Trade and Labour Demand Elasticity in Imperfect Competition: Theory and Evidence

Daniel Mirza and **Mauro Pisu**
GEP, University of Nottingham

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In recent years, a growing body of the literature in international trade tried to investigate whether openness has been increasing labour demand elasticities. From a labour theory perspective in partial equilibrium, the Allen-Hamermesh theoretical framework became one of the few general frameworks to refer to[1]. This theory states that labour demand elasticity should be positively affected by its two principal determinants: the elasticity of substitution between labour and other factors and the elasticity of demand for goods to prices. Under the assumption that openness is affecting these factors by increasing the possibility of substitution among factors and goods respectively, that relation could then predict a consecutive increase in the elasticity of demand for labour.

Although some empirical studies in the field were inspired by that relation (i.e. Slaughter (2001), Haskel, Slaughter and Fabbri (2002) among others), two issues remain.

First, Allen (1938) showed that this relation holds in a perfect competition environment at the industry level. While it is now widely recognized that imperfect competition is one of the most influent basis for a rise in trade and multinational activities, the Allen-Hamermesh relation constrains the researchers to test the impact of openness on labour demand elasticities assuming competitive markets. The first question addressed then by this article is how could the Allen-Hamermesh (AH) relation be extended to an imperfect competition world[2]. Following Dixit's (1990) modelling framework, we show that AH can be generalized to allow for imperfect competition. In particular, under the assumption of oligopoly, the elasticity of labour de-

[1]One should also note that Leamer (1996), Wood (1995) and also Panagariya (1999) discussed the effect of trade on labour demand elasticities, but from applying HO or specific factor trade theories in General Equilibrium

[2]Note that Krishna *et al* (2001) have studied the impact of trade on labour demand elasticities by emphasizing the role of imperfect competition as well. However, the authors design a framework based on monopolistic competition (i.e. they do not consider strategic interaction among firms) and assuming a Cobb-Douglas production function.

mand depends on a third term, neglected so far by the AH relation, that is reducing the burden on labour demand and : the elasticity of prices to wages. Actually, an increase in wages has a pure cost effect but is reducing at the same pace the market share of the firm and thus its mark-up. As a result of this pro-competitive effect, there might be incomplete pass through between prices and wages and the adjustment of labour demand would be then smaller than expected.

The second issue left out by the AH relation is that it does not show *formally* the relationship between trade openness mesures and labour demand elasticities. We try to fill that gap in this article by showing that the average elasticity of labour demand depends on the import penetration rates. Also, our model provides an explanation for why the elasticity of demand has not been increasing that much with trade, a result that was pointed out by previous studies[3]. In fact, it predicts that the effect of import penetration would be high, if there is complete pass-through from wages to prices. But in the case of incomplete pass-through, then a small effect of import penetration should prevail.

We use UK firm level data from OneSource database to test for our relationship. Our results tend to support, on average, our theoretical framework.

1 The Allen (1938)-Hammermesh (1993) relation

Some authors like Slaughter (2001) have been inspired by the following relation, ***at the industry level***, of the elasticity of labour demand (sensitivity of labour demand to wages η_L) proved in Allen (1938) and discussed in details in Hamermesh (1993):

$$\eta_L = -(1-\alpha_L)\sigma_L - \alpha_L \eta_Y \tag{1}$$

with $\alpha_L = \frac{wL}{pY}$ is the share of labour cost to revenue in the industry, σ_L is the elasticity of substitution between labour and another factor in the production process (this relation applies for two factor of production), and η_Y the elasticity of total demand Y to prices in the sector. Allen (1938) proves this relation by resolving a program of profit maximisation in perfect competition, considering the case of two factors and a constant return to scale technology.

What is the intuition behind this relation? When wages increase, and given a fixed output, employers would want to substitute away labour towards the other factor of production whose price is now relatively lower (the

[3]Jean (2000) could also link trade measures with the elasticity of labour demand but he uses a different framework than that of Allen-Hamermesh. His work is built on a perfect competition world in general equilibrium with an Armington type hypothesis on the demand side and a Leontief production function on the supply side

employers change the technique of production along the same isoquant). The extent of this effect depends on α. The more the share of labour cost is important, the smaller the pass-through from σ to η_L.

However, industry output is not fixed. In fact, for a given technique of production, an increase in wages affect commodity prices in the industry which reduces industrial production overall. (The isoquant moves inward.) This affects downward the demand for the two factors and *a fortiori* that for labour. The extent of this decrease in labour demand following the adjustment of production to the new prices η_Y, depends on the share of labour cost in total revenue.

Slaughter (2001) and Haskel *et al* (2002) mention that trade could increase σ by increasing the possibilities of substitution between domestic and foreign factors. Moreover, openness could lead to an increase in the elasticity of industry demand to prices η_Y by increasing competition.

Allen (1938) generalizes this relation to m factors of production ($m > 2$) by proving that:

$$\eta_L = -\alpha_L \sigma_{LL} - \alpha_L \eta_Y \tag{2}$$

Here, σ_{LL} represents the elasticity of substitution between L and all m-1 factors of production in the industry. Notice moreover that the factor of pass-through from substitution to labour demand is now α_L. Hence, the effect of substituting away labour towards all other factors is more harmful on labour demand, the more the share of labour in total revenue is important. The same relation is obtained from a more elegant and simpler formal setting by Dixit (1990) who minimizes total costs instead of maximizing profits.

2 Generalization of the theory to imperfect competition

Because of its simplicity, Dixit's (1990) framework is more convenient than Allen's to work with. We thus follow the same type of formulation than Dixit in what follows but extend the framework to the case of imperfect competition.

Assume a firm that produces with constant returns to scale. Its total cost can be written as follows:[4]

$$C = yc(W) \tag{3}$$

[4]We could have supposed an increasing returns to scale technology by assuming an alternative expression that includes fixed costs like $C = yc(W) + F$, but this does not affect the relation to estimate hereafter.

Where $W = (w_1, \ldots w_m)$ is the vector of factor prices for m factors of production. Assuming Cournot competition, the first order conditions provides an equality between marginal revenue and marginal costs. Prices could then be represented by:

$$p = \frac{1}{\left(1 - \frac{s}{\eta_Y}\right)} c(W) \tag{4}$$

where p is the equilibrium price, Y represents total demand (or industry production), $s = \frac{y}{Y}$ is the market share and η_Y the absolute value of the elasticity of the product demand to prices faced by the firm. Note in what follows that $\frac{1}{\left(1 - \frac{s}{\eta_Y}\right)} = \mu$ represents the mark up. By Shephard's Lemma, the demand for labor is the derivative of total costs with respect to the price of labor:

$$l = \frac{\delta C}{\delta w_l} = y \frac{\delta c(W)}{\delta w_l} = y c_w \tag{5}$$

Deriving with respect to w_l we have:

$$\frac{dl}{dw_l} = c_{ww} y + \frac{\delta y}{\delta Y} \frac{\delta Y}{\delta p} \frac{\delta p}{\delta w_l} c_w \tag{6}$$

where $c_{ww} = \frac{\delta c_w}{\delta w}$.

We know from Uzawa (1962) and Hammermesh (1993) that when the cost function is linear and homogenous, the absolute value of the elasticity of substitution σ_{ll} equals $\left|\frac{c(W) c_{ww}}{c_w c_w}\right|$. In addition, let $\eta_p = \frac{\delta p}{\delta w} \frac{w}{p}$ be the elasticity of prices to wages and recall $\eta_Y = \frac{\delta Y}{\delta p} \frac{p}{Y}$ the elasticity of total demand to prices in the industry. Then expressing equation 6 as an elasticity, $\eta_l = \frac{dl}{dw_l} \frac{w_l}{l}$, gives:

$$\eta_l = -\sigma_{ll} \alpha_l - \eta_Y (1/s) \eta_p \tag{7}$$

Relation 7 designates the firm-level elasticity of demand in oligopoly with $\alpha_l = \frac{wl}{C}$ standing as the labour share in total costs. It has some similarities with the traditional relation presented in the prior section. Firstly, the elasticity of substitution of labour with respect to all other factors (σ_{ll}) enters the equation as before and is multiplied by the cost share of labour.

Second, note $\eta_Y(1/s) = \eta_y$. This is, for a typical firm, the perceived elasticity of demand to an increase of its price. Hence, when the firm has a small market share due for example, to a big number of firms in the industry, the firm perceives a price-elasticity of demand for its commodity that is high because it has little market power that enables that firm to set its own price.

Keeping this perceived elasticity in mind, the second term of equation 7 can thus be presented as $-\eta_y \eta_p$. How can our framework compare then to that of AH? To see this, we develop in what follows the expression of the elasticity of prices to wages $\eta_p = \frac{\delta p/p}{\delta w/w}$.

Indeed, from 4, we have

$$\frac{\delta p}{\delta w_l} = \frac{\delta \mu c(W)}{\delta w_l} = c_w \mu + c(W) \frac{\delta \mu}{\delta w_l} \tag{8}$$

The derivative of costs with respect to wages c_w has a positive sign. Besides, it can be easily shown that the derivative of mark-ups is $\frac{\delta \mu}{\delta w_l} = \mu^2 (1/\eta_Y) \frac{\delta s}{\delta w_l}$. Under the traditional assumption of downward sloping best response functions, it is well known that market share is decreasing with the marginal cost of the firm: thus, $\frac{\delta s}{\delta w_l}$ is negative and so do the derivative of mark-ups. To sum up, an increase in wage has 2 opposite effects on prices: a pure positive cost effect and a negative pro-competitive effect. From that effect, one can thus observe an incomplete pass-through between a change in wages and a change in prices. Part of the higher cost are now supported by the firm in the form of lower mark-ups.

Note that the elasticity of mark-ups to wages can be expressed as: $\eta_\mu = -\frac{\delta \mu}{\delta w_l} \frac{w_l}{\mu}$. Multiplying equation 8 by $\frac{w_l}{p}$, and recalling the relations 3, 4 and 5, we obtain the following expression of η_p after simplification:

$$\eta_p = \frac{\delta p}{\delta w_l} \frac{w_l}{p} = \alpha_l - \eta_\mu \tag{9}$$

Plugging that expression into equation 7 we obtain:

$$\eta_l = -\sigma_{ll} \alpha_l - \eta_Y (1/s) \alpha_l + \eta_Y (1/s) \eta_\mu \tag{10}$$

Here, an additional positive term $\eta_Y(1/s)\eta_\mu$ enters the equation . This term is *reducing in absolute values* the elasticity of labour demand to wages. It is doing so because of the pro-competitive effect generated by an increase in wages on mark-ups. In order not to loose much of their competitiveness, the firms are constrained to pass a part of the increase in wages on to less mark-ups, making eventually a relatively small adjustment on prices and thus demand. Hence, in an oligopoly world, this incomplete pass through between wages and prices would reduce the burden on labour demand.

By comparing the two relations 10 and **??**, one can deduce that AH is a particular case of the above equation. Indeed, consider a relatively competitive market where say, s is small but not too small in order to keep having a finite perceived elasticity of product demand $\eta_Y(1/s) \neq \infty$. In that case, the mark-up tends to 1 and its elasticity with respect to wages η_μ would then approximate 0. Hence, the whole increase in wages is passed on prices and the third term of our equation 10 vanishes, leaving us with a new relation comparable to AH.

If the market is perfectly competitive though $s \approx 0$, our relationship indicates that $\eta_Y(1/s)$, the demand elasticity would tend to infinity and so does the elasticity of labour demand. Hence, in that market the firm cannot act neither on the wage it offers nor on the price it sets. It takes them as given from the competitive labour and product markets. Note that this perfect competition type result is different from that provided by the AH relation because our unit of study is the firm, not the industry. In AH, factor and commodity prices should vary evenly across firms and thus affect total demand as a whole at the industry level. In our firm-level configuration, if it happens that a firm decides unilaterally to increase its price, consumers substitute away the product of that firm towards those sold by other firms in the industry at a lower (market) price. Hence, the composition of suppliers changes leaving total demand unchanged.

A second particular case of equation η that is worth noting is that of monopoly with constant elasticity of product demand to prices. In this case, $s = 1$ and $\eta_\mu = 0$: here again a proportionate increase in wages results in a same proportion of increase in prices. This is also true for the case of perfect differentiation in, say a monopolistic competition structure: a firm producing its own variety faces an elasticity of demand compared to that of a monopolist. In that case, the AH relationship prevails at the firm level.

3 Elasticity of Labour Demand and Trade

How would openness to imports affect labour demand elasticity? So far, the literature noted that trade could affect labour demand elasticity by affecting both the elasticity of substitution and the elasticity of product demand. The first elasticity, could indeed be affected as openness increase the possibility of combining domestic and foreign factors in the production process of a firm. This article does not tackle however the fragmentation issue related to openness. It focuses instead on the impact of openness to imports in some industry on labour demand elasticity of that industry. In this respect, imports would be affecting the elasticity of labour through an increase in the elasticity of product demand. The question then to be addressed is how could we obtain a formal relationship between the elasticity of labour demand and import penetration.

Consider again our equation 7. This firm level equation is convenient for estimating the impact of a firm market share which can vary either due to openness or because of any other domestic shock (new entry of a domestic firm, etc...). In other terms, this relation does not inform on the pure impact of penetration rates. Let's see how import penetration can be introduced.

In equation 7, multiply each term by the market share of the firm among its peers in the market ($s_l^d = \frac{y_l}{Y^D}$)[5] and sum over all domestic firms in order to obtain an expression for the weighted mean elasticity of labour demand in the industry, $\overline{\eta} = \sum_l s_l^d \eta_l$. After simplification we obtain:

[5] Y^D is total sales of domestic firms

$$\overline{\eta} = -\sigma_{ll} \sum_{l} (\alpha_l s_l^d) - \eta_Y \eta_p N \frac{1}{S} \qquad (11)$$

with S being the total market share of domestic firms on their market. It is also equal to $1 - MP$ where MP is the import penetration rate in the market. In this relation, we can thus estimate the pure effect of import penetration via its impact on perceived product demand on average in the industry: $\overline{\eta_y} = \eta_Y \frac{1}{S}$.

We conduct our empirical study in two steps. First, we test our relation 7 on firm level data to show how the results can be consistent with the theory. Second, we infer a measure for the elasticity of product demand to wages, and plug it into equation 11. From there, we can deduce a mesure for the mean perceived elasticity of demand at the industry level directly function of import penetration. We can thus infer of how much import penetration contributes to the formation of the perceived elasticity of product and labour demands.

4 Data set

UK firm level data were used in this paper. These come from the OneSource database from 1993 to 1999. It includes information on all public limited companies, all companies with employees greater than 50, and the top companies based on turnover, net worth, total assets, or shareholders funds (whichever is largest) up to a maximum of 110,000 companies, in both manufacturing and service industries. Companies that are dissolved or in the process of liquidation are excluded from the OneSource sample. In this paper we concentrate on manufacturing firms from this data source.

The data set was screened to keep only those firms for which there were a complete set of information about output and inputs. This left an unbalanced panel data of around 36500 observations regarding 11100 firms. This firm level data set was used to obtain data about number of workers, cost shares, and mark-ups.

The relationship under scrutiny requires market shares as well. To compute it the firm level data set was merged by industry and years with the Input/Output Supply and Use tables, provided by the British Office of National Statistics. This procedure was necessary to have reliable measures of total industry production.

Further detail about the variables used can be found in Appendix A.

5 Empirical results

The formulas 7 can be estimated on firm level data using variables of employment, wages and market shares [6].

Taking discrete approximations, accounting for firm i cross-section and time t variations, equation 7 can be re-written as:

$$\begin{aligned} \Delta \log (l_{it}) &= -\sigma \left[\alpha_{it} \Delta \log (w_{it})\right] - \beta \left[(1/s_{it}) \Delta \log (w_{it})\right] \\ +d_t + d_i + \epsilon_{it} \end{aligned} \tag{12}$$

The Δ operator expresses here first differences. The parameter β is the interaction between the elasticity of demand and that of prices to wages (i.e. $\eta_Y + \eta_p$). It can be interpreted alternatively as the elasticity of product demand to wages. Independent variables, $\Delta \log (w)$, α_l and $(1/s)$ can be easily computed from our data (see appendix) which leaves us with the estimation of the Allen/Uzawa elasticity of substitution σ and the elasticity of the product demand to wages β.

We first perform a random effect model which results are shown in the first column of table 1. The estimated elasticity of substitution is negative, as expected, and significant. In particular, it is estimated at around in the range [-0.60-0.67] and thus is in line with many studies reported in Hamermesh (1993) and in particular with Slaughter's results (2001) which are in the same range.

Surprisingly however, the estimated product demand elasticity to wages β is negative although statistically insignificant in our random effects regression. However, such a result could be due to a misspecification of the econometric relation at hand.

Indeed, Hausman's test (182.99) rejects the null hypothesis of no correlation between the individual effects and the regressors. We know that the alternative hypothesis of the Hausman test is not well specified since it could be either that there is correlation between the regressors and the error term or that the model itself is misspecified. We first assume that the correlation hypothesis holds and run a fixed effect model. The results presented in the second column of table 1 are still unconvincing however, as the same β parameter is still insignificant.

The asymptotic efficiency of the FE estimators depends on the assumption that the error terms ϵ_{it} are homoskedastic and serially uncorrelated viz. $E\left(\epsilon_\mathbf{i} \epsilon_\mathbf{i}' | \mathbf{x_i}, d_i\right) = E\left(\epsilon_\mathbf{i} \epsilon_\mathbf{i}'\right) = \sigma^2 \mathbf{I_T}$ (e.g.: Wooldbridge 2002 p. 281). However, the last assumption may be deemed to be too stringent in this case.

Indeed, equation 7 might represent a long run relationship. Firms are unlikely to adjust their employment to their steady state level instantaneously

[6] We have performed alternatively a test of equation 10 but the results were not convincing partly because of the independent variables used, α, $\alpha * (1/s)$ and $(1/s)$, that are correlated by construction

and lags of the variable considered may play an important role in the adjustment process. The presence of one lag of the dependent and independent variables can be easily taken into account allowing for an autoregressive error (e.g.: Kennedy 1998 p.g. 281).

Thus, if the disturbance in equation 12 is autocorrelated, i.e. $\epsilon_{it} = \rho\,\epsilon_{it-1} + \eta_{it}$ where η_{it} is white noise, and $\rho = 1$ then the FE estimator will be inefficient. In this circumstance, the first difference (FD) estimator is more efficient than the FE since the error term of the FD panel data model is not autocorrelated [7]. If the error term of the model in 12 is autocorrelated, but of order less than 1, that is $\rho < 1$ then also the FD regression will have a serially correlated noise term with an autocorrelation coefficient equal to $\rho - 1$.

Column 3 of table 1 reports the result obtained considering first differenced variables and a AR1 error term. As it is possible to see, now the estimated elasticities are both negative and statistically significant as suggested by our theory[8].

Besides, at the bottom of the table is reported the estimate of the autocorrelation parameter of the error term of the FD model. As we can see this is equal to -0.1236, which would imply an estimate of the autocorrelation parameter of the error term of the not differenced model equal to $-0.1236 + 1 \approx 0.88$.

However, the preferred FD-AR method of estimation still leads to to an estimation of the elasticity of product demand to wages that is very small in magnitude. Two factors might explain the small negative effect of the elasticity of product demand: First, Industrial classifications at such level of disaggregation can hardly be deemed to represent market. Then, the market share as computed is probably not a very reliable measure. If the market from the point of vue of the firm is far smaller than that computed at the 2-digit level, then the market share should be bigger than that which enters the equation as an explanatory variable. Mechanically, the estimated parameter should be biased downward.

Second, the small effect of the elasticity of labour demand to wages can have another explanation that our theory provides. Recall β as an interaction between the elasticity of product demand to prices and that of prices to wages. If there is incomplete pass-through from wages to prices in the sense that most of the increase in wages is supported by the firm in the form of reduction in mark-ups than the elasticity of prices to wages would be small. As a result, the estimated elasticity β should be expected to be small.

[7] This is because the first difference error term is $\Delta\epsilon_{it} = \epsilon_{it} - \epsilon_{it-1} = \epsilon_{it-1} + \eta_{it} - \epsilon_{it-1} = \eta_{it}$

[8] The standard errors of these estimators are all lower than those obtained through the FE model. This would suggest that the use of the AR1 term yields more efficient estimates than FE.

We check whether the results change when performing estimations by industries. Our guess is that in monopolistic or competitive type industries the parameter on mark-ups (i.e. elasticity of market share to wages) would be insignificant. But in industries that are known to be oligopolistic, that effect should be significant. On the other hand, although one should not expect big differences in the elasticity of substitution across industries, the elasticity of product demand is expected to be high in homogenous type industries. Then, in that configuration, the joint elasticity $\zeta_{ll} = \sigma_{ll} + \eta_y$ is expected to be high as well.

Table 2 presents the results obtained by industry on the same FD-AR1 specification. The estimated elasticity of substitution is on average around -0.55 and is negative and statistically significant in the majority of cases (15/22). The highest values are retrieved in Textile (-1.83), Electricals (-.97) and Food Products (-.92).

The elasticity of product demand to wages β is negative in 15 out of 22 industries, but only 8 of which are statistically significant. Most strikingly, the negative and statistically significant values of that elasticity are mostly concentrated in industries that are known to produce more homogenous products, products for which the elasticity of demand to prices (i.e. η_Y) should be high in absolute values. It is the case for Wood products, Paper products, Publishing and printing, Rubber and Plastic, Non-metallic or Basic metals and Furniture[9]. This could explain why β, that equals $\eta_Y \eta_p$, is estimated to be relatively higher in these industries.

In contrast, but still completely relevant with regard to our theory, industries that are known to produce more differentiated products like Machinery and equipment, Office machinery, Electricals, Radio, TV and Telecom and finally Motor vehicles, are associated with insignificant elasticities.

However, even when it is estimated at the industry level, the elasticity of product demand to wages is still small in magnitude. [Other regressions will be run in the near future to account for the problems of measurement errors in the market shares].

6 Appendix A: Construction of variables

Labour demand (l): This is the total number of workers employed by the firm. Unfortunately, Onesource does not contain information on the number of production and non-production workers so their aggregate measure was used in this exercise.

Wage: The wage of workers in each firm was calculated dividing the total wage bill by the number of workers.

[9] Oliveira-Martins et al (1996) provide a classification on the degree of differentiation of these industries from which we have been partly inspired to illustrate our results

Table 1: Elasticity of Labour Demand Equation: Pooled data results

	RE	FE	AR1
	(1)	(2)	(3)
σ(elas. of sub.)	-.624**	-.667**	-.595**
	(.020)	(.09)	(.022)
β (elas. of Demand/wages)	-9.0e-07	-5.0e-07	-7.0e-06*
	(3.0e-06)	(.000001)	(4.00e-06)
cons	.038371**	.046067**	.0203**
	(.004)	(.004)	(.004)
Hausman	179.03		
ρ			-.130
Obs.	41062	41062	29726
Firms	11220	11220	9974
R^2	0.028	.437	.035

Notes

(i) Robust standard errors in parenthesis

(ii) * significance at 5% confidence level; ** significance at 1%

(iii) FE: fixed effect estimation

(iv) AR1: model with autoregressive disturbance

(vi) Time dummies included in all specifications

(vii) The Hausman test statistics has a $\chi^2(8)$ distribution

Cost share of labour (α_l): This figure is the ratio between the cost of labor and the total cost of production. The cost of labour is the wage bill whereas the total cost of production is the sum of the cost of labour, cost of materials and the rental price of capital. The cost of materials is present in the data set whilst the cost of capital was computed multiplying the user cost of capital times the stock of capital (OECD productivity manual). The former was calculated using the interest rate set by the Bank of England as the rental price of capital. The latter was computed by means of the perpetual inventory method using an 8% depreciation rate and the GDP deflator of capital formation as the deflator of capital.

Market share (s): The Input/Output Supply and Use tables provide information about the total demand of each industry for each year. The data of these tables were aggregated at two digit SIC92 level by means of the correspondence list between the Input/Output tables' industry grouping and the SIC92 classification, which is provided in the tables. The total demand of each two digit SIC92 industry includes the domestic production sold in the domestic market plus imports. These figures, deflated by 2 digit deflator, represent the total production in each industry and were used to compute market shares at two digit level.

Mark-up (μ): This was ascertained exploiting the assumption of constant return to scale. Indeed, in this circumstance the average cost (AC) is equal to the marginal cost (MC) therefore $\mu = P/MC = P/AC = P/C(W, y)/y = Py/C(W, y)$ where Py is the total sale in our data and $C(W, y)$ is the total cost computed summing the wage bill, the cost of materials and the cost of capital.

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Kennedy (1998)
Wooldridge (1998)

Table 2: By industry regressions:Elasticity of labour demand equation

sic92_2	Description	Elas. of subs.		s.e.	Elas. of demand/wages		s.e.	Observatio	No. of firms	Rho	R_squared
15	Food products and Beverages	**-0.92**	***	-0.14	**0.00003**	***	0.00	2039	700	-0.17	0.02
16	Tobacco prod.	**-3.54**		-2.62	**0.015**		-0.01	22	10	-0.28	0.23
17	Textiles	**-1.88**	***	-0.14	**0.0002**	**	0.00	1030	376	-0.14	0.3
18	Wearing apparel	**-0.19**		-0.21	**-0.00008**		0.00	619	255	-0.11	0.03
19	Leather and leather prod.	**-0.03**		-0.35	**-0.00054**		0.00	306	103	-0.25	0.02
20	Wood and wood prod.	**-0.50**	**	-0.20	**-0.00044**	**	0.00	664	212	-0.09	0.07
21	Pulp, paper and paper prod.	**-0.32**	*	-0.18	**-0.00025**	***	0.00	870	266	-0.04	0.04
22	Publishing, printing prod.	**-0.41**	***	-0.05	**-0.00003**	***	0.00	3548	1252	-0.19	0.06
23	Coke, Refined Petroleum prod.	**1.15**		-0.94	**-0.00039**		0.00	96	37	-0.08	0.07
24	Chemicals and chemical prod.	**-0.78**	***	-0.11	**-0.00002**	***	0.00	2283	730	-0.2	0.04
25	Rubber and plastic prod.	**-0.72**	***	-0.11	**0.00001**		0.00	2280	700	-0.12	0.04
26	Other non-metallic mineral prod.	**0.39**	***	-0.13	**-0.00062**	***	0.00	1022	323	-0.2	0.12
27	Basic metals	**0.55**	***	-0.19	**-0.00072**	***	0.00	992	327	-0.13	0.18
28	Fabricated metal prod.	**-0.70**	***	-0.06	**0.00008**	***	0.00	3458	1122	-0.15	0.05
29	Machinery and equipment n.e.c.	**-0.44**	***	-0.08	**-0.00001**		0.00	3665	1233	-0.19	0.04
30	Office machinery and computers	**-0.83**	***	-0.27	**-0.00005**		0.00	251	123	-0.11	0.07
31	Elec. machinery and apparatus n.e.c.	**-0.97**	***	-0.14	**0.00007**		0.00	1012	363	-0.08	0.07
32	Radio, TV and Communication	**-0.46**	***	-0.14	**0.00001**		0.00	1081	363	-0.26	0.03
33	Medical, Precision and Optical ins.	**-0.84**	***	-0.12	**-0.00007**		0.00	1247	470	-0.03	0.1
34	Motor vehicles, trailers	**-0.28**	***	-0.09	**-0.00002**		0.00	985	336	-0.07	0.05
35	Other transport equipment	**-0.23**		-0.22	**-0.0003**	**	0.00	766	275	0.03	0.03
36	Furniture	**-0.26**	**	-0.13	**-0.00012**	**	0.00	1490	503	-0.07	0.06
	Average figures	***-0.55***			***-0.00053***						

Standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%