the policy change on the intercept. We argue in this paper that a free trade agreement brings about fundamental policy changes, which are likely to affect the parameters of our model. The change in the parameters reflects the change in the behaviour of firms that conduct business across borders. In terms of Buckley and Casson's optimal timing of a FDI model (Buckley and Casson, 1981), the use of a dummy variable in an econometric model captures the intercept effect (changes in levels of FDI, following changes in the fixed costs of servicing a foreign market). Using a growth approach, we argue that fixed costs of FDI remain unchanged. What changes, however, is the variable cost of servicing a foreign market through exports or FDI. Beyond this market share and size considerations affect the relative profitability of FDI versus exports. This, we argue, affects the coefficients of all the parameters in the model, and is a slope effect, as opposed to an intercept effect.

(III) US FDI into Canada and Modelling Strategies with Emphasis on Free Trade Effects

Figure 1 presents, in 1985 Canadian dollars, the path of US FDI into Canada between 1955 and 2000. For most of this period there is an upward trend in the data; however, in the early 1990's the upward trend appears to increase dramatically. This insight is supported by Figure 2, which plots the growth rate in US FDI into Canada for the same period. For the 1950s and early 1960s we observe a period of high growth in US FDI into Canada which, after 1967 and until the early 1990s, appears to be on a downward trend. There are eight years of negative growth in this series between 1973 and 1989. In the early 1990s high growth reappears, such that growth rates in US FDI into Canada return to levels only observed previously in the 1950s. Table 1 documents this periodic variability in the average growth rate in US FDI into Canada. The average for the whole period is 3.3 percent but this is generated by an average of only 1.3 percent between 1977 and 1988 and 4.7 percent after 1987. This pattern in both the

level and growth in US FDI into Canada would be expected if Canada did indeed benefit in from the introduction of free trade between the two countries.

There is a problem in asserting that Figures 1 and 2 document a free trade agreement effect on US FDI into Canada, since this pattern could be the result of other factors occurring at the same time as the implementation of the first free trade agreement in 1989. An obvious factor is the growth of the Canadian economy which can, in part, account for the change we observe in these two figures. Between 1980 and 1991 Canadian real GDP grew on average by 2.4 percent; while, after that, the average growth rate was 3.1 percent. Thus what we observe is, in part, US multinationals responding to the growth in their Canadian markets. This suggests that we need to use a conditional, or regression, framework to disentangle the different effects.

To implement a conditional analysis requires that the measure we explain is stationary. The reasonably continuous upward trend in the stock of US FDI in Canada outlined in Figure 1 suggests that it might be subject to a stochastic trend and thus not a stationary series. Testing for this under the null hypothesis that there is stochastic trend in the real US FDI in Canada we find that the Phillips-Perron test statistic for this series is -1.20 with a MacKinnon approximate p-value of 0.934.[7] This, of course, is the conclusion that Globerman and Shapiro (1999) came to and, like them, does not allow us to use a regression technique to examine the determinants of the stock of US FDI in Canada over this period.

To identify a free trade effect in the data requires us to use an alternative representation of the FDI series. Previous researchers have addressed this problem by using FDI flows (Clegg and Scott-Green 1999; Globerman and Shapiro 1999) or by normalising the FDI level series using another trended variable, such as GDP (Klein and Rosengren 1994;

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[7] We use this unit root test since it is less susceptible to an incorrect conclusion when a series possesses a structural break, as we will argue below, than the standard Augmented Dickey-Fuller tests. However, as Appendix B documents using this traditional test comes to the same conclusion.

Hejazi and Safarian 1999). Our alternative representation of the series is to model it in a growth context and in particular to use:

$$g_t^{K^F} \cong \ln\left(K_t^F\right) - \ln\left(K_{t-1}^F\right). \quad (1)$$

Where:

K_j^F : the stock of United States FDI in Canada, j=t or t-1;

$g_t^{K^F}$: the growth rate in that stock in period t.

An advantage of using equation (1) as a representation of US FDI in Canada is that the coefficients in a regression context will have a straightforward interpretation relative to the other alternatives used in the literature. Another advantage of $g_t^{K^F}$ is that it is a stationary series. This documented in Table 2, which reports a Phillips-Perron test statistic for the series of -3.141 with a MacKinnon approximate p-value of 0.024. So we can reject the null hypothesis that the series is non-stationary, so enabling us to use the growth rate of US FDI into Canada within a regression framework.

The standard approach in the FDI literature is to use current value(s) of the explanatory variable(s) so, in our growth context, a simplified representation of this equation is:

$$g_t^{K^F} = \beta_0 + \beta_1 \Delta X_{1t} + \Delta u_t. \quad (2)$$

Equation (2) hypothesises that growth in Real Canadian GDP between period t and t-1 $\left(\Delta X_{1t} = X_{1t} - X_{1t-1}\right)$ explains the growth in US FDI into Canada. We can label this as a static process in that only current values matter and the past values play no role.

Given that the underlying process being modelled is investment decisions by firms, this static assumption is extremely strong even in the context of the annual data that we analyse. The idea we want to capture is that firms make an investment decision using the

current information available; however, its actual implementation, when it appears in the books, can be in the future. What we observe today will be a function of both current and past information: it is a dynamic and not static process. The simplest method to introduce dynamics into the relationship is to use a distributed lag structure by including lagged values of the independent variables in the econometric equation:[8]

$$g_t^{K^F} = \beta_0 + \beta_1 \Delta X_{1t} + \beta_2 \Delta X_{1t-1} + \Delta u_t \tag{3}$$

Relative to equation (2) equation (3) hypothesises that this year's growth in US FDI into Canada is a function of this year's and last year's $\left(\Delta X_{1t-1}\right)$ growth in real Canadian GDP. The advantage of this simple set-up is that hypothesis testing procedures can be used to determine whether the lags do matter, and that we require a dynamic structure to explain the data. If a dynamic structure is required, then the cumulative effect of a factor is just the sum of the individual period or dynamic factors associated with it:

$$\beta_1^T = \beta_1 + \beta_2 \tag{4}$$

The distributed lag structure outlined in equation (3) is extremely flexible in that it does not require all factors that determine the growth in US FDI into Canada to have a dynamic structure. For example, a factor such as change in the real exchange rate $\left(\Delta X_{2t}\right)$ can be added to equation (3) as a static factor:

$$g_t^{K^F} = \beta_0 + \beta_1 \Delta X_{1t} + \beta_2 \Delta X_{1t-1} + \beta_3 \Delta X_{2t} + \Delta u_t. \tag{5}$$

So, using the distributed lag structure to the underlying equation can nest both dynamic and static factors in the determination of the growth in US FDI into Canada. Further, we can view the existing literature as just a restricted version of equation (5) in that lagged coefficients are zero.

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[8] In this paper we leave the dynamics in terms of the dependent variable as unspecified and correct for the implied autocorrelation.

Equation (5) assumes that the parameters of the equation are not affected by the introduction of free trade in the bilateral relationship between the USA and Canada. We argue that the development of a free trade area between the two countries, which was implemented in January 1, 1989, represents a fundamental change in the economic policy governing the relationship between the two countries. As Robert Lucas (1976) argued, in a forecasting context, the parameters of an econometric model are conditional on the existing policy regime. When a policy regime changes, it is necessary to allow for the possibility that the parameters governing the relationship change. To capture this idea we treat the implementation of the first Canada-US free trade agreement as a structural break in the parameters of the relationship. For example, before the free trade agreement, the effect of current growth in Canada's GDP is β_1, but that after this agreement comes into force the coefficient is now β_1^* because of the fundamental change in policy. Therefore, the free trade effect on the parameter can be defined as:

$$\beta_1^{FT} \equiv \beta_1^* - \beta_1 \tag{6}$$

Viewing the process in this structural break framework allows us to estimate β_1 and β_1^{FT} using a dummy variable:

$$D_t^{FT} = \begin{cases} 1 & \text{if } t \geq 1989; \\ 0 & \text{if } t < 1989. \end{cases} \tag{7}$$

The parameter on any variable interacting with the dummy variable defined in equation (7) yields an estimate the change in the parameter that is a result of the introduction of free trade between the United States and Canada: β_1^{FT}. Its companion variable, not interacted with D_t^{FT}, yields an estimate of the pre-free trade effect $\left(\beta_1\right)$ of the variable on the growth in US FDI into Canada. Using equation (6) we can then derive an estimate of the post-free trade effect $\left(\beta_1^*\right)$ the variable has on the growth of US FDI into Canada. Expanding equation (5) to allow

all parameters to be affected by the introduction of free trade between Canada and the USA, we now have a hypothesised FDI growth equation:

$$g_t^{K^F} = \beta_0 + \beta_1 \Delta X_{1t} + \beta_1^{FT}\left(D_t^{FT} \times \Delta X_{1t}\right) + \beta_2 \Delta X_{1t-1} + \beta_2^{FT}\left(D_t^{FT} \times \Delta X_{1t-1}\right) + \beta_3 \Delta X_{2t} + \beta_3^{FT}\left(D_t^{FT} \times \Delta X_{2t}\right) + \Delta u_t. \tag{8}$$

Specifying the relationship using equation (8) allows us to test directly if the development of the free trade area between the United States and Canada did affect the decision by US multinationals to invest in Canada. This is just a standard significance test on the parameter of the dummy variable-interaction variable. Thus with this distributed lag and structural break innovations we have a flexible methodology that allows the data tell us what is and is not important in determining the growth of inward US FDI into Canada in terms of both dynamic and free trade effects.

So far we have introduced two of the variables that we will use to model the growth rate of US FDI into Canada. We control for market size using the growth in the Canadian economy as proxied by growth in Canada's real gross domestic product $\left(\Delta X_{1j} : j = t \text{ or } t-1\right)$. As Table 2 makes clear, this variable is stationary and so it is a legitimate regressor in explaining the growth of US inward FDI in Canada.

We will also control for changes in the exchange rate using the ratio of Canadian dollars to US dollars $\left(\Delta X_{2j} : j = t \text{ or } t-1\right)$. The Phillips-Perron Unit root statistic is –5.603 and so we can reject the null that it is a non-stationary series and it is a legitimate regressor.

Finally, to capture the opportunity cost of US multinationals FDI in Canada we use changes in real Canadian medium term interest rates $\left(\Delta X_{3j} : j = t \text{ or } t-1 \text{ or } t-2\right)$ to capture the effect of the opportunity cost of US FDI in Canada in terms of a risk-free paper asset. As Table 2 illustrates, this is also a stationary series and so can be used in a regression

framework. As we make clear in the next section, the inclusion of the second lagged term for the effect of the opportunity cost of FDI is justified for empirical reasons.

The most general specification of the relationship we will be estimating is:

$$\begin{aligned} g_t^{K^F} &= \beta_0 + \beta_1 \Delta X_{1t} + \beta_1^{FT}\left(D_t^{FT} \times \Delta X_{1t}\right) + \beta_2 \Delta X_{1t-1} + \beta_2^{FT}\left(D_t^{FT} \times \Delta X_{1t-1}\right) \\ &+ \beta_3 \Delta X_{2t} + \beta_3^{FT}\left(D_t^{FT} \times \Delta X_{2t}\right) + \beta_4 \Delta X_{3t} + \beta_4^{FT}\left(D_t^{FT} \times \Delta X_{3t}\right) \\ &+ \beta_5 \Delta X_{3t-1} + \beta_5^{FT}\left(D_t^{FT} \times \Delta X_{3t-1}\right) + \beta_6 \Delta X_{3t-2} + \beta_6^{FT}\left(D_t^{FT} \times \Delta X_{3t-2}\right) + \Delta u_t. \end{aligned} \tag{9}$$

One criticism of equation (9) is the failure to control for other factors in the FDI decision by firms; however, as our review of the empirical literature in the previous section makes clear, many of these regressors used by other researchers are generally insignificant. In recognition of the limited degrees of freedom that face us in our empirical estimation, there are strong efficiency reasons for following Zvi Griliches' (1974) advice to minimise the number of parameters estimated.

(IV) Results

Table 3 presents the results of seven specifications of our model of US FDI growth into Canada. The specifications include the literature's standard static specification in column (1); a static model that allows for free trade effects in column (3); a full dynamic specification with free trade effects in column (4), which is our estimate of equation (9); and concludes in column (7) with our preferred specification of the relationship. In the second part of Table 3 we present various specification tests that allow us to distinguish between the seven specifications in this table.

Column (1), the standard static specification, assumes no free trade effects on the parameters of the relationship and we obtain some standard results with this specification. Current Canadian GDP growth and the change in the exchange rate have positive and statistically significant parameters, which are in line with the existing literature and/or theoretical expectation. However, the change in the medium term bond rate variable has a

negative sign though it is statistically insignificant. While the Ramsey Reset test indicates no specification problems, the extremely low power of this test makes us sceptical of its ability to guide us in choosing a specification. As is clear, none of the seven specifications tested using this statistic indicates a problem even though all them are significantly different from each other. For this reason, in choosing between specification we will use traditional t and F-tests on the parameters of the equation that are reported in this section of Table 3.

An improvement might be obtained by allowing for a dynamic specification in the no free trade effects context, and these results are reported in column (2) of Table 3. The conclusion is that the results are inferior to the standard specification: the change in returns variable remains insignificant both the current and lagged values. The change in the current exchange rate is now statistically insignificant, as is the lagged term that has been added; although, the cumulative multiplier parameter is similar in size to that reported for the current variable in column (1) and it is statistically significant. This suggests that exchange rates are important but we are not modelling them properly. Our formal test of the dynamic model suggests that jointly the four lags terms in this specification are zero because the F-statistic in this case is only 0.38 with a probability value of 0.516. This leads to the conclusion that introducing dynamics does not of itself improve the explanation of the growth in US FDI into Canada.

Column (3) of Table 3 takes the static specification but now allows all the parameters, except the constant, to change after the introduction of free trade between Canada and the United States.[9] Our test of the joint significance of the three interaction parameters allows us to reject the null hypothesis that they are jointly insignificant, and suggests that we have found some free trade effects in the data. In particular, our estimate of post free trade effect of

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[9] Results reported in Appendix C, Table C.2 replicate the results in columns (3) to (7) of Table 3 but include the free trade dummy and thus allow for the intercept term to change with the introduction of free trade between the

growth in the Canadian economy is large and indicates that the introduction of free trade between the two countries increased the responsiveness of US multinationals to this factor. However, with this specification we have obtained no improvement on our change variable for the opportunity cost of FDI, and the interaction parameter on the change in exchange rate variable is insignificant. The combined evidence suggests that we could do better in specifying the relationship.

Combining our two empirical innovations with a full set of dynamic and free trade effects is reported in Column (4). There are a number of interesting results in this specification. First, both our dynamic and free trade tests indicate that we can reject the null hypothesis that all the lags or post-free trade parameters are zero, so we now have evidence that the distributive lag and structural break specification changes help explain the data. Second, the pre-free trade parameter on current growth in real Canadian GDP is larger than in our previous specifications. Finally, we now observe a significant effect on the change in opportunity cost variable, although this is positive and only in the case of the first lag of post-free trade parameter.

However, Column (4) reports a number of insignificant parameters, which suggest the specification is over-parameterised. In particular, all the lagged terms estimating the dynamic parameters prior to the introduction of free trade are individually and jointly insignificant, as reported in Table 3. So, to improve the results, we re-specify the specification by assuming that, prior to free trade being implemented, the relationship was static and set these lagged term parameters to zero. These results are reported in column (5) of Table 3. Again, we report that both of the dynamic and free trade parameter tests indicate they are jointly significant parameters. Our results on GDP growth are unchanged, but we are now obtaining similar

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two countries. The parameter on this dummy is always statistically insignificant and this affects none of our conclusions.

results on the pre-free trade effect on the change in the exchange rate, as in columns (1) and (3). Further, the post-free trade lagged change in the real interest rate variable becomes statistically significant. This suggests that we are arriving at a reasonable specification; however, the post-free trade coefficients for the change in the exchange rate are individually and jointly insignificant. In addition, the post-free trade coefficient on the change in real interest rates is statistically insignificant. Therefore we set these three coefficients to zero, and the results of this re-specification are reported in Column (6).

This second-to-last specification again produces results consistent with significant dynamic and free trade effect, and the only remaining insignificant parameter is the post-free trade parameter on lagged change in real Canadian GDP growth which, when set to zero, yields our final reported specification in Column (7). The reported coefficient on the current change in real Canadian GDP is similar to the estimates that we obtain for the cumulative effect for this variable in the previous specification. This suggests that allowing for a dynamic structure for this variable after the free trade agreement has over parameterised the relationship.

All coefficients reported in Column (7) of Table 3 have, from a theoretical perspective, a reasonable sign and in Table 4 we have converted these results into elasticity form for ease of interpretation. The market size variable, real growth in Canadian GDP, both pre- and post-free trade parameters indicate that US multinationals respond to the growth in demand for their products in Canada by increasing capacity of their affiliates. In this case the coefficients are in elasticity form already and, as Table 4 indicates, prior to the implementation of the free trade agreement market size was basically a unit elastic response. A one percent growth in the Canadian economy would result in a little less then one percent growth in US FDI. After 1989 the response to a similar change results in an almost two percent growth in investment by US multinationals. After this point the variable is picking up

a clear market growth effect, in that within the new policy environment American multinationals see a growing Canadian economy as one where new investment opportunities are available.

Our change in the real exchange rate parameter estimate, while different from what is usually obtained when examining FDI into the USA, and from Globerman and Shapiro's (1999) results for Canada, can be explained both empirically and theoretically. From an empirical perspective (pace Globerman and Shapiro 1999) we have used a real and not nominal exchange rate so that standard "inflation" based explanations of the negative sign on host appreciation are not appropriate in this case. This result suggests that the reaction that the reaction of the US multinational is as argued above, i.e., the appreciation of Canadian assets in Canadian dollar terms result in expanded FDI by US MNEs in Canada.

The negative coefficients on the lagged changes in medium bond rate capturing the opportunity cost of FDI, after implementation of the free trade agreement, indicate that US multinationals responded to increases in the opportunity cost by decreasing their investments. The most important result in Table 4 is that the elasticity of response of US FDI to the growth in real Canadian GDP increased from 0.829 to 2.603 following the free trade agreement. This result is reinforced by the fact that response to changes in the real exchange rate is unchanged. The results in Table 4 for the real Canadian interest rate variable, proxying the opportunity cost of investment, shows US FDI to be invariant to the Canadian bond rate before integration, but correctly negatively signed after integration when Canadian and American bonds returns become more correlated.

(V) Conclusions

We began this paper by asking whether Canada did benefit in respect of inward FDI from the development of the free trade area with the USA in 1989. To answer this simple question requires us to introduce two empirical innovations to the FDI literature. The first innovation is

to model the FDI decision in a dynamic framework, rather than the literature's traditional static framework, and is accomplished by using a distributed lag specification of the estimating equation. The second empirical innovation is to generalise the existing methodology of analysing the effect on FDI of policy changes by using a structural break framework, rather than modelling it as an intercept shift only, and allowing all parameters in the estimating equation to change. An important advantage of these innovations is that the standard framework used by previous researchers is just a special case of the model estimated in this paper, and will be of interest to researchers beyond the specific case study pursued here.

We implement these two innovations and answer the paper's question by analysing the US FDI decision into Canada in the growth context which, unlike the levels series, is stationary for the period 1955 to 2000. Three conclusions are obtained: first, the signing of the free trade agreements between Canada and the United States increased by a factor of two the responsiveness of growth in the Canadian economy on the US FDI decision. Second: limited dynamics are found in the form of lagged effects in the Canadian interest rate; although, interestingly this factor only entered the decision making after the first free trade agreement was signed. Finally, the effect of the change in the exchange rate is static and constant over the whole 1955 to 2000 period, and was unaffected by the introduction of free trade between the United States and Canada.

Our results indicate the introduction of free trade between the United States and Canada did fundamentally alter the decision making process by US multinational firms to invest in Canada. Prior to the agreement in 1989 US multinationals' decisions were driven by market size and exchange rate factors in a static way while after the agreement it is clear via the market size and interest rate effects that these firms are looking at the Canadian market in terms of growing investment opportunities and not just maintaining their market position. So,

in answer to our original question, Canada did benefit in terms of inward foreign direct investment as a result of developing a free trade area with the United States of America.

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Figure 1: Stock of US Foreign Direct Investment in Canada, 1955-2000

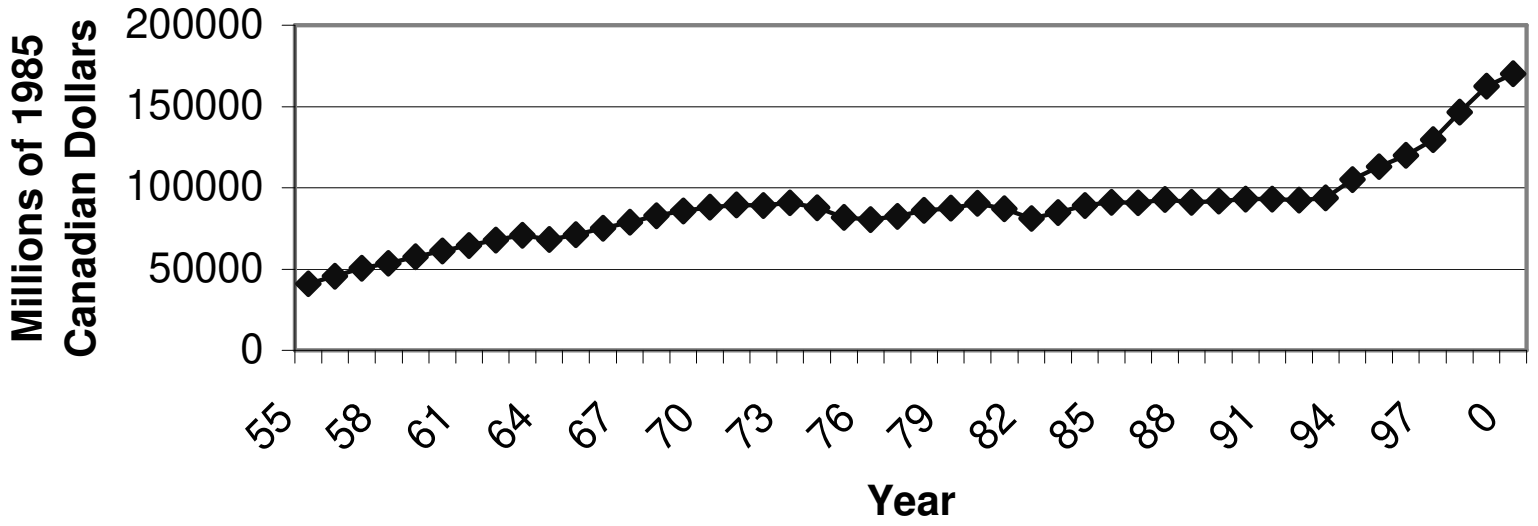

Figure 2:
Growth Rate in US FDI in Canada, 1955-2000

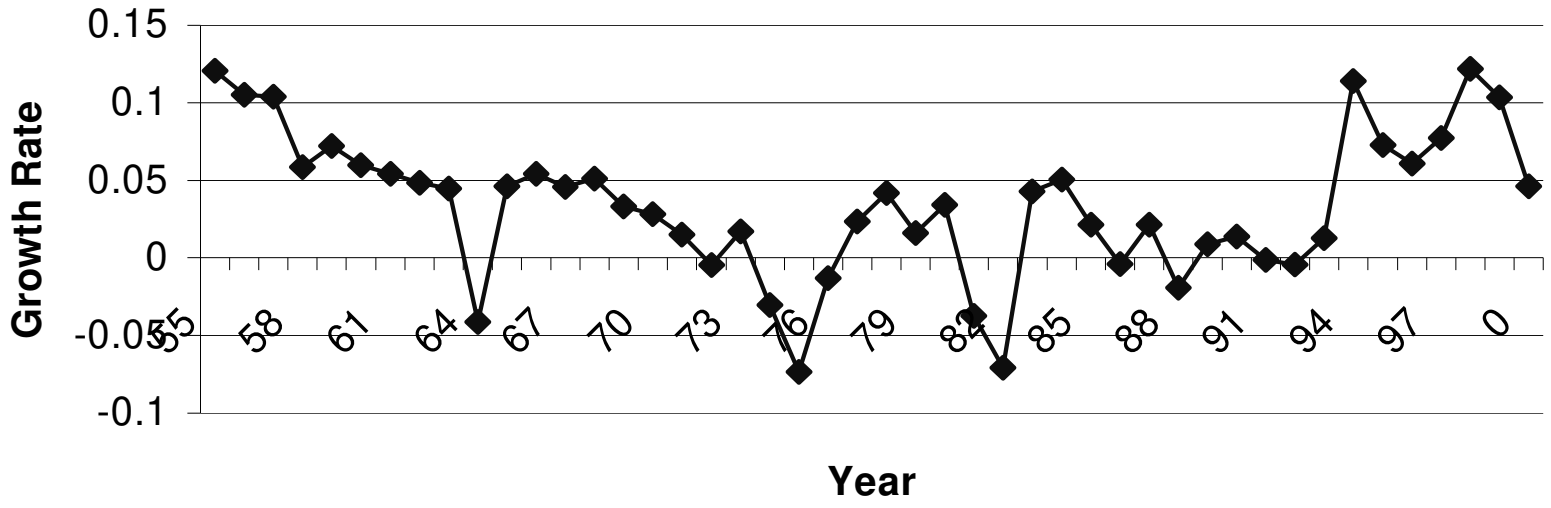

Table 1
Growth Rate of United States Foreign Direct Investment into Canada

Period	Mean	Standard Deviation
1955-1964	0.0627	0.0451
1965-1976	0.0142	0.0385
1977-1987	0.0128	0.0369
1988-2000	0.0467	0.0484
1955-2000	0.0336	0.0463

Table 2
Descriptive Statistics

Variable	Mean	Standard Deviation	Phillips-Perron Unit Root Statistic[a]
Real US FDI into Canada (Millions Canadian $)	87939.36	25917.67	-1.200 (0.934)
Growth in Real US FDI into Canada	0.034	0.046	-3.141 (0.024)
Growth in Real Canadian GDP[b]	0.039	0.024	-6.175 (0.000)
Change in Canada-US Exchange Rate	0.008	0.059	-5.603 (0.000)
Change in Real Canadian Medium Term Interest Rate	0.027	1.738	-7.017 (0.000)

Notes to Table 2:

a: Newey-West Standard errors are used and in parenthesis are the MacKinnon Approximate P-Values.

b: Unit root test includes a time trend in the underlying regressions.

Table 3
Growth in United States Direct Investment into Canada and the Introduction of Free Trade, 1955-2000

	Dependent Variable: Growth Rate in United States FDI into Canada						
Specification	**No Free Trade Effects**			**With Free Trade Effects**			
Independent Variables	**(1) Static**	**(2) Dynamic**	**(3) Static**	**(4) Dynamic**	**(5) Dynamic**	**(6) Dynamic**	**(7) Dynamic**
Current Growth Real Canadian GDP	0.689	0.654	0.651	0.852	0.801	0.862	0.829
	(0.267)	(0.252)	(0.274)	(0.277)	(0.277)	(0.241)	(0.235)
	[0.014]	[0.014]	[0.022]	[0.004]	[0.007]	[0.001]	[0.001]
1st Lagged Growth Real Canadian GDP		0.081		0.164			
		(0.277)		(0.337)			
		[0.771]		[0.629]			
Cumulative Multiplier for Real Growth Canadian GDP		0.735		1.017			
		(0.358)		(0.404)			
		[0.047]		[0.017]			
(Free Trade, 1989)x(Current Growth Real Canadian GDP)			1.314	1.333	1.351	1.399	1.774
			(0.355)	(0.308)	(0.287)	(0.370)	(0.327)
			[0.001]	[0.000]	[0.000]	[0.001]	[0.000]
(Free Trade, 1989)x(1st Lag Growth Real Canadian GDP)				0.540	0.446	0.433	
				(0.486)	(0.389)	(0.304)	
				[0.275]	[0.259]	[0.171]	
(Free Trade, 1989)x(Cumulative Multiplier for Real Growth Canadian GDP)				1.873	1.797	1.822	
				(0.320)	(0.299)	(0.344)	
				[0.000]	[0.000]	[0.000]	

Table 3 Continued on Next Page

Table 3
Growth in United States Direct Investment into Canada and the Introduction of Free Trade, 1955-2000

	Dependent Variable: Growth Rate in United States FDI into Canada						
Specification	**No Free Trade Effects**		**With Free Trade Effects**				
Independent Variables	**(1) Static**	**(2) Dynamic**	**(3) Static**	**(4) Dynamic**	**(5) Dynamic**	**(6) Dynamic**	**(7) Dynamic**
Current Change in Real Canada $/US $ Exchange Rate	0.283 (0.101) [0.008]	0.165 (0.101) [0.111]	0.321 (0.112) [0.007]	0.105 (0.170) [0.540]	0.318 (0.120) [0.012]	0.268 (0.063) [0.000]	0.253 (0.061) [0.000]
1st Lag Change in Real Canada $/US $ Exchange Rate		0.204 (0.128) [0.118]		0.079 (0.159) [0.622]			
Cumulative Multiplier for Change in Real Canada $/US $ Exchange Rate		0.369 (0.150) [0.019]		0.184 (0.174) [0.297]			
(Free Trade, 1989)x(Current Change in Real Canada $/US $ Exchange Rate)			-0.256 (0.168) [0.136]	0.139 (0.271) [0.611]	-0.154 (0.164) [0.353]		
(Free Trade, 1989)x(1st Lag Change in Real Canada $/US $ Exchange Rate)				0.032 (0.179) [0.857]	0.122 (0.069) [0.085]		
(Free Trade, 1989)x(Cumulative Multiplier for Change in Real Canada $/US $ Exchange Rate)				0.172 (0.245) [0.489]	-0.033 (0.174) [0.852]		

Table 3 Continued on Next Page

Table 3
Growth in United States Direct Investment into Canada and the Introduction of Free Trade, 1955-2000

	Dependent Variable: Growth Rate in United States FDI into Canada						
Specification	**No Free Trade Effects**		**With Free Trade Effects**				
Independent Variables	**(1) Static**	**(2) Dynamic**	**(3) Static**	**(4) Dynamic**	**(5) Dynamic**	**(6) Dynamic**	**(7) Dynamic**
Current Change in Medium Real Canadian Returns	-0.004	-0.000	-0.003	0.002	-0.003		
	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)		
	[0.398]	[0.993]	[0.481]	[0.766]	[0.569]		
1st Lag Change in Medium Real Canadian Returns		-0.001		0.001			
		(0.005)		(0.006)			
		[0.785]		[0.927]			
2nd Lag Change in Medium Real Canadian Returns		0.004		0.008			
		(0.004)		(0.005)			
		[0.308]		[0.101]			
Cumulative Multiplier for Change in Medium Real Canadian Returns		0.003		0.010			
		(0.010)		(0.012)			
		[0.786]		[0.387]			
(Free Trade, 1989)x(Current Change in Canadian Real Returns)			-0.001	0.002	0.008		
			(0.006)	(0.008)	(0.005)		
			[0.831]	[0.835]	[0.129]		
(Free Trade, 1989)x(1st Lag Change in Canadian Real Returns)				0.018	0.017	0.020	0.021
				(0.006)	(0.003)	(0.004)	(0.003)
				[0.010]	[0.000]	[0.000]	[0.000]
(Free Trade, 1989)x(2nd Lag Change in Canadian Real Returns)				0.006	0.013	0.011	0.011
				(0.005)	(0.003)	(0.005)	(0.006)
				[0.280]	[0.000]	[0.036]	[0.053]

Table 3 Continued on Next Page

Table 3
Growth in United States Direct Investment into Canada and the Introduction of Free Trade, 1955-2000

	Dependent Variable: Growth Rate in United States FDI into Canada						
Specification	**No Free Trade Effects**			**With Free Trade Effects**			
Independent Variables	**(1) Static**	**(2) Dynamic**	**(3) Static**	**(4) Dynamic**	**(5) Dynamic**	**(6) Dynamic**	**(7) Dynamic**
(Free Trade, 1989)x(Cumulative Multiplier for Change in Canadian Real Returns)				0.025 (0.013) [0.067]	0.030 (0.004) [0.000]	0.031 (0.008) [0.000]	0.032 (0.007) [0.000]
Intercept	0.005 (0.013) [0.723]	0.002 (0.015) [0.905]	-0.000 (0.013) [0.971]	-0.020 (0.017) [0.266]	-0.009 (0.014) [0.548]	-0.012 (0.013) [0.362]	-0.010 (0.012) [0.411]
Specification Tests							
Model Test	6.03	2.81	5.79	55.59	78.11	26.00	13.03
F-Statistic on Joint Significance	{3,42} [0.002]	{7,38} [0.019]	{6,39} [0.000]	{14,31} [0.000]	{10,35} [0.000]	{6,39} [0.000]	{5,40} [0.000]
Ramsey Reset Test	1.79 {3,39} [0.165]	0.86 {3,35} [0.473]	0.20 {3,36} [0.895]	1.11 {3,28} [0.360]	0.81 {3,32} [0.499]	0.96 {3,36} [0.539]	1.14 {3,36} [0.344]
Dynamic Test: Static Versus Dynamic		0.38 {4,38} [0.516]		10.09 {8,31} [0.000]	19.36 {4,35} [0.000]	9.62 {3,39} [0.000]	21.43 {2,40} [0.000]
Dynamic Test: Static Before Free Trade				1.15 {4,31} [0.353]			

Table 3 Continued on Next Page

Table 3
Growth in United States Direct Investment into Canada and the Introduction of Free Trade, 1955-2000

	Dependent Variable: Growth Rate in United States FDI into Canada						
Specification	**No Free Trade Effects**		**With Free Trade Effects**				
Independent Variables	**(1) Static**	**(2) Dynamic**	**(3) Static**	**(4) Dynamic**	**(5) Dynamic**	**(6) Dynamic**	**(7) Dynamic**
Exchange Rate Constant Over Whole Period					1.92 {2,35} [0.161]		
Free Trade Test			6.42	12.64	16.90	9.27	16.01
Inclusion of Free Trade Interaction Terms			{3,39} [0.001]	{7,31} [0.000]	{7,35} [0.000]	(4,39} [0.000]	{3,40} [0.000]

() Standard Errors: Static are Robust and Dynamic are Newey-West; [] Two-Sided Probability Values; {} Degrees of Freedom.

Table 4
US Foreign Direct Investment Elasticity Estimates

	Elasticity
(A) Before Free Trade Agreement	
Current Growth Real Canadian GDP	0.829
Current Change in Real Canada $/US $ Exchange Rate[a]	0.002
Change in Medium Real Canadian Returns	0.000
(B) After Free Trade Agreement	
Current Growth Real Canadian GDP	2.603
Current Change in Real Canada $/US $ Exchange Rate[a]	0.002
1st Lag Change in Medium Real Canadian Returns[b]	-0.004
2nd Lag Change in Medium Real Canadian Returns[b]	-0.003
Total Lagged Medium Real Canadian Returns	-0.007

Notes to Table 4:

a: Evaluated using average change in the Real Canada $/ US $ Exchange Rate for the whole period, 0.008.

b: Evaluated using average change in the Real Medium Returns for the post-free trade agreement period, -0.228.

Appendices To

A Simple and Flexible Dynamic Approach to Foreign Direct Investment Growth: Did Canada Benefit From the Free Trade Agreements with the United States?

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June 2004

Appendix A
Variable Definitions and Data Sources

Table A.1
Variable definitions

Real United States foreign direct investment in Canada:

Growth rate of stock data for the period - as approximated by difference in logs, 1955-2000 (Source: United States Bureau of Economic Analysis)

Real Canadian Gross Domestic product:

Growth rate as approximated by difference in logs, 1955-2000 (Source: IMF)

Real opportunity cost of FDI:

Approximated by the difference between the Canadian medium term interest rates (end of year) and inflation, 1955-2000 (Source: IMF)

Real exchange rate:

Approximated by [(Canadian$/US$)x(US GDP deflator/Canadian GDP Deflator], 1955-2000 (Source: IMF)

Dummy variable:

Equals 1 in 1989 and after, 0 before 1989

Appendix B
Augmented Dickey-Fuller Unit Root Test Results

Tables B.1 to B.5 present our results for the presents of stochastic trend in the five variables we use in this paper. These tests are the Augmented Dickey-Fuller unit root test and are an alternative unit root test to the one presented in the main body of the paper.[10] While the tests differ the conclusions are the same as that presented in Table 2.

[10] Augmented Dickey-Fuller Critical Values are: Intercept Only: 10%=-2.57; 5%=-2.86; 1%=3.43 or Intercept and Trend: 10%=-3.12; 5%=-3.41; 1%=3.96.

Table B.1
Unit-Root Tests for United States (US) Foreign Direct Investment (FDI) into Canada, 1955-2000

	Dependent Variable: Change in US FDI					
Specification	**Without Time Trend**			**With Time Trend**		
Independent Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
1st Lag in US FDI	**0.068**	**0.010**	**0.012**	**0.094**	**-0.060**	**-0.056**
	(2.59)	**(0.43)**	**(0.49)**	**(1.71)**	**(1.17)**	**(1.02)**
1st Lag Change in US FDI		0.662	0.731		0.747	0.763
		(5.15)	(4.44)		(5.41)	(4.65)
2nd Lag Change in US FDI			-0.119			-0.035
			(0.68)			(0.19)
Trend				-51.454	128.309	122.652
				(0.53)	(1.55)	(1.38)
Constant	-2958.022	176.758	136.010	-3942.153	3035.105	2869.904
	(1.26)	(0.09)	(0.07)	(1.30)	(1.13)	(1.03)
Akaike Information Criteria	16.764	16.327	16.360	16.801	16.315	16.357
Bayes Information Criteria	16.843	16.446	16.519	16.920	16.474	16.556
Observations	**46**					

() Absolute Value of t-statistic

Table B.2
Unit-Root Tests for Growth in United States (US) Foreign Direct Investment (FDI) into Canada, 1955-2000

	Dependent Variable: Change in Growth of US FDI					
Specification	**Without Time Trend**			**With Time Trend**		
Independent Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
1st Lag Growth in US FDI	**-0.381**	**-0.372**	**-0.306**	**-0.381**	**-0.370**	**-0.283**
	(3.30)	**(2.93)**	**(2.26)**	**(3.23)**	**(2.81)**	**(-1.96)**
1st Lag Change in Growth in US FDI		-0.029	-0.105		-0.031	-0.133
		(0.20)	(0.66)		(0.20)	(0.78)
2nd Lag Change in Growth in US FDI			-0.194			-0.218
			(1.30)			(1.37)
Trend (*1/1000)				-0.001	0.198	2.133
				(-0.00)	(0.05)	(0.47)
Constant	0.012	0.012	0.010	0.012	0.011	0.003
	(1.83)	(1.69)	(1.34)	(0.89)	(0.76)	(0.18)
Akaike Information Criteria	-6.583	-6.540	-6.536	-6.539	-6.497	-6.498
Bayes Information Criteria	-6.503	-6.421	-6.377	-6.420	-6.338	-6.299
Observations	**46**					

() Absolute Value of t-statistic

Table B.3
Unit-Root Tests for Growth Rate of Real Canadian (Can) Gross Domestic Product (GDP), 1955-2000

	Dependent Variable: Change in Real Can GDP Growth					
Specification	**Without Time Trend**			**With Time Trend**		
Independent Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
1st Lag in Growth in Real Can GDP Growth	**-0.742**	**-0.765**	**-0.594**	**-0.584**	**-0.977**	**-0.889**
	(5.35)	**(4.29)**	**(2.83)**	**(6.16)**	**(5.29)**	**(3.69)**
1st Lag in the Change in Real Can GDP Growth		0.030	-0.119		0.142	0.072
		(0.21)	(0.68)		(1.01)	(0.39)
2nd Lag in the Change in Real Can GDP Growth			-0.207			-0.083
			(1.49)			(0.58)
Trend				-0.001	-0.001	-0.001
				(2.49)	(2.67)	(2.22)
Constant	0.029	0.030	0.023	0.051	0.058	0.052
	(4.68)	(3.98)	(2.69)	(4.83)	(4.61)	(3.38)
Akaike Information Criteria	-7.504	-7.462	-7.470	-7.595	-7.576	-7.540
Bayes Information Criteria	-7.425	-7.343	-7.311	-7.476	-7.47	-7.341
Observations	**46**					

() Absolute Value of t-statistic

Table B.4
Unit-Root Tests for Change in Real Canadian (Can) Returns, 1955-2000

	Dependent Variable: Change in the Change in Real Canadian (Can) Returns					
Specification	**Without Time Trend**			**With Time Trend**		
Independent Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
1st Lag Change in Real Can Returns	**-1.026**	**-1.066**	**-1.191**	**-1.027**	**-1.070**	**-1.211**
	(6.96)	**(4.88)**	**(4.70)**	**(6.90)**	**(4.84)**	**(4.71)**
1st Lag Change in the Change in Real Can Returns		0.037	0.142		0.039	0.158
		(0.25)	(0.78)		(0.27)	(0.86)
2nd Lag Change in the Change in Real Can Returns			0.122			0.137
			(0.98)			(1.07)
Trend				-0.008	-0.009	-0.013
				(0.43)	(0.43)	(0.62)
Constant	0.027	0.032	0.064	0.259	0.270	0.414
	(0.10)	(0.12)	(0.24)	(0.43)	(0.44)	(0.66)
Akaike Information Criteria	1.169	1.211	1.232	1.208	1.250	1.266
Bayes Information Criteria	1.248	1.330	1.391	1.327	1.409	1.465
Observations	**46**					

() Absolute Value of t-statistic

Table B.5
Unit-Root Tests for Change in Real United States/Canada (US/Can) Exchange Rate, 1955-2000

	Dependent Variable: Change in the Change in Real Can/US Exchange Rate					
Specification	**Without Time Trend**			**With Time Trend**		
Independent Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
1st Lag Change in Real US/Can Exchange Rate	**-0.839** **(5.63)**	**-0.840** **(4.19)**	**-1.050** **(4.56)**	**-0.843** **(0.151)**	**-0.853** **(4.16)**	**-1.077** **(4.57)**
1st Lag Change in the Change in Real US/Can Exchange Rate		0.001 (0.01)	0.201 (0.167)		0.012 (0.07)	0.223 (1.11)
2nd Lag Change in the Change in Real US/Can Exchange Rate			0.292 (1.74)			0.303 (1.78)
Trend(*1/10)				0.003 (0.43)	0.003 (0.43)	0.004 (0.62)
Constant	0.007 (0.78)	0.007 (0.76)	0.007 (0.85)	-0.001 (0.05)	-0.001 (0.05)	-0.004 (0.18)
$\overline{R}^2$	0.406	0.392	0.419	0.395	0.380	0.411
Akaike Information Criteria	-5.626	-5.582	-5.609	-5.587	-5.543	-5.575
Bayes Information Criteria	-5.546	-5.463	-5.450	-5.467	-5.384	-5.376
Observations	**46**					

() Absolute Value of t-statistic

Appendix C

Table C.1
Growth in United States FDI into Canada and the Introduction of Free Trade, 1955-2000: Difference in Interest Rates Version

	Dependent Variable: Growth Rate in United States FDI into Canada						
Specification	**No Free Trade Effects**		**With Free Trade Effects**				
Independent Variables	**(1) Static**	**(2) Dynamic**	**(3) Static**	**(4) Dynamic**	**(5) Dynamic**	**(6) Dynamic**	**(7) Dynamic**
Current Growth Real Canadian GDP	0.679	0.655	0.657	0.836	0.832	0.876	0.772
	(0.297)	(0.276)	(0.291)	(0.274)	(0.298)	(0.254)	(0.256)
	[0.027]	[0.023]	[0.030]	[0.005]	[0.008]	[0.001]	[0.004]
1st Lagged Growth Real Canadian GDP		0.045		0.066			
		(0.277)		(0.356)			
		[0.871]		[0.854]			
Cumulative Multiplier for Real Growth Canadian GDP		0.701		0.902			
		(0.380)		(0.403)			
		[0.073]		[0.033]			
(Free Trade, 1989)x(Current Growth Real Canadian GDP)			1.271	-0.206	-0.241	0.833	1.539
			(0.355)	(0.538)	(0.283)	(0.407)	(0.354)
			[0.001]	[0.704]	[0.620]	[0.047]	[0.000]
(Free Trade, 1989)x(1st Lag Growth Real Canadian GDP)				1.557	1.539	0.928	
				(0.523)	(0.467)	(0.483)	
				[0.006]	[0.002]	[0.062]	
(Free Trade, 1989)x(Cumulative Multiplier for Real Growth Canadian GDP)				1.351	1.297	1.762	
				(0.393)	(0.483)	(0.391)	
				[0.002]	[0.003]	[0.000]	

Table C.1 Continued on Next Page

Table C.1
Growth in United States FDI into Canada and the Introduction of Free Trade, 1955-2000: Difference in Interest Rates Version

	Dependent Variable: Growth Rate in United States FDI into Canada						
Specification	**No Free Trade Effects**		**With Free Trade Effects**				
Independent Variables	**(1) Static**	**(2) Dynamic**	**(3) Static**	**(4) Dynamic**	**(5) Dynamic**	**(6) Dynamic**	**(7) Dynamic**
Current Change in Real Canada $/US $ Exchange Rate	0.295	0.216	0.312	0.239	0.314	0.251	0.210
	(0.102)	(0.097)	(0.121)	(0.129)	(0.130)	(0.061)	(0.070)
	[0.006]	[0.032]	[0.014]	[0.073]	[0.021]	[0.000]	[0.005]
1st Lag Change in Real Canada $/US $ Exchange Rate		0.183		0.073			
		(0.119)		(0.159)			
		[0.131]		[0.649]			
Cumulative Multiplier for Change in Real Canada $/US $ Exchange Rate		0.399		0.312			
		(0.139)		(0.126)			
		[0.007]		[0.019]			
(Free Trade, 1989)x(Current Change in Real Canada $/US $ Exchange Rate)			-0.229	0.149	0.057		
			(0.165)	(0.222)	(0.199)		
			[0.174]	[0.507]	[0.776]		
(Free Trade, 1989)x(1st Lag Change in Real Canada $/US $ Exchange Rate)				0.076	0.153		
				(0.212)	(0.127)		
				[0.721]	[0.235]		
(Free Trade, 1989)x(Cumulative Multiplier for Change in Real Canada $/US $ Exchange Rate)				0.225	0.210		
				(0.184)	(0.183)		
				[0.230]	[0.260]		

Table C.1 Continued on Next Page

Table C.1
Growth in United States FDI into Canada and the Introduction of Free Trade, 1955-2000: Difference in Interest Rates Version

	Dependent Variable: Growth Rate in United States FDI into Canada						
Specification	**No Free Trade Effects**		**With Free Trade Effects**				
Independent Variables	**(1) Static**	**(2) Dynamic**	**(3) Static**	**(4) Dynamic**	**(5) Dynamic**	**(6) Dynamic**	**(7) Dynamic**
Current Change in Difference Canada-US Real Returns	-0.006	-0.002	-0.003	-0.001	-0.003		
	(0.005)	(0.006)	(0.006)	(0.007)	(0.006)		
	[0.285]	[0.689]	[0.607]	[0.894]	[0.507]		
1st Lag Change in Difference Canada-US Real Returns		-0.002		0.000			
		(0.004)		(0.004)			
		[0.674]		[0.991]			
2nd Lag Change in Difference Canada-US Real Returns		0.004		0.007			
		(0.004)		(0.004)			
		[0.402]		[0.063]			
Cumulative Multiplier for Change in Difference Canada-US Real Returns		0.000		0.007			
		(0.011)		(0.012)			
		[0.966]		[0.580]			
(Free Trade, 1989)x(Current Change in Difference Canada-US Real Returns)			-0.000	-0.009	-0.007		
			(0.007)	(0.013)	(0.011)		
			[0.965]	[0.473]	[0.507]		
(Free Trade, 1989)x(1st Lag Change in Difference Canada-US Real Returns)				0.008	0.007	0.016	0.014
				(0.008)	(0.005)	(0.004)	(0.004)
				[0.289]	[0.175]	[0.001]	[0.001]
(Free Trade, 1989)x(2nd Lag Change in Difference Canada-US Real Returns)				-0.009	-0.002	0.004	0.000
				(0.009)	(0.007)	(0.005)	(0.005)
				[0.316]	[0.740]	[0.437]	[0.963]

Table C.1 Continued on Next Page

Table C.1
Growth in United States FDI into Canada and the Introduction of Free Trade, 1955-2000: Difference in Interest Rates Version

	Dependent Variable: Growth Rate in United States FDI into Canada						
Specification	**No Free Trade Effects**			**With Free Trade Effects**			
Independent Variables	**(1) Static**	**(2) Dynamic**	**(3) Static**	**(4) Dynamic**	**(5) Dynamic**	**(6) Dynamic**	**(7) Dynamic**
(Free Trade, 1989)x(Cumulative Multiplier for Change in Diff. Can-US Real Returns)				-0.010 (0.024) [0.670]	-0.003 (0.020) [0.899]	0.020 (0.008) [0.014]	0.015 (0.007) [0.051]
Intercept	0.005 (0.014) [0.738]	0.003 (0.015) [0.842]	-0.001 (0.013) [0.951]	-0.014 (0.015) [0.333]	-0.011 (0.015) [0.502]	-0.013 (0.014) [0.371]	-0.007 (0.013) [0.599]
Specification Tests							
Model Test	6.13	3.18	5.72	16.68	15.69	16.72	12.18
F-Statistic on Joint Significance	{3,42} [0.002]	{7,38} [0.009]	{6,39} [0.000]	{14,31} [0.000]	{10,35} [0.000]	{6,39} [0.000]	{5,40} [0.000]
Ramsey Reset Test	1.72 {3,39} [0.178]	1.39 {3,35} [0.263]	0.27 {3,36} [0.848]	2.40 {3,28} [0.089]	1.65 {3,32} [0.197]	1.35 {3,36} [0.274]	1.20 {3,37} [0.322]
Dynamic Test: Static Versus Dynamic				20.75 {8,31} [0.000]	33.55 {4,35} [0.000]	5.67 {3,39} [0.003]	7.66 {2,40} [0.002]
Dynamic Test: Static Before Free Trade				1.85 {4,31} [0.145]			

Table C.1 Continued on Next Page

Table C.1
Growth in United States FDI into Canada and the Introduction of Free Trade, 1955-2000: Difference in Interest Rates Version

	Dependent Variable: Growth Rate in United States FDI into Canada						
Specification	**No Free Trade Effects**		**With Free Trade Effects**				
Independent Variables	**(1) Static**	**(2) Dynamic**	**(3) Static**	**(4) Dynamic**	**(5) Dynamic**	**(6) Dynamic**	**(7) Dynamic**
Exchange Rate Constant Over Whole Period					1.13 {2,35} [0.333]		
Free Trade Test			6.85	4.88	21.20	6.22	9.82
Inclusion of Free Trade Interaction Terms			{3,39} [0.001]	{7,31} [0.001]	{7,35} [0.000]	(4,39} [0.001]	{3,40} [0.000]

() Standard Errors: Static are Robust and Dynamic are Newey-West; [] Two-Sided Probability Values; {} Degrees of Freedom.

Table C.2
Growth in United States FDI into Canada and the Introduction of Free Trade, 1955-2000: Intercept Version

	Dependent Variable: Growth Rate in United States FDI into Canada						
Specification	**No Free Trade Effects**		**With Free Trade Effects**				
Independent Variables	**(1) Static**	**(2) Dynamic**	**(3) Static**	**(4) Dynamic**	**(5) Dynamic**	**(6) Dynamic**	**(7) Dynamic**
Current Growth Real Canadian GDP	0.689	0.654	0.770	0.890	0.770	0.812	0.808
	(0.267)	(0.252)	(0.329)	(0.371)	(0.348)	(0.328)	(0.325)
	[0.014]	[0.014]	[0.025]	[0.023]	[0.034]	[0.018]	[0.017]
1st Lagged Growth Real Canadian GDP		0.081		0.202			
		(0.277)		(0.393)			
		[0.771]		[0.611]			
Cumulative Multiplier for Real Growth Canadian GDP		0.735		1.009			
		(0.358)		(0.604)			
		[0.047]		[0.081]			
(Free Trade, 1989)x(Current Growth Real Canadian GDP)			0.967	1.279	1.399	1.557	1.859
			(0.427)	(0.399)	(0.373)	(0.432)	(0.376)
			[0.029]	[0.003]	[0.001]	[0.001]	[0.000]
(Free Trade, 1989)x(1st Lag Growth Real Canadian GDP)				0.374	0.576	0.506	
				(0.477)	(0.257)	(0.261)	
				[0.439]	[0.032]	[0.060]	
(Free Trade, 1989)x(Cumulative Multiplier for Real Growth Canadian GDP)				1.652	1.975	2.063	
				(0.636)	(0.397)	(0.409)	
				[0.014]	[0.000]	[0.000]	

Table C.2 Continued on Next Page

Table C.2
Growth in United States FDI into Canada and the Introduction of Free Trade, 1955-2000: Intercept Version

	Dependent Variable: Growth Rate in United States FDI into Canada						
Specification	**No Free Trade Effects**		**With Free Trade Effects**				
Independent Variables	**(1) Static**	**(2) Dynamic**	**(3) Static**	**(4) Dynamic**	**(5) Dynamic**	**(6) Dynamic**	**(7) Dynamic**
Current Change in Real Canada $/US $ Exchange Rate	0.283 (0.101) [0.008]	0.165 (0.101) [0.111]	0.318 (0.115) [0.009]	0.095 (0.195) [0.631]	0.318 (0.121) [0.013]	0.277 (0.068) [0.000]	0.255 (0.063) [0.000]
1st Lag Change in Real Canada $/US $ Exchange Rate		0.204 (0.128) [0.118]		0.080 (0.161) [0.621]			
Cumulative Multiplier for Change in Real Canada $/US $ Exchange Rate		0.369 (0.150) [0.019]		0.175 (0.191) [0.367]			
(Free Trade, 1989)x(Current Change in Real Canada $/US $ Exchange Rate)			-0.285 (0.183) [0.127]	0.110 (0.200) [0.589]	-0.114 (0.129) [0.382]		
(Free Trade, 1989)x(1st Lag Change in Real Canada $/US $ Exchange Rate)				0.036 (0.178) [0.840]	0.118 (0.062) [0.066]		
(Free Trade, 1989)x(Cumulative Multiplier for Change in Real Canada $/US $ Exchange Rate)				0.146 (0.207) [0.487]	-0.003 (0.147) [0.986]		

Table C.2 Continued on Next Page

Table C.2
Growth in United States FDI into Canada and the Introduction of Free Trade, 1955-2000: Intercept Version

	Dependent Variable: Growth Rate in United States FDI into Canada						
Specification	**No Free Trade Effects**		**With Free Trade Effects**				
Independent Variables	**(1) Static**	**(2) Dynamic**	**(3) Static**	**(4) Dynamic**	**(5) Dynamic**	**(6) Dynamic**	**(7) Dynamic**
Current Change in Medium Real Canadian Returns	-0.004	-0.000	-0.003	0.002	-0.003		
	(0.005)	(0.005)	(0.004)	(0.006)	(0.005)		
	[0.398]	[0.993]	[0.531]	[0.734]	[0.554]		
1st Lag Change in Medium Real Canadian Returns		-0.001		0.001			
		(0.005)		(0.006)			
		[0.785]		[0.902]			
2nd Lag Change in Medium Real Canadian Returns		0.004		0.008			
		(0.004)		(0.005)			
		[0.308]		[0.143]			
Cumulative Multiplier for Change in Medium Real Canadian Returns		0.003		0.011			
		(0.010)		(0.013)			
		[0.786]		[0.412]			
(Free Trade, 1989)x(Current Change in Canadian Real Returns)			0.002	0.002	0.007		
			(0.006)	(0.006)	(0.005)		
			[0.751]	[0.724]	[0.170]		
(Free Trade, 1989)x(1st Lag Change in Canadian Real Returns)				0.017	0.017	0.021	0.022
				(0.007)	(0.003)	(0.005)	(0.003)
				[0.016]	[0.000]	[0.000]	[0.000]

Table C.2 Continued on Next Page

Table C.2
Growth in United States FDI into Canada and the Introduction of Free Trade, 1955-2000: Intercept Version

	Dependent Variable: Growth Rate in United States FDI into Canada						
Specification	**No Free Trade Effects**			**With Free Trade Effects**			
Independent Variables	**(1) Static**	**(2) Dynamic**	**(3) Static**	**(4) Dynamic**	**(5) Dynamic**	**(6) Dynamic**	**(7) Dynamic**
(Free Trade, 1989)x(2nd Lag Change in Canadian Real Returns)				0.005 (0.006) [0.415]	0.014 (0.003) [0.000]	0.012 (0.004) [0.009]	0.012 (0.005) [0.018]
(Free Trade, 1989)x(Cumulative Multiplier for Change in Canadian Real Returns)				0.024 (0.014) [0.102]	0.031 (0.004) [0.000]	0.033 (0.007) [0.000]	0.033 (0.005) [0.000]
Free Trade, 1989 Dummy Variable			0.017 (0.019) [0.385]	0.009 (0.030) [0.760]	-0.007 (0.020) [0.717]	-0.009 (0.021) [0.668]	-0.003 (0.020) [0.871]
Intercept	0.005 (0.013) [0.723]	0.002 (0.015) [0.905]	-0.007 (0.018) [0.701]	-0.023 (0.029) [0.427]	-0.007 (0.019) [0.717]	-0.009 (0.019) [0.634]	-0.009 (0.019) [0.637]
Specification Tests							
Model Test	6.03	2.81	9.65	79.79	121.14	65.12	54.51
F-Statistic on Joint Significance	{3,42} [0.002]	{7,38} [0.019]	{7,39} [0.000]	{15,30} [0.000]	{11,34} [0.000]	{7,38} [0.000]	{6,39} [0.000]
Ramsey Reset Test	1.79 {3,39} [0.165]	0.86 {3,35} [0.473]	1.10 {3,35} [0.363]	1.00 {3,28} [0.409]	0.68 {3,31} [0.572]	0.90 {3,35} [0.449]	1.13 {3,36} [0.350]

Table C.2 Continued on Next Page

Table C.2
Growth in United States FDI into Canada and the Introduction of Free Trade, 1955-2000: Intercept Version

	Dependent Variable: Growth Rate in United States FDI into Canada						
Specification	**No Free Trade Effects**		**With Free Trade Effects**				
Independent Variables	**(1) Static**	**(2) Dynamic**	**(3) Static**	**(4) Dynamic**	**(5) Dynamic**	**(6) Dynamic**	**(7) Dynamic**
Dynamic Test:		0.38		18.09	39.20	10.61	28.05
Static Versus Dynamic		{4,38}		{8,30}	{4,34}	{3,38}	{2,39}
		[0.516]		[0.000]	[0.000]	[0.000]	[0.000]
Dynamic Test:				0.87			
Static Before Free Trade				{4,30}			
				[0.491]			
Exchange Rate Constant Over					2.32		
Whole Period					{2,34}		
					[0.114]		
Free Trade Test			5.26	13.59	24.47	12.37	20.02
Inclusion of Free Trade			{4,38}	{8,30}	{8,34}	(5,38}	{4,39}
Interaction Terms			[0.002]	[0.000]	[0.000]	[0.000]	[0.000]

() Standard Errors: Static are Robust and Dynamic are Newey-West; [] Two-Sided Probability Values; {} Degrees of Freedom.