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Labour Demand and Exchange Rate Volatility

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Abstract

The purpose of this paper is to assess under what conditions exchange rate volatility exerts a positive effect on a firm's labour demand. As the exchange rate volatility increases, so does the value of the export option provided the firm under study is flexible. Flexibility is important because it gives the firm option value. Higher volatility increases the potential gains from trade and may increase the demand for labour. This may explain part of the mixed empirical findings regarding the effects of exchange rate risk on labour demand and international trade.

Keywords: Labour demand, Exchange rate risk, Risk aversion, Flexibility, Real option, International trade

JEL-Classification: F16, F23, F31, F41

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1 Introduction

In the last decades international firms were exposed to high foreign exchange rate risk since major currencies showed substantial volatility. The volatility of prices and foreign exchange rates affects employment and the wage process in two ways, first through international trade and second through foreign direct investment.

The intensified interest in the various effects of exchange rate volatility arose with the abolition of the Bretton-Woods agreement. The outcome of the research on this topic is far from unique, and the debate on the effects of exchange rate volatility keeps going on. Many of the first studies concentrated on the impact of a regime of freely floating exchange rates on international trade flows. A common belief by some of the early critics of freely floating exchange rates was that they would make international trade and hence welfare decrease and not increase as predicted by its supporters. The reasoning behind this rejection is that international firms are commonly risk averse: they would not be willing to incur revenue losses that would arise from uncertain export or import activity, respectively. This is the overall effect which is found when uncertainty is introduced to a formerly certain situation. One might think that with the realization of the EURO currency area a great part of the associated riskiness has disappeared.[1] This statement would be far too general, though. Within the EU, internal terms-of-trade differences continue to matter. As regards international trade relationships with extra-EU countries, exchange rate uncertainty has the same bearing for each member country as it had before the single currency was introduced.

Another branch of literature deals with the impact of exchange rate volatility on international trade flows, i.e. with an increase in uncertainty which represents the marginal effect of uncertainty. A priori, the firm's reaction is not clear, a risk averse firm e.g. may well react adversely, i.e. it may rather expand than reduce its export activity in response to an increase in exchange rate volatility intenting to offset probable revenue losses by an increase in its export volume. A positive effect could thus be observed but possibly for reasons different from those put forward by the supporters of freely floating exchange rates.

McKenzie (1999) gives a survey of theoretical and empirical studies on the impact of exchange rate volatility on international trade flows. He summa-

[1] De Grauwe (1997), p. 52 argues that within the EU the elimination of transaction costs is another source of gains in economic efficiency arising from a single currency, and it is certainly the most visible gain from the monetary union.

rizes that both positive and negative findings of exchange rate volatility were found in both theoretical and empirical studies and that some of the latter were significant and others were not. Despite of different estimation techniques, he deduces some general findings from the empirical papers. First, whether nominal or real exchange rates are modeled does not seem to influence the result. Second, it seems that disaggregated sectoral data yield more reliable outcomes than aggregate or bilateral trade data.

In a recent paper, Bacchetta and van Wincoop (2000) study the effect of the exchange rate system on trade and welfare in a stochastic general equilibrium model. One of their findings is that in general, a fixed exchange rate regime is not necessarily associated with higher trade levels than a floating exchange rate regime. Furthermore, they do not derive general relationships between trade and welfare from the exchange rate regime implemented.

Exchange rate uncertainty also impacts domestic employment, as well on the firm as on the aggregate level. Empirical evidence, however, regarding the effect of exchange rate risk on employment has at best been inconclusive. In a recent study Chen and Funke (2002) use the real options approach to study the effects of the exchange rate regime on labour adjustment. They find that the underlying regime influences the firm's decision between working hours and employment. In particular, a credible peg may be favourable to the firm's employment adjustment.

Recently the options theory has been increasingly applied to various economic problems apart from corporate finance, including exchange rate risk. Generally speaking, real options provide the firm under study with flexibility. The firm may exercise its option, but it is not obliged to do so. Coy (1999) argues that in investment planning, e.g., real options may well dominate the net present value approach. Even when future payouts are adjusted for risk, the risk will never be fully predictable with the net present value approach. In the context of exchange rate volatility, the advantage of the flexibility originating from real options consists in making the international allocation of production conditional on the realization of the exchange rate. A result found in many of the early theoretical papers that an exporter sells all his production output on the world market, irrespective of the exchange rate (see, e.g., Benninga, Eldor and Zilcha (1985), Kawai and Zilcha (1986), Broll, Wahl and Zilcha (1995)), will no longer hold provided a firm is flexible. A firm rather adjusts its export volume to the exchange rate level. When the exchange rate permits profitable exports, the firm will export; with a surge in the exchange rate to high levels, exports increase; when the exchange rate drops below a certain level, exports fall to zero.

One of the first to apply real options theory to export strategies was Franke (1991). He models a firm that is risk neutral and acts as a monopolistic competitor.

In our study, we analyze the effect of exchange rate volatility on the labour demand of a risk averse firm which is flexible in its choice between allocating its output to the world market or to the domestic market. Ex-ante, the firm has to decide about its labour input, but it can ex-post choose where to sell. We show that under these assumptions increased riskiness of the exchange rate uncertainty affects the level of employment, but the sign of this effect is ambiguous depending on the firm's degree of risk aversion (Dellas and Zilberfarb (1993)). An increase in the exchange rate volatility increases labour demand if the relative risk aversion is sufficiently low. Hence, in contrast to the traditional literature, real exchange rate volatility may have a positive impact on domestic employment. This may explain part of the mixed empirical findings in the economic literature (Bini-Smaghi (1991), McKenzie (1999)). In addition, we decompose the net effect that results from uncertainty in a substitution effect and an income effect. We find that whether the substitution or the income effect dominates will again depend on the firm's degree of relative risk aversion.

We proceed as follows. Section 2 is a short introduction to the overall and marginal impact of uncertainty and to real options. In section 3, we set up the model of a risk averse firm under exchange rate volatility endowed with some firm specific degree of flexibility. We derive employment effects of an increase in the exchange rate volatility including the analysis of the substitution and the income effect. Section 4 concludes.

2 Uncertainty and real options theory

In this section, we sketch the difference between the overall and the marginal impact of price uncertainty on the output decision of a risk averse firm. We further set out briefly the concept of real options theory.

2.1 Overall and marginal impact of uncertainty

For a risk averse firm the transition from decision making under certainty to decision making under uncertainty does not bear the same effects as an increase in the degree of uncertainty. When confronted with an uncertain output price, the risk averse firm will typically reduce its output volume in

order not to incur revenue losses. This is the overall effect, and it is expressed in marginal cost being less than the expected output price. The resulting difference can be interpreted as a risk premium.[2]

The marginal effect of price uncertainty, in contrast, captures the reaction of a risk averse firm to variations in the degree of price uncertainty. At a very general level, even for a risk averse firm nothing can be said about the sign of the marginal effect. Under certain assumptions, some general conclusions about the marginal effect can nevertheless be drawn. Provided the uncertain output price varies around the expected output price, a price taking firm's profits may on average be higher than they would be with the expected output price. This is the case if the profit function is convex[3] or if the marginal cost curve is constant or increasing over the relevant range. Under these assumptions the firm will produce more when price levels are high in order to profit from them, and it will produce correspondingly less at low uncertain price levels. In doing so, the gains from expanding the output volume will on average dominate the losses from an output reduction with low price levels. The higher average profits increase the firm's expected utility, but at the same time, this effect is counteracted by the greater uncertainty about them (cf. de Grauwe (1997), p. 54).

2.2 Real options theory

The options theory was introduced in finance by the famous works of Fischer Black and Myron Scholes (1973) and Robert Merton (1973). They developed a formula to derive the value of an option traded in a perfect capital market. The options theory can also be applied to economic decision making other than finance. The underlying decision problem is then termed a real option. However, applying real options theory does not necessarily involve the valuation of the underlying option. Besides, when real options are employed there is no need for diversification or for hedging.

When an exporting firm is flexible in its choice whether or not to export, the export strategy is like a real option: whatever the realized exchange rate, the domestic market revenue is certain. The domestic price is the strike price of the export option. The possibility to export when real exchange rates are favourable therefore conveys a real call option-like source of income to the

[2]For an explanation see e.g. Sandmo (1971).

[3]In the standard theory of a price taking firm under certainty the profit function is usually assumed convex. A higher output price makes the firm adjust its optimal output policy. See e.g. Varian (1992), p. 43

firm. As the exchange rate volatility increases, so does the value of the export option. The higher the volatility, the more likely extremely high realizations of the real exchange rate, and consequently the higher the potential gains from international trade and finally the higher the effect on employment. On the other hand, the equally higher probabilities of low realizations of the real exchange rate do not offset these gains since the firm may choose to give up export. Losses are effectively truncated. The necessary requirement for the positive effect of high volatility levels remains that the firm's revenue function be convex in the exchange rate. But his property is precisely guaranteed with the real options theory, as figure 1 demonstrates.

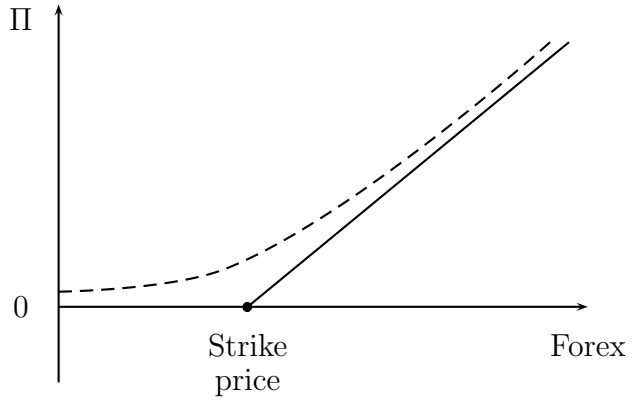

Figure 1: Convex revenue function

The concepts of this section can be summmarized as follows. Given a risk averse firm, an increase in foreign market uncertainty induced by an increase in the real exchange rate volatility reduces the firm's expected utility. This effect would imply first a decrease in trade and second a reduction of labour demand. Hence, an increase in the exchange rate volatility reduces labour demand. On the other hand, higher riskiness makes the option to export more profitable, provided the firm is flexible in the sense mentioned above. Flexibility tends to stimulate trade and employment. We will make use of both concepts in the next section where we set up the model of a risk averse firm.

3 Export flexibility and labour demand

In this section we show that with trade flexibility a greater exchange rate volatility yields a larger labour demand and hence a greater amount of planned production. This property holds if the degree of relative risk aversion is not too high. We develop a partial equilibrium model of a competitive firm of the Sandmo type (see Sandmo (1971)). We differ in that we state the firm's optimization problem in terms of the input rather than the output space.

3.1 Model of a risk averse firm

The firm produces a single good using labour as the only factor of production. It is risk averse with a von Neumann-Morgenstern utility function $u(\Pi)$ and maximizes the expected utility of its home currency profit $Eu(\Pi)$. We assume u is a strictly concave, increasing and differentiable function which indicates risk aversion. The firm can allocate its output at the domestic market or at the world market. It chooses the amount of labour it uses in production before the spot exchange rate as modeled in section 2.1 is observed whereas the decision about international trade is not made until the real exchange rate is observed. Our model differs from the Sandmo approach in that the firm's decision is not on an adjustment of the output volume or the export volume, respectively, but on whether or not to export. This captures the notion of flexibility through use of real options (Gagnon (1993), Broll and Eckwert (1999)).

We specify the time structure of the model as follows: in the current period (period 0) the firm decides on labour input L which gives rise to labour costs WL, where W denotes the real wage rate. At date 1, the random real exchange rate realizes and the firm decides about the output allocation between the home and the foreign goods markets.

Real exchange rate

The real exchange rate $\tilde{e}$ is a random variable and is defined as $\tilde{e} = \tilde{S}P/Q$ where $\tilde{S}$ denotes the spot exchange rate, defined as units of domestic to units of foreign currency, and P and Q denote the foreign and domestic goods prices, respectively. The latter are assumed to be fixed. We model exchange rate volatility as a mean-preserving spread.

Assumption 1. *The real exchange rate fluctuates around the purchasing power parity with expected zero noise, i.e.,* $\tilde{e} = 1 + \alpha\tilde{\varepsilon}, E(\tilde{\varepsilon}) = 0, \sigma_{\varepsilon}^2 = 1, \alpha > 0$*, where* α *is the standard deviation. The parity exchange rate* $e = 1$ *for the traded goods is* $e = SP = 1$*, where the domestic goods' prices are normalized to unity.*

In this formulation, the exchange rate's standard deviation is the spread parameter and measures volatility. Figure 2 represents two possible realizations of α with $\alpha_2 > \alpha_1$. The export option associated with the more volatile α_2 is riskier than with α_1, but the potential increases in labour demand are likely to be higher, too.

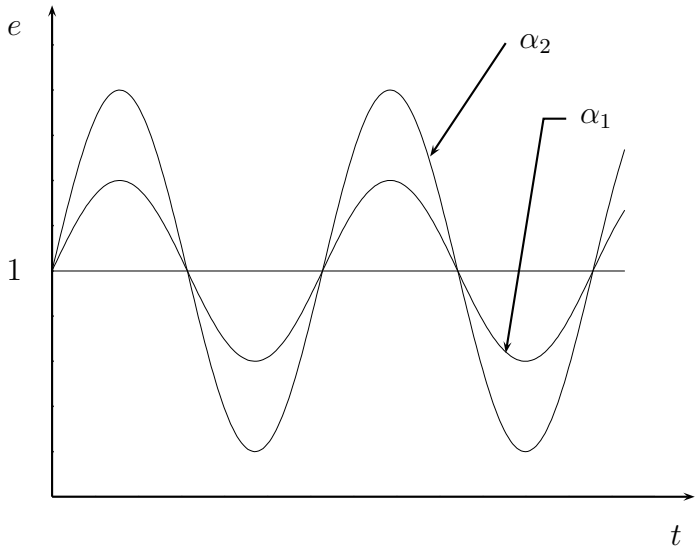

Figure 2: Exchange rate volatility

The production process adopted by the firm is given by a strictly concave production function $F(L)$. The allocation decision is conditional on the realization of the real exchange rate. Hence, the firm's random revenues in domestic currency are

$$\arg\ \max\{\tilde{e}[F(L) - Y]; Y\} \tag{1}$$

where Y denotes domestic supply and $X = F(L) - Y$ is the export volume.

Export decision

Since the export decision is made the exchange rate e has been observed, it follows that the allocation decision is based on a comparison of the goods prices on the home and foreign goods markets, both in domestic currency. The firm's profit at date 1 (for a given first-stage labour demand L_0) is defined by

$$\max\{\tilde{e}[F(L_0) - Y]; Y\} - WL_0.$$

The optimal decision rule at date 1 is found by maximizing profit with respect to the optimal allocation of production for given e and labour input L_0.

For all realizations $\varepsilon > 0$ the firm's exports are equal to its total production: $X = F(L)$. There is no export for $\varepsilon \leq 0$, i.e., $Y = F(L)$. Thus we obtain the following export decision rule:

$$X = \begin{cases} 0: & e \leq 1 \\ F(L_0): & e > 1 \end{cases}$$

This condition implies that if $e \leq 1$, the export option is not exercised. The per unit export payoff is $e - 1$ if $e > 1$ and zero otherwise. Compare this payoff to that of a European call option which entitles the option holder to sell a financial asset at the spot price if the spot price is above the exercise price. The payoff of the export option is therefore identical in form to the payoff of a call option with exercise price 1 and security price e.

Optimal labour demand

At date 0, the firm maximizes the expected utility of profit $E[u(\tilde{\Pi})]$ by choosing its optimal labour employment given a subjective probability distribution of the random variable $\tilde{\varepsilon}$ and the optimal decision rule for the allocation of production. The decision problem reads

$$\max_L \int_{\{\varepsilon>0\}} u\left[(1+\alpha\varepsilon)F(L) - WL\right] z(\varepsilon)d\varepsilon + u\left[F(L) - WL\right] z(\varepsilon \leq 0)$$

with $z(\varepsilon)$ being the probability density function of ε. The necessary and sufficient first-order condition for optimal labour demand L^* at date 0 reads

$$\begin{aligned} &\int_{\{\varepsilon>0\}} u'(\Pi^*)\left[(1+\alpha\varepsilon)F_L(L^*) - W\right] z(\varepsilon)d\varepsilon \\ &\quad + u'(\Pi^*)[F_L(L^*) - W]z(\varepsilon \leq 0) = 0 \end{aligned} \tag{2}$$

where $u'(\cdot)$ is marginal utility and an asterisk indicates an optimum level. From (2) we can show that with a sufficiently low degree of relative risk aversion, $r(\Pi) = -u''(\Pi)\Pi/u'(\Pi)$, there exists a positive effect of exchange rate volatility on labour demand.

3.2 A positive effect on labour demand

We can prove

Proposition 1. *Given an international firm with export flexibility as described above. The firm's optimal labour demand increases in the exchange rate volatility if the decision maker is not too risk averse, i.e., if the degree of relative risk aversion is less than unity.*

Proof. In view of the first order condition, the optimal labour demand L^* is a function of the exchange rate volatility α, $L^* = L(\alpha)$. Implicit differentiation yields

$$\frac{dL^*}{d\alpha} = -\frac{\beta}{\Delta}.$$

From the second order condition we obtain that the denominator is negative,

$$\begin{aligned}\Delta &= \int\limits_{\{\varepsilon>0\}} \left\{u''(\Pi^*)\left[(1+\alpha\varepsilon)F_L(L^*) - W\right]^2 + u'(\Pi^*)(1+\alpha\varepsilon)F_{LL}(L^*)\right\} z(\varepsilon)d\varepsilon \\ &+ \left\{u''(\Pi^*)\left[F_L(L^*) - W\right]^2 + u'(\Pi^*)F_{LL}(L^*)\right\} < 0.\end{aligned}$$

The numerator β reads

$$\beta = \int\limits_{\{\varepsilon>0\}} \varepsilon F_L(L^*)u'(\Pi^*)\left\{\frac{u''(\Pi^*)}{u'(\Pi^*)}\left[(1+\alpha\varepsilon)F(L^*) - W\frac{F(L^*)}{F_L(L^*)}\right] + 1\right\} z(\varepsilon)d\varepsilon. \tag{3}$$

Its sign cannot be directly assessed. It follows that

$$\frac{dL^*}{d\alpha} \quad \left\{\begin{array}{c}<\\=\\>\end{array}\right\} 0 \quad \Leftrightarrow \quad \beta \left\{\begin{array}{c}<\\=\\>\end{array}\right\} 0.$$

We expand the term in squared brackets in equation (3) and obtain

$$\beta = \int\limits_{\{\varepsilon>0\}} \varepsilon F_L(L^*)u'(\Pi^*)\left\{1 - r(\Pi^*) + \frac{u''(\Pi^*)}{u'(\Pi^*)}\left[L^* - \frac{F(L^*)}{F_L(L^*)}\right]W\right\} z(\varepsilon)d\varepsilon \tag{4}$$

$$> \int\limits_{\{\varepsilon>0\}} \varepsilon F_L(L^*)u'(\Pi^*)\left\{1 - r(\Pi^*)\right\} z(\varepsilon)d\varepsilon. \tag{5}$$

This enables us to derive the sufficient condition for a positive impact of exchange rate volatility on a risk averse's labour demand. As can be seen, in (4) the expression $\varepsilon F_L(L^*)u'(\Pi^*)$ is positive. Observe that due to the strict concavity of the firm's technology $F_L(L^*) < F(L^*)/L^*$ holds. Thus we can restate β explicitly as an inequality in terms of $r(\Pi^*)$. It follows that

$$\beta > 0 \quad \Leftarrow \quad r(\Pi^*) < 1 \quad \Rightarrow$$

$$\frac{dL^*}{d\alpha} > 0 \quad \Leftarrow \quad r(\Pi^*) < 1. \tag{6}$$

This proves the proposition. ■

Since the firm's international trade is equal to total production for any realization $e > 1$ and increasing in the exchange rate volatility for $r(\Pi^*) < 1$, proposition 1 implies a sufficient condition for a positive relationship between the exchange rate volatility, domestic labour demand and international trade in economies with low risk aversion.

3.3 Substitution and income effect

The net effect of exchange rate volatility on an international firm's optimal labour demand can be decomposed in a substitution and an income effect. These two effects are common concepts in household theory where they describe how a price change affects the consumer's budget and the rate of substitution for any consumption bundle[4]. Whereas the substitution effect is typically negative, the income effect is mostly indeterminate giving rise to an indeterminate net effect.[5] Sandmo (1970), (1977) noted that price uncertainty may also give rise to these two effects. However, a fundamental

[4]See, e.g., Varian (1992).

[5]Consider the case of a "normal" good, then the income effect is clearly positive but nothing can be said about the absolute values of the single effects and hence the sign of the net effect.

difference consists in that with price uncertainty the substitution effect is positive; like in household theory, a priori nothing can be said about the sign of the income effect.

In determining the single effects, we again focus on β as the sign of Δ is determinate. The substitution and the income effect can be read off the derivation of β in section 3.2 before collecting terms which we did in order to isolate $r(\Pi^*)$. We repeat the derivation explicitly for ease of explication; it reads

$$\begin{aligned}
\beta &= \frac{\partial}{\partial\alpha}\left(\int_{\{\varepsilon>0\}} \frac{du(\Pi^*)}{d\Pi^*}\,\frac{d\Pi^*}{dL}\,dz(\varepsilon)\right) \\
&= \int_{\{\varepsilon>0\}} \left\{\frac{du(\Pi^*)}{d\Pi^*}\,\left[\frac{\partial}{\partial\alpha}\,\left(\frac{d\Pi^*}{dL}\right)\right] + \left[\frac{\partial}{\partial\alpha}\,\left(\frac{du(\Pi^*)}{d\Pi^*}\right)\right]\,\frac{d\Pi^*}{dL}\right\} dz(\varepsilon) \\
&= \int_{\{\varepsilon>0\}} \{u'(\Pi^*)\varepsilon F_L(L^*) \\
&+ u''(\Pi^*)\varepsilon F(L^*)\left[(1+\alpha\varepsilon)F_L(L^*) - W\right]\} dz(\varepsilon).
\end{aligned}$$

The term $\varepsilon F_L(L^*)$ in the first addend reflects labour's increased marginal productivity in the export case compared to selling domestically. The increase in labour's marginal productivity is weighted with the firm's marginal utility. The first addend is positive altogether, and it constitutes the substitution effect. The second addend constitutes the income effect, but, as already mentioned, nothing can be said about its sign. Still, we can identify two effects the exchange rate volatility has on income. We observe first an increase in the output value again compared to selling domestically, represented by $\varepsilon F(L^*)$. The firm's income is increased. But this positive effect is superposed by a loss in marginal utility because a higher exchange rate volatility makes the revenue more volatile, too. These two effects together exert a negative effect, but the term in squared brackets remains indeterminate and is the reason why the income effect as a whole is indeterminate.

We can, however, be more precise about the income effect and decompose it in a volatility and a level effect. Again we know in advance that due to uncertainty, the former is negative wheras the latter will turn out to be indeterminate. The income effect IE reads

$$IE = \int_{\{\varepsilon>0\}} \{u''(\Pi^*)\varepsilon F(L^*)\left[(1+\alpha\varepsilon)F_L(L^*) - W\right]\} dz(\varepsilon). \tag{7}$$

The indeterminacy arises from the term in squared brackets. We write it short by h and continue as follows

$$\begin{aligned} h &= (1+\alpha\varepsilon)F_L(L^*) - W \\ \Leftrightarrow \varepsilon &= \frac{1}{\alpha}\left[\frac{h+W}{F_L(L^*)} - 1\right]. \end{aligned}$$

We substitute for ε in (7) to get

$$\begin{aligned} IE &= \int_{\{\varepsilon>0\}} \left\{ \frac{u''(\Pi^*)}{\alpha}\ F(L^*)\ \left[\frac{h+W}{F_L(L^*)} - 1\right] h \right\} dz(\varepsilon) \\ &= \int_{\{\varepsilon>0\}} \left\{ \frac{u''(\Pi^*)}{\alpha}\ \frac{F(L^*)}{F_L(L^*)}\ h^2 \right. \\ &\quad \left. + h\ F(L^*)\frac{u''(\Pi^*)}{\alpha}\ \left[\frac{w}{F_L(L^*)} - 1\right] \right\} dz(\varepsilon). \end{aligned}$$

The first addend constitutes the negative volatility effect. The second addend represents the level effect which is still indeterminate. Thus, the IE cannot be fully determined.

For the special case of $r(\Pi^*) < 1$ that we have derived as a sufficient condition for a positive net effect of exchange rate volatility on the firm's labour demand, we can conclude that the net effect of the real exchange rate volatility on labour demand is positive when the income effect is greater than the substitution effect in absolute value.

4 Concluding remarks

The aim of this study is to provide a theoretical foundation of a positive effect of exchange rate volatility on domestic production and labour demand given that a risk averse firm can react flexibly to exchange rate volatility. With a strictly concave production technology, the sufficient condition for a positive link between real exchange rate volatility and the firm's labour demand is a degree of relative risk aversion less than unity. The economic intuition for this result is the following: as the real exchange rate volatility increases, so does the value of the option to export to the world market. A more volatile exchange rate volatility increases the potential gains from international trade what makes exports more profitable and consequently increases the firm's labour demand. We decompose the net effect of exchange

rate volatility on labour demand in a substitution and an income effect in order to identify those terms which may be responsible for the general indeterminacy of exchange rate volatility on labour demand. We confirm that the substitution effect is positive and that the income effect is indeterminate. The decomposition of the income effect reveals that its indeterminacy stems from an indeterminate level effect whereas the volatility effect is identified to be clearly negative. We eventually conclude that with $r(\Pi^*) < 1$ the substitution effect dominates the income effect, i.e. the former is larger in absolute value than the latter.

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Zusammenfassung

In diesem Beitrag leiten wir her, unter welchen Bedingungen Wechselkursschwankungen einen positiven Effekt auf die inländische Beschäftigung eines internationalen Unternehmens haben können. Wir nehmen an, das Unternehmen sei risikoavers und verfüge zudem über eine firmenspezifische, nicht näher zu spezifizierende Flexibilität. Diese ermöglicht es ihm, seinen Export als Realoption aufzufassen, d.h. das Unternehmen wird nur dann exportieren, wenn der Wechselkurs profitabel ist. Wir modellieren Wechselkursschwankungen als mean-preserving spread. Die geographische Flexibilität des Unternehmens ist eine notwendige, aber keine hinreichende Bedingung für einen positiven Beschäftigungseffekt. Unter Risikogesichtspunkten wird eine höhere Wechselkursvolatilität negativ beurteilt, unter dem Optionsgesichtspunkt dagegen positiv. Wir zeigen, dass eine hinreichende Bedingung für eine positive Beschäftigungswirkung von Wechselkursschwankungen ein Risikoaversionsgrad kleiner Eins ist. Vom Risikoaversionsgrad hängt es ab, ob der Substitutionseffekt oder der Einkommenseffekt dominiert.

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