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WAGE ADJUSTMENT, IMPERFECT COMPETITION AND REAL EXCHANGE RATE REVERSION: AN ATTEMPT TO UNRAVEL THE PPP PUZZLE

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ABSTRACT: Building on the Dixit-Stiglitz framework of product differentiation, this paper derives a model of exchange rate pass-through and employs it to predict the persistence of sectoral real exchange rates across 14 OECD countries. Deviating from earlier studies by assuming variable marginal costs, the paper predicts that the rate of sectoral real exchange rate reversion is positively related to the sensitivity of industry wages to exchange rates, while inversely related to the output share of labor, the substitutability between product variants, and to the price-cost margin. Using almost three decades of annual data on industry-specific variables, the paper finds that real sectoral exchange rate reversion is explained primarily by wage adjustment and input shares of output, suggesting that the labor market may deserve more recognition as a channel through which deviations from purchasing power parity decay.

Key words: Purchasing power parity, imperfect competition

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TIIVISTELMÄ: Tutkimus tarkastelee tekijöitä, jotka vaikuttavat kansainväliseen toimialojen hintojen hitaaseen palautumiseen kohti ostovoimapariteettia. Tutkimuksessa johdetaan valuuttakurssimuutosten välittymistä kuvaava malli, joka nojaa Dixitin ja Stiglitzin esittämään tuotedifferointikehikkoon. Mallilla selitetään toimialakohtaisten reaalisten valuuttakurssien pysyvyyttä 14 OECD-maassa. Työssä esitetty malli poikkeaa aikaisemmista malleista olettamalla, että yritysten tuotannon rajakustannukset riippuvat mm. valuuttakurssista. Malli ennustaa, että nopeus, jolla toimialakohtainen reaalinen valuuttakurssi palautuu kohti ostovoimapariteettia, riippuu positiivisesti toimialan palkkojen valuuttakurssiherkkyydestä ja käänteisesti työn tulo-osuudesta tuotannon arvosta, tuotteiden korvattavuudesta sekä voittomarginaalista. Työn empiirisessä osassa käytetään toimialakohtaista vuosiaineistoa lähes kolmen vuosikymmenen ajalta. Tulosten mukaan toimialakohtaisten reaalisten valuuttakurssien palautuminen kohti ostovoimapariteettia selittyy ensisijaisesti palkkojen sopeutumisella ja panosten osuudella tuotoksesta. Tulos viittaa siihen, että työmarkkinoiden rooli kanavana, jonka kautta poikkeamat ostovoimapariteetista eliminoituvat, ansaitsee aikaisempaa enemmän huomiota.

Asiasanat: Ostovoimapariteetti, epätäydellinen kilpailu

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I. Introduction

The Theory of Purchasing Power Parity (PPP) has undergone intense scrutiny for more than two decades, with wide rejection pervasive in the 1980s slowly yielding to more favorable support for long-run PPP in the 1990s. The PPP research agenda is overflowing with studies that look at whether exchange rates move to equate the prices of internationally traded goods, and it now appears that research within this area of international economics is rapidly approaching the region of diminished returns. As such, attention is slowly shifting to explanations of the slow rate of reversion to PPP, the so-called "purchasing power parity puzzle" pointed out by Rogoff (1996). This is an inchoate, yet promising, area of research.

The issue at hand is the following. Researchers have spent much time of late examining the mean-reverting properties of real exchange rates[1]. Although the proclivity of researchers in this field is to vastly refine the techniques employed and increase the time spans examined in these analyses, the crux of the matter is that the rate of mean reversion of real exchange rates is still surprisingly slow[2]. A natural starting point from which to begin building a coherent riposte to such a slow rate of reversion amongst the exchange rates of industrialized countries is, arguably, an examination of the pricing behavior of firms, particularly in an imperfectly competitive environment. A thorough understanding of the factors influencing deviations in common-currency prices at the industry level would certainly clarify our understanding of aggregate price deviations.

Solid theoretical and empirical rationalizations for slow mean reversion within the pricing to market framework can be found in the seminal papers of Dornbusch (1987)

[1] Although this literature is too vast to provide a neat comprehensive overview here, we encourage the reader interested in recent econometric applications to see Glen (1992).

and Marston (1990). The pricing to market approach views exchange rate movements as cost shocks for a foreign firm producing at home and selling its output in a foreign market. Changes in exchange rates can then either be passed to the firm's foreign prices or absorbed by the firm in the form of changes in its profit margin. The firm's pricing behavior, these models posit, will be a function of market structure and industry characteristics.

An interesting empirical study that applies the current body of knowledge regarding pricing to market to formulate an understanding of what accounts for the rates at which deviations from sectoral purchasing power parity decay is Cheung, Chinn and Fujii (hereafter CCF) (1999). This is one of the rare studies that use the rate of mean reversion as the dependent variable in regression specifications that include market structure proxies on the right-hand side. Essentially, the authors take an eclectic approach by probing the literature for variables posited to influence the degree of pricing to market and PPP deviations, with particular interest on market structure. The authors employ two proxies of market imperfection, namely the intra-industry trade index and the price-cost margin, finding that they have a positive impact on real exchange rate persistence. On the other hand, CCF report that the coefficients on the macroeconomic variables they include in their multitude of regression specifications display weak explanatory power and, in some cases, their signs are not in accordance with theory.

Another paper that uses the rate of reversion as a dependent variable is Campa and Wolf (1997). In this paper, the authors painfully seek for empirical support of an arbitrage explanation of real exchange rate mean reversion, but to no avail. Specifically, they find that deviations of real exchange rates from trend are not significantly

[2] For example, using annual data over a period spanning more than a century, Diebold, Husted and Rush (1991) find reversion with half-lives on the order of approximately three years. Using a similar span of

correlated with deviations of trade from trend. Instead, their results open up the possibility of mean reversion being explained by incipient arbitrage instead of actual arbitrage.

Another strand in this literature posits that real exchange rates follow a threshold autoregressive (TAR) process, or what Balke and Fomby (1997) coin "on and off cointegration." The idea behind this approach is that real exchange rate mean reversion may be slow or nonexistent within a certain band. Once real exchange rates fluctuate beyond a certain upper or lower threshold, mean reversion either kicks in or the rate at which the PPP deviations decay accelerates. Hence, within the band real exchange rates may display unit root properties, but outside the bands they become stationary. For the most part, the central justification for such nonlinear adjustment is the existence of transaction costs: if the common-currency price of apples diverges only marginally between two distinct and separated markets, market agents will unlikely find it in their interest to ship apples from the relatively less expensive market to the more expensive market, and, therefore, the "real apple exchange rate" will appear to be nonstationary. However, if prices diverge enough to exceed the costs of shipping the apples, then arbitrage will lead to price convergence.[3]

The present study treads the path set out by CCF with respect to its methodological approach. However, we diverge from their paper in many other ways. First, instead of taking their eclectic approach, we derive an explicit model of mean reversion, which we employ as the basis for our estimating equations. Second, unlike all of the previous studies conducted in this spirit that we are aware of, we assume that firms face variable marginal costs. In our model, this implies that wages respond to exchange rate movements, which, in turn, has implications on the rate at which sectoral

data, Lothian and Taylor (1996) report slightly higher half-lives.

[3] For a TAR-based study on the Law of One Price, see Flaherty (1997).

price deviations across countries decline. One reason we are inclined to include wage responses to exchange rates results from the vast literature on wage bargaining, which demonstrates that fluctuations in exchange rates create a wedge between the wage paid by the employer and that received by the worker. This, in turn, can cause effective labor supply to shift. Equilibrium wages will therefore change in response to fluctuations in exchange rates. If this is the case, then firms' pricing behavior, and thus the rate at which international prices converge, will depend on the degree of wage adjustment in their particular industry. A third way in which our paper deviates from CCF is that it uses a longer time span, thanks to a more recent version of the database that is used in both studies now being available.

As a preview of our results, we find that our wage response estimates and input shares of output are significantly related to the rate of sectoral real exchange rate reversion, with coefficients displaying signs in accordance with the model we develop. On the other hand, we find scant evidence for the importance of market structure proxies, which stands in stark contrast to the results obtained by CCF. Admittedly, the econometric techniques employed in this paper are rudimentary compared to the state-of-the-art techniques employed in advanced studies. Nevertheless, the paper hopes to generate discussion about the potential importance of other channels besides market structure that may affect the degree of exchange rate reversion.

The remainder of the paper is organized as follows. The next section lays out the theoretical structure upon which the paper is based. After briefly explaining the data and their sources in Section 3, an elucidation of how the dependent and independent variables are estimated and constructed is presented in Section 4. In Section 5 we introduce the regression specification of our model's econometric counterpart. Section 6 presents and discusses the empirical results. The final section concludes.

II. The Exchange Rate Pass-Through Model

We adopt a very simple imperfectly competitive structure for the market for heterogeneous traded goods in a given home country. Although belonging to a well-defined industry, these traded goods are viewed by consumers as imperfect substitutes for each other. There are two countries, the home country, H, and the foreign country, F. All consumption takes place in H, while production occurs in both countries. Output is produced by two factors of production, labor and imported materials, using a Cobb-Douglas technology. The demand side of the model follows the Dixit-Stiglitz model applied in Dornbusch (1987), wherein Chamberlinian imperfect competition implies that the impact of an individual firm's price on the aggregate industry price is negligible. Although we also adopt the large-number-of-firms assumption in order to abstract from effects stemming from market share, we deviate from previous studies by drawing on the Shephard-Samuelson theorem to derive the representative firm's marginal cost, which we assume varies in response to exchange rate fluctuations.

The starting point of the Dixit-Stiglitz model is a representative consumer who maximizes a subutility function with respect to two arguments:

$$V = U(z, y);\ y = \left[y_H^a + y_F^a\right]^{\frac{1}{a}}, 0 < a < 1. \qquad (1)$$

Commodity y comprises two product variants, y_H and y_F, representing the industry variants produced in the home country and in the foreign country, respectively. The parameter a measures the substitutability between the two variants, where larger values suggest that consumers view the two variants as more substitutable and lower values imply lower substitutability. After maximizing (1) subject to a budget constraint, the

Dixit-Stiglitz model yields the following variant demand functions and the price index for good y:

$$y_H = y(P / P_H)^{\frac{1}{1-a}}, \tag{2}$$

$$y_F = y(P / P_F)^{\frac{1}{1-a}}, \tag{3}$$

$$P = \left[\left(\sum p_H^c + \sum p_F^c\right)\right]^{1/c}; c = \frac{-a}{1-a}, \tag{4}$$

where P is the industry price, P_H denotes the price charged for a domestic brand and P_F is the price of the imported brand. Solving for the elasticity of demand with respect to either domestic or foreign brand yields:

$$\varepsilon_i = \frac{1}{a-1}. \tag{5}$$

The magnitude of the demand elasticity observed by either domestic or foreign firm depends on the degree of substitutability between the variants. A higher degree of substitutability translates into a more elastic demand curve and vice versa. Again, in order to prevent the exchange rate persistence model that follows from becoming too cumbersome, we assume a large number of firms so that the demand elasticity is constant. This elasticity would no longer remain constant by dropping the large-number-of-firms assumption.

We now turn to the supply side of the model. Let y_i, x_l, and x_m denote, respectively, measures of firm output, input l (labor) and input m (imported materials) used to produce variant i. Assuming that technology conforms to a standard Cobb-Douglas production function,

$$y_i = f(x_l, x_m) = A\prod_{i=1}^{2} x_i^{a_i}, \tag{6}$$

where $A > 0$, $0 < a < 1$, and $\sum_i a_i = 1$. The total cost equation is

$$C = \sum w_i x_i + b, \qquad i= L\ (labor),\ M\ (imported\ materials), \tag{7}$$

where b represents the fixed cost. Since input x_m is imported, w_m is equal to the foreign price of materials times the exchange rate. Minimizing total cost (7) subject to the production function (6) yields the well-known first order conditions:

$$w_i - \lambda a_i \frac{y_i}{x_i} = 0 \tag{8}$$

$$y_i - A\prod_{i=1}^{2} x_i^{a_i} = 0. \tag{9}$$

Raising (8) to the power a_i yields

$$\lambda^{a_i} a_i^{a_i} y_i^{a_i} x_i^{a_i} - w_i^{a_i} = 0. \tag{10}$$

Summing (10) for all i, we get

$$\lambda = \theta \prod_i w_i^{a_i} \tag{11}$$

where $\theta = \prod_i a_i^{a_i}$. We can now draw on the Shephard-Samuelson theorem, which states that λ is equivalent to marginal cost.

Under perfect competition λ would also equal average cost and price, which we do not assume here. Instead, given imperfect competition, profit maximization yields the following first-order conditions:

$$p_H\left(1 + \frac{1}{\varepsilon_H}\right) = \lambda_H \tag{12}$$

$$p_F\left(1 + \frac{1}{\varepsilon_F}\right) = s_{H,F}\lambda_F. \tag{13}$$

Since fluctuations in exchange rates are generally viewed as cost shocks from the perspective of the foreign firm, we augment the foreign firm's marginal cost in (13) with the nominal exchange rate $s_{H,F}$, which is defined in terms of home currency units per unit of foreign currency. Doing so also allows us to focus on the variant prices denominated in the home currency.

We now turn to the derivation of the exchange rate pass-through elasticity. We note that, given our assumption of a large number of firms, the demand elasticities in (12) and (13) will not depend on the prices charged by competitors. Hence, to solve for the pass-through elasticity, we can focus solely on (13). Moreover, as mentioned earlier, unlike previous studies that assume a fixed marginal cost, we believe that exchange rate movements are important determinants of changes in industry wages, and, therefore, the link with the labor market should be examined when deriving the pass-through elasticity. Furthermore, we assume that material prices obey the Law of One Price, that is, the foreign price of materials is constant. Totally differentiating (13), recalling that the exchange rate also appears in the foreign firm's marginal cost term, that wage is a function of the exchange rate, and multiplying through by the exchange rate divided by the foreign price, yields our pass-through elasticity:

$$\frac{\partial p_F}{\partial s_{H,F}} \cdot \frac{s_{H,F}}{p_F} = \frac{1}{1+\frac{1}{\varepsilon_F}} \left(\frac{s_{H,F} \lambda_F}{p_F} \right) \left(1 + \alpha_L \eta_{w,s} + \alpha_M \right), \tag{14}$$

where the term on the left-hand side of the equation is the pass-through elasticity, $\eta_{w,s}$ is the elasticity of wage with respect to the exchange rate, α_L is the output share of labor, α_M is the output share of imported materials, and all other variables are defined earlier. To further clarify, the second term on the right-hand side represents the ratio of marginal cost (in home currency units) to the price charged by the foreign firm in the home country (of course, in home currency units).

Equation (14) illuminates some oft-neglected issues in the exchange rate pass-through literature. The degree of exchange rate pass-through is not predefined, but, instead, depends on four important parameters: the cost-price ratio, the elasticity of demand, the elasticity of industry wages with respect to the exchange rate, and the output share of productive inputs. Since the elasticity of demand is merely a function of parameter a, the substitutability between the two variants, we can focus entirely on this parameter and the three other parameters listed above. Given reasonably low values for the wage elasticity, (14) indicates that, generally, the pass-through elasticity will be less than one, namely that exchange rate pass-through is incomplete.

The first two parameters, the cost-price ratio (more specifically, its inverse) and the degree of variant substitutability, are standard in the literature. In fact, they correspond to two of the three factors (the additional factor being market integration or separation) pointed out by Dornbusch (1987) as affecting the response of relative prices to exchange rate fluctuations. The degree of substitutability between variants affects the foreign firm's pricing behavior in response to exchange rate movements through its affect on consumers' switching behavior. The more substitutable are the variants, the more will consumers switch to other products when a cost shock – stemming from an exchange rate movement -- is passed on to one of the variants. In this case, then, we expect a lower pass-through elasticity. Obversely, when variants are highly differentiated, the foreign firm will have fewer reservations about passing cost shocks onto its prices since it will lose relatively few customers by doing so.

Of greater interest to us in this paper are the last two parameters given the novelty of their application. Although the elasticity of wages with respect to the exchange rate has received much attention, it has been neglected in the pass-through and PPP literature. Jose Campa and Linda Goldberg are two notable researchers who have recently contributed significantly to our understanding of the ways in which exchange rates affect the real economy. In Campa and Goldberg (1998), the authors look at the link between real exchange rates and wages across two-digit industry levels of aggregation. They note that real exchange rates have substantial effects on industry wages, while more subdued effects are observed for employment. Another similar study includes Revenga (1992), which also found significant exchange-rate effects on wages.

We realize that there may be some overlap between potential variables that affect the elasticity of wages and those present in our pass-through model outlined above[4]. A full-fledged model, integrating both sectoral wage determination and exchange rate pass-through simultaneously, might prove to be of interest, but remains outside the scope of this paper. Instead, we take a two-step approach, first estimating wage elasticities across industries and then employing these estimates in the pass-through model above. We then allow for latitude in our regression specifications, hoping to alleviate any problems that may arise from our measured variables being too highly intercorrelated. Therefore, the focus of this paper is not on the direct determinants of the wage elasticity per se, but more on the aggregate effect of the latter on PPP reversion. We leave a more detailed examination of wages as an avenue for future research. At this point, however, we note that greater wage responsiveness to exchange rates changes leads to faster sectoral real exchange rate reversion. As an illustrative example, assume wages are determined within a bargaining framework (see, e.g., Anderton and Barrell (1995)). Exchange rate fluctuations will create a wedge between the wage paid by the employer and that received by the worker. Effective labor supply may shift in response to the appreciation or depreciation of the exchange rate, which in turn will be reflected in a change in equilibrium wage. Hence, the factors affecting wage responses to

[4] For example, Campa and Goldberg (1998) find that wages in industries with low price-over-cost markups respond more to exchange rate movements than wages in industries with higher markups.

exchange rates need not be equivalent to those posited by our model as affecting pass-through, depending on the theoretical framework that is employed.

Recalling that the labor share of imported materials equals one minus the corresponding labor share, (14) also indicates a negative (positive) relationship between the output share of labor (imported materials) and the pass-through elasticity. When the imported input commands a higher output share, firms are more inclined to pass cost shocks to their prices abroad in order to bolster their profit margins. On the other hand, when the output share of labor is high, firms are less inclined to pass cost shocks to prices, and prices are more stabilizing.

III. Data

The data employed in this study come from two sources, the *OECD's Structural Analysis Industrial Database*, or *STAN*, and the IMF's *International Financial Statistics* CD ROM. The *STAN* database is very extensive, containing annual data on imports, exports, total production, value added (constant and current price), labor compensation, employment, gross fixed capital formation, and exchange rates at various levels of industry aggregation. The *International Financial Statistics* CD ROM is only used to obtain the nominal effective exchange rate index for the U.S. dollar.

Due to data omissions across various countries, our analysis is restricted to the following OECD countries covering the 1970-1997 period: United States, Belgium, Canada, Germany, Denmark, Finland, France, Great Britain, Italy, Japan, Netherlands, Norway, Portugal, and Sweden. In this initial study, we focus our attention on the two-digit industry level of aggregation, but realize the potential aggregation problems that may arise, particularly if sectoral PPP reversion is more pronounced in constituent industries than in their aggregated counterparts.

IV. Variable Construction and Estimation

Our interest in this paper is to explain the rate of reversion to parity from deviations in the international prices of traded goods. The model presented above in (14) explains, on the other hand, the elasticity of exchange rate pass-through. One could, of course, estimate pass-through by the following general equation:

$$\Delta \ln P_{i,t}^{imp} = \beta_{1,t}\Delta \ln s_t + \beta_{2,t}\Delta \ln P_{i,t-1}^{imp} + Z_t + \varepsilon_t , \qquad \varepsilon \sim \text{IID}(0,\sigma^2), \qquad (15)$$

where the term on the left-hand side is the log change in the import price index of industry i, s is the exchange rate, and Z denotes all other factors deemed important by the researcher as having an impact on import prices (for example, inflation). A lagged dependent variable can also be included in the specification, as in (15), to allow for dynamic effects. The coefficient for the exchange rate measures the short-run elasticity of pass-through, while that for the lagged dependent variable shows the persistence of import prices. The long-run elasticity, then, is simply the ratio of the short run elasticity to one minus the value of the coefficient obtained for import price persistence:

$$\frac{\beta_1}{1-\beta_2}.$$

Reversion to sectoral price parity will depend not only on the factors determining the foreign firm's pricing behavior in the home market, but also on the determinants of the domestic firm's pricing behavior in the foreign economy. Hence, it is fair to say that real exchange rate persistence is a function of the coefficients on pass-through elasticities in *both* countries, and, as a result, we can move terminologically from pass-through elasticity to real sectoral exchange rate persistence or to the rate of sectoral parity reversion[5]. For expositional purposes, we reproduce (14) below, interchanging the pass-through term with the rate of reversion:

$$|REV| = \frac{1}{1+\frac{1}{\varepsilon_F}}\left(\frac{s_{H,F}\lambda_F}{p_F}\right)(1+\alpha_L\eta_{w,s}+\alpha_M), \tag{16}$$

where *REV* is the reversion coefficient, α_1, explained in (18). Note that we also take the absolute value of *REV*, since, as we will see below, our reversion coefficients are always negative, and faster reversion corresponds with a higher degree of pass-through. It is to the estimation and construction of the variables that we now turn.

1. Estimation of the Reversion Coefficient

The dependent variable in (16) is not directly observable, and therefore must be estimated. Following CCF we define the sectoral real exchange rate as

$$RER_t^{i,j} = s_t^j + PP_t^{i,j} - PP_t^{i,US}, \tag{17}$$

where $RER^{i,j}$ is the real sectoral exchange rate, s^j is the nominal exchange rate defined as U.S. dollars per unit of country *j*'s currency, $PP^{i,j}$ is the domestic price index for industry *i* in country *j*, and $PP^{i,US}$ is the corresponding domestic price index for industry *i* in the U.S. Producer price indexes are obtained by dividing value added at current prices by value added at constant prices. Also, all variables appear in logarithms and time subscripts are denoted by *t*.

The sectoral PPP reversion regression is given by the following specification:

$$\Delta RER_t^{i,j} = \alpha_0 + \alpha_1 RER_t^{i,j} + \alpha_2 \Delta RER_{t-1}^{i,j} + \ldots + \alpha_{p-1}\Delta RER_{t-p+1}^{i,j} + \varepsilon_t, \tag{18}$$

[5] Of course, a high pass-through elasticity corresponds to low persistence, which, in turn, corresponds to a low reversion coefficient (recall that $-1 <$ reversion coefficient < 0), implying fast reversion. Since, in what follows, we employ the reversion coefficient as the dependent variable, it is important to keep in mind that we should expect opposite signs on the coefficients of the independent variables compared to the corresponding ones posited in (14).

where Δ denotes the first difference operator, α_1 is the sectoral PPP reversion parameter, the ε_t are *IID* $(0,\sigma^2)$, and p is determined by the Akaike information criterion and by inspection thereafter of the residuals to ensure that any serial correlation has been removed. In all cases, the number of lagged first-difference terms was one.

Figure (1) plots the reversion parameters of the 13 sectoral exchange rates by each two-digit industry examined. In all cases, a negative parameter greater than negative one was estimated, as was expected, providing support for parity reversion. The reversion coefficient varies widely across countries and industries, ranging from a low of –0.85 with respect to the real basic metal industry sectoral exchange rate between the U.S. and Norway to a high of –0.004 with respect to the food industry of the same country pair. Taking the simple average of reversion coefficients in each industry, the lowest measure is found in the textiles, apparel and leather industry, while the highest is witnessed in the basic metal industry. There is also substantial variation between coefficients within each industry. The industry with the widest variation is the basic metal industry, while the lowest variation is observed in the other manufacturing industry sector.

2. Independent Variable Construction

Turning to the independent variables, the degree of variant substitutability, or product differentiation, is also not directly observed, requiring that we use a proxy variable. A standard proxy used to capture this variable in the empirical industrial organization literature is the intra-industry trade index, which measures the overlap in trade, defined as:

$$IIT_i^j = 1 - \frac{\left|X_i^j - M_i^j\right|}{X_i^j + M_i^j}, \qquad (19)$$

where X_i and M_i are the values of exports and imports in industry i, respectively. Time subscripts have been omitted for expositional convenience. Higher *IIT* values correspond to higher degrees of product differentiation, or, equivalently, lower variant substitutability.

The results of our IIT index construction for each industry in the 14 countries examined in this study are presented in Table 1. A cursory examination of Table 1 shows that the core European countries, notably Belgium, Germany, and France, enjoy high levels of intra-industry trade within their industries, and, hence, also product differentiation. Interestingly, of the European countries, the Nordic economies appear to have less product differentiation within their respective industries. For most industries, Japan and Portugal also seem to have low degrees of product differentiation. We also observe a relatively high degree of product differentiation in four industries in the U.S., namely food, paper, paper products and printing, chemical products, and fabricated metal products, with relatively less product differentiation in the remaining five industries.

The price-cost ratio is an important measure of industry profitability and thus has often been used as a proxy for market structure. At this juncture, we opt to speak of and employ the more appealing *price-cost margin*, since this term is qualitatively similar to the *price-cost ratio*, and used often in the literature. We follow Cheung, Chinn and Fujii (1999) and Campa and Goldberg (1995), by defining the price-cost margin as

$$\frac{Price}{Cost} = \frac{Y_i^j - M_i^j - W_i^j}{Y_i^j}, \tag{20}$$

where $Y_{i,j}$ is the value of total industry i production in country j, $M_{i,j}$ is the cost of material inputs, and $W_{i,j}$ is total labor compensation. Again, time subscripts have been omitted.

We report the price-cost margins for each industry and country in Table 2. Although the data provided exhibit much variation, we can make several generalizations. First, relatively higher price-cost margins are observed in the chemical products and non-metallic mineral products industry groupings, while relatively low margins appear in the food industry. Examining the data by country, it appears that Portuguese, Japanese, and Italian industries typically enjoy higher price-cost margins.

Next, we calculate the constant factor share of either input. Define the output share of labor in industry i in country j as

$$\alpha_{L,i}^{j} = \frac{W_i^j}{Y_i^j}, \tag{21}$$

where the variables are defined as before. Since we assume only two factors of production, the corresponding output share of imported materials is one minus the value generated by (21). Table 3 presents the calculated labor shares for each industry in the countries examined. Again, there is wide variation by country and by industry. Non-metallic mineral products, fabricated metal products, and other manufacturing appear to be the most labor-intensive industries on an international scale, while food and chemicals manufacturing seem to be less labor intensive. Looking at the individual countries, Denmark, Sweden, and France appear to be the most labor intensive at the industry level of aggregation examined. On the other hand, Japan, Italy, and Belgium seem to be the least labor intensive with respect to these industries.

We now turn to our final variable, the elasticity of wage with respect to the exchange rate. Since this, too, is not readily observable, nor can any reasonable proxies be constructed from accounting data, this variable must be estimated. Hence, I adopt a process wherein these elasticities are first estimated and then used later as the independent variable in our rate-of-reversion model developed earlier.

The specification of the wage elasticity model proposed implies that changes in industry-specific wages depend on producer price changes and on exchange rate movements:

$$\Delta \ln w_t^{i,j} = \beta_0 + \beta_1 \Delta \ln s_t^j + \beta_2 \Delta \ln PP_t^{i,j} + \varepsilon_t, \qquad \varepsilon \sim \text{IID}(0,\sigma^2), \tag{22}$$

where $w^{i,j}$ is an index of industry i wages in country j, defined as total labor compensation divided by the number of persons employed in the industry, t denotes time, the coefficient β_1 is our measure of wage elasticity with respect to the exchange rate, and all other variables are defined earlier. For purposes of data consistency, we continue to define the exchange rate as U.S. dollars per unit of country j's currency. Also note that we have adopted a specification denoted in first differences. This is due to the fact that many time series are nonstationary processes. As such, we first differenced our time series in order to insure against making inference misjudgments in the remainder of the paper.

Our wage elasticity results are presented in Table 4. Since the U.S. dollar is used as the numeraire in the exchange rates employed in this paper, we estimate the U.S. wage elasticities using the nominal effective exchange rate index for the U.S. dollar. Data on this nominal effective exchange rate index were obtained from the *International Financial Statistics* CD ROM produced by the International Monetary Fund (line *neu*). Again, there is substantial wage elasticity variation across industries and countries. In many cases, these elasticities turn out to be positive for a wide range of industries. Nevertheless, since we do not provide a theoretical basis with which to hypothesize about the expected sign or magnitude of these elasticities, we take our estimates at face value[6]. To enhance the robustness of the exchange rate persistence results reported later,

[6] Again, we refer the interested reader to the paper by Campa and Goldberg (1998), which provides a theoretically appealing model of wage formation that focuses on permanent movements in exchange rates.

we changed the specification of the U.S. wage equation to include a lagged dependent variable on the right-hand side. Doing so resulted in negative wage elasticities for all but two industries (reported in Table 5), with an overall industry average of –0.03, which is very much in line with the value obtained by Campa and Goldberg (1998) of –0.04. As we will see later, using these alternative wage elasticities in our estimations did not alter the general results of our exchange rate persistence model significantly.

V. Reversion Regression Specification

Given our estimated dependent variable and constructed and estimated independent variables, we now turn to the regression specification. Equation (16) forms the basis of our regression specification. As mentioned in the previous section, we move terminologically from exchange rate pass-through to the rate of sectoral parity reversion. The econometric counterpart to (16) becomes

$$REV = \beta_0 + \beta_1 IIT + \beta_2 PCM + \beta_3 WAGEADJ + \beta_4 LSHARE + v, \quad v \sim \mathrm{IID}(0,\sigma^2), \quad (23)$$

where *REV* is the reversion coefficient obtained by estimating (18), *IIT* denotes the intra-industry trade index, which is used as our proxy for product differentiation, *PCM* is the price-cost ratio, *WAGEADJ* is our wage elasticity estimate, and *LSHARE* is the output share of labor. As we alluded to earlier, given that we are interested in the rate of reversion to parity between the U.S. and foreign price of a given industry's output, the independent variables on the right-hand side of (23) must, therefore, reflect the factors the model deems important in both countries. As such, following Cheung, Chinn and Fujii, we transform each right-hand side variable into a sum of the corresponding individual country measures. Doing so, *IIT* is the sum of industry *i*'s average IIT index (over the 1970-1997 period) in the U.S. and in the foreign economy, *PCM* is sum of industry *i*'s average price-cost margin in the U.S. and in the foreign economy, *WAGEADJ* is the sum of the absolute value of industry *i*'s estimated wage elasticity in the U.S. and in the foreign economy[7], and *LSHARE* is the sum of industry *i*'s average labor share of output in the U.S. and in the foreign economy.

The model presented in (16), and its econometric counterpart in (23), represents only a narrow interpretation of the factors affecting exchange rate pass-through and the speed of parity reversion. There are, of course, many other important factors affecting pass-through that are highlighted in the literature. To mention just a few of these, the openness of the economy receives much subliminal support as a determinant of real exchange rate persistence, since goods market arbitrage is widely held as causing mean reversion, but little empirical support[8]. Some studies that look at the causes of PPP deviations in the Balassa-Samuelson framework rely on government spending as an important determinant, through its effect on the ratio of tradable goods prices to nontradable goods prices[9]. Yet another possibly important variable could be transportation costs, captured by geographical distance between markets (for a recent paper, see, for example, Wei and Parsley (1995)). Rather than taking an eclectic approach in this paper by probing the literature for possible important determinants to include in our model, we prefer the more parsimonious avenue of focusing strictly on the variables spelled out by our model. This comes at the cost, of course, of possible acquiescence to the omitted-variable bias.

VI. Empirical Results

[7] Recall that the estimated wage elasticities turn out to be both positive and negative, and therefore simply summing them would not be appropriate in this context. Consequently, we sum the absolute values of these estimates to capture the general aspects of wage adjustment or rigidity.
[8] As we pointed out in the first section of this paper, Campa and Wolf (1997), while finding evidence of mean reversion, fail to reveal a significant link between trade flows and mean reversion.
[9] See, for example, Dibooglu (1996) and Strauss (1996).

In this section, we provide the results of our speed-of-reversion regressions. We have conducted our estimation by pooling the industries and countries examined to form two coherent data sets, each one of which includes either alternative of our wage elasticities estimated for the U.S., as described in the previous section. As the regressions will show, the results from using these alternative wage elasticities are qualitatively similar.

Using OLS to estimate the coefficients of (23) yields the results presented in Table 6. For purposes of comparison, we also present estimation results using the alternative U.S. wage elasticities, which were presented earlier in Table 5, in the last column of Table 6. From Table 6, first note that intra-industry trade indexes and price-cost margins do not have significant explanatory power with respect to the speed of sectoral real exchange rate reversion. The intra-industry trade index is supposed to proxy product differentiation. For this variable, a higher value indicates a higher degree of product differentiation (or a lower degree of variant substitution), and, according to our theory, is supposed to be negatively correlated with the reversion coefficient[10]. The price-cost margin is supposed to indicate market structure, and is expected to display a positive relationship with the reversion parameter. One potential problem that may explain the weakness of the effect of these two traditional variables on PPP reversion is that the two may, indeed, be picking up the same aspect of market structure simultaneously. Hence, as shown later, we will re-estimate (23) later by omitting one of these two variables.

Of greater interest to us in this paper are the coefficients for the labor share variable and, particularly, that for the wage elasticity variable. According to our theory,

[10] Note how this contrasts with CCF. In their paper, industries with higher degrees of product differentiation are less competitive and, therefore, tend to have *more* persistent sectoral PPP deviations. In our paper, the model developed posits that a higher degree of product differentiation implies that firms within a given industry can pass relatively more of the cost shock (stemming from an exchange rate fluctuation) to their prices abroad, since doing so will not result in a significant loss of customers. That is,

a higher labor share of output is expected to exhibit a negative relationship with the exchange rate pass-through elasticity, and, hence, a positive relationship with the reversion coefficient. This result is confirmed by the results, which show that the effect of *LSHARE* is positive and significant in both estimations (significant at the ten and five percent levels, respectively).

Turning to *WAGEADJ*, the wage elasticity, the effect is positive and highly significant regardless of which wage elasticity data alternative is employed, implying that industries with a higher (absolute value of) wage elasticity with respect to the exchange rate display slower sectoral real exchange rate parity reversion. Interpreting the sensibility of this sign requires some thought. Recall that our wage elasticities were estimated using the exchange rate defined as dollars per unit of foreign currency for all industries outside of the U.S. and as the nominal effective exchange rate for the U.S. dollar for all U.S. industries. Therefore, the most plausible sign for these elasticities is a negative one, that is, domestic wages move downward as a result of a domestic currency appreciation. Returning to (14), this would imply a smaller degree of pass-through to prices in the home market. This, in turn, is associated with a higher reversion coefficient. Hence, if negative wage elasticities dominate over positive elasticities, then a positive effect is expected from *WAGEADJ* to the reversion coefficient, which is confirmed by the results in Table 6.

To test whether *IIT* and *PCM* are picking up the same aspects of market structure, we re-estimate (23) by eliminating either variable. The results appear in Table 7. The effect from either variable is still insignificant, while *WAGEADJ* remains positive and highly significant. The coefficient on the variable *LSHARE* remains positive and

industries with higher degrees of product differentiation should have *less* persistent sectoral PPP deviations.

significant in all cases but one. When the alternative U.S. wage elasticities are employed, the coefficient on this variable loses some of its explanatory power.

Finally, we wish to drop our two variables of interest, *LSHARE* and *WAGEADJ*, from the estimation to appease the skeptical reader who suspects that the insignificant *t*-statistics on the coefficients for *IIT* and *PCM* may stem from multicollinearity, namely that the measured variables do not allow for a precise breakdown of their individual effects because they are too highly intercorrelated. Doing so yields the results reported in Table 8. As can be seen from these results, *IIT* and *PCM* remain insignificant.

To summarize the empirical results, then, we find an interesting and significant relationship between an important labor market characteristic not previously looked at, the wage elasticity with respect to the exchange rate, and the degree of sectoral real exchange rate reversion. Moreover, we also find a significant and explicit relationship between the output share of labor and the degree of sectoral real exchange rate reversion, which, to the best of our knowledge, has not been earlier applied in this context in the literature. Interestingly, and in stark contrast to Cheung, Chinn and Fujii, we find no support for the role of product differentiation and price-cost margins on exchange rate persistence.

VII. Concluding Remarks

The research agenda appears to have reached the point of diminished returns with respect to explaining whether or not real exchange rates display mean reversion. An inchoate, yet promising, area of research appears to be sprouting in the area of analysis that attempts to explain the rate of reversion to parity. This paper attempts to contribute modestly to this growing field of research.

The point of departure in this paper is the question, "shouldn't the labor market, particularly wage responses to exchange rates, play a role in determining the speed at which industry prices revert to parity across countries?" To answer this question, we build on the Dixit-Stiglitz framework of product differentiation, but, unlike any previous studies on exchange rate persistence that we are aware of, we allow marginal cost to vary in response to exchange rate movements. Specifically, we believe wages should respond to exchange rate fluctuations, which is a reasonable assumption given the prevalence of such a reaction observed in reality. That is, labor supply and labor demand are seen to shift in response to exchange rate movements, the aggregate effect of which is then witnessed in wage rises or declines. We maintain that this, in turn, should have a bearing on the degree of exchange rate pass-through of individual firms, and, hence, on the rate at which sectoral price deviations are eliminated across countries.

The theoretical model we build predicts that the rate of reversion should be positively correlated with the degree of product differentiation, negatively with the price-cost margin and the labor share of output, and positively with the (absolute value of) the elasticity of wages with respect to the exchange rate.

Using data on nine industries at the two-digit level of aggregation in 14 OECD countries, this paper finds that the proxy variable for product differentiation and the price-cost margin show an insignificant relationship with the rate of sectoral real exchange rate reversion. On the other hand, and more interesting from our view, are the significant relationships found between our wage elasticity estimates and input shares and the rate of exchange rate reversion. In particular, industries that are susceptible to downward movements in wages as a result of currency appreciation, seem to imperfectly pass the exchange rate fluctuation to their prices abroad, thereby exacerbating the persistence of the deviation in international prices of their output. Moreover, industries with a higher output share of labor, or, equivalently in our model, a lower share of imported materials, also exhibit a lower degree of pass-through and, thus, a lower rate of exchange rate reversion.

The findings in this paper offer a contribution to the literature. They suggest that the labor market may be an important source of exchange rate persistence. Instead of merely assuming that any effects go from exchange rate pass-through to wage elasticities, the paper proposes that the latter, regardless of how these values are determined, are an important source of the former.

An interesting avenue of future research would involve a full-fledged model of exchange rate reversion that determines both labor supply and demand simultaneously. Doing so would enhance our knowledge of how to precisely pin down the channels through which exchange rate movements affect real economic variables.

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Table 1 – *Average IIT Indexes by Country*

	BEL	CAN	DEU	DNK	FIN	FRA	GBR
Food	0.908	0.884	0.795	0.476	0.786	0.950	0.523
Textiles, Apparel & Leather	0.942	0.353	0.736	0.799	0.842	0.859	0.788
Wood Products & Furniture	0.929	0.336	0.833	0.760	0.183	0.702	0.302
Paper, Paper Products & Printing	0.858	0.377	0.913	0.575	0.101	0.782	0.627
Chemical Products	0.909	0.884	0.858	0.750	0.658	0.961	0.912
Non-Metallic Mineral Products	0.781	0.600	0.885	0.870	0.854	0.952	0.841
Basic Metal Industries	0.690	0.674	0.902	0.489	0.793	0.957	0.916
Fabricated Metal Products	0.947	0.830	0.630	0.931	0.819	0.916	0.882
Other Manufacturing	0.966	0.437	0.923	0.795	0.806	0.883	0.941

Note: Each entry gives the mean of the IIT index over the 1970-1997 period for the given country and industry. A higher value of the IIT index is posited to indicate a higher degree of product differentiation

Table 1 (continued)

	ITA	JPN	NDL	NOR	PRT	SWE	USA
Food	0.550	0.257	0.659	0.683	0.661	0.584	0.885
Textiles, Apparel & Leather	0.526	0.681	0.778	0.258	0.537	0.493	0.468
Wood Products & Furniture	0.749	0.248	0.486	0.624	0.221	0.417	0.539
Paper, Paper Products & Printing	0.834	0.807	0.871	0.713	0.654	0.229	0.904
Chemical Products	0.868	0.924	0.735	0.833	0.541	0.730	0.940
Non-Metallic Mineral Products	0.485	0.450	0.763	0.543	0.716	0.800	0.725
Basic Metal Industries	0.841	0.616	0.950	0.796	0.286	0.882	0.518
Fabricated Metal Products	0.839	0.284	0.902	0.632	0.517	0.863	0.854
Other Manufacturing	0.430	0.821	0.799	0.342	0.695	0.669	0.497

Note: Each entry gives the mean of the IIT index over the 1970-1997 period for the given country and industry. A higher value of the IIT index is posited to indicate a higher degree of product differentiation

Table 2 – *Average Price-Cost Margins by Country and Industry*

	BEL	CAN	DEU	DNK	FIN	FRA	GBR
Food	0.144	0.100	0.089	0.087	0.071	0.103	0.084
Textiles, Apparel & Leather	0.082	0.098	0.100	0.104	0.126	0.110	0.083
Wood Products & Furniture	0.161	0.085	0.106	0.100	0.111	0.155	0.060
Paper, Paper Products & Printing	0.078	0.128	0.124	0.097	0.131	0.126	0.105
Chemical Products	0.097	0.098	0.170	0.127	0.156	0.204	0.120
Non-Metallic Mineral Products	0.107	0.155	0.163	0.160	0.183	0.186	0.080
Basic Metal Industries	0.000	0.063	0.088	0.076	0.107	0.101	0.036
Fabricated Metal Products	0.079	0.097	0.096	0.094	0.138	0.109	0.049
Other Manufacturing	0.213	0.108	0.206	0.218	0.186	0.156	0.091

Note: Each entry gives the mean of the calculated price-cost margins over the 1970-1997 period for the given country and industry.

Table 2 (continued)

	ITA	JPN	NDL	NOR	PRT	SWE	USA
Food	0.133	0.213	0.002	0.009	0.167	0.066	0.096
Textiles, Apparel & Leather	0.159	0.110	0.071	0.076	0.131	0.078	0.077
Wood Products & Furniture	0.186	0.112	0.103	0.097	0.128	0.104	0.128
Paper, Paper Products & Printing	0.152	0.146	0.124	0.097	0.203	0.124	0.130
Chemical Products	0.130	0.231	0.175	0.117	0.242	0.145	0.129
Non-Metallic Mineral Products	0.202	0.181	0.155	0.139	0.215	0.089	0.101
Basic Metal Industries	0.124	0.153	0.122	0.118	0.238	0.052	0.078
Fabricated Metal Products	0.148	0.148	0.095	0.061	0.104	0.075	0.094
Other Manufacturing	0.147	0.168	0.099	0.100	0.191	-0.478	0.163

Note: Each entry gives the mean of the calculated price-cost margins over the 1970-1997 period for the given country and industry.

Table 3 – *Average Labor Shares by Country and Industry*

	BEL	CAN	DEU	DNK	FIN	FRA	GBR
Food	0.088	0.169	0.144	0.145	0.131	0.156	0.176
Textiles, Apparel & Leather	0.263	0.326	0.286	0.303	0.348	0.324	0.324
Wood Products & Furniture	0.220	0.306	0.307	0.315	0.270	0.309	0.288
Paper, Paper Products & Printing	0.295	0.321	0.334	0.363	0.225	0.320	0.356
Chemical Products	0.160	0.163	0.222	0.214	0.166	0.203	0.177
Non-Metallic Mineral Products	0.381	0.326	0.323	0.381	0.335	0.364	0.287
Basic Metal Industries	0.239	0.227	0.287	0.281	0.140	0.213	0.239
Fabricated Metal Products	0.287	0.265	0.342	0.382	0.346	0.340	0.323
Other Manufacturing	0.164	0.276	0.328	0.404	0.378	0.391	0.293

Note: Each entry gives the mean of the calculated labor share over the 1970-1997 period for the given country and industry.

Table 3 (continued)

	ITA	JPN	NDL	NOR	PRT	SWE	USA
Food	0.106	0.187	0.117	0.137	0.151	0.154	0.150
Textiles, Apparel & Leather	0.245	0.254	0.289	0.335	0.238	0.354	0.298
Wood Products & Furniture	0.232	0.245	0.313	0.270	0.192	0.251	0.319
Paper, Paper Products & Printing	0.274	0.279	0.304	0.294	0.213	0.272	0.326
Chemical Products	0.218	0.139	0.150	0.167	0.184	0.201	0.192
Non-Metallic Mineral Products	0.319	0.275	0.320	0.303	0.384	0.361	0.349
Basic Metal Industries	0.167	0.103	0.230	0.204	0.222	0.232	0.263
Fabricated Metal Products	0.313	0.246	0.345	0.302	0.309	0.323	0.341
Other Manufacturing	0.175	0.238	0.406	0.386	0.208	0.508	0.339

Note: Each entry gives the mean of the calculated labor share over the 1970-1997 period for the given country and industry.

Table 4 – *Wage Elasticities by Country and Industry*

	BEL	CAN	DEU	DNK	FIN	FRA	GBR
Food	0.048	0.052	-0.011	0.057	0.079	0.014	-0.006
Textiles, Apparel & Leather	-0.034	-0.098	0.012	-0.024	0.014	-0.106	-0.265
Wood Products & Furniture	0.002	0.195	0.030	-0.059	0.049	-0.033	-0.019
Paper, Paper Products & Printing	0.009	0.074	0.037	-0.008	0.034	-0.075	-0.040
Chemical Products	-0.035	-0.149	-0.019	0.012	0.044	-0.188	-0.084
Non-Metallic Mineral Products	0.083	0.041	0.046	-0.048	-0.026	-0.093	0.011
Basic Metal Industries	-0.014	0.014	0.025	-0.046	0.047	-0.018	0.060
Fabricated Metal Products	-0.089	-0.011	0.050	-0.046	0.129	-0.061	-0.031
Other Manufacturing	0.018	0.171	-0.002	-0.009	0.118	-0.152	-0.030

Note: The equation estimated is
$\Delta \ln w_t^{i,j} = \beta_0 + \beta_1 \Delta \ln s_t^j + \beta_2 \Delta \ln PP_t^{i,j} + \varepsilon_t$,
where $w^{i,j}$ is an index of industry i wages in country j, defined as total labor compensation divided by the number of persons employed in the industry, t denotes time, s is the exchange rate defined as foreign currency per unit of domestic currency, the coefficient β_1 is a measure of wage elasticity with respect to the exchange rate, and *PP* denotes the producer price index of the industry in question.

Table 4 (continued)

	ITA	JPN	NDL	NOR	PRT	SWE	USA
Food	-0.031	-0.088	0.044	0.063	0.094	-0.005	0.089
Textiles, Apparel & Leather	0.014	-0.106	-0.031	0.011	0.128	0.089	0.021
Wood Products & Furniture	-0.066	-0.143	0.008	0.078	-0.115	-0.015	0.055
Paper, Paper Products & Printing	-0.139	-0.033	0.013	0.042	-0.074	0.076	0.057
Chemical Products	-0.099	-0.100	0.011	0.082	-0.069	-0.103	0.150
Non-Metallic Mineral Products	-0.142	-0.025	-0.029	0.153	0.011	0.013	0.039
Basic Metal Industries	-0.195	-0.008	0.026	0.057	0.009	-0.028	-0.010
Fabricated Metal Products	0.000	0.036	0.033	-0.010	0.133	0.066	0.042
Other Manufacturing	-0.051	-0.034	0.348	-0.093	-0.072	0.055	0.038

Note: The equation estimated is

$$\Delta \ln w_t^{i,j} = \beta_0 + \beta_1 \Delta \ln s_t^j + \beta_2 \Delta \ln PP_t^{i,j} + \varepsilon_t,$$

where $w^{i,j}$ is an index of industry i wages in country j, defined as total labor compensation divided by the number of persons employed in the industry, t denotes time, s is the exchange rate defined as foreign currency per unit of domestic currency, the coefficient β_1 is a measure of wage elasticity with respect to the exchange rate, and PP denotes the producer price index of the industry in question.

Table 5 – *U.S. Alternative Wage Elasticities by Industry*

Food	-0.035
Textiles, Apparel & Leather	-0.043
Wood Products & Furniture	-0.014
Paper, Paper Products & Printing	0.013
Chemical Products	0.038
Non-Metallic Mineral Products	-0.006
Basic Metal Industries	-0.120
Fabricated Metal Products	-0.009
Other Manufacturing	-0.080

Note: The alternative wage equation estimated for the U.S. includes a lagged dependent variable on the right-hand side. The equation estimated is
$\Delta \ln w_t^i = \beta_0 + \beta_1 \Delta \ln s_t + \beta_2 \Delta \ln PP_t^i + \Delta \ln w_{t-1}^i + \varepsilon_t$,
where $w^{i,j}$ is an index of industry i wages, defined as total labor compensation divided by the number of persons employed in the industry, t denotes time, s is the nominal effective exchange rate index for the U.S. dollar, the coefficient β_1 is a measure of wage elasticity with respect to the exchange rate, and PP denotes the producer price index of the industry in question.

Table 6 – *Results for Real Sectoral Exchange Rate Reversion Equation*

Variable Name	Description	Wage Elasticities, Alternative 1	Wage Elasticities, Alternative 2
Constant		-0.4479***	-0.5168***
		(0.1020)	(0.1044)
IIT	Intra-industry trade index	0.0143	0.0680
		(0.0459)	(0.0469)
PCM	Price-cost margin	-0.0709	0.0280
		(0.1674)	(0.1675)
LSHARE	Output share of labor	0.2207**	0.1851*
		(0.0994)	(0.0996)
WAGEADJ	Elasticity of industry wages	0.6233***	0.6277***
		(0.0705)	(0.0721)
N		117	117
F		19.879	19.266
R^2		0.415	0.408

Note: Standard errors are in parentheses. ***, **, and * indicate significant at the 1, 5, and 10 percent level, respectively.

Table 7 – *Results for Real Sectoral Exchange Rate Reversion Equation*

Variable Name	Description	Wage Elasticities: Alternative 1		Wage Elasticities: Alternative 2	
Constant		-0.4245*** (0.0690)	-0.4618*** (0.0962)	-0.4035*** (0.0696)	-0.5111*** (0.0983)
IIT	Intra-industry trade index		0.0129 (0.0456)		0.0686 (0.0465)
PCM	Price-cost margin	-0.0671 (0.1662)		0.0465 (0.1678)	
LSHARE	Output share of labor	0.2135** (0.0963)	0.2213** (0.0990)	0.1501 (0.0970)	0.1846* (0.0991)
WAGEADJ	Elasticity of industry wages	0.6221*** (0.0701)	0.6197*** (0.0698)	0.6085*** (0.0713)	0.6283*** (0.0717)
N		117	117	117	117
F		26.686	26.638	24.744	25.901
R^2		0.415	0.414	0.396	0.407

Note: Standard errors are in parentheses. ***, **, and * indicate significant at the 1, 5, and 10 percent level, respectively.

Table 8 – *Results for Real Sectoral Exchange Rate Reversion Equation*

Variable Name	Description	
Constant		-0.2184** (0.0930)
IIT	Intra-industry trade index	-0.0167 (0.0577)
PCM	Price-cost margin	0.0992 (0.2150)
LSHARE	Output share of labor	
WAGEADJ	Elasticity of industry wages	
N		117
F		0.139
R^2		0.002

Note: Standard errors are in parentheses. ***, **, and * indicate significant at the 1, 5, and 10 percent level, respectively.

Figure 1 – *Reversion Coefficients by Industry and Country*

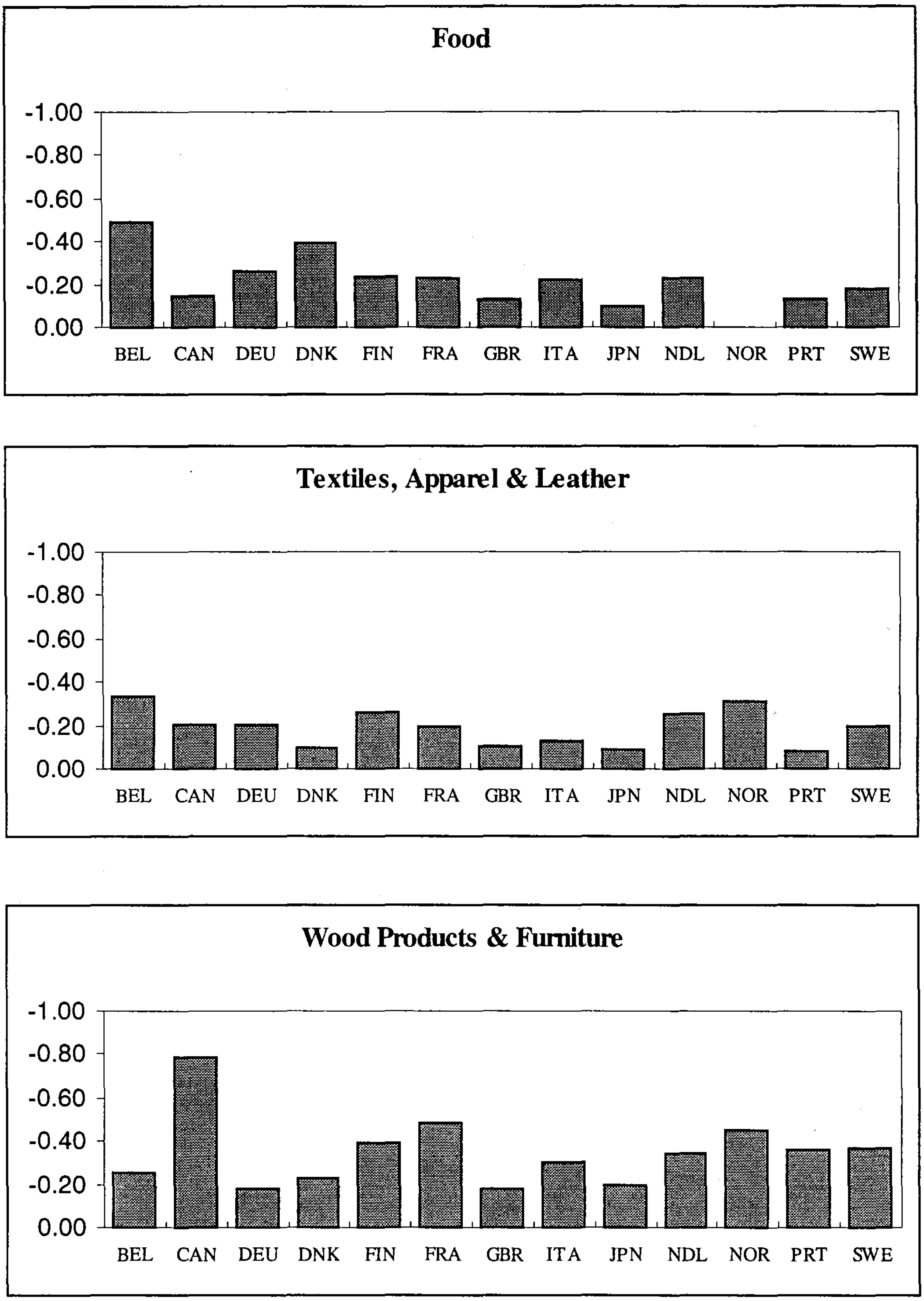
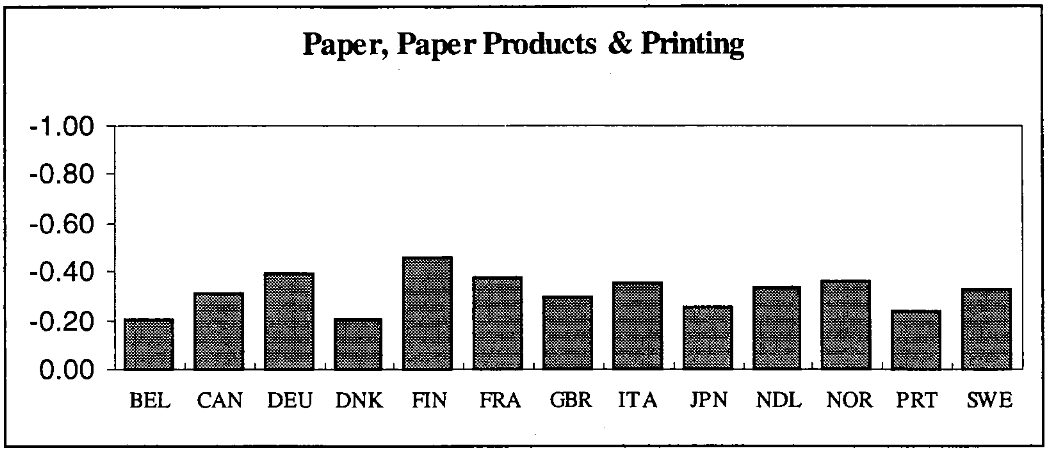
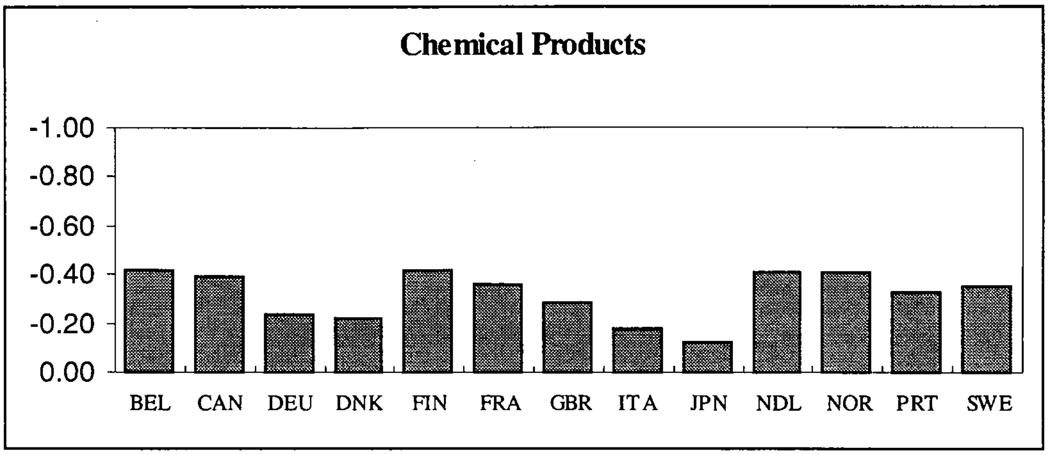


Figure 1 (continued)





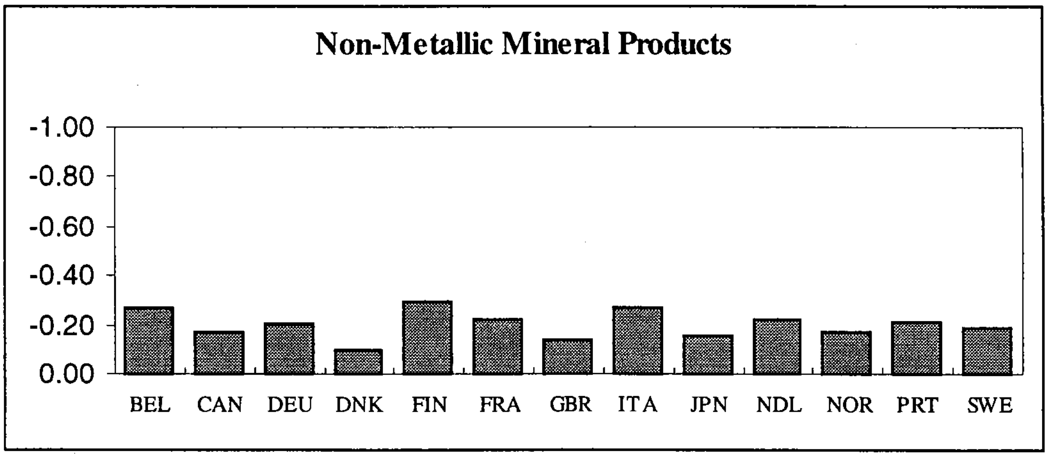
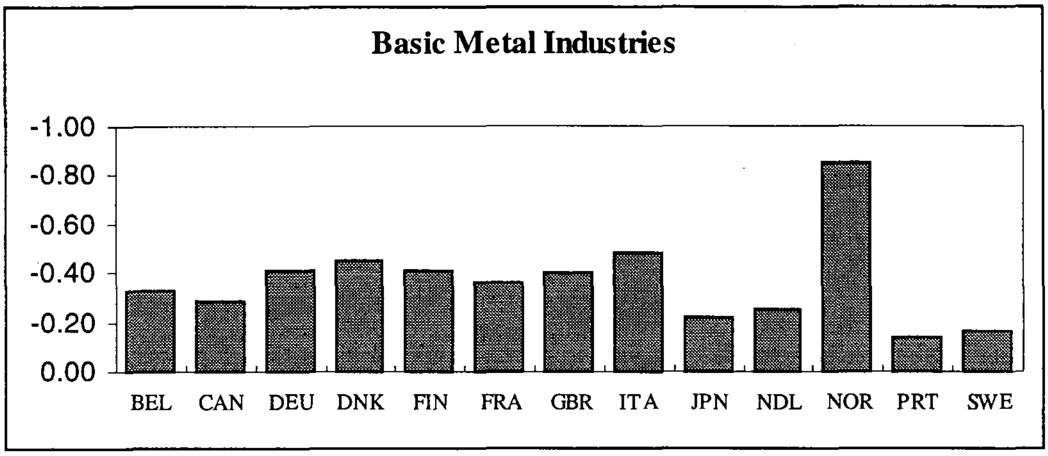
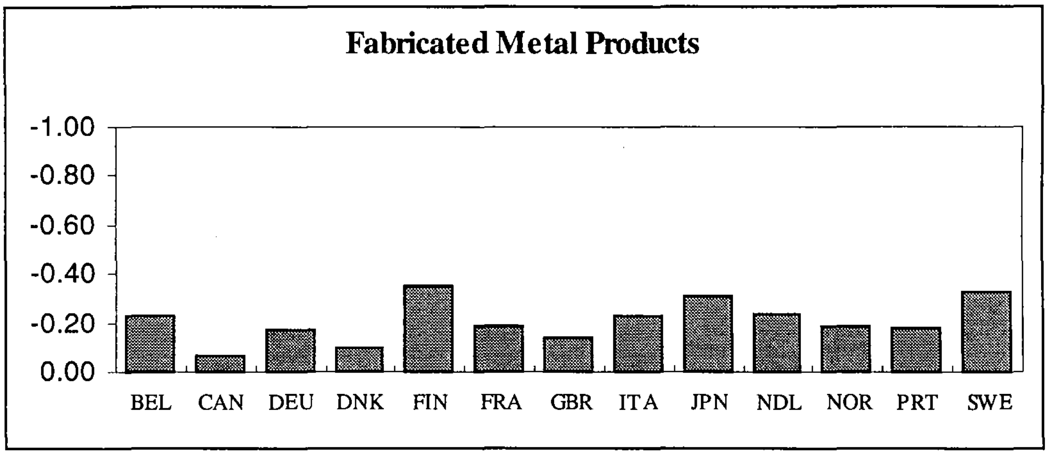
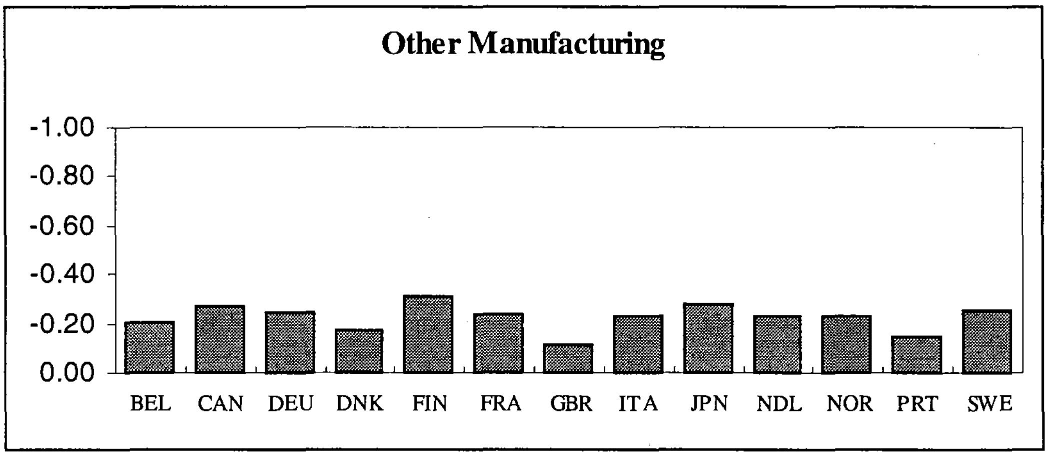


Figure 1 (continued)







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