The isolable Weight-Distance structure of trucking rates in Canada, 1981-1996: simple implications for constant-quantity price index constructs

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Abstract

Using very large trucking commodity origin-destination survey data providing waybill information by shipment over a period of 16 years, we study the extent to which Canadian domestic trucking rates are determined by shipment Weight and Distance dimensions and by some other general factors, notably Market size, with exhaustive single and double-digit breakdowns of commodity classes.

Using Box-Cox transformations on dependent and independent variables, we first demonstrate the absence of any flexible U-shaped forms of unit prices with respect to Weight or Distance, and *a fortiori* the absence of the most restrictive symmetric quadratic effects sometimes hypothesized *a priori* for this price structure. We also show in particular that a simple monotonic Power Model of shipment dimensions provides an excellent and stable approximation of the rate determination mechanism, allowing for the easy construction of constant-quantity trucking prices needed for trucking service price indices because the rate determination equation is basically of logarithmic form.

Moreover, dimensioning Power parameter estimates for Canada, wherein the exponent of Weight is 50% smaller than that of Distance, exhibit relative values resembling those obtained for numerous, but not all, other countries under comparable functional form assumptions.

Key words: transport output units of measurement, constant-quantity trucking prices, Statistics Canada Trucking Commodity Origin Destination Survey, domestic waybill trucking rates, Weight, Distance, Market size, Box-Cox transformations, serial autocorrelation, Canada, constant output Weight-Distance Power price corrections.

Table of contents

List of tables

Journal of Economic Literature (JEL) classification: C8, R40, C59.

1. Introduction: the problem of reference output units in transport[1]

Transport practitioners have to define non-trivial output units (Wilson, 1959), an issue with a long history that includes the famous discussion, from 1891 until 1920 and beyond, between F. W. Taussig and A. C. Pigou. More recently, it has been shown, for instance, that separation of « tons» from « miles » in the freight ton-miles output measure had a great impact on the resulting distance elasticity in a cost function (Waters II, 1980); on similar lines, distinguishing between weight and distance classes of shipments carried by trucking firms naturally impacts trucking cost function estimates (Gagné, 1990). More generally, transport price indices should measure price variations for constant quantities, which requires expressing prices for output units of similar weight and distance dimensions over time or finding corrections, here of observed shipment prices, that compensate for their variations.

Our analysis of Canadian shipping rates for the period 1981 until 1996 will demonstrate that such rates are properly explained by monotonic Box-Cox power functions of Weight and Distance shipment dimensions, among other explanatory factors, and that the simplicity of optimally determined (logarithmic) form parameters for different levels of aggregation actually allows for the easy construction of constant-quantity trucking prices. Our flexible form freight rate equations[2] therefore demonstrate that **unit** (or quantity) — as opposed to **quality** — adjusted trucking service price indices could easily be constructed from available waybill shipment data at least in Canada and perhaps elsewhere.

2. The approach through flexible form analysis

There has long existed (*e.g.* Chow & Caravan, 1991) widespread agreement that road freight rates in Canada are reasonably or systematically close to costs. If that is the case and market structure imperfections away from the competitive ideal are moderate and stable, estimates of the roles of Distance and Weight in the explanation of trucking rate structures should reflect underlying resource costs if they are based on large enough yearly samples such as those found in Statistics Canada's Trucking Commodity Origin Destination (TCOD) Survey databases.

In this perspective, we study at some depth the structure of such domestic shipment prices for the year 1986 (using a 2-digit classification with 88 categories of freight) drawn from a series of 16 successive yearly waybill samples for the period 1981-1996, which also provides for time-series estimates of the comparable roles of Distance and Weight (using a 1-digit classification with 18 categories of freight)[3]. For the analysis of 1986 data, a subsample of about 10 000 observations is drawn from the 652 000 available (2-digit) records. For the time series analysis, 7 200 records per year are drawn, a total of 115 200 for the 16 years, from more than 1,5 million available (1-digit) records.

The structure of the freight rate function estimated from this waybill information turns out to be extremely robust and the logarithmic form good enough an approximation of the optimal freight rate functional form to provide corrective weights for the construction of constant-quantity trucking price indices required to duly account for the continuously changing weights and distances of shipments.

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[1] The first version of this paper, circulated in 1998, was entitled: "ROUT-TPI: Reference Output Units in Transport: the case of Trucking Price Indices". This version uses regression work carried out mostly in 1999. The author thanks Jean-Dominique Blardone and Christophe Rizet for references to French and international analyses of trucking prices.

[2] The same TRIO econometric methodology and estimation programs (Gaudry *et al*., 1993, 2005) used here, available since 2000 as freeware from the Agora Jules Dupuit site (www.e-ajd.net), were previously used by Abbott *et al*. (1994, Chapter 6) to analyze 1990 freight rates under the Atlantic Region Freight Assistance Program of Canada. These analyses, which tested only monotonic cases of Box-Cox transformation use in Equation (1), were based on the TCOD survey and on a National Transportation Agency (NTA) database.

[3] Although the statistical methodology of this Survey was modified in 2004 (Gagnon & Trépanier, *circa* 2006), it would be surprising if the five redesign changes then implemented made a significant difference — and for that matter any difference at all — to estimates of the roles of Distance and Weight in explanations of the rate structure presented here.

Although the results are exploratory in the sense that additional information on the evolving structures of deregulation in the various provinces, well summarized in Ziegler (1996), and on the years of Atlantic Region Freight Assistance transport subsidies[4] (perhaps including indicators of vertical integration between carriers and shippers[5]) could in principle be relevant, we do not believe that such additions to specifications, presumably made in the form of dummy or quasi-dummy variables, would significantly change the Weight-Distance functional form estimates revealed by the exploration.

3. Model specification

Neglecting observation subscripts, the general rate equation form for waybills at period *t* of T is:

(1)
$$R_t^{(\lambda_P)} = \beta_0 + \beta_{W_1} W_t^{(\lambda_{W_1})} + \beta_{W_2} W_t^{(\lambda_{W_2})} + \beta_{D_1} D_t^{(\lambda_{D_1})} + \beta_{D_2} D_t^{(\lambda_{D_2})} + \beta_M M_t^{(\lambda_M)} + \sum_{c=2}^{c=C} \beta_c d_{ct} + \sum_{r=2}^{r=R} \beta_r d_{rt} + \sum_{y=2}^{y=Y} \beta_y d_{yt} + u_t$$

with

$$u_t = \sum_{\ell=1}^{\ell=2} \rho_\ell u_{t-\ell} + v_t$$

where

R	=	Revenue per tonne-kilometre
W	=	Weight in tonnes
D	=	Distance in kilometres
M	=	Market size for the regional O-D flow considered: number of waybills per year
d_c	=	Dummy variable for each commodity group c = 1, …, C (except one)
d_r	=	Dummy variable for each regional O-D pair r = 1, …, R (except one) defined in Footnote 8
d_y	=	Dummy variable for each year y = 1, …, Y (except one)

with Box-Cox transformation (BCT), applied to strictly positive variables [R, W, D, M], defined as:

(2)
$$X_k^{(\lambda)} = \begin{cases} \dfrac{X_k^{\lambda} - 1}{\lambda} & \text{if } \lambda \neq 0, \\ \ln X_k & \text{if } \lambda \to 0; \end{cases}$$

and susceptible to be used twice on X_k variables, such as W or D, to detect U-shaped effects. As shown in Gaudry *et al.* (2000), regression estimates may yield a maximum or a minimum if, as summarized in Table 1, the corresponding β_{k_1} and β_{k_2} regression coefficients alternate in sign and the differences in BCT values are negative (for a maximum) or positive (for a minimum).

Table 1. Conditions for a maximum or a minimum with two BCT applied to the same variable

CASE	β_1	β_2	$\lambda_1 - \lambda_2$	$\beta_1(\lambda_1 - \lambda_2)$ or $\beta_2(\lambda_2 - \lambda_1)$
I. Maximum 1	+	−	−	−
II. Minimum 1	+	−	+	+
III. Maximum 2	−	+	+	−
IV. Minimum 2	−	+	−	+

[4] Subsidies paid to carriers under the Atlantic Region Freight Assistance Act were, except for very rare occurrences, not included in waybills. The program was terminated on July 1, 1995.

[5] An analysis of the National Transportation Agency database (Abbott *et al.*, 1994, p. 125) showed (using a grouping of commodities into 5 categories consistent with the subsidy rates) that vertically integrated carriers (having the same corporate owner as the shipper) had on average rates 27,5% higher than non-integrated carriers also receiving subsidies under the assistance program, but Distance-Weight rate structure estimates were apparently unaffected by ownership. Higher charges by integrated firms were certainly not discouraged by subsidies set as a fixed proportion of transportation costs, thereby opening the door to subsidy maximization through inflated transportation costs used as transfer prices within integrated firms.

Allowing for turning relationships. The double use of BCT on a given variable[6] gives great flexibility to model asymmetric U-shapes by allowing for unconstrained power values [$\lambda_1 \neq \lambda_2$], or even by setting one such exponent at 1 and leaving the second one unrestricted [$\lambda_1 = 1, \lambda_2 \neq 2$]: the simple symmetric quadratic shape [$\lambda_1 = 1, \lambda_2 = 2$] is a special case. The advantage of flexibility is of course that a strictly quadratic shape is extremely restrictive and often rejected in favor of more open and *asymmetric* bowl-like shapes with *strongly different* upward and downward slopes.

In the above general specification, shipment Weight is considered a good candidate for some sort of U-shape because smaller shipments require more consolidation that average ones, and because large ones may require more care in loading, carriage and unloading, the use of more axles, or even special permits. Distance could also imply non monotonicity: Baumol & Vinod (1970) have formulated a theoretical freight demand function where modal transit Time (and whence Distance if trucking speeds are approximately given) appears both linearly and raised to the power ½, but they did not estimate its parameters or test the validity of their assumed U-shaped form.

Sometimes a rigid quadratic U form is assumed because it is just presumed to "fit well into the structure of transport tariffs" (*e.g.* Liedtke, 2012)[7]. More rarely one hears that competition among carriers that would be strong in urban areas but decrease with intermediate distances, might conceivably yield an inverted U form. Simple monotonic non linearity is typically justified by the fact that relatively high loading and unloading costs, the same for long and short trips, certainly decrease in importance with trip length and perhaps also with shipment weight.

Also, if, as pointed out in Baumol & Vinod, a market size variable reflects shippers' inventory requirements, it also implies for carriers organizational scale advantages and perhaps lower chances of empty backhauls on relatively higher service frequency O-D pairs.

On elasticities and *t*-statistics. We present here only key results obtained from Maximum likelihood estimation of (1) under homoskedasticity[8] assumptions. Forthcoming tables have columns presenting, for the selected explanatory variable reported on — we neglect the tens of commodity, year and regional O-D dummy variables —, the elasticity of the dependent variable and the *t*-statistic of the underlying β_k coefficient.

The latter are computed conditionally upon the value of the BCT and the former are calculated at sample means in accordance with the following expressions:

(3) $$\eta(y, X_k) \equiv \frac{\partial y}{\partial X_k} \frac{X_k}{y} = \beta_k \frac{X_k^{\lambda_k}}{y^{\lambda_y}} \Big|_{\bar{y}, \bar{X}_k, \bar{X}_\ell}, \quad k \neq \ell ,$$

and we note in passing that $\lambda_k < 0$ implies a decreasing elasticity with respect to X_k.

4. Results for Canada and elsewhere

Form results for the year 1986. The starting point model, summarily presented in Table 2, contains the minimum number of explanatory variables (and a constant β_0) needed to explain the shipment price per tonne-kilometre, mimicking the specification previously used for the analysis of such rates in the Atlantic regions of Canada receiving freight rate subsidies in 1990 (Abbott *et al.*, 1994, p. 118).

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[6] Clearly, some rules apply in the maximization of the Likelihood function as identical starting values of the BCT imply exact colinearity.

[7] The author did not report on tests of the validity of this assumption in explaining tariffs but simply used it as given.

[8] We carefully checked for heteroskedasticiy using a very general formulation (Gaudry & Dagenais, 1979) programmed in the estimation algorithm: without surprise, the price per tonne-kilometre formulation of the dependent variable yields in (1) a regression error of roughly constant variance irrespective of the value of the BCT applied to the dependent variable.

It is noteworthy that the linear specification (Column 1) is rejected with infinite certainty, as compared to the logarithmic specification (Column 2) but that further gains in Log-likelihood occasioned by the use of BCT are still possible with two such transformations, one for the dependent variable and another for Weight and Distance (but allowing for distinct BCT for these dimensions yields no further gain). In best fit terms, one would select Column 4. (For detailed results, see Appendix 1).

In terms of elasticities however, the difference between the logarithmic and Box-Cox cases is small. This implies that the logarithmic model is a good approximation and that an appropriate correction factor to obtain constant-quantity rates in a price index is simply a division of waybill rates by ($W^{0,5}D^{0,6}$).

Table 2. Box-Cox forms and trucking freight rates in Canada, 1986 (9 849 observations)

Explanatory variables	*Case*	***1** Linear*	***2** Logarithmic*	***3** 1 Box-Cox*	***4** 2 Box-Cox*	***5** 3 Box-Cox*
Weight	elasticity	-0,32	-0,47	-0,36	-0,39	-0,39
	t-statistic	(-5,42)	(-130,49)	(-145,53)	(-142,88)	(-143,00)
Distance	elasticity	-0,65	-0,62	-0,53	-0,53	-0,54
	t-statistic	(-12,06)	(-107,67)	(-108,76)	(-107,52)	(-107,80)
β_0; 87 commodity dummies		[...]	[...]	[...]	[...]	[...]
	Box-Cox λ_R	1,00	0,00	**-0,05**	**-0,07**	**-0,07**
	Box-Cox λ_W	1,00	0,00	**-0,05**	**-0,02**	**-0,03**
	Box-Cox λ_D	1,00	0,00	**-0,05**	**-0,02**	**-0,01**
	Log-likelihood	-39715.503	-902.719	-610.012	-583.941	-583.111
	Diff. in degrees of freedom	0	0	1	2	3

But what of the presence of U-shaped effects for these variables? In both cases, further tests allowing an asymmetric form [$\lambda_1 = 1; \hat{\lambda}_2$] yielded regression coefficients of the same sign, inconsistent with both asymmetric and symmetric quadratic forms, and strongly supporting monotonicity.

Form estimated over 16 years (1981-1996). What happens to the results just outlined if many years are taken into account (and a dummy variable is added for each of the 16 years), if the specification is enriched by 14 regional[9] dummies to capture jurisdictional and local market factors, and if the original 88 commodity groups are aggregated[10] into 18? Key results are again presented in Table 3.

The sequence of form tests defined for Cases 2-5 of Table 2 yields with the new sample a strictly comparable sequence of Log likelihood values: -477 (Logarithmic case); 1517 (1 Box-Cox case); 3204,1564 (2 Box-Cox case); and 3204,1561 (3 Box-Cox case). Only the last of these is presented, as Case 1, in Table 3: the form estimates are extremely close to the corresponding ones of Table 2.

In order to maintain flexibility in further enrichment tests, we keep this 3-Box-Cox specification of Case 1 despite the fact that it again provides no gain when compared to the 2-Box-Cox one. We see in Table 3 that, if this retained specification is now enriched by a market size variable (in the 5 bottom cases), and a first or second-order autocorrelation[11] scheme is added, very little happens to the parameters of interest. The robustness of the proposed Weight-Distance correction is confirmed by the addition of the market size variable: it considerably increases the explanatory power of the model, the

[9] For: (1) Island provinces (Newfoundland + Prince Edward Island); (2) New Brunswick + Nova Scotia; (3) Quebec; (4) Ontario; (5) Manitoba + Saskatchewan; (6) Alberta + Northwest Territories; (7) British Columbia +Yukon; (8) Island Provinces to Other provinces; (9) New Brunswick + Nova Scotia to Other provinces; (10) Quebec to Other provinces; (11) Ontario to Other provinces; (12) Manitoba + Saskatchewan to Other provinces; (13) Alberta + Northwest Territories to Other provinces; (14) British Columbia + Yukon to Other provinces.

[10] Both groupings are exhaustive and leave out no shipment: miscellaneous and "other" classes are taken into account.

[11] This is made possible by randomly selecting the same total number of observations per year (7 200). If ρ_2 is estimated by itself, the Log likelihood values are 909 (corresponding to Case 3 for ρ_1) without the Market size variable and 1071 (corresponding to Case 8 for ρ_1) with it.

two new parameters allowing for Likelihood ratio gains always larger than 100 units and simultaneously yielding a reasonable and stable elasticity with respect to market size of about -0,3.

A simple constant-quantity correction for trucking prices. Overall, not only is the Weight-Distance correction needed to develop constant-quantity trucking prices monotonic[12] but, as shown in Table 3, the isolable logarithmic form correction $W^{0,4}D^{0,6}$ is adequate. In terms of fit, small deviations from logarithmic values remain of some marginal interest except for the Weight dimension that is so precisely logarithmic that one wonders whether rate makers might not be establishing rates on the basis of Napier's very formula.

Note also that it does not seem to matter that the 88 two-digit groups listed in Appendix 1 have been reduced to 18 single-digit aggregates[13], a matter of some relevance as we now examine foreign results obtained without any use of commodity type variables.

Table 3. Box-Cox forms and trucking freight rates in Canada, 1981-1996 (115 200 observations)

Explanatory variables	*Case*	*1* *3 Box-Cox*	*2* *3 Box-Cox*	*3* *3 Box-Cox + ρ_1*	*4* *3 Box-Cox*	*5* *3 Box-Cox + $\rho_1 + \rho_2$*
Weight	elasticity	-0,38	-0,38	-0,38	-0,38	-0,39
	t-statistic	(-363,05)	(-350,85)	(-352,21)	(-338,13)	(-339,68)
Distance	elasticity	-0,62	-0,63	-0,64	-0,63	-0,65
	t-statistic	(-218,36)	(-212,50)	(-212,75)	(-204,92)	(-205,04)
β_0; 17c; 13r; 16y dummies*		[...]*	[...]	[...]	[...]	[...]
	Box-Cox λ_R	**-0,10**	**-0,10**	**-0,10**	**-0,10**	**-0,10**
	Box-Cox λ_W	**-0,00**	**0,00**	**0,00**	**0,00**	**0,00**
	Box-Cox λ_D	**0,11**	**0,11**	**0,11**	**0,11**	**0,10**
	First order autocorrelation ρ_1			0,07		0,06
	Second order autocorrelation ρ_2					0,04
	Log-likelihood	3420	2331	2562	823	1108
Explanatory variables	*Case*	*6* *4 Box-Cox*	*7* *4 Box-Cox*	*8* *4 Box-Cox + ρ_1*	*9* *4 Box-Cox*	*10* *4 Box-Cox + $\rho_1 + \rho_2$*
Weight	elasticity	-0,38	-0,38	-0,38	-0,37	-0,38
	t-statistic	(-366,20)	(-353,25)	(-351,25)	(-340,31)	(-338,32)
Distance	elasticity	-0,62	-0,62	-0,63	-0,62	-0,64
	t-statistic	(-219,41)	(-213,34)	(-213,32)	(-205,80)	(-205,78)
Market size	elasticity	-0,28	-0,26	-0,27	-0,27	-0,28
	t-statistic	(-24,51)	(-21,34)	(-20,63)	(-20,34)	(-19,89)
β_0; 17c; 13r; 16y dummies*		[...]*	[...]	[...]	[...]	[...]
	Box-Cox λ_R	**-0,10**	**-0,10**	**-0,11**	**-0,10**	**-0,11**
	Box-Cox λ_W	**0,00**	**0,00**	**-0,00**	**0,00**	**0,00**
	Box-Cox λ_D	**0,11**	**0,11**	**0,11**	**0,11**	**0,11**
	Box-Cox λ_M	**0,16**	**0,12**	**0,16**	**0,07**	**0,16**
	First order autocorrelation ρ_1			0,05		0,05
	Second order autocorrelation ρ_2					0,03
	Log-likelihood	3711	2552	2720	1025	1250
	Diff. in degrees of freedom	0	0	1	0	2
	Sample size	115 200	108 000	108 000	100 800	100 800
	Period	16 years	15 years	15 years	14 years	14 years

Is Canada special? As Weight-Distance rate structures in competitive markets should depend very much on vehicle technology, it might be asked whether comparable results occur in other countries.

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[12] It would be very surprising if the strictly quadratic forms of R in terms of W and D estimated in a pooled sample (2004-2009) from the TCOD Survey was supported by Box-Cox functional form tests, but these are unfortunately not provided by the authors (Anderson & Brown, 2012a; 2012b) who use fixed *a priori* regression forms.

[13] (1) Food requiring refrigerated equipment; (2) Other food; (3) Other vegetable products; (4) Crude wood; (5) Ore and scrap; (6) Petroleum; (7) Wood fabricated materials; (8) Pulp and paper; (9)Textile; (10) Chemicals; (11) Metal fabricated; (12) Vehicle parts; (13) Road motor vehicles; (14) Non metallic products; (15) Equipment; (16) Home equipment; (17) Miscellaneous; (18) Other.

A first comparable study by Rizet & Gwét (1998) was performed on national shipment samples drawn — independently from the nature of transported commodities — within 7 countries of Central America (Costa Rica), South-East Asia (Indonesia, Vietnam) and Africa (Burkina Faso, Cameroon, Ghana and Ivory Coast). All analyses, performed with a Logarithmic specification strictly comparable to that of Case 2 in Table 2, similarly yield a Weight power parameter smaller than the Distance power parameter, as summarized in Table 4 where the 5-country subset excludes Cameroun and Ghana. Also, interestingly, if a regression is performed separately for each country, the ratio of Distance to Weight elasticities increases most for Indonesia, a result isolated in Column 3.

Table 4. Logarithmic regression estimates, 7-country sample (Rizet & Gwét, 1998)

Explanatory variables	*Case*	*1* *7 countries*	*2* *5 countries*	*3* *Indonesia*
Weight	elasticity	-0,21	-0,30	-0,29
	standard error	0,01	--	0,03
Distance	elasticity	-0,48	-0,55	-0,72
	standard error	0,01	--	0,02
β_0		[...]	[...]	[...]
Box-Cox transformation on λ_R, λ_W, λ_D		0,00	0,00	0,00
	Sample size	3540	2247	481

In addition, the two-dimensional graphs of log(R) against log(W) or log(D) provided by the authors appear furthest away from a straight line for Indonesia, where the presence of some curvature implies $\lambda_k < 0$, in particular for the Distance term. The question therefore arises as to why one would typically obtain a clean straight line plot, notably for Vietnam, but a shape convex to the origin for Indonesia.

Could corruption be strong enough to modify the price structure? First, it is noteworthy that the mean value of the 1998 Corruption Index constructed by Kaufmann *et al.* (2005) is 0,46 for the seven countries of the Rizet-Gwét sample but twice as high than the mean (0,95) for Indonesia (surpassed only by Cameroon at 1,11)[14].

And, concerning Indonesia specifically, it has been demonstrated by Olken & Barron (2009) with a sample of over 6 000 illegal payments to traffic police, military officers and attendants at weigh stations on roads in two provinces (Aceh and North Sumatra) that, for such bribes, extortion and other protection payments: (i) downstream checkpoints (closest to the final destination) received higher bribes than upstream checkpoints (closer to the trip origin), as hold-up theory predicts; (ii) the elasticity of the average bribe paid at a checkpoint with respect to the total number of checkpoints encountered along a trip (increasing with Distance) is between -0,54 and -0,81 (under an assumed Log-Log specification). As the bribes incorporated into Indonesian prices amount on average to 13% of the total trip cost, we speculate that their spatial pattern could increase price/cost ratios relatively more at the ends of trips, or at least generate a distortion of the straight line with $\lambda_D < 0$, or at least with $\lambda_D \neq 0$, for some Distance ranges.

A second comparable study, made for France (Jeger & Thomas, 1999) with 53 000 observations for 1998, included 10 freight, 10 vehicle type, as well as 3 other categorical variables referring to the nature of shipper-carrier commercial relationships. It found, also under logarithmic form assumptions, an elasticity with respect to weight of -1,0 and with respect to distance of 0,5; this result, quite different from the above, might be due in part to French weight limits on trucks which are less than half (40 tons) of those imposed by most Canadian provinces, to say nothing of those in Africa...

The results for Canada suggest the validity of all other results obtained under log-log specifications.

[14] For Canada, the value of the corruption index is -2,51.

5. The simple dimensioning price correction and index constructs

To understand the potential relevance for a domestic trucking price index of using a formula as simple as the division of Revenue per shipment by $W^{0,4}D^{0,6}$, consider in Table 5 the average fluctuating Weight and Distance dimensions of domestic shipments by truck over some recent years, as listed in Anderson & Brown (2012a, Table 1) for the same TCOD survey data series.

Table 5. Recent average Weight and Distance, domestic waybills

Canada-wide values			
	W		D
	Weight tonnes	Correl. W, D	Distance kilometres
2004	11		415
2005	12		395
2006	12	-0,20	396
2007	13		409
2008	12		398
2009	12		390

Note, in addition to variations in average values listed, the small inverse correlation of -0,20 between the variables. It should be clear under these conditions that the construction of constant- output indices will yield results that differ from uncorrected ones, a matter deserving further work.

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7. Appendix 1. Detailed results of Table 2 models

		CASE =	1	2	3	4	5
		VARIANT =	Linear	LOG	1 Box-Cox	2 Box-Cox	3 Box-Cox

Part I. Beta, Elasticity and conditional t-statistic

SHIPMENT DIMENSIONS

		1	2	3	4	5
DISTANCE EFFECTED PER	DIST	-.147159E-02	-.614566E+00	-.866487E+00	-.724850E+00	-.663373E+00
SHIPMENT (KM)		-.647	-.615	-.529	-.530	-.537
		(-12.06)	(-107.67)	(-108.76)	(-107.52)	(-107.80)
Box-Cox transformation index			LAM 1	LAM 1	LAM 2	LAM 2
WEIGHT PER	POID	-.935864E-04	-.471996E+00	-.667310E+00	-.559410E+00	-.569037E+00
SHIPMENT (KG)		-.318	-.472	-.364	-.391	-.388
		(-5.42)	(-130.49)	(-145.53)	(-142.88)	(-143.00)
Box-Cox transformation index			LAM 1	LAM 1	LAM 2	LAM 3

RETAINED COMMODITY GROUPS (except for reference one)

		1	2	3	4	5
MEAT AND	BV01	-.365166E-01	-.156572E+00	-.466954E-01	-.876086E-01	-.860147E-01
MEAT PREPARATIONS	====	-.016	-.157	-.041	-.075	-.073
		(-.02)	(-1.68)	(-.46)	(-.86)	(-.85)
FISH	BV03	.487278E+00	.264891E+00	.308133E+00	.291224E+00	.288547E+00
	====	.218	.265	.274	.248	.246
		(.27)	(2.86)	(2.99)	(2.86)	(2.83)
OTHER MARINE PRODUCTS	BV04	.320494E+00	.498033E+00	.606640E+00	.588799E+00	.586086E+00
	====	.143	.498	.539	.501	.500
		(.18)	(5.36)	(7.27)	(7.07)	(7.05)
DAIRY	BV05	-.523851E+00	-.324441E+00	-.308863E+00	-.308550E+00	-.303002E+00
PRODUCTS,	====	-.234	-.324	-.274	-.263	-.258
EGGS AND HONEY		(-.29)	(-3.51)	(-3.02)	(-3.09)	(-3.04)
CEREAL	BV06	.480472E+00	-.238872E+00	-.301626E+00	-.306035E+00	-.309624E+00
GRAINS (INC. SEED,	====	.215	-.239	-.268	-.261	-.264
FLOUR, MEAL+CEREAL. PREP.)		(.26)	(-2.58)	(-3.05)	(-3.08)	(-3.13)
FRUITS AND	BV07	.946541E-01	-.261939E+00	-.262222E+00	-.288068E+00	-.287469E+00
FRUIT PREPARATIONS	====	.042	-.262	-.233	-.245	-.245
		(.05)	(-2.83)	(-2.95)	(-3.26)	(-3.26)
NUTS (EXCEPT OIL NUTS)	BV08	.714307E+00	-.169325E+00	-.714751E-01	-.126163E+00	-.121117E+00
	====	.319	-.169	-.064	-.107	-.103
		(.31)	(-1.44)	(-.62)	(-1.10)	(-1.06)
VEGETABLES AND	BV09	.221034E+00	-.516451E+00	-.561863E+00	-.582677E+00	-.579650E+00
VEGETABLE PREPARATIONS	====	.099	-.516	-.499	-.496	-.494
		(.12)	(-5.58)	(-6.83)	(-7.02)	(-7.00)
SUGAR AND	BV10	.828601E+00	-.150298E-01	.763578E-02	-.647758E-02	-.850439E-02
SUGAR PREPARATIONS	====	.370	-.015	.007	-.006	-.007
		(.46)	(-.16)	(.08)	(-.06)	(-.09)
COCOA, COFFEE,	BV11	.419796E+00	-.762081E-01	.223568E-01	-.296689E-01	-.261450E-01
TEA AND SPICES	====	.187	-.076	.020	-.025	-.022
		(.23)	(-.82)	(.26)	(-.34)	(-.30)
MARGARINE,	BV12	.111761E+01	.380029E-01	-.453415E-01	-.727635E-01	-.697117E-01
SHORTENING AND LARD	====	.499	.038	-.040	-.062	-.059
		(.61)	(.41)	(-.52)	(-.85)	(-.81)
OTHER FOODS, FOOD	BV14	.126575E+00	-.563398E-01	.372107E-01	-.682933E-02	-.597592E-02
MATERIALS AND	====	.057	-.056	.033	-.006	-.005
FOOD PREPARATIONS		(.07)	(-.61)	(.41)	(-.08)	(-.07)
FODDER AND FEED	BV15	-.229882E+00	-.468624E+00	-.507286E+00	-.514934E+00	-.514645E+00
(EXCEPT	====	-.103	-.469	-.451	-.438	-.439
UNMILLED CEREALS)		(-.13)	(-5.07)	(-5.58)	(-5.68)	(-5.69)
BEVERAGES	BV17	-.838248E-01	-.761852E-02	.293231E-01	.147296E-01	.111451E-01
	====	-.037	-.008	.026	.013	.010
		(-.05)	(-.08)	(.29)	(.15)	(.11)
TOBACCO	BV18	.282894E+00	.539902E-01	.187126E+00	.144726E+00	.146038E+00
	====	.126	.054	.166	.123	.125
		(.15)	(.58)	(1.81)	(1.39)	(1.41)

CRUDE	BV20	.125324E+01	.619253E-02	-.112624E+00	-.124798E+00	-.131540E+00
ANIMAL PRODUCTS,	====	.560	.006	-.100	-.106	-.112
INEDIBLE (EXC. FIBRES)		(.69)	(.07)	(-.82)	(-.89)	(-.95)
CRUDE	BV21	.747458E+00	-.498086E-01	-.634633E-01	-.761620E-01	-.801336E-01
VEG.PROD., INEDIBLE	====	.334	-.050	-.056	-.065	-.068
(EXC. TOB., FIBRES+ WOOD)		(.41)	(-.54)	(-.68)	(-.81)	(-.86)
CRUDE WOOD MATERIALS	BV23	.101796E+01	-.403789E+00	-.567232E+00	-.543229E+00	-.548408E+00
	====	.455	-.404	-.504	-.462	-.468
		(.55)	(-4.36)	(-5.10)	(-4.97)	(-5.03)
TEXTILE AND RELATED	BV24	.525584E+01	.384246E+00	.488091E+00	.459765E+00	.461601E+00
FIBRES	====	2.347	.384	.434	.391	.394
(INCLUDING WASTE)		(2.88)	(4.12)	(4.74)	(4.41)	(4.44)
METAL ORES, METAL IN	BV25	.105731E+01	-.486308E+00	-.634178E+00	-.598744E+00	-.599112E+00
ORES,	====	.472	-.486	-.563	-.510	-.511
CONCENTRATES AND SCRAP		(.58)	(-5.25)	(-6.37)	(-5.93)	(-5.94)
COAL, CRUDE PETROLEUM	BV26	.349381E+00	-.400942E+00	-.500469E+00	-.463243E+00	-.463470E+00
AND RELATED	====	.156	-.401	-.445	-.394	-.395
CRUDE PRODUCTS		(.19)	(-4.33)	(-4.93)	(-4.56)	(-4.56)
CRUDE	BV27	.974128E+00	-.816759E+00	-.103383E+01	-.102667E+01	-.102602E+01
NON-METALLIC MINERALS	====	.435	-.817	-.919	-.874	-.875
(EXCEPT COAL AND PETROLEUM)		(.53)	(-8.82)	(-12.93)	(-12.90)	(-12.91)
OTHER WASTE AND	BV29	.477872E+00	-.153188E+00	-.233564E+00	-.213328E+00	-.218754E+00
SCRAP MATERIALS	====	.213	-.153	-.208	-.182	-.187
		(.26)	(-1.66)	(-2.10)	(-1.90)	(-1.95)
LEATHER	BV30	.370840E+00	.249179E+00	.413966E+00	.365512E+00	.371969E+00
	====	.166	.249	.368	.311	.317
		(.20)	(2.67)	(3.70)	(3.22)	(3.30)
FURS, DRESSED	BV31	.155855E+01	.169306E+00	.279451E+00	.262800E+00	.259813E+00
	====	.696	.169	.248	.224	.222
		(.85)	(1.79)	(2.46)	(2.33)	(2.31)
RUBBER AND PLASTIC	BV32	.206296E+01	.418766E+00	.517862E+00	.489253E+00	.490804E+00
FABRICATED MATERIALS	====	.921	.419	.460	.416	.419
		(1.13)	(4.48)	(5.87)	(5.48)	(5.52)
WOOD	BV33	.107082E+01	-.173781E+00	-.273936E+00	-.285701E+00	-.289418E+00
FABRICATED MATERIALS	====	.478	-.174	-.243	-.243	-.247
		(.59)	(-1.88)	(-3.18)	(-3.28)	(-3.34)
PULP	BV34	.122232E+01	-.256558E+00	-.409002E+00	-.395028E+00	-.404208E+00
	====	.546	-.257	-.363	-.336	-.345
		(.66)	(-2.77)	(-3.40)	(-3.29)	(-3.36)
PAPER AND PAPERBOARD	BV35	.486896E+00	-.124574E+00	-.143193E+00	-.178762E+00	-.181742E+00
	====	.217	-.125	-.127	-.152	-.155
		(.27)	(-1.34)	(-1.69)	(-2.12)	(-2.16)
TEXTILE	BV36	.542652E+01	.205124E+00	.299183E+00	.262024E+00	.264550E+00
FABRICATED MATERIALS	====	2.423	.205	.266	.223	.226
		(2.97)	(2.20)	(3.17)	(2.73)	(2.77)
TEXTILE	BV37	.117563E+01	.936256E-01	.223666E+00	.186500E+00	.191208E+00
FABRICATED MATERIALS	====	.525	.094	.199	.159	.163
		(.64)	(1.00)	(2.29)	(1.88)	(1.94)
TEXTILE	BV38	.176897E+01	.353512E+00	.471673E+00	.437771E+00	.443549E+00
FABRICATED MATERIALS	====	.790	.354	.419	.373	.378
		(.97)	(3.77)	(5.22)	(4.76)	(4.84)
OILS, FATS, WAXES,	BV39	.662381E+00	.206491E+00	.144102E+00	.171376E+00	.166010E+00
EXTRACTS AND	====	.296	.206	.128	.146	.142
DER., ANIMAL AND VEG.		(.36)	(2.23)	(1.59)	(1.90)	(1.84)
CHEMICALS AND	BV40	.182137E+01	.225349E+00	.164960E+00	.204968E+00	.199682E+00
RELATED PRODUCTS	====	.813	.225	.147	.174	.170
		(1.00)	(2.44)	(1.54)	(1.88)	(1.84)
CHEMICALS AND	BV41	.101922E+01	.266289E+00	.219399E+00	.231538E+00	.226407E+00
RELATED PRODUCTS	====	.455	.266	.195	.197	.193
		(.56)	(2.88)	(2.56)	(2.67)	(2.62)
CHEMICALS AND	BV42	.134679E+01	.275105E+00	.327651E+00	.316249E+00	.316644E+00
RELATED PRODUCTS	====	.601	.275	.291	.269	.270
		(.74)	(2.97)	(3.36)	(3.23)	(3.24)

PETROLEUM AND	BV43	.572987E+00	-.432004E+00	-.555432E+00	-.549146E+00	-.553591E+00
COAL PRODUCTS	====	.256	-.432	-.493	-.467	-.472
		(.31)	(-4.67)	(-5.81)	(-5.75)	(-5.80)
IRON, STEEL AND ALLOYS	BV44	.848763E+00	.155512E+00	.165185E+00	.158910E+00	.158065E+00
	====	.379	.156	.147	.135	.135
		(.47)	(1.68)	(1.95)	(1.84)	(1.83)
NON-FERROUS METALS	BV45	.112874E+01	.148370E+00	.181235E+00	.157031E+00	.156634E+00
	====	.504	.148	.161	.134	.134
		(.62)	(1.60)	(1.93)	(1.64)	(1.65)
METAL	BV46	.724053E+00	.321568E-01	.145303E+00	.103175E+00	.106218E+00
FABRICATED	====	.323	.032	.129	.088	.091
BASIC PRODUCTS		(.40)	(.34)	(1.64)	(1.16)	(1.19)
NON-METALLIC	BV47	.629749E+00	-.538479E-01	-.118871E+00	-.950759E-01	-.979872E-01
MINERAL BASIC PRODUCTS	====	.281	-.054	-.106	-.081	-.084
		(.35)	(-.58)	(-1.39)	(-1.11)	(-1.15)
MISCELLANEOUS	BV49	.333430E+01	.218030E+00	.333286E+00	.288564E+00	.290035E+00
FABRICATED MATERIALS	====	1.489	.218	.296	.246	.247
		(1.82)	(2.33)	(3.28)	(2.80)	(2.82)
MACHINERY	BV50	.708119E+01	.476831E+00	.562206E+00	.524164E+00	.527140E+00
NOT ELSEWHERE	====	3.162	.477	.499	.446	.450
SPECIFIED CLASSIFIED BY FUNCTION		(3.87)	(5.09)	(6.40)	(5.89)	(5.93)
CONVEYING,	BV51	.494536E+00	.183631E+00	.300437E+00	.263718E+00	.268713E+00
ELEVATING AND	====	.221	.184	.267	.224	.229
MATERIAL HANDLING EQUIPMENT		(.27)	(1.98)	(3.58)	(3.11)	(3.18)
SPECIAL	BV52	.172356E+01	.394437E+00	.449454E+00	.445618E+00	.443051E+00
INDUSTRY MACHINERY	====	.770	.394	.399	.379	.378
		(.95)	(4.26)	(4.70)	(4.59)	(4.58)
AGRICULTURAL	BV54	.556411E+00	.362295E+00	.500586E+00	.452435E+00	.451087E+00
MACHINERY AND	====	.248	.362	.445	.385	.385
EQUIPMENT (EXCEPT TRACTORS)		(.30)	(3.88)	(5.32)	(4.75)	(4.74)
TRACTORS	BV55	.817727E+00	.264718E+00	.384638E+00	.354889E+00	.356439E+00
	====	.365	.265	.342	.302	.304
		(.45)	(2.85)	(3.87)	(3.56)	(3.58)
RAILWAY ROLLING STOCK	BV57	.339357E+01	.428439E+00	.452910E+00	.438773E+00	.438900E+00
	====	1.515	.428	.402	.374	.374
		(1.66)	(4.09)	(4.12)	(3.90)	(3.91)
ROAD MOTOR VEHICLES	BV58	.153202E+01	.209348E+00	.355430E+00	.314483E+00	.315379E+00
	====	.684	.209	.316	.268	.269
		(.84)	(2.24)	(3.23)	(2.84)	(2.85)
SHIPS AND BOATS	BV59	.234382E+01	.767223E+00	.904153E+00	.880107E+00	.882543E+00
	====	1.047	.767	.803	.749	.753
		(1.28)	(8.23)	(10.34)	(9.98)	(10.04)
AIRCRAFT	BV60	.869232E+01	.537427E+00	.591142E+00	.568640E+00	.569487E+00
	====	3.882	.537	.525	.484	.486
		(4.74)	(5.69)	(6.11)	(5.81)	(5.83)
MISCELLANEOUS	BV61	.199189E+01	.261738E+00	.385933E+00	.349733E+00	.353148E+00
VEHICLES	====	.890	.262	.343	.298	.301
(INCLUDE PARTS & ACCESSORIES)		(1.09)	(2.79)	(4.17)	(3.71)	(3.75)
RUBBER TIRES AND TUBES	BV62	.121363E+00	.115742E+00	.261293E+00	.216617E+00	.218256E+00
	====	.054	.116	.232	.184	.186
		(.07)	(1.24)	(2.54)	(2.09)	(2.12)
COMMUNICATION AND	BV63	.455657E+01	.449838E+00	.574578E+00	.539820E+00	.543285E+00
RELATED EQUIPMENT	====	2.035	.450	.510	.460	.463
		(2.48)	(4.78)	(6.52)	(6.04)	(6.09)
HEATING, AIR	BV65	.195117E+01	.141189E+00	.261398E+00	.210713E+00	.214096E+00
CONDITIONING	====	.871	.141	.232	.179	.183
& REFRIGERATION EQUIPMENT		(1.07)	(1.51)	(3.08)	(2.47)	(2.52)
COOKING	BV66	.156840E+01	.176014E+00	.289739E+00	.250820E+00	.254356E+00
EQUIPMENT FOR FOOD	====	.700	.176	.257	.214	.217
		(.86)	(1.87)	(2.83)	(2.42)	(2.46)
PLUMBING EQP.	BV67	.986720E+00	.179494E+00	.307515E+00	.266237E+00	.266877E+00
AND FITTINGS	====	.441	.179	.273	.227	.228
(EXC. VALVES, PIPES, FITTINGS)		(.54)	(1.91)	(3.29)	(2.81)	(2.83)

ELECTRIC LIGHTING,	BV68	.337901E+01	.286752E+00	.387503E+00	.349921E+00	.353680E+00
DISTRIBUTION AND	====	1.509	.287	.344	.298	.302
CONTROL EQUIPMENT		(1.85)	(3.06)	(4.25)	(3.78)	(3.83)
OTHER ELECTRIC	BV69	.367288E+01	.143037E+00	.262445E+00	.221235E+00	.222865E+00
EQUIPMENT	====	1.640	.143	.233	.188	.190
AND APPLIANCES		(2.01)	(1.52)	(2.74)	(2.30)	(2.32)
MEASURE,	BV70	.408652E+01	.239646E+00	.330812E+00	.304997E+00	.307952E+00
CONTROL, LAB.,	====	1.825	.240	.294	.260	.263
MEDICAL AND OPTICAL INST. & ACC.		(2.23)	(2.54)	(3.37)	(3.05)	(3.09)
X-RAY AND	BV71	.695343E+01	.572890E+00	.651690E+00	.630553E+00	.633736E+00
RELATED EQUIPMENT	====	3.105	.573	.579	.537	.540
		(2.55)	(4.11)	(4.11)	(3.94)	(3.97)
SAFETY AND SANITATION	BV72	.429036E+01	.234537E+00	.322966E+00	.300458E+00	.302683E+00
EQUIP., ALARM	====	1.916	.235	.287	.256	.258
AND SIGNAL SYSTEMS		(2.34)	(2.49)	(3.05)	(2.80)	(2.83)
SERVICE	BV73	.595883E+01	.328245E+00	.444786E+00	.394181E+00	.395140E+00
INDUSTRY EQUIPMENT	====	2.661	.328	.395	.336	.337
(INCL. VENDING MACHINES)		(3.26)	(3.52)	(5.25)	(4.55)	(4.58)
FURNITURE AND FIXTURES	BV74	.221844E+01	.461479E+00	.612975E+00	.567050E+00	.569706E+00
	====	.991	.461	.545	.483	.486
		(1.21)	(4.93)	(6.77)	(6.17)	(6.22)
HAND TOOLS	BV75	.408401E+01	.334396E+00	.423844E+00	.390411E+00	.392813E+00
AND CUTLERY	====	1.824	.334	.377	.332	.335
(EXCEPT TABLE AND KITCHEN)		(2.23)	(3.56)	(4.29)	(3.95)	(3.98)
OTHER EQUIPMENT	BV76	.322567E+01	.248544E+00	.331071E+00	.296025E+00	.299534E+00
	====	1.440	.249	.294	.252	.255
		(1.76)	(2.65)	(3.68)	(3.27)	(3.31)
OFFICE	BV77	.253650E+01	.167482E+00	.271479E+00	.242434E+00	.247112E+00
MACHINES AND EQUIPMENT	====	1.133	.167	.241	.206	.211
		(1.38)	(1.77)	(2.54)	(2.25)	(2.29)
APPAREL AND	BV78	.195539E+01	.469895E-01	.142921E+00	.123926E+00	.129667E+00
ACCESSORIES	====	.873	.047	.127	.105	.111
		(1.06)	(.50)	(1.50)	(1.27)	(1.33)
FOOTWEAR	BV79	.339435E+01	.224464E+00	.346302E+00	.308454E+00	.312556E+00
	====	1.516	.224	.308	.263	.267
		(1.85)	(2.38)	(3.55)	(3.12)	(3.17)
TOILETRIES, CLEANING	BV80	.164881E+01	.711296E-01	.155515E+00	.127144E+00	.128362E+00
PREP. AND	====	.736	.071	.138	.108	.109
CHEMICAL SPECIALITIES		(.90)	(.76)	(1.59)	(1.30)	(1.31)
JEWELLERY	BV81	.948782E+01	.734668E+00	.634983E+00	.648009E+00	.644092E+00
AND SILVERWARE	====	4.237	.735	.564	.552	.549
(EXCEPT WATCHES & CLOCKS)		(5.17)	(7.68)	(7.50)	(7.41)	(7.38)
WATCHES AND CLOCKS	BV82	.116116E+02	.549676E+00	.454133E+00	.500421E+00	.498919E+00
	====	5.185	.550	.403	.426	.425
		(6.32)	(5.74)	(4.36)	(4.61)	(4.61)
OTHER	BV83	.217822E+01	.342346E+00	.454236E+00	.422455E+00	.426133E+00
REC.EQUIP., TOYS,	====	.973	.342	.404	.360	.363
GAMES, SPORTING & ATHLETIC GOODS		(1.19)	(3.63)	(4.56)	(4.19)	(4.23)
HOUSING FURNISHINGS	BV84	.830818E+00	.170942E+00	.307802E+00	.265320E+00	.266874E+00
	====	.371	.171	.273	.226	.228
		(.45)	(1.83)	(2.95)	(2.51)	(2.53)
KITCHEN	BV85	.940118E+00	.960315E-01	.222730E+00	.185012E+00	.189707E+00
UTENSILS, CUTLERY	====	.420	.096	.198	.157	.162
AND TABLEWARE (EXC. SILVERWARE)		(.51)	(1.02)	(2.34)	(1.92)	(1.97)
OTHER HOUSEHOLD	BV86	.199280E+01	.162751E+01	.181644E+01	.179824E+01	.180094E+01
AND PERSONAL EQUIPMENT	====	.890	1.628	1.614	1.531	1.536
		(1.09)	(17.44)	(22.38)	(22.08)	(22.18)
MEDICINAL AND	BV87	.494905E+01	.116830E+00	.169390E+00	.149918E+00	.150395E+00
PHARMACEUTICAL	====	2.210	.117	.150	.128	.128
PRODUCTS		(2.70)	(1.24)	(1.77)	(1.54)	(1.55)
MEDICINAL SUPPLIES,	BV88	.184979E+01	.208980E+00	.344988E+00	.311104E+00	.313045E+00
OPTHALMIC GOODS	====	.826	.209	.307	.265	.267
AND ORTHOPAEDIC APP.		(1.01)	(2.22)	(3.06)	(2.75)	(2.78)

PRINTED MATTER	BV89	.284787E+01	-.128037E-01	.552677E-01	.273491E-01	.315690E-01
	====	1.272	-.013	.049	.023	.027
		(1.55)	(-.14)	(.60)	(.29)	(.34)
STATIONER'S	BV90	.148114E+01	-.476706E-01	.726671E-01	.296202E-01	.327010E-01
AND OFFICE	====	.661	-.048	.065	.025	.028
SUPPLIES AND ARTIST'S MATERIALS		(.81)	(-.51)	(.76)	(.31)	(.34)
PHOTOGRAPHIC GOODS	BV91	.338123E+01	.578070E+00	.663506E+00	.642223E+00	.644944E+00
	====	1.510	.578	.590	.547	.550
		(1.84)	(6.15)	(7.89)	(7.51)	(7.56)
MUSICAL GOODS	BV92	.186817E+01	.170318E+00	.281294E+00	.255863E+00	.259317E+00
	====	.834	.170	.250	.218	.221
		(1.02)	(1.80)	(2.60)	(2.31)	(2.35)
FIREARMS,	BV93	.248067E+01	.589643E+00	.676403E+00	.668534E+00	.674007E+00
WEAPONS AND AMMUNITION	====	1.108	.590	.601	.569	.575
		(1.35)	(6.29)	(6.26)	(6.16)	(6.22)
MISCELLANEOUS	BV94	.328676E+01	.326727E+00	.439916E+00	.406109E+00	.410688E+00
END-PRODUCTS	====	1.468	.327	.391	.346	.350
		(1.79)	(3.48)	(5.06)	(4.59)	(4.65)
CONTAINERS	BV95	.245521E+01	.145351E+00	.224901E+00	.196620E+00	.198152E+00
AND CLOSURES	====	1.096	.145	.200	.167	.169
		(1.35)	(1.56)	(2.66)	(2.31)	(2.34)
REMAINING	BV96	.143289E+01	.207794E+00	.295498E+00	.264501E+00	.267615E+00
END-PRODUCTS	====	.640	.208	.263	.225	.228
CLASSIFIED BY MATERIAL		(.78)	(2.23)	(2.99)	(2.65)	(2.69)
GENERAL OR	BV99	.281107E+01	.235202E+00	.254669E+00	.231724E+00	.231591E+00
UNCLASSIFIED FREIGHT	====	1.255	.235	.226	.197	.198
		(1.54)	(2.52)	(2.88)	(2.61)	(2.61)
REGRESSION CONSTANT	CONSTANT	.234950E+01	.571137E+01	.676514E+01	.619774E+01	.604651E+01
		(1.80)	(71.61)	(83.43)	(78.00)	(76.99)
	CASE =	1	2	3	4	5
	VARIANT =	Linear	LOG	1 Box-Cox	2 Box-Cox	3 Box-Cox

Part II. Box-Cox transformations and their unconditional t-statistics

ON DEPENDENT VARIABLE

REVENUE PER	RETK		LAM 1	LAM 1	LAM 1	LAM 1
TONNE-KM ($)			.000	-.054	-.074	-.074
[T-STATISTICS=0]			FIXED	[-30.39]	[-30.98]	[-30.61]
[T-STATISTICS=1]				[-588.34]	[-447.43]	[-445.87]

ON EXPLANATORY VARIABLES

DISTANCE EFFECTED PER	DIST		LAM 1	LAM 1	LAM 2	LAM 2
SHIPMENT			.000	-.054	-.022	-.008
[T-STATISTICS=0]			FIXED	[-30.39]	[-5.34]	[-.60]
[T-STATISTICS=1]				[-588.34]	[-246.76]	[-80.95]
WEIGHT PER	POID		LAM 1	LAM 1	LAM 2	LAM 3
SHIPMENT (KG)			.000	-.054	-.022	-.025
[T-STATISTICS=0]			FIXED	[-30.39]	[-5.34]	[-5.68]
[T-STATISTICS=1]			[-588.34]	[-246.76]	[-232.41]	[-188.84]

Part III. General statistics

LOG-LIKELIHOOD	-39715.503	-902.719	-610.012	-583.941	-583.111
PSEUDO-R2 : - (E)	.042	.252	.401	.393	.397
- (L)	.042	1.000	1.000	1.000	1.000
- (E) ADJUSTED FOR D.F.	.033	.246	.396	.387	.391
- (L) ADJUSTED FOR D.F.	.033	1.000	1.000	1.000	1.000
AVERAGE PROBABILITY (Y=LIMIT OBSERV.)	.000	.000	.000	.000	.000
SAMPLE : - NUMBER OF OBSERVATIONS	9849	9849	9849	9849	9849
- FIRST OBSERVATION	1	1	1	1	1
- LAST OBSERVATION	9849	9849	9849	9849	9849
NUMBER OF ESTIMATED PARAMETERS :					
- FIXED PART :					
. BETAS	90	90	90	90	90
. BOX-COX	0	0	1	2	3