

Discussion by Linda Goldberg of
“Exchange Rate Variability and Investment in Canada”

by Robert Lafrance and David Tessier

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The main premise of this paper is that it is important to consider the effects of exchange rate movements on real economic activity in order to evaluate the implications of flexible exchange rates. In order to accomplish this task, Robert Lafrance and David Tessier focus on the responsiveness of investment activity in Canada to levels of the Canadian dollar and to the volatility of the Canadian dollar. This dimension of real activity is a key one to explore in detail, since investment fluctuations are an important component of levels and volatility of aggregate business cycles.

The authors have provided a well-articulated and carefully organized piece on the relationship between investment and exchange rates. The paper begins with a thorough and thoughtful exposition of the competing arguments for profitability and investment effects arising from exchange rate movements. The authors also survey the existing evidence on this subject, noting those studies that are particularly relevant for Canada.

Beyond this literature overview, the main contribution of the paper is a detailed analysis of the linkage between Canadian investment and exchange rates. There are three types of aggregate investment measures examined: by Manufacturing industries, by a subset of the manufacturing industries, specifically by Machinery & Equipment sectors, and foreign direct investment activity, all taken relative to GDP. Although these measures will not provide a full

window in potential redistributive effects of exchange rates across sectors of the Canadian economy, they are appropriate for understanding aggregate investment fluctuations. A number of different exchange rate measures also are applied. These encompass the real effective exchange rate for the Canadian Dollar, measures of exchange rate misalignments constructed using either a Hodrik-Prescott filter or an Amano-Van Norden model, and a measure of nominal exchange rate volatility. While the authors have not been consistent in using only real exchange rates, and this type of consistency would be appropriate, I do not expect any of the key results of the study to be significantly changed by a full-scale shift to real realignments and real exchange rate volatility.

The main methodological approach applied in this paper is the use of VARS for identifying whether there are significant causal effects of exchange rates. Ultimately, Lafrance and Tessier conclude that exchange rates and their volatility have not really had much of an effect on Canadian investment activity. This type of finding is central to the paper and to the theme of the overall conference, in that it is highly relevant for “revisiting of the case for flexible exchange rates”. Implicit in the Lafrance-Tessier conclusion is that the detrimental effects of exchange rate volatility, which are sometimes evoked in arguments against flexibility, have not been evident in Canada. Before accepting this conclusion, however, it is necessary to look more carefully at the methodology, and ask whether, as applied, it can deliver the conclusions presented by the authors.

The VAR methodology assumes a constancy in the relationship between exchange rate measures and investment measures over the time horizon of the analysis --- almost 30 years. Therefore, it is worth going deeper into the analytics of this relationship to determine if the assumptions underlying the empirical approach are well-founded. From exposing the theory

and looking at some additional empirical evidence, I conclude below that the tests performed in the Lafrance and Tessier paper are biased against finding statistically significant implications of exchange rates for investment. As I will detail below, the extent to which this is a valid concern could be established by the authors through additional robustness and parameter stability tests. In either case, their paper suggests additional puzzles that warrant consideration.

For discussing the issue of parameter stability, I appeal to a formal theoretical model of the links between investment and exchange rates. The authors are quite clear that it is not their goal to test a single theory of such linkages, and I am very sympathetic to this view. Nonetheless, this formality helps provide insight into the types of conditions that would need to prevail for the VAR to capture and measure the tightness of the actual relationship between the variables in question. In this regard, the theory helps identify the dimensions in which the VARs performed by the authors are adequately addressing the important potential effects of exchange rates.

The theory. In a series of papers, Campa and Goldberg (*JIE* 1995, *IER* 1999) show the way in which real exchange rates can enter the producer maximization problem. A firm chooses investment I to maximize the expected present value of the stream of future profits, V . Capital K , the only quasi-fixed factor of production, is subject to a traditional capital accumulation equation and an increasing and convex cost of installing new capital. The maximized value of the firm at time t is given by

$$V_t(K_t, e_t) = \max_{\{I_t\}_{t=t}^{\infty}} E \left[\sum_{t=0}^{\infty} \mathbf{b}^t [\Pi(K_{t+t}, e_{t+t}) - c(I_{t+t}) - I_{t+t}] \Omega_t \right] \quad (1)$$

where K_t is the beginning-of-period t capital stock, Π is the profit function, \mathbf{b} is the discount rate, I_t is the investment expenditure in period t , c is the capital adjustment cost function, e_t is the period t exchange rate expressed in terms of domestic currency per unit of foreign currency, and $E[.\mid\Omega_t]$ is the expectations operator conditional on the time t information set Ω_t . For simplicity, it is assumed that the only source of uncertainty about the future is the exchange rate, over which the expectation operator applies.

The timing of the model is as follows. The firm observes the exchange rate at the beginning of the period. After observing the exchange rate, the firm chooses its variable inputs and output level for the period and observes the period's profits. Given profits this period and expected future profits, the firm chooses its investment level. The new capital resulting from this investment becomes productive at the beginning of next period, i.e. under the assumption of a one period time to build lag.

Suppose too that producer profits at any time t are driven by revenues from some domestic market sales --- wherein the producer might face import competition—and by revenues from export sales abroad. Moreover profits may be exposed to currency fluctuations through producer reliance on imported inputs into production.

Campa and Goldberg have derived the specific elasticity of a producer's investment with respect to exchange rates as proportional to

$$\frac{\partial I_t/I_t}{\partial e_t/e_t} \propto \left[\left(\mathbf{h}_{p,e} - \mathbf{h}_{MKUP,e} \right) (1 - X_t) + \left(1 + \mathbf{h}_{p^*,e} - \mathbf{h}_{MKUP^*,e} \right) X_t - \left(1 + \mathbf{h}_{w^*,e} \right) \mathbf{a}_t \right] \frac{de_t}{e_t} \quad (2)$$

where $\mathbf{h}_{p,e}$ and $\mathbf{h}_{p^*,e}$ are exchange-rate pass-through elasticities in domestic and foreign markets; $\mathbf{h}_{MKUP,e}$ and $\mathbf{h}_{MKUP^*,e}$ are markup elasticities with respect to exchange rate changes;

X_t represents the share of total revenues associated with foreign sales [(1- X_t) is the share associated with domestic sales], and a_t , the share of imported inputs in production costs, is multiplied by the elasticity of these input costs with respect to exchange rates, $(1 + h_{w^*,e})$. The link between investment and exchange rates is tighter for exchange rate movements that are perceived to be permanent.

Observe that the exchange rate affects expected profitability and therefore investment activity through three channels: (i) export market revenues; (ii) imported input costs; and (iii) home market revenues. This third channel is intended to capture the possibility of import competition or the existence of wealth effects that potentially shift the demand schedule for domestically produced goods. These channels matter for interpreting the exercise of the Lafrance and Tessier paper. The profitability effects of exchange rates, and consequent investment response, could potentially be fully eliminated in the event that revenue effects are fully offset by import input cost effects. It is possible, but not at all guaranteed, that such a situation could arise when exporting occurs alongside a preponderance of multinational production activity / outsourcing activities/ reliance on imported inputs. More generally, however, the relationship between exchange rates and investment (through the profitability channel) will vary over time to the extent that net external orientation varies. Here, producer net external orientation is the difference between revenue exposure and cost exposure. An absence of an investment – exchange rate relationship should be the exceptional case, rather than the rule, for an externally exposed economy.

The Evidence. What do we know about Canadian net external orientation? As an indicator of net external orientation, consider the difference between the export share and imported input share of the subsets of Canadian manufacturing considered by Lafrance and Tessier, i.e. all Manufacturing, and the Machinery and Equipment sectors within Manufacturing (Figures 1 and 2).¹

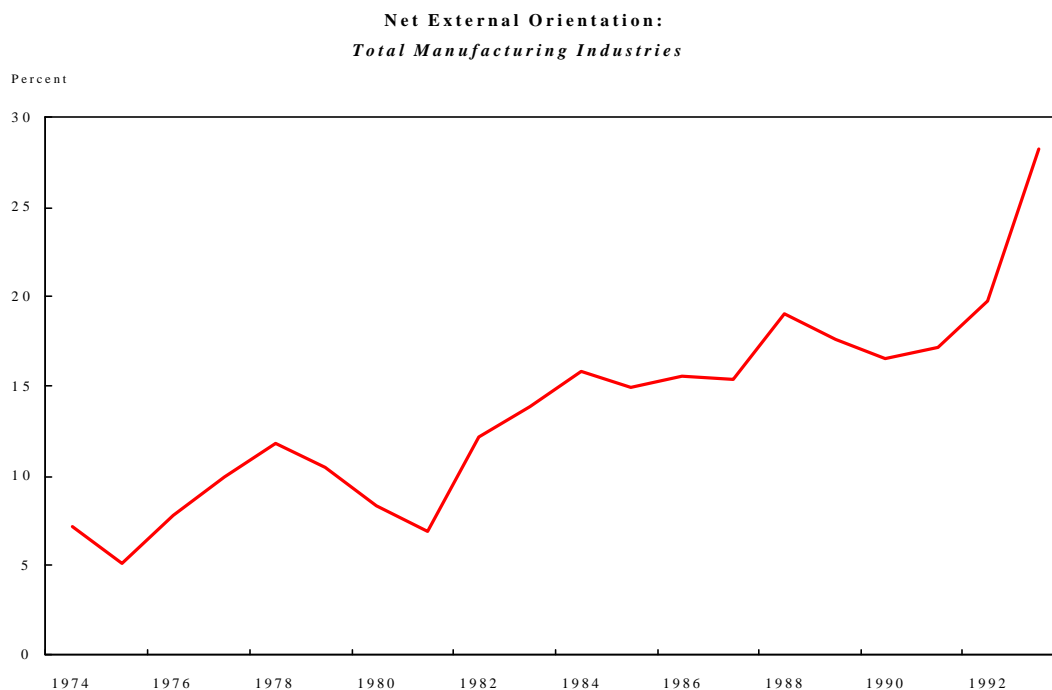


Figure 1

Observe that net external exposure of Canadian manufacturing industries has more than tripled since the early 1970s. When the Machinery and Equipment sectors are considered, this indicator doubled by the early 1990s. Because of these extensive movements over time, from equation (2) we would also expect that the effects of exchange rates on producer profitability and on investment also would be rising over time in Canada. Thus, a methodology that assumes a

¹ Campa and Goldberg (1997) provide a more extensive discussion of the exposure of specific Canadian

constant relationship -- such as the VAR in the paper -- may understate the significant and evolving effects of exchange rates on Canadian investment.



Figure 2

This criticism still does not prove that in the data there exists a significant and identifiable link between exchange rates and investment in Canada. It should be taken as a caution for interpretation of the present results, and it suggests the importance of further exploration of the data. Further and more extensive robustness checks are warranted.

If the Lafrance and Tessier conclusions still end up as valid -- indeed, Campa and Goldberg (1999) also could not find significant implications of Canadian exchange rates on

manufacturing industries. The data from that paper is used for creating Figures 1 and 2.

industry-level investment -- a broader puzzle exists for Canada. Consistent with the VAR structure of Lafrance and Tessier, exchange rates should drive profits, which in turn should drive investment. If the link from exchange rates to investment is insignificant, how can this be explained? Is it because exchange rates don't matter for the profitability of Canadian manufacturers, an outcome I would find higher unlikely, or because profitability does not matter for Canadian investment? The authors of the paper can provide more guidance on this puzzle to a very interested audience. Moreover, if the authors are to argue that exchange rates matter for producer investment above and beyond the profitability channel, they could explore this further conceptually and empirically.

Concluding remarks. Overall, the authors have put together a very insightful and thought-provoking discussion of whether the behavior of the Canadian dollar has significant effects on Canadian investment spending. While the jury is still out on the final answer to this question, the authors have made important progress toward its resolution. If, as currently concluded, the answer is "no", then other puzzles warrant discussion. Indeed, it would be surprising if investment in an open economy as Canada were truly insulated from exchange rates.

References

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