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Flexible Exchange Rates and Traded Goods Prices: A Theory of the Short-Run

by

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ABSTRACT

The volatility displayed by floating exchange rates has revived interest in the relationship between exchange rates and traded goods prices. This paper aims to provide a theory of exchange rates and traded goods prices in the short-run. In particular, it examines how various factors can cause exchange rate pass-through to be incomplete in the short-run but not in the long-run. These include: (i) menu costs, (ii) the costs of changing supply, (iii) the dynamics of demand response to price changes, (iv) order-delivery lags, (v) forward exchange cover, and (vi) the currency denomination of trade contracts. From a policy perspective, the presence of these factors could account for the often prolonged adjustment of trade balances to exchange rate changes, and the failure of exchange rate volatility to perceptibly affect the volume of international trade flows.

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FLEXIBLE EXCHANGE RATES AND TRADED GOODS PRICES: A THEORY OF THE SHORT-RUN[*]

by

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1. Introduction

Foreign exchange markets around the world have been characterised by a considerable amount of variability since the advent of floating exchange rates after the breakdown of the Bretton Woods system more than a decade ago. Lately, it has not been uncommon to find bilateral exchange rates displaying wide fluctuations on a month-to-month or even day-to-day basis. This volatility in exchange rates has found a ready explanation in the monetary approach or the asset models of exchange rate determination, which views the exchange rate as the relative price of assets denominated in different currencies. As an asset price, it is argued that spot rates would respond almost instantaneously to events or "news" that would alter expectations of its future price, and compared to other asset markets volatility in exchange rate markets should not seem excessive. Of course, exchange rates link prices of traded goods as well as assets, and it is clear that goods prices have not fluctuated with every exchange rate movement.

The resilience of traded goods prices to fluctuations in floating exchange rates has revived interest in the exchange rate pass-through relationship. Exchange rate pass-through refers to the degree to which exchange rate changes are reflected in the destination currency prices of traded goods. While a number of recent contributions, particularly Dornbusch (1987), Venables (1990) and Menon (1993), have addressed the determinants of the pass-through relationship in the long-run, the short-run relationship has been ignored. This gap in the literature should be addressed for a number of reasons.

To begin with, it would provide a theoretical basis for the findings of a number of studies on the pass-through relationship. Studies such as Spitaller (1980), Garnaut, Baxter and Krueger (1984), Helkie and Hooper (1988) and Clark Leith (1990) have found that while pass-through is incomplete in the short run, this does not carry through to the long-run. These studies also find that there can be very long lags associated with the transmission of exchange rate changes to traded goods prices. From a policy

* I would like to thank Peter Dixon and Premachandra Athukorala for useful suggestions, without implicating them in any way.

perspective, these lags can severely disrupt the current-account adjustment process, and the expected "*J*-Curve" response pattern of the trade balance to a currency depreciation.

There is also the widely held view, particularly with respect to small-open-economies, that complete pass-through would prevail as a long-run equilibrium relationship between exchange rates and prices. Finally, if short-run fluctuations in the exchange rate are not passed-through to traded goods prices, then there may be grounds to reconsider the perceived harmful effects of exchange rate volatility on the volume of international trade. It could in fact explain why most studies have not been able to detect a significant link between exchange rate variability and international trade flows[1]. All of these issues highlight the importance of studying the factors which affect the pace of adjustment of traded goods prices to exchange rate changes.

This paper aims to fill this gap in the literature by providing a theory of exchange rates and traded goods prices in the short-run. The rest of the paper is in five parts. Section 2 discusses the effect of menu costs on changing prices, while Section 3 looks at the costs of changing supply. The implications that demand-side dynamics have on the pricing decision in the short-run is the subject of Section 4. Section 5 examines the effect of order and payment lags, forward exchange cover and the currency denomination of contracts on price outcomes in the short-run. A final section provides some concluding remarks.

2. Costs of Changing Prices

Sticky prices in the short-run can be explained in terms of the benefits of maintaining stable prices, or alternatively in terms of the costs associated with frequently changing prices. Examples of such costs include the fixed cost related to each pricing decision, which involves the collection and processing of new information, the costs associated with changing "posted" prices, and "menu" costs (see Mussa, 1981; Rotemberg, 1982; Sheshinski and Weiss, 1977). To see how these costs can cause pass-through to be incomplete in the short-run, consider the case of an exporting firm that faces a volatile exchange rate. Figure 1 depicts the demand curve, *DD*, faced by the firm in the export market[2]. For ease of exposition, we assume that the firm is a monopoly supplier. We begin with the equilibrium price (measured in destination currency) at P, and the demand

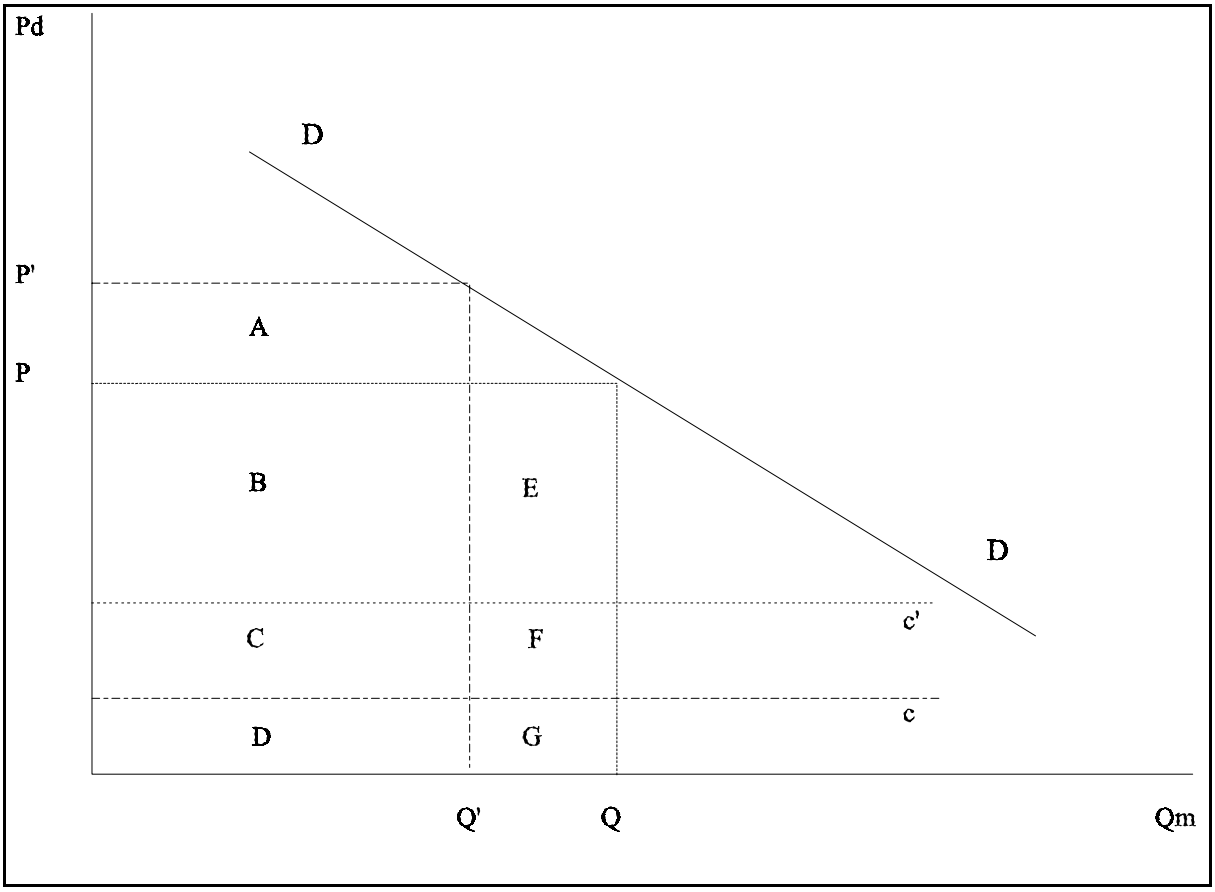
(1) For instance, the survey of this literature by the IMF (1984, p. 36) concludes that "the large majority of empirical studies ... are unable to establish a systematically significant link between measured exchange rate variability and the volume of international trade, whether on an aggregated or bilateral basis".

(2) This figure is adapted from Mankiw (1985) to incorporate international trade.

for imports at Q. *c* is the marginal cost (which is equal to average cost) measured in destination currency. The profit (π) earned by the monopolist is given by:

$$\pi = (P - c)Q = B + C + E + F \quad (1)$$

Figure 1: Short-run Pass-through in the Presence of Menu Costs



Now assume that volatility in floating exchange rates results in a 5 percent depreciation of the currency. The cost of production of the firm measured in destination currency also rises by 5 percent, from *c* to *c'*. If there are no costs associated with changing prices, then the monopolist will raise price from P to P' if A > E. At P, profits are given by:

$$\pi = (P - c')Q = B + E \quad (2)$$

If price is raised to P', then profit earned by the monopolist is:

$$\pi = (P' - c')Q' = A + B \quad (3)$$

From Figure 1, it is clear that A > E, and that the monopolist would raise price if there are no menu or related costs.

If the firm has to incur incurs menu costs *M*, then it will change price only if:

$$A - E > M \quad (4)$$

If M > A - E, then prices will remain rigid at P and pass-through will be zero. The profit earned by the firm will now be given by:

$$\pi = \{(P - c')Q\} - M = B + E - M \quad (5)$$

In the Australian context for instance, evidence presented to the Prices Surveillance Authority (PSA; 1989:61) inquiry suggests that "it is less costly to absorb (positively and negatively) uncovered short-run fluctuations in the exchange rate into margins, than to translate them into price changes". To avoid these costs (or to secure the benefits of price stability), an exporting firm could choose to set its price in foreign currency and maintain this price by absorbing fluctuations in the exchange rate into profit margins. The relationship between the domestic price and the foreign price could then be based on the firm's estimate of the long-run equilibrium exchange rate. If in the meantime a major exchange rate adjustment occurs which affects the firm's estimate of the long-run equilibrium rate, the firm may respond by making a *single* adjustment to the foreign price (Dunn, 1970). All in all, given the costs associated with changing prices, firms are likely to ignore movements in the exchange rate perceived as transitory, and respond only to movements which are believed to be of a more permanent nature.

3. Supply-Side Dynamics

The wish to maintain relative stability in prices is not the only reason for incomplete pass-through in the short-run, however. If there are costs associated with changing supply to the foreign market, then movements in the exchange rate perceived as being transitory will again be ignored. For example, if an exchange rate appreciation is perceived as being transitory, the firm may avoid passing on the full price advantage if the expansion in sales also requires an expansion in service, sales and distribution "infrastructure". Not only would such an expansion in infrastructure be costly, one would imagine that a significant proportion of such costs would be sunk. Clearly the firm would be willing to incur such costs only if the appreciation is expected to last long enough to at least recoup such costs. Once again, short-term variations in pass-through does not imply that the long-run relationship may not be complete.

Even if the appreciation is perceived as being relatively permanent, we may still observe incomplete pass-through in the short-run but not necessarily in the long-run. Not only would an expansion in infrastructure be costly, one could imagine that it is bound to be more costly the more rapid the attempted expansion. Even if the appreciation is viewed as being relatively permanent, there would be little point in cutting prices immediately if there is no capacity to meet the expanded demand. What is more likely is that prices would fall gradually as the infrastructure is put in place, and given time pass-through should be complete (Krugman, 1987). The presence of these supply-side factors suggest that incomplete pass-through in the short run can be explained in terms of the perceived duration of the exchange rate change, as well as how recently the exchange rate has changed (even when viewed as permanent) without preventing complete pass-through in the long run.

This dynamic response on the supply-side can be modelled in the following way. Let us assume that we have a firm that exports its product to a foreign market, where it faces a demand curve of constant elasticity. We write the demand function in inverse form:

$$P_d = P_d(x) \tag{6}$$

where x is the rate of deliveries to the foreign market.

The costs faced by the exporting firm is assumed to consist of two parts. Firstly, there is the cost of production; and we assume marginal production costs to remain constant in the exporter's currency. Secondly, we will try and capture the dynamic aspects of marketing and distribution by assuming that there are costs associated with adjusting the level of sales to the foreign market (i.e. an adjustment cost that is increasing in the deviation of $\partial x/\partial t$ from zero). If we write this adjustment cost as $h(\partial x/\partial t)$, then the firms instantaneous profits will be:

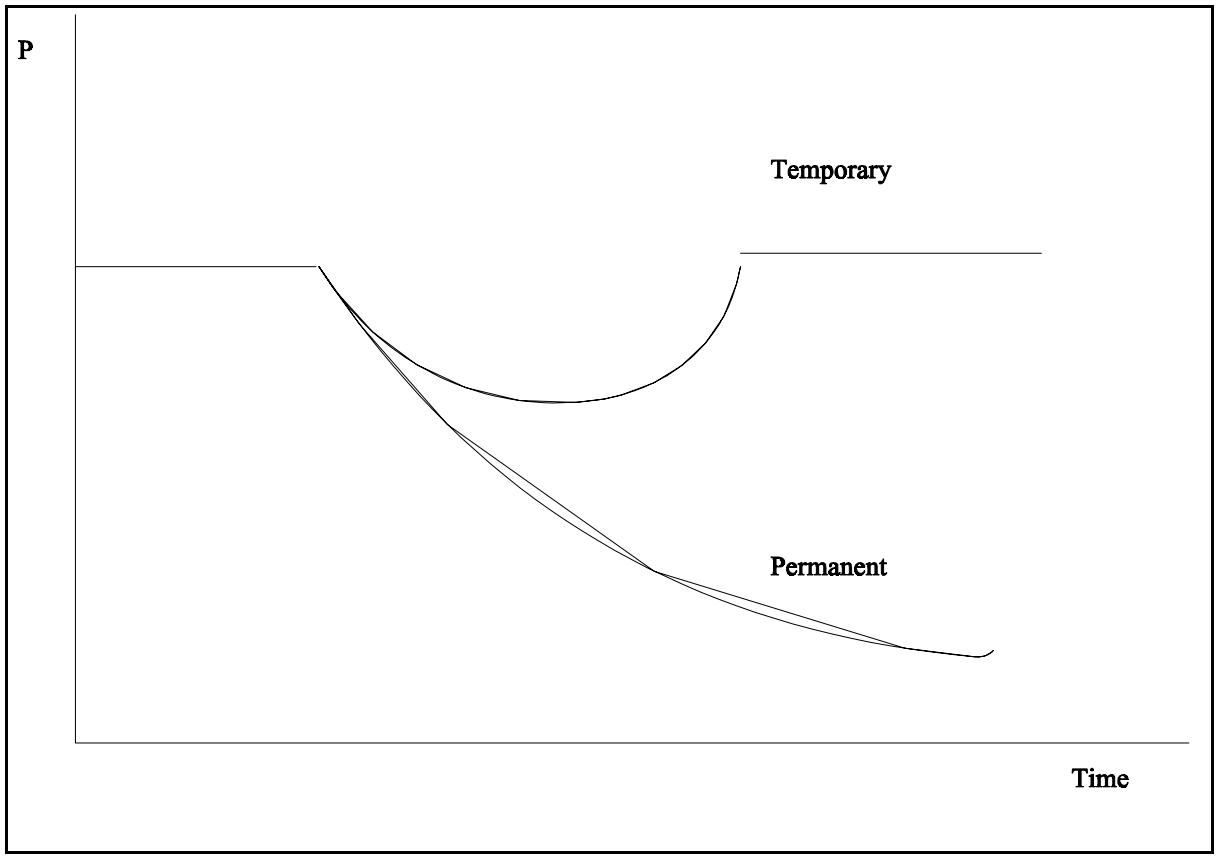
$$V = P_d\, x / \phi - C_f\, x - h(\partial x/\partial t) \tag{7}$$

where C_f is the marginal cost of production in the exporter's currency, and ϕ is the exchange rate.

It will be the firm's objective to maximise the present discounted value of V in this case. Problems of this sort have become increasingly common in economics (for example, see Sargent (1979)), so it should not be necessary to rework the solution here. Instead, it would be more revealing to review some of the basic but important characteristics of the outcome.

The most useful way of thinking about the problem is to regard the firm as placing a shadow price on output. The firm will expand output if this shadow price is positive, and will contract output if it is negative. The evolution of the shadow price itself depends on the marginal profitability of an increase in *x*. The optimal solution takes the form of a saddle path.

Figure 2: Dynamics of Price Response Following Temporary and Permanent Exchange Rate Shocks



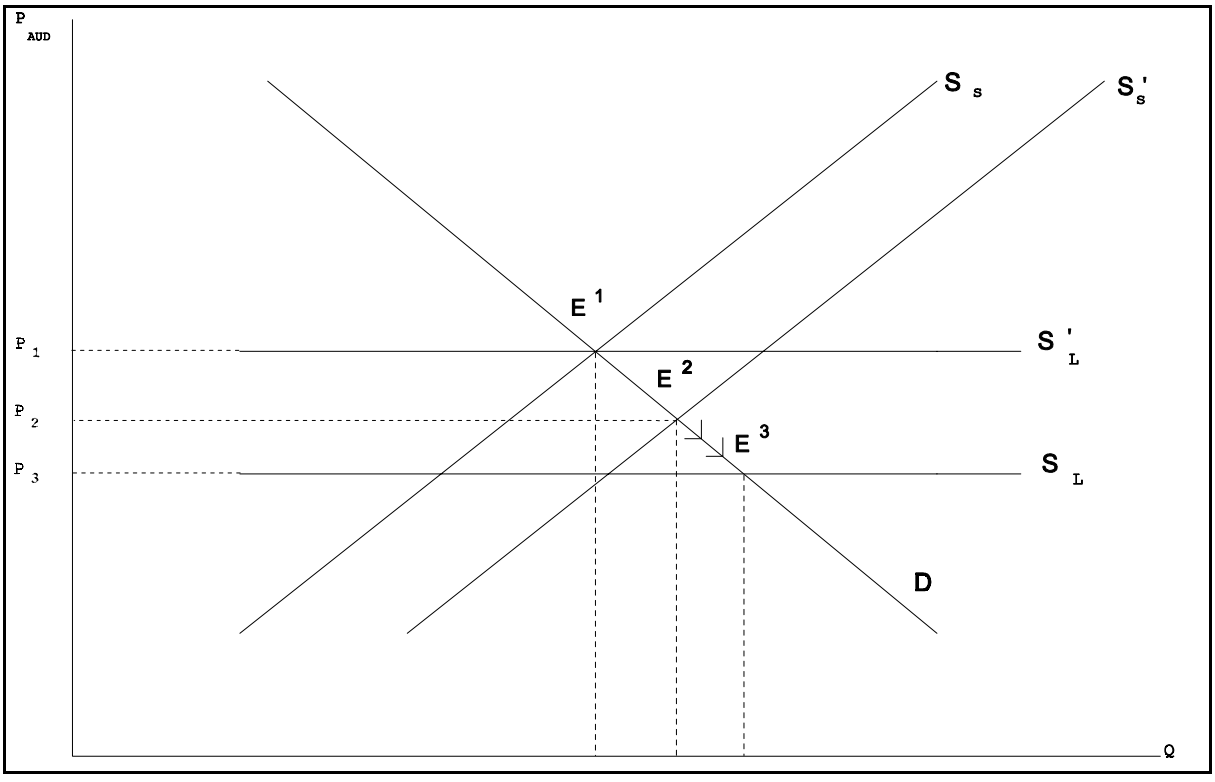
Suppose that we now introduce a shock to the system by changing the exchange rate ϕ. The result depends on how permanent the shock, as depicted in Figure 2. Figure 2 illustrates how the price of imports would behave following a permanent and a temporary exchange rate change. In the case of a permanent appreciation, the price would fall only gradually as *x* rose, and finally falling by the full amount of the appreciation in the long run. In the case of a temporary appreciation, the price would not only begin rising again after the exchange rate returned to its initial level, it would fall much more slowly from the start and might actually begin to rise before the exchange-rate reversal.

This result is not conditional upon the need for the exporter to expand (or even provide) the infrastructure to meet the expanded demand in the foreign market. It is much more

general than that. To see this, let us now assume that there exists excess capacity in the distribution network to cater for the expansion in demand. As long as it takes time to increase the supply of exports to a foreign market, as it must given the presence of order-delivery lags, import prices will only gradually adjust to exchange rate variations. This point is illustrated in Figure 3, which represents the market for an imported good. D represents the demand curve for imports; S_S is the short-run import supply curve, and S_L is the long-run import supply curve. S_S is upward sloping, reflecting the difficulty associated with changing supply in the short-run. Supply is perfectly elastic in the long-run.

Initially we are at E^1, with price P_1 and imports of Q_1. An appreciation of the exchange rate will shift both S_S and S_L downwards. The post-appreciation supply curves are depicted as S'_S and S'_L. The inelasticity of supply in the short-run will initially lead to only partial pass-through of the appreciation. As we move from E^1 down to E^2, pass-through will be equal to $\{(P_1 - P_2) / (P_1 - P_3)\}$. There will be further adjustment over time as supply responds, leading to a gradually falling import price and rising import volume, as indicated by the arrowheads along the demand curve. This will continue until E^3 is reached, where import volume has increased to Q_3, and import price has fallen by the full amount of the appreciation to P_3.

Figure 3: Exchange Rate Pass-through in the Short-Run: Supply-Side Dynamics



4. Demand-Side Dynamics

To understand the role of demand-side dynamics, we need to look a bit more closely at the underlying conditions that allow pass-through to be incomplete in the short run but not in the long run. The fact that exchange rate pass-through is usually complete in the long run in these cases implies that firms are aware that they might create arbitrage opportunities for rival firms, or invite entry of new firms into the market, both of which are likely to threaten their market share. So, what is it that enables firms to ignore such threats to their market share in the short-run? In answering this question, it would be useful to separate the conditions for potential entry into the market to exploit arbitrage opportunities, from the response of existing (rival) sellers in the market.

For rival firms already selling in the market, one would expect that the same costs associated with expanding infrastructure and so on in the short run would beset them too, and there would be little wisdom in simply cutting prices immediately. But even if we assume that the rival firms did have the infrastructure in place to meet an expansion in demand, we might still observe the failure of these firms to exploit the arbitrage opportunity (provided by the exporter who failed to completely pass-through the exchange rate appreciation in the short run). This behaviour can be explained in terms of the lags in the adjustment of demand to price differences, as customers move over time from firms with higher prices to firms with lower prices (Dohner, 1984). The slow adjustment of customers to price differences is easily explained in terms of the slow diffusion of information about prices (Phelps and Winter, 1970). As Junz and Rhomberg (1973, p.413) put it, "it takes time for buyers and sellers to become aware of the changed competitive situation, and this delay may be rather longer in international trade than in domestic trade because of language and distance obstacles to the spreading of information".

Furthermore, factors such as uncertainty regarding the reliability of new sellers, the reluctance to give up a satisfactory relationship with traditional suppliers and commitments to a given type of equipment because of previous purchases or stocks of spare parts may all explain the failure of buyers to respond immediately to price differences, and the inertia of buyers in patronising customary sources in the short run (Kravis and Lipsey, 1978). There are a variety of costs associated with switching suppliers, which would include the costs incurred in information acquisition, evaluation of product quality and reliability of supply, and establishing new contractual links. The presence of these factors could largely account for, and may in fact be confirmed by, the substantial lags in the adjustment of trade flows to relative price changes identified in a

number of studies (see, for instance, Junz and Rhomberg, 1973; Spitaller, 1980)[3].

The presence of these lags on the demand side could go a long way towards explaining why such arbitrage opportunities remain unexploited by rival firms in the short run. It may also well explain why the foreign firm concerned could risk creating a price differential by not fully passing on an appreciation in the short-run but not in the long-run. As Kravis and Lipsey (1971, p.47) put it, "Even if a continuation of the price difference would eventually find the higher priced seller with no customers, there may be a long interval in which sales are made at both high and low prices".

Firms contemplating entry into the market, on the other hand, are faced with a variety of fixed costs which they must bear for the first time if wishing to sell in the market. As Krugman (1989) points out, these costs may take on an investment-like component, and would include the resources expended in adapting the product to the foreign market, in developing a marketing and distribution network, and often in creating production capability specially geared to foreign demand. A significant proportion of these costs may be regarded as sunk once they have been incurred, since the firm cannot easily sell off its assets, visible or invisible. To a large extent, the investment is simply irreversible (Baldwin, 1988; Dixit, 1989a,b).

Second is the issue of time, and this has two dimensions. In the first place the price differential must persist long enough for firms to become aware of the arbitrage opportunity, given that communication and recognition lags exist (see Junz and Rhomberg, 1973; Dohner, 1984). From this time onwards, the next important time frame is how long the firms contemplating entry *believe* the price differential is going to persist. The obvious point here is that the exploitation of profit opportunities offered by international arbitrage would require that the profit opportunity be believed to persist at least long enough to permit recovery of these fixed costs of entry.

If the profit opportunity was provided by an exchange rate change, then these firms must not only consider how permanent that change is expected to be, but also the reaction of existing firms in the market if they held the same expectations. The ex-post position of complete pass-through in the long run suggests that short run variations should not invite entry. Finally, although the discussion has emphasised the expected duration of the price differential caused by incomplete pass-through of the exchange rate change, a complete assessment of the viability of engaging in arbitrage cannot ignore the size of the exchange rate change itself, or more accurately the degree of pass-through of the

(3) In the Australian case for example, Athukorala and Menon (1988) found that the average lag in the response of demand to price differences between domestic and imported manufactures was four quarters.

exchange rate which will determine the size of the price differential that exists.

It is clear from the discussion above that arbitrage opportunities may not be pursued in the short-run due to lags on the demand side or other timing factors.

5. Order and Payment Lags, Forward Exchange Cover, and Currency Denomination of Contracts

As a result of lead times involved in ordering, receiving and paying for imported goods, prices may not reflect current exchange rates but those that prevailed in the past. Contract stipulations as to when payment for goods ordered is due is obviously going to matter if the exchange rate moves in the interim. For instance, the contract may stipulate that payment be made on receipt of the goods, or that pre-payment may be necessary. In the case of the former, the importer will be affected by any exchange rate movement that occurs during the order-delivery period, but not in the case of the latter. Furthermore, clauses may be built into the contract so that the price is adjusted according with exchange rate movements that occur between the time of order and the time of payment. In some instances, some form of risk-sharing agreement associated with exchange rate changes may be arranged between the foreign supplier and importer. In all of these cases, the pass-through of exchange rate changes to import prices during this period is going to be higher than if payment is made at the time of ordering.

To eliminate the risk generated by currency movements during the order-payment period, importers may chose to take out forward exchange cover in order to avoid any potential losses. The use of forward exchange cover by importers will consolidate the effects of the order-payment lag in the pass-through process. In the case of non-speculative or "hedging" contracts, it is likely that the cover will be taken out as soon as a currency exposure is created, which would be at the point of placing the order. These importers will not be operating at current exchange rates but those that prevailed 6 months or more in the past.

Apart from the duration of these lags and whether or not forward cover is used, the currency in which contracts are denominated is also going to matter in the short run. The assumption implicit in the discussion so far is that contracts are denominated in the currency of the source country. To the extent that import contracts are written in either the buyer's currency or that of a third country, the pass-through relationship in the short-run is going to be affected. Magee (1973) attributes much of the incomplete pass-through observed in the short-run to the alternative mixes of invoice currencies used in international trade. Spitaeller (1980) alludes to this empirical fact in explaining why estimated elasticities of export price with respect to competitors' export prices often

differ from the elasticity with respect to the exchange rate, even though in theory they should be equal.

In the case of imports for instance, contracts written in the currency of the importing country will not be affected by exchange rate movements that occur during the order-payment period, simply because the importer will not have to undergo a currency translation in order to make payment. This will result in a short-term lag being built into the response of import prices to exchange rate changes, since prices will not change until a new contract is negotiated[4]. In fact, the writing of contracts in the importer's currency may be viewed as a form of forward cover for the duration of the contract. Given that bilateral exchange rates do vary quite significantly across countries even in the short-term, the use of third country currencies may alter both the duration of the lags involved and the degree of short-run exchange rate pass-through. For instance, if the third country currency is weaker (stronger) than that of the import supplying country, then short run pass-through will be less (more) than 100 percent.

6. Concluding Remarks

This paper has aimed to fill an important gap in the literature by providing a theory of exchange rates and traded goods prices in the short-run. It has examined how various factors can cause exchange rate pass-through to be incomplete in the short-run but not in the long-run. These factors include: (i) menu costs, (ii) the costs of changing supply, (iii) the dynamics of demand response to price changes, (iv) order-delivery lags, (v) forward exchange cover, and (vi) the currency denomination of trade contracts. These factors may well explain why a number of studies have found pass-through to be incomplete in the short-run but not in the long-run. From a policy perspective, the presence of these factors could account for the often prolonged adjustment of trade balances to exchange rate changes, and the failure of exchange rate volatility to perceptibly affect the volume of international trade flows.

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(4) A number of authors have noted that the currency in which contracts are denominated is likely to be determined by the relative market power of international traders (see, for instance, Magee, 1973; Krugman, 1980; Athukorala and Menon, 1994). From the perspective of minimising risk, the preferred currency will always be the trader's own currency. In the Australian context, evidence supplied to the PSA suggests that foreign suppliers may either impose a price premium for invoicing in AUDs, or currency rise and fall clause may be written into contracts to safeguard the returns of the foreign supplier in foreign currency terms. Alternatively, exporters looking to break into a market may offer the choice of currency to the buyer as an inducement to gain the competitive edge. In the Australian clothing and footwear industries, it was common practice for relatively new entrants to the market such as China and Taiwan to offer to write contracts in AUDs purely for this reason, without imposing any further conditions. The dominant party to the transaction may also wish to speculate on the future course of the exchange rate in deciding on the invoicing currency, and thus try and secure capital gains through anticipated currency movements.

References

Athukorala, P. and Menon, J., (1988), "Relative Prices, Economic Activity and Imports of Manufactured Goods: The Australian Experience", *Economics Discussion Paper 1988/24*, School of Economics, La Trobe University, Melbourne.

Athukorala, P. and Menon, J., (1994) "Pricing to Market Behaviour and Exchange Rate Pass-through in Japanese Exports", *Economic Journal*, 104, forthcoming.

Baldwin, R.E., (1988), "Hysteresis in Import Prices: The Beachhead Effect", *American Economic Review*, 78, 773-85.

Blejer, M.I. and Hillman, A.L., (1982), "A Proposition on Short-Run Departures from the Law of One Price", *European Economic Review*, 17, 51-60.

Clark Leith, J., (1991), "The Exchange Rate and the Price Level in a Small Open Economy", *Journal of Policy Modeling*, 13 (2), 309-15.

Dixit, A.K. (1989a), "Hysteresis, Import Penetration and Exchange Rate Pass-Through", *Quarterly Journal of Economics*, 104 (2), 205-228.

Dixit, A.K. (1989b), "Entry and Exit Decisions Under Uncertainty", *Journal of Political Economy*, 97 (3), 620-38.

Dohner, R.S., (1984), "Export Pricing, Flexible Exchange Rates, and Divergences in the Price of Traded Goods", *Journal of International Economics*, 16, 79-101.

Dornbusch, R., (1987), "Exchange Rates and Prices", *American Economic Review*, 77, 93-106.

Dornbusch, R. and Krugman, P., (1976), "Flexible Exchange Rates in the Short-run", *Brookings Papers on Economic Activity*, No. 1, 143-85.

Dunn, R.M., (1970), "Flexible Exchange Rates and Oligopoly Pricing", *Journal of Political Economy*, 78, 140-51.

Garnaut, R., Baxter, P., and Krueger, A.O., (1984), "Exchange Rate and Macroeconomic Policy in Independent Papua New Guinea", *Pacific Research Monograph No. 10*, Canberra: Development Studies Centre, Australian National University.

Helkie, W.L. and Hooper, P., (1988), "An Empirical Analysis of the External Deficit", Chap. 2 in R.C. Bryant, G. Holtham, and P. Hooper, (eds.), *External Deficits and the Dollar: The Pit and the Pendulum*, Washington, D.C.:Brookings Institution.

Holmes, P.M., (1978), *Industrial Pricing Behaviour and Devaluation*, London: Macmillan.

International Monetary Fund (IMF), (1984), "Exchange Rate Volatility and World Trade", *Occasional Paper No. 28*, July, Washington, D.C.

Junz, H.B. and Rhomberg, R.R., (1973), "Price Competitiveness in Export Trade among Industrial Countries", *American Economic Review*, 63, 412-8.

Kravis, I.B. and Lipsey, R.E. (1971), *Price Competitiveness in World Trade*, New York: National Bureau of Economic Research.

Kravis, I.B. and Lipsey, R.E., (1978), "Price Behaviour in Light of Balance of Payments Theories", *Journal of International Economics*, 8, 193-246.

Krugman, P.R., (1980), "Vehicle Currencies and the Structure of International Exchange", *Journal of Money, Credit and Banking*, 12 (3), 513-26.

Krugman, P.R., (1987), "Pricing to Market When the Exchange Rate Changes", in S.W. Arndt and J.D. Richardson (eds.), *Real-Financial Linkages Among Open Economies*, Cambridge, Massachusetts: Massachusetts Institute of Technology Press.

Krugman, P.R., (1989), *Exchange-Rate Instability*, Cambridge, Massachusetts: Massachusetts Institute of Technology Press.

Magee, S.P., (1973), "Currency Contracts, Pass-Through and Devaluation", *Brookings Papers on Economic Activity*, 1, 303-23.

Mankiw, G.N., (1985), "Small Menu Costs and Large Business Cycles: A Macroeconomic Model of Monopoly", *Quarterly Journal of Economics*, May, 100, 529-37.

Menon, J., (1993), "Exchange Rate Pass-through: Theory and Evidence", *Working Paper No. IP-59*, Centre of Policy Studies/IMPACT Project, Monash University, Melbourne.

Mussa, M., (1981), "Sticky Prices and Disequilibrium Adjustment in a Rational Model of the Inflationary Process", *American Economic Review*, 71, 1029-37.

Phelps, E.S. and Winter, S.G., (1970), "Optimal Pricing Policy under Atomistic Competition", in Phelps *et al*., *Microeconomic Foundations of Employment and Inflation Theory*, New York: Norton.

Prices Surveillance Authority (PSA), (1989), "Inquiry Into Effects of Exchange Rate Appreciation on Prices of Consumer Goods, *Report No. 21*, Canberra: Australian Government Publishing Service (AGPS).

Rotemberg, J.J., (1982), "Sticky Prices in the United States", *Journal of Political Economy*, 90, 1187-211.

Sargent, T.J., (1979), *Macroeconomic Theory*, New York: Academic Press.

Sheshinski, E. and Weiss, Y., (1977), "Inflation and Costs of Price Adjustment", *Review of Economic Studies*, 44, 287-304.

Spitaller, E., (1980), "Short-run Effects of Exchange Rate Changes on the Terms of Trade and Trade Balance", *IMF Staff Papers*, 27 (2), 320-348.

Venables, A.J., (1990), "Microeconomic Implications of Exchange Rate Changes", *Oxford Review of Economic Policy*, 6 (3), Autumn, 18-27.