Income and Price Elasticity: Econometric Model of Paper Product

by

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Abstract

This thesis is about income and price elasticity of paper products. It is a panel data model which combines time-series data and cross-section data. The pooled data are based on twenty-three major forest consumed counties in 20 years. These annual data are from 1990-2009. The paper products are categorized in three kinds**:** newspaper, printing and writing paper, other paper and paperboard. In these 20 years, the price indices are deflated by the Consumer Price Index. Demand equations are estimated by country using ordinary least squares with Newey-West standard errors. The data are then aggregated into a panel and two-way fixed and random effects models are estimated. The estimated income and price elasticities prove robust regardless of which pooling technique or estimation method is used.

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List of Abbreviations

LSDV	Least Square with Dummy Variable
OLS	Ordinary Least Square
GDP	Gross Domestic Product
FAO	Food and Agriculture Organization
CIF	Cost, Insurance and Freight
FOB	Free On Board

Chapter 1

Introduction

A lot of potential reasons cause disparities in elasticity estimates. In the past 20 years, the Internet's developing changed people's reading habits; e.g., it affected the tradition media, so the demand for newspaper was reduced. Also the recovered paper's effect on the demand for new paper is very obvious. In addition the costs of inputs were not fixed over the period. The prices of wood fiber, labor, and electricity varied year by year. So the elasticities were constantly changing.

The short-term and long-term income and price elasticities can be estimated in either a static or dynamic framework. A static model assumes the response of demand to change in income and price occurs in one period, while a dynamic model assumes a multi-period (perhaps, postponed) response, Ordinary least squares (**OLS**) with dummy variables is often a useful methodto obtain demand equations. Furthermore, the bias of the pooled **OLS** approach can be corrected with the least squares dummy variables (**LSDV)** and the results gave higher price and income elasticity estimates. In addition, the long-run elasticities of the dynamic model predicted by LSDV are often similar to those of the static model. Dummy variables taking values of 1 and 0 (or their linear transforms) are a means of introducing qualitative regressors in regression analysis.

This paper is important because it considers the demand for paper products and how it affects the international trade of those products. The price of paper in every country is affected by the international market for paper, and the elasticity of demand provides valuable information

regarding the extent of the effect. This paper proceeds in the following manner: In Chapter 2, the literature on paper products is reviewed. These papers are from 1970s to 2000s. In Chapter 3, the main theories used in this paper are discussed. In Chapter 4, data collection is discussed and the empirical model specified. In Chapter 5, the results of the fixed effects and random effects model estimates are analyzed. Chapter 6, provides a summary and conclusions. We now turn to our review of the literature on the demand for paper products.

Chapter 2

Literature Review

Paper products are common products in that there will not change considerably from year to year. Several researchers have analyzed the price elasticity and income elasticity of paper products. Typical examples of such studies are: Joseph Buongiorno (1979); M.L. Chas-Amil & Joseph Buonigiorno(2000); W.S. Chao & Joseph Buongiorno(2002); Roger Brown (2005) In these papers, the elasticity estimates differ substantially from each other.

In Joseph Buongiorno's (1979) paper "Income and Price Elasticity of Demand for Sawn Wood and Wood Based Panels: A Paneled Cross-section and Time-series Analysis", over the period 1963-1973, demand for all products are found to be price inelastic, with long time elaticities ranging from -0.1 for board to -0.2 for coniferous wood. Price elasticities for plywood and non-coniferous wood were not different from zero. Long-term income elasticities were +0.7 and +0.5 for coniferous and non-coniferous sawn wood, respectively. Demands for all wood-based panels were income elastic, with long-term elasticities of +1.0 for plywood and fiber wood, and +2.3 for board. In the paper "Exports and growth: a causality analysis for the pulp and paper industries based on international panel data" by W.S Chao & Joseph Buongiorno(2002), the least squares dummy variable (LSDV) results implied average multipliers across countries of 1.2 to 1.4 from exports to production, and 0.20 to 0.25 from production to exports.

In the paper "Estimating Supply Elasticity for Disaggregated Paper Products: A Primal Approach" by Roger Brown and Daowei Zhang (2005), estimated long-run (short-run) output price elasticity is 2.75 (0.69) for newspaper, 2.45 (1.07) for printing and writing paper and 0.41 (0.24) for paperboard (and other).

In some of the analysis to follow the data are pooled across countries. These data define the short-term and long-term elasticities of demand with respect to the price and gross national product. They were estimated by two-way model taking into account both in time-series nature and cross-section nature of the data. [see, for example, Hair (1967); Buongiorno, (1977)].

Also, in what follows real gross domestic product (GDP) is used as a proxy for the output variable Y, the outputs of paper product are highly correlated with the general level of economic activity. Real GDP in the United States dollars is then computed by deflating the nominal GDP with the GDP deflator of the United States with 2005 as base year. Deflators and exchange rates are from the World Bank World Tables. These results then, are GDP statistics by countries, all definied in United States dollars, at the purchasing power of 2005. This approach is exactly that taken by M.L. Chas-Amil & Buongiorno (2006).

Based on the previous discussion, several consumption models have been established on population and incomes (or some other index of economic activity) as explanatory variables for consumption (e.g, FAO 1960, 1963,1972; Hair 1967). These studies don't change so much for the reason of explanatory variables as to the form of the functions and to the type of data used.(Joseph Buoniorno 1978). International data showed differences in income elasticity derived from time-series and cross-sectional observations.(FAO, Sundelin).

Much of the economic literature on paper deals with the supply side: input demand and output supply estimation. In this literature, most existing econometric studies of US pulp and paper supply follow the "dual" rather than the "primal" approach (see Beattie and Taylor 1993).

The dual approach requires first an estimation of the appropriate objective (cost and profit) function and subsequent derivation of supply relationship through optimization. For example, elasticities of input demand are obtained by Boungiorno and Gilless (1980) and Boungiorno et al.(1983) by first estimating generalized Cobb-Douglas cost functions. More flexible forms, such as translog cost functions, whereas Bernstein (1989) and Hseu and Boungiorno (1997) use profit functions to obtain estimators of input demand and output supply. Competition and pricing based on market forces best characterize the paper industry.

Coordinated anticompetitive behavior is unlikely given that market concentration is modest and competition from foreign paper products is significant. The market share of the top five producers for each paper grade ranges from 60% for printing paper to 80% for newspaper (Roberts,D. Center for International Trade in Forest Products, Seattle,WA, available at www. Cintrafor.org 2001). Average tariffs on paper is near zero, making efforts by large suppliers to attract monopoly-type rents generally unrealistic (Gullichsen and Paulapuro 1998). In both cases, numerous foreign and other domestic firms stimulate competition within the paper industry with respect to pricing and production decisions. Thus we assume that the sub segments of the paper industry studied in this article are competitive or close to competitive. We can think of a firm with borrowing and lending as consisting of department for managing capital,

production, and liabilities of the firm. The first two departments are presented in the simplest model of a firm with capital as a factor of production. The third is a finance department that issues and redeems debt and equity in order to satisfy the cash flow requirement of the firm. The objective of this department is to minimize the cost.

In this study, however, we are concerned with the demand for the output of paper products. So the theoretical foundation for our work is consumer constrained utility maximization from which a general demand relationship in whoch the quantity consumed id a function of price and income can be derived. The study by Buongiorno (1977) is an example of this approach. In the following chapter we discuss this theoretical approach in detail.

Chapter 3

Theory

Since we are interested in the demand for paper by consumers of paper, we assume that consumers purchase paper so as to maximize their utility subject to a given level of income. Thus, we assume a general utility function (U) of the form

$$U = U(W, X) \qquad (1)$$

where W is paper and X is "all other goods", and we choose W and X so as to maximize this function subject to an income constraint of the form $Y= P_pW+P_xX$. Under some fairly general assumptions, we can derive a demand curve for paper from the first order conditions for this maximization problem. The grneral form of this demand function is

$$W = W(Pp, Px, Y) \qquad (2)$$

Assuming that W and X are unrelated in consumption allows us to rewrite our paper demand function in a simpler form as

$$D = D(P, Y) \qquad (3)$$

Where D is the demand for paper, P is the price of paper, and Y is total income.

A popular specification of this general relationship is a multiplicative functional form

$$D = AY^b P^c \qquad (4)$$

Converting this behavioral relationship to one appropriate for empirical inquiry yields

$$D_{ijt} = AY_{it}^b P_{ijt}^c \exp\left(\varepsilon_{ijt}\right) \qquad (5)$$

Where D_{ijt} is per capita consumption of paper type j in country i in year t, Y_{it} is the income in country i in year t, P_{ijt} is the price of product j in country I in year t, a, b_j, and c_j are positive parameters, and ε is a stochastic disturbance term.

Taking logarithms of both sides converts this model to the classic double-logarithmic formula:

$$\text{Log } D_{ijt} = a + b_j \text{Log} Y_{it} + c_j \text{ Log} P_{ijt} + \epsilon_{ijt} \quad (6)$$

The model is static since time doesn't appear explicitly in the formulation (Labys 1973). Equation (6) is the specification that we will employ to empirically investigate the demand for paper. We turn now to a discussion of the data we will use and the specific model formulations we employ.

Chapter 4

Data and Model

Annual data of domestic production and exports were obtained from the FAOSTAT database, the period covered from 1990-2009. The per capital GDP is used as the l income measure for every country.. The real GDP in United States dollars was then computed by deflating the nominal GDP with the GDP deflator of the United States, with 2005 as base year. Deflators and exchange rates came from the World Bank World Tables. The results then, are GDP statistics by country, all expressed in United States dollars. The amount of paper consumed was measured as domestic production plus imports minus exports. The price variable in each country (P_{ijt}), in nominal United States dollars, was then estimated as weighted arithmetic average of the unit value of imports and exports. To express these values as real prices, the GDP deflator for the United States (base 2005) was applied to nominal unit values. The purchasing power of 2005 is the standard of the price in United States dollars.

In this study, the 23 countries for which the United Nations statistical office reported long-term rates of growth in domestic product were selected. These countries which presumably have the most reliable Systems of national accounts consumed 85 percent of the world paper and paperboard production. Standardized series of production, imports, and exports are available for these groups. Unit values of imports and exports are readily computed from trade statistics. Time series for the three groups of products considered.

In the equation (2), price can be considered as exogenous variable, because unit value is price of imports and exports. These unit values are determined by the world supply and demand, it can not be affected by single country, however, there will be a serious bias if these countries supply and demand levels are totally different. The method always used to circumvent this problem is (Hoch 1962; Mundlak 1961; Johnson 1964; Buongiorno 1978).With these method theoretical model can be expressed as:

$$\text{Log } D_{ijt} = \Sigma^{n}_{t=1}\, a_i + b_j \text{Log} Y_{it} + c_j \text{Log} P_{ijt} + \epsilon_{ijt} \qquad (7)$$

Where a_i is the dummy variable assuming all the belongings to country i, and N is the number of observation.

The dynamic model is more complex. Theoretical results and Monte-Carlo experiment by Nerlove (1967,1971) and Maddala have shown that ordinary least square will lead to a serious bias, one of coefficients will be biased downwards, analysis the of covariance with dummy variables will cause bias to opposite direction. A two round generalized least square will yield this problem (Nerlove 1971 and Maddala 1971).

$$\epsilon_{ijt} = u_{ij} + v_{it} \qquad (8)$$

Where ε_{ijt} is random over time and countries, u_{ij} is random variable from country to country, but remains constant over time, v_{it} is time-series difference.

The b_j and c_j are the income and price elasticity, respectively, since (6):

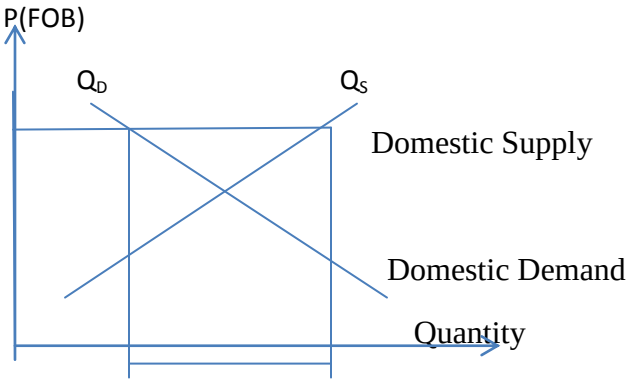
$$b_j=(\delta D_{ijt} / D_{ijt})(\delta Y_{it}/ Y_{it}) \quad (9)$$

$$c_j=(\delta D_{ijt} / D_{ijt}) (\delta P_{ijt/} P_{ijt}) \quad (10)$$

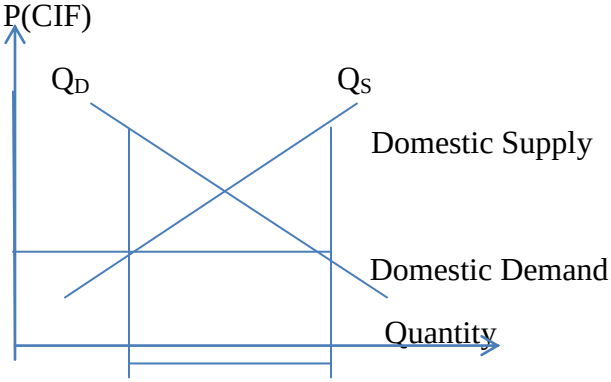
By international trade, a country can increase its income by it can most cheaply produce some goods. Export expansion generates foreign exchange earnings, finances capital goods and intermediate imports, and hence induces more production (Bhagwati, 1978;Krueger 1978). Because potential markets offer greater economies of scale, the exporting economy enhances its productivity by better resource allocation and technology nnovation(Bhagwati,1978;Feder,1982; Kavoussi, 1984). Together, export expansion contributes to domestic growth. This view seems to be supported by the success of East Asia economies where, between 1960s and 1980s, rapid GDP growth followed aggressive outward-looking trade policies.(W.S. Chao& J. Buongiorno(2002)).

Illustration 1

1a—Net exporting country



1b—Net importing country



In the model, the relationship between price and demand need to be considered.. The model assumed that for any single country import CIF or export FOB prices, they are not relative to the domestic prices, are exogenous, determined by the world demand and supply of paper products. The price of a net exporting country is the FOB price, which is decided by the world demand and supply of paper products. For a net importing country faces a symmetric situation, the import

price CIF, determined by the world demand and supply and by transportation costs which vary according to the country location.

Chapter 5

In chapter 5, the price elasticity coefficient and the income elasticity coefficient of every country are estimated. *The Durbin-Watson d* statistic is based on the estimated residuals, which are computed in regression analysis. It is a summary statistic used to test for autocorrelation and is reported along with other summary statistics such as R^2, *t* ratio.

Empirical Result

Table 1

Country	Model	B	Std.error	t	Sig.	R	R square	DW*
Agentina	constant	-0.6	1.298	-0.462	0.65	.732[a]	0.536	1.948
	ln(Y)	0.403	0.091	4.43	0.01			
	ln(P)	-0.174	0.189	-0.919	0.371			
Australia	constant	2.2	1.277	1.724	0.103	.529[a]	0.279	1.287
	ln(Y)	0.076	0.16	0.471	0.043			
	ln(P)	-0.212	0.085	-2.496	0.023			
Austria	constant	3.727	1.433	2.601	0.019	.800[a]	0.64	1.298
	ln(Y)	0.333	0.066	5.072	0.02			
	ln(P)	-0.409	0.184	-2.224	0.04			
Brazil	constant	0.948	1.293	0.733	0.473	.714[a]	0.509	1.408
	ln(Y)	0.689	0.203	3.4	0.003			
	ln(P)	-0.574	0.371	-1.548	0.14			
Canada	constant	-3.401	9.595	-0.354	0.727	.801[a]	0.64	2.107
	ln(Y)	0.732	0.601	1.218	0.24			
	ln(P)	-0.257	1.673	-0.154	0.88			
China	constant	-0.155	0.755	-0.205	0.84	.983[a]	0.966	1.785

	ln(Y)	0.61	0.029	20.793	0.01			
	ln(P)	-0.145	0.126	-1.153	0.265			
Czec Rep	constant	-0.6	1.298	-0.462	0.65	.732[a]	0.536	1.927
	ln(Y)	0.403	0.091	4.43	0.02			
	ln(P)	-0.174	0.189	-0.919	0.011			
Denmark	constant	3.407	1.115	3.055	0.087	.853[a]	0.728	1.948
	ln(Y)	0.526	0.086	6.126	0.05			
	ln(P)	-0.68	0.146	-4.658	0.132			
EGYPT	constant	-4.582	1.991	-2.301	0.034	.842[a]	0.71	1.785
	ln(Y)	0.95	0.157	6.038	0.004			
	ln(P)	-0.035	0.203	-0.17	0.046			
Finland	constant	0.234	2.708	0.086	0.932	.713[a]	0.509	1.927
	ln(Y)	0.679	0.184	3.696	0.002			
	ln(P)	-0.309	0.482	-0.642	0.053			
India	constant	0.579	1.453	0.398	0.695	.839[a]	0.704	1.745
	ln(Y)	0.641	0.121	5.296	0.003			
	ln(P)	-0.402	0.126	-3.189	0.005			
Indonesia	constant	-1.889	1.071	-1.764	0.096	.897[a]	0.805	1.759
	ln(Y)	0.7	0.088	7.988	0.02			
	ln(P)	-0.301	0.131	-2.301	0.034			
Ireland	constant	-6.209	1.774	-3.501	0.003	.844[a]	0.712	1.272
	ln(Y)	0.878	0.152	5.783	0.004			
	ln(P)	0.011	0.317	0.033	0.974			
Italy	constant	-0.774	1.689	-0.458	0.653	.881[a]	0.776	1.758
	ln(Y)	0.483	0.063	7.668	0.05			
	ln(P)	-0.197	0.255	-0.771	0.451			
Japan	constant	-1.023	1.008	-1.015	0.324	.778[a]	0.605	1.651
	ln(Y)	0.558	0.11	5.072	0.032			
	ln(P)	-0.343	0.152	-2.253	0.038			
Malaysia	constant	5.063	0.606	8.357	0.002	.711[a]	0.506	1.213
	ln(Y)	0.034	0.065	0.528	0.605			
	ln(P)	-0.201	0.059	-3.405	0.003			
Mexico	constant	5.638	3.176	1.775	0.094	.695[a]	0.483	1.979
	ln(Y)	0.139	0.106	1.313	0.207			
	ln(P)	-0.883	0.406	-2.177	0.044			

New Zealand	constant	-2.867	1.778	-1.612	0.125	.709[a]	0.502	1.287
	ln(Y)	0.847	0.227	3.729	0.002			
	ln(P)	-0.301	0.336	-0.894	0.384			
Norway	constant	9.056	1.791	5.057	0.011	.613[a]	0.376	1.298
	ln(Y)	0.053	0.147	0.362	0.722			
	ln(P)	-0.789	0.302	-2.61	0.018			
Republic of KOREA	constant	-0.433	2.165	-0.2	0.844	.884[a]	0.781	1.958
	ln(Y)	0.949	0.123	7.717	0.002			
	ln(P)	-0.859	0.313	-2.743	0.014			
Singapore	constant	-0.97	0.744	-1.303	0.21	.937[a]	0.879	1.745
	ln(Y)	0.647	0.059	11.052	0.007			
	ln(P)	-0.074	0.075	-0.989	0.337			
UK	constant	0.741	1.634	0.454	0.656	.717[a]	0.514	1.948
	ln(Y)	0.355	0.088	4.051	0.001			
	ln(P)	-0.145	0.198	-0.733	0.073			
USA	constant	16.092	2.82	5.706	0.003	.802[a]	0.643	1.256
	ln(Y)	0.773	0.151	5.106	0.002			
	ln(P)	-0.712	0.382	-1.865	0.008			

a. Predictors: (Constant), Ln(P), Ln(Y)

b. * DW significant at the 0.01 level.

To be more exact, assume that we want to find how "near" is the estimated coefficient to the real coefficient. The confidence intervals are known as the confidence limits (also known as critical values), note that in practice α and 1- α are often expressed in percentage forms as 100α and 100(1-α)percent. An interval estimator, in contrast to a point estimator, is an interval

constructed in such a manner that it has a specified probability 1- α of including within its limits the true value of the parameter.

For Argentina, The income coefficient 0.403 is significant at the 1% level. For Australia, both the income and price coefficients 0.076 and -0.212 are significant at 5% level. For Austria, both the income and price coefficients 0.333 and -0.409 are significant at 5% level. For Brazil, income coefficient 0.689 is significant at the 1% level. For China, the income coefficient 0.61 is significant at the 1% level. For Czech, the income coefficient 0.403 is significant at the 5% level, the price coefficient -0.174 is significant at 1% level.

For Denmark, the income coefficient 0.526 is significant at 5% level. For Egypt, the income coefficient 0.95 is significant at 1% level, and the price coefficient -0.035 is significant at 5% level. For Finland, the income and price coefficients 0.679 is significant at 1% level, and the price coefficient -0.309 is significant at 5% level. For India, both the income and price coefficients 0.641 and -0.402 are significant at 1% level. For Indonesia, both the income and price coefficients 0.7 and -0.301 are significant at 5% level. For Ireland, the income coefficient 0.878 is significant at 1% level. For Italy, The income coefficient 0.878 is significant at the 1% level, but the price coefficient is not very good. For Japan, both the income and price coefficient 0.558,-0.343 are significant at 5% level. For Malaysia, the price coefficient -0.201 is significant at 1% level. For Mexico, the price coefficient -0.883 is significant at 5% level.

For New Zealand, the income coefficient 0.847 is significant at 1% level. For Norway, the price coefficient -0.789 is significant at 5% level. For Korea, both the income and price coefficients

0.949 and -0.859 are significant at 1% level. For Singapore, the income coefficient 0.647 is significant at 1% level. For UK, the income coefficient 0.355 is significant at 1% level. For United States, both the income and price coefficients 0.773 and -0.712 are significant at 1% level.

The traditional test for the presence of first-order autocorrelation is the d statistic The DW-test:

$$D = \frac{\sum_{t=2}^{t=n}[\![(u]\!]_t - \widehat{u_{t-1}})^2}{\sum_{t=2}^{t=n} \widehat{u_t^2}}$$

For this model,D_L=0.863, D_U=1.271. It's under the 0.01 level of significance.

For a lot of countries except Malaysia and USA, all other countries' d had the same condition: D_U <d <4- D_U, the Null hypothesis is "No autocorrelation, positive or negative", the decision is "Do not reject".

For Malaysia and USA, D_L <d<D_U, the Null hypothesis is "No positive autocorrelation" , the decision is "No decision".

Rather than correcting for autocorrelation using Generalized Least Squares (GLS), we continue to employ OLS but use Newey-West Standard errors as our remedial measure of dispersion. It is known that in the presence of autocorrelation, OLS standard errors are inconsistently estimated. The Newey-West correction provides consistent estimates for those standard errors, making the OLS estimates, while inefficient, still reliable.

These are individual country results, also the whole world as a market is very important. A pooled model with no correction for cross country (or time) heterogeneity will be discussed. Pooling data can improve the efficiency of theOLS estimates. Also, unobserved heterogeneity across countries can be taken into account by employing fixed effects and random effects estimation procedures. In the pooled data discussion, OLS model with Newy-West standard errors, the Fix-effects model and Random-effects Models are estimated and analyzed.

Table2: The Pooled Data Model with Newey-West Standard Errors

Variable	Coefficient	Standard Error	b/St.Er.	|P[|Z|>z]	Mean of X
Constant	-1.81469844	.79890836	-2.271	.0231	
LNY	.66351579	.05270534	12.589	.0000	9.21195644
LNP	-.16032241	.07543456	-2.125	.0336	6.56092276

.

From the result, it's obvious that the income elasticity is positive, when the income is increasing; the demand for the paper is also increasing, it means when people have much more money they will consume more products. On the contrast, the price of product has the opposite effects on the demand of the paper products.

For Brazil (0.689, -0.574), Finland (0.679, -0.309), India (0.641,-0.402), Indonesia (0.7,-0.301), New Zealand (0.847,-0.301), Republic of Korea (0.949,-0.859), USA (0.773,-0.712), the

income elasticities are much larger than other countries, at the same time, their price elasticities are large too. This means that these countries' elasticities are more sensitive. Singapore (0.647,-0.074), China (0.61, -0.145), Ireland (0.878, -0.011), Egypt (0.95, -0.035), for these four countries, the income elasticities are very substantial, but the price elasticities are not so large. It means the demand for the paper production is relative fixed; it's not easily affected by the world price. In fact, these four countries are not important import countries. So their price elasticities of demand are not large.

For all these countries, the income elasticity of each country is larger than the absolute value of price elasticity. It means that the incomes affection on demand is more substantial than price's changing's effect.

Fix-effects model and Random-effects Models

Do the elasticity differences across countries translate into differences in the constant term of the model across countries or fifferences in the random error across countries? If the former is the case, the "fixed effects" statistical model (essentially a LSDV model) is best; if the latter is the case the "random-effectc" statistical model (essentially a GLS model specifying a specific but complicated form of heterodscedasticity)is more suitable

Table 3 Hypothesis Tests of models

	Likelihood Ratio Test			F Tests			
	Chi-squared	d.f.	Prob.	F	num.	denom.	P value
(2) vs (1)	816.839	22	P<0 .000001	50.558	22	1293	P <0.00001
(3) vs (1)	706.329	2	P<0 .000001	466.374	2	1313	P <0 .00001
(4) vs (1)	1071.454	24	P<0 .000001	67.633	24	1291	P <0 .00001
|(4) vs (2)	254.615	2	P<0 .000001	137.789	2	1291	P<0 .00001
|(4) vs (3)	365.125	22	P<0 .000001	18.764	22	1291	P<0 .00001
|(5) vs (4)	4.617	19	P=0 .99968	0 .235	19	1272	P =0 .99974
|(5) vs (3)	369.741	42	.00000	9.825	42	1272	P<0 .00001

(1) Constant term only (2)Group effects only (3) X - variables only (4) X and group effects

(5) X independent & time effects

Table 4

Least Squares with Group and Period Effects (Two ways Fixed-effect Model)

Variable	Coefficient	Standard Error	b/St.Er.	P[|Z|>z]|	Mean of X
LNY	0 .59949009	0 .03969378	15.103	P< 0.0001	9.21195644
LNP	-0.22969934	0 .05545553	-4.142	P<0.0001	6.56092276
Constant	-0.76971977	0.53463248	-1.440	P=0 .1499	

The coefficient of LNY is the income elasticity, and the coefficient of LNP is the price elasticity.

Table 5

Two-Way Random Effects Model

Variable	Coefficient	Standard Error	b/St.Er.	P[|Z|>z]	Mean of X
LNY	.59876559	.03444767	17.382	.0000	9.21195644
LNP	-.23706910	.05393498	-4.395	.0000	6.56092276
Constant	-.69992540	.48936791	-1.430	.1526	

The coefficient of LNY is the income elasticity, and the coefficient of LNP is the price elasticity.

Hausman test

We have two estimators for b: b_0 and b_1. Under the null hypothesis, both of these estimators are consistent, but b_1 is efficient (has the smallest asymptotic variance), at least in the class of estimators containing b_0. Under the alternative hypothesis, b_0 is consistent, whereas b_1 isn't.

Then the Hausman statistic is:

$$H = (b_1 - b_0)'\big(\operatorname{Var}(b_0) - \operatorname{Var}(b_1)\big)^{\dagger}(b_1 - b_0),$$

where † denotes the Moore–Penrose pseudoinverse. This statistic has asymptotically the chi-squared distribution with the number of degrees of freedom equal to the rank of matrix $\operatorname{Var}(b_0) - \operatorname{Var}(b_1)$.

Fixed vs. Random Effects (Hausman) = 0.45. (2df, prob values = 0.800471)

Low values of H favor Random Effects Model. Implying that the Random effects model is best. From this model it is clear that the international demand for paper id both income and price inelastic.

Differences in demand between countries caused by variables other than price or GDP were also represented with a random effects model (Greene 1997), known as the error components model (Hsiao 1986).Indeed, "whether to treat the effects as fixed or random is not an easy question to answer" (Hsiao 1986). Here, given that the countries used are a small part of the

whole existing countries, the random effect model may seem more appropriate. In the random effect approach, cross-sectional heterogeneity was allowed through the random term rather than through the constant.

The possible synergy of exports and economic growth continues to fascinate economists (Frankel and Romer,1999).However, whether economics growth is exogenous or endogenous or whether growth and trade nurture each other is still unclear. They have the simplicity of form and economy of assumption needed to serve in the Global Forest Production Model (Tomberlin *et al.,1998*) and other similar. However, this simplicity comes at a cost in forecasting accuracy which mighty be improved with other functional forms and additional explanatory variables.

Differences in elasticity may be attributable to differences in output substitution, capacity utilization, growth trends, retail orientation, and price volatility as noted previously. Elasticity estimates in the present analysis may also be compared with estimates from earlier published studies. Such comparisons can be difficult because of differences in maintained assumption, definition of inputs and outputs, estimation procedures, and time periods.

Furthermore, the method increases considerably the number of observations available and makes possible the modeling of short-term dynamics of demand. Because of rapid changes in the world economy, analyses of dynamics of demand in the short to medium term are necessary complements of the usual long-term studies (FAO).Therefore; one of the two models proposed is dynamic, allowing a distinction between long-term and short-term elasticities. The results show that the response of paper and paperboard demand to changes in economic conditions is

generally spread over several years. They also indicate that prices play a significant role in the determination of demand, both in rich and poor countries.

Chapter 6

Conclusion

Comparing with other industries, for example, the high-tech industry, it's easy to findthe paper industries almost has little response to the change of income. When doing the dynamic models for newspaper, the failure leads the elasticity extremely biased. The dynamic elasticity has the character as static model. The reason is that there are large differences among countries. The elasticities for the printing and writing paper, other paper and paperboard are unbiased. The conclusion for the paper product is that the prices are exogenous, single country's changing in price and demand will not affect the whole market so significantly.

For each product, year and country, amount demanded was defined by obvious consumption (production +imports-exports). Data on markets are not available, which raises the difficulty of pure time-series within countries. The data on production, imports and exports were obtained from the FAOSTAT database (Bintang C.H.Simangunsong & Joseph Buongiorno (2001)).

Although the estimated elasticities for each country should be unbiased, they had large variances, so much so that all but two of the mean elasticities across countries were not significantly different from zero. Although the short time-series obtainable, the lack of domestic price statistics for paper and paperboard, it seems we can obtain long-term and short-term income and price elasticities which approved in theoretical expectations. The method proposed

consists of pooling time-series across countries and using unit values of imports and exports as price indices. For newsprint both static and dynamic models can be used, but the elasticities must be regarded as long-term one.

The statistical tests supported the LSDV and the error-component models, suggesting that even after the effects of prices and income were taken into account, the differences between countries were too large for pooled OLS. To obtain the correct theoretical signs those are so important to perform meaningful policy analysis with multi-country models.

The world prices are exogenous with respect to demand and supply within any single country could be released, and a simultaneous supply and demand model formulated instead, but such refinements depend on considerable improvements regarding the quantity and quality of international forest industries data. In particular there is an urgent need to collect domestic price data consistent with the groups of products for which production and trade statistics are now available.

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Software and Web

Limdep, IBM Spass Statistics, MS WORD ,MS EXCEL, SAS 9.2, World Bank, United Nation, FAO STATISTICS, Wikipedia

APPENDIX

Data Table

1 Argentina

Newspaper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	1.432161	8.373323	6.49224
1991	1.715369	8.653994	6.51186
1992	2.017667	8.827761	6.208076
1993	1.952937	8.84894	6.193345
1994	1.865025	8.919854	6.221807
1995	1.947619	8.909641	6.654706
1996	1.748014	8.950533	6.663367
1997	1.929323	9.011889	6.308643
1998	1.860382	9.020752	6.429626
1999	1.82565	8.956609	6.34578
2000	1.872718	8.948456	6.398441
2001	1.759236	8.882253	6.534779
2002	1.432161	7.904704	6.128324
2003	1.571597	8.134468	6.562626
2004	1.814565	8.292549	6.265998
2005	1.817586	8.462948	6.408283
2006	1.841587	8.609955	6.507236
2007	1.80167	8.798455	6.461089
2008	2.131243	9.015055	6.591739
2009	1.701825	8.94442	6.420245

Writing and Printing Paper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	2.550421	8.373323	5.209696
1991	2.752329	8.653994	5.2831
1992	2.806243	8.827761	6.579091
1993	2.799073	8.84894	6.484531
1994	2.858849	8.919854	6.431485
1995	2.813682	8.909641	7.072985
1996	2.766536	8.950533	7.419412
1997	3.048717	9.011889	7.572059
1998	2.753123	9.020752	6.795832
1999	2.882227	8.956609	6.624194
2000	2.938828	8.948456	6.559262
2001	2.905343	8.882253	6.584778
2002	2.934915	7.904704	6.238724
2003	2.802574	8.134468	6.511126
2004	2.953925	8.292549	6.858876
2005	3.371493	8.462948	6.933356
2006	3.174088	8.609955	6.797035
2007	3.15737	8.798455	6.914915
2008	3.43187	9.015055	7.643844
2009	3.30762	8.94442	6.402161

Package Paperboard

Year	Ln(D)	Ln(Y)	Ln(P)
1990	1.358053	8.373323	6.700116
1991	1.395794	8.653994	6.700116
1992	1.987896	8.827761	6.844891
1993	2.125011	8.84894	6.734552
1994	2.280734	8.919854	6.660824
1995	2.012313	8.909641	7.119936
1996	1.865025	8.950533	7.17132
1997	1.997543	9.011889	6.921883
1998	2.662567	9.020752	6.853516
1999	2.500969	8.956609	6.786308
2000	2.86327	8.948456	6.847254
2001	2.488214	8.882253	6.825395
2002	2.494406	7.904704	6.743396
2003	2.775	8.134468	6.616655
2004	2.934683	8.292549	6.617658
2005	3.047645	8.462948	6.685919
2006	2.612646	8.609955	6.792445
2007	2.785631	8.798455	6.814039
2008	3.299374	9.015055	6.964245
2009	2.844889	8.94442	6.881552

2 Australia

Newspaper Writing and Printing Paper Package Paperboard

Year	Ln(D)	Ln(Y)	Ln(P)	Year	Ln(D)	Ln(Y)	Ln(P)	Year	Ln(D)	Ln(Y)	Ln(P)
1990	2.842004	9.970118	6.424448	1990	1.432161	8.373323	6.49224	1990	1.432161	8.373323	6.49224
1991	2.890372	10.00225	6.441229	1991	1.715369	8.653994	6.51186	1991	1.715369	8.653994	6.51186
1992	3.73767	10.11908	6.361401	1992	2.017667	8.827761	6.208076	1992	2.017667	8.827761	6.208076
1993	3.943776	10.07525	6.188092	1993	1.952937	8.84894	6.193345	1993	1.952937	8.84894	6.193345
1994	4.013602	10.14152	6.452837	1994	1.865025	8.919854	6.221807	1994	1.865025	8.919854	6.221807
1995	3.837869	10.30882	6.661988	1995	1.947619	8.909641	6.654706	1995	1.947619	8.909641	6.654706
1996	3.005215	10.29092	6.300321	1996	1.748014	8.950533	6.663367	1996	1.748014	8.950533	6.663367
1997	3.484004	10.16862	6.245161	1997	1.929323	9.011889	6.308643	1997	1.929323	9.011889	6.308643
1998	3.633039	10.19335	6.351857	1998	1.860382	9.020752	6.429626	1998	1.860382	9.020752	6.429626
1999	3.74995	10.18603	6.30038	1999	1.82565	8.956609	6.34578	1999	1.82565	8.956609	6.34578
2000	3.56986	10.08473	6.156536	2000	1.872718	8.948456	6.398441	2000	1.872718	8.948456	6.398441
2001	3.56986	10.07878	6.308235	2001	1.759236	8.882253	6.534779	2001	1.759236	8.882253	6.534779
2002	3.398846	10.15323	6.246934	2002	1.432161	7.904704	6.128324	2002	1.432161	7.904704	6.128324
2003	3.350056	10.35083	6.281885	2003	1.571597	8.134468	6.562626	2003	1.571597	8.134468	6.562626
2004	3.314847	10.4815	6.315535	2004	1.814565	8.292549	6.265998	2004	1.814565	8.292549	6.265998
2005	3.324738	10.51983	6.358168	2005	1.817586	8.462948	6.408283	2005	1.817586	8.462948	6.408283
2006	3.456665	10.5773	6.462444	2006	1.841587	8.609955	6.507236	2006	1.841587	8.609955	6.507236
2007	3.87577	10.71843	6.528459	2007	1.80167	8.798455	6.461089	2007	1.80167	8.798455	6.461089
2008	3.524471	10.81334	6.61424	2008	2.131243	9.015055	6.591739	2008	2.131243	9.015055	6.591739
2009	3.209763	10.7285	6.592516	2009	1.701825	8.94442	6.420245	2009	1.701825	8.94442	6.420245

3 Austria

Newspaper Writing and Printing Paper Package Pape

Year	Ln(D)	Ln(Y)	Ln(P)	Year	Ln(D)	Ln(Y)	Ln(P)	Year	Ln(D)	Ln(Y)	Ln(P)
1990	2.842004	9.970118	6.424448	1990	1.432161	8.373323	6.49224	1990	1.432161	8.373323	6.49224
1991	2.890372	10.00225	6.441229	1991	1.715369	8.653994	6.51186	1991	1.715369	8.653994	6.51186
1992	3.73767	10.11908	6.361401	1992	2.017667	8.827761	6.208076	1992	2.017667	8.827761	6.208076
1993	3.943776	10.07525	6.188092	1993	1.952937	8.84894	6.193345	1993	1.952937	8.84894	6.193345
1994	4.013602	10.14152	6.452837	1994	1.865025	8.919854	6.221807	1994	1.865025	8.919854	6.221807
1995	3.837869	10.30882	6.661988	1995	1.947619	8.909641	6.654706	1995	1.947619	8.909641	6.654706
1996	3.005215	10.29092	6.300321	1996	1.748014	8.950533	6.663367	1996	1.748014	8.950533	6.663367
1997	3.484004	10.16862	6.245161	1997	1.929323	9.011889	6.308643	1997	1.929323	9.011889	6.308643
1998	3.633039	10.19335	6.351857	1998	1.860382	9.020752	6.429626	1998	1.860382	9.020752	6.429626
1999	3.74995	10.18603	6.30038	1999	1.82565	8.956609	6.34578	1999	1.82565	8.956609	6.34578
2000	3.56986	10.08473	6.156536	2000	1.872718	8.948456	6.398441	2000	1.872718	8.948456	6.398441
2001	3.56986	10.07878	6.308235	2001	1.759236	8.882253	6.534779	2001	1.759236	8.882253	6.534779
2002	3.398846	10.15323	6.246934	2002	1.432161	7.904704	6.128324	2002	1.432161	7.904704	6.128324
2003	3.350056	10.35083	6.281885	2003	1.571597	8.134468	6.562626	2003	1.571597	8.134468	6.562626
2004	3.314847	10.4815	6.315535	2004	1.814565	8.292549	6.265998	2004	1.814565	8.292549	6.265998
2005	3.324738	10.51983	6.358168	2005	1.817586	8.462948	6.408283	2005	1.817586	8.462948	6.408283
2006	3.456665	10.5773	6.462444	2006	1.841587	8.609955	6.507236	2006	1.841587	8.609955	6.507236
2007	3.87577	10.71843	6.528459	2007	1.80167	8.798455	6.461089	2007	1.80167	8.798455	6.461089
2008	3.524471	10.81334	6.61424	2008	2.131243	9.015055	6.591739	2008	2.131243	9.015055	6.591739
2009	3.209763	10.7285	6.592516	2009	1.701825	8.94442	6.420245	2009	1.701825	8.94442	6.420245

4 Brail

Newspaper Writing and Printing Paper Package Paperboard

Year	Ln(D)	Ln(Y)	Ln(P)	Year	Ln(D)	Ln(Y)	Ln(P)	Year	Ln(D)	Ln(Y)	Ln(P)
1990	0.595331	8.034955	6.232753	1990	2.717725	8.034955	6.02505	1990	1.623393	8.034955	6.665062
1991	0.854228	7.892452	6.228726	1991	2.683263	7.892452	6.198059	1991	1.593845	7.892452	6.664065
1992	0.43384	7.834788	6.354128	1992	2.677527	7.834788	6.122542	1992	1.599741	7.834788	6.478038
1993	0.682767	7.934513	6.103662	1993	2.721903	7.934513	6.158977	1993	1.775198	7.934513	6.374667
1994	1.02038	8.139441	6.08837	1994	2.734199	8.139441	6.292337	1994	1.940523	8.139441	6.434638
1995	1.208244	8.46611	6.830003	1995	2.937809	8.46611	6.720814	1995	1.902711	8.46611	6.748098
1996	1.203575	8.538759	6.514122	1996	2.960626	8.538759	6.47963	1996	1.947442	8.538759	6.84588
1997	1.323263	8.560444	6.144468	1997	3.13095	8.560444	6.435712	1997	2.037637	8.560444	6.534827
1998	1.247823	8.513386	6.271945	1998	3.119816	8.513386	6.382622	1998	1.752628	8.513386	6.513842
1999	1.134972	8.135347	6.108402	1999	2.940727	8.135347	6.296056	1999	2.22372	8.135347	6.450647
2000	1.217518	8.215006	6.223991	2000	2.986119	8.215006	6.276477	2000	2.328148	8.215006	6.60565
2001	0.991871	8.048788	6.368181	2001	3.161529	8.048788	6.104206	2001	2.3178	8.048788	6.53145
2002	0.947525	7.941651	6.070784	2002	3.22333	7.941651	6.263033	2002	2.213768	7.941651	6.509254
2003	0.760413	8.02027	6.070784	2003	3.186462	8.02027	6.05462	2003	2.134669	8.02027	6.471294
2004	0.737928	8.191463	6.490891	2004	3.259569	8.191463	6.14714	2004	2.214298	8.191463	6.497631
2005	0.990388	8.464425	6.329426	2005	3.313727	8.464425	6.289504	2005	2.22043	8.464425	6.540706
2006	1.039112	8.664406	6.425448	2006	3.291628	8.664406	6.422409	2006	2.370476	8.664406	6.65091
2007	1.035623	8.88142	6.411966	2007	3.342624	8.88142	6.554474	2007	2.404359	8.88142	6.7504
2008	1.222123	9.062768	6.473619	2008	3.372463	9.062768	6.72488	2008	2.371968	9.062768	6.855111
2009	0.945103	9.01809	6.367329	2009	3.259569	9.01809	6.550889	2009	2.301666	9.01809	6.713674

5 Canada

Newspaper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	2.300395	9.950753	6.360032
1991	2.481899	9.963359	6.392415
1992	2.040446	9.919361	6.308091
1993	1.466403	9.880679	6.257418
1994	0.984535	9.872513	6.186731
1995	0.808644	9.909321	6.49427
1996	2.477802	9.937164	6.484734
1997	2.520361	9.964583	6.320486
1998	3.265929	9.9228	6.373442
1999	3.335398	9.984192	6.262607
2000	3.092237	10.06731	6.321929
2001	2.908705	10.04399	6.365692
2002	2.365439	10.06156	6.205691
2003	2.02409	10.21592	6.185879
2004	2.737934	10.34213	6.2724
2005	2.707686	10.46561	6.385104
2006	2.602538	10.57546	6.468717
2007	2.971083	10.67325	6.428406
2008	2.172247	10.71686	6.548128
2009	2.663537	10.58769	6.438514

Writing and Printing Paper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	3.012422	9.950753	6.307861
1991	3.412872	9.963359	6.365513
1992	3.323784	9.919361	6.307996
1993	3.221865	9.880679	6.232267
1994	3.372006	9.872513	6.256867
1995	3.700597	9.909321	6.580832
1996	3.687039	9.937164	6.431757
1997	3.99734	9.964583	6.484182
1998	3.725183	9.9228	6.285455
1999	3.801363	9.984192	6.285752
2000	3.894201	10.06731	6.337657
2001	3.765602	10.04399	6.405811
2002	3.815686	10.06156	6.364959
2003	3.746963	10.21592	6.392836
2004	3.975604	10.34213	6.459302
2005	3.90715	10.46561	6.500087
2006	3.962136	10.57546	6.576462
2007	3.59986	10.67325	6.869535
2008	3.993479	10.71686	6.770047
2009	3.816551	10.58769	6.722144

Package Paperboard

Year	Ln(D)	Ln(Y)	Ln(P)
1990	3.729174	9.950753	6.654084
1991	3.478925	9.963359	6.576105
1992	3.692003	9.919361	6.577955
1993	3.759169	9.880679	6.557234
1994	3.886383	9.872513	6.565668
1995	4.326264	9.909321	6.864912
1996	4.252334	9.937164	6.801975
1997	4.312416	9.964583	6.712443
1998	4.433333	9.9228	6.652149
1999	4.434811	9.984192	6.809156
2000	4.565881	10.06731	6.703474
2001	4.569942	10.04399	6.711175
2002	4.528749	10.06156	6.597315
2003	4.549119	10.21592	6.59133
2004	4.725917	10.34213	6.565966
2005	4.815788	10.46561	6.648074
2006	4.736424	10.57546	6.684697
2007	4.528883	10.67325	6.672813
2008	4.730047	10.71686	6.804722
2009	4.506817	10.58769	6.751353

6 China

Newspaper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	-0.38686	5.749393	6.35045
1991	-0.41929	5.799093	6.302804
1992	-0.24949	5.894403	6.151141
1993	-0.10678	5.924256	6.351575
1994	0.006614	6.150603	6.461744
1995	0.008977	6.403574	6.94683
1996	0.362691	6.555357	7.316096
1997	0.449055	6.651572	7.277669
1998	0.297183	6.710523	7.194429
1999	0.454622	6.76273	7.108886
2000	0.611355	6.855409	7.146395
2001	0.6703	6.948897	7.096971
2002	0.728347	7.034388	6.755839
2003	0.871246	7.149917	6.96636
2004	1.092915	7.306531	6.996148
2005	1.123607	7.456455	7.055106
2006	1.156692	7.634821	6.958696
2007	1.247202	7.882692	6.839164
2008	1.310088	8.13564	7.014755
2009	1.349719	8.229244	6.53745

Writing and Printing Paper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	2.255616	5.749393	6.503502
1991	2.337834	5.799093	6.419481
1992	2.446179	5.894403	6.323654
1993	2.715058	5.924256	6.165346
1994	2.7892	6.150603	6.348227
1995	2.897525	6.403574	6.597159
1996	2.983279	6.555357	6.323845
1997	3.032803	6.651572	6.271645
1998	3.079152	6.710523	6.17765
1999	3.085874	6.76273	6.228682
2000	3.056392	6.855409	6.345262
2001	3.029694	6.948897	6.329368
2002	3.170094	7.034388	6.280734
2003	3.29289	7.149917	6.379831
2004	3.41072	7.306531	6.483327
2005	3.504912	7.456455	6.476807
2006	3.608868	7.634821	6.560761
2007	3.70394	7.882692	6.692899
2008	3.792411	8.13564	6.825341
2009	3.870351	8.229244	6.174386

Package Paperboard

Year	Ln(D)	Ln(Y)	Ln(P)
1990	1.388722	5.749393	6.970769
1991	1.441045	5.799093	6.893156
1992	1.556109	5.894403	6.757667
1993	1.055351	5.924256	6.696538
1994	1.433378	6.150603	6.667768
1995	1.43999	6.403574	6.942669
1996	1.765553	6.555357	6.693857
1997	1.842307	6.651572	6.678272
1998	1.802168	6.710523	6.617719
1999	1.917359	6.76273	6.593076
2000	1.972264	6.855409	6.639758
2001	2.045877	6.948897	6.562747
2002	2.279646	7.034388	6.569379
2003	2.320201	7.149917	6.600354
2004	2.401049	7.306531	6.675369
2005	2.440191	7.456455	6.71469
2006	2.544063	7.634821	6.723687
2007	2.624705	7.882692	6.798498
2008	2.670745	8.13564	6.935738
2009	2.719787	8.229244	6.863908

7 Czech Republic

Newspaper

Year	Ln(D)	Ln(Y)	Ln(P)
1990			
1991			
1992			
1993	1.721551	8.110127	5.94247
1994	2.098361	8.28778	7.035589
1995	2.13265	8.584665	5.779879
1996	2.259134	8.701513	6.826871
1997	2.187309	8.620652	6.451812
1998	2.268987	8.700847	6.57504
1999	2.288405	8.67488	6.49356
2000	2.423137	8.616314	6.545657
2001	2.456198	8.707648	6.549735
2002	2.307453	8.905987	5.973049
2003	2.259134	9.099409	5.978916
2004	2.326145	9.27996	5.928437
2005	2.406188	9.406565	6.545484
2006	2.472328	9.538708	6.076042
2007	2.488201	9.732581	6.203558
2008	1.614306	9.939289	5.254666
2009		9.805709	6.722672

Writing and Printing Paper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	1.432161	8.373323	6.49224
1991	1.715369	8.653994	6.51186
1992	2.017667	8.827761	6.208076
1993	1.952937	8.84894	6.193345
1994	1.865025	8.919854	6.221807
1995	1.947619	8.909641	6.654706
1996	1.748014	8.950533	6.663367
1997	1.929323	9.011889	6.308643
1998	1.860382	9.020752	6.429626
1999	1.82565	8.956609	6.34578
2000	1.872718	8.948456	6.398441
2001	1.759236	8.882253	6.534779
2002	1.432161	7.904704	6.128324
2003	1.571597	8.134468	6.562626
2004	1.814565	8.292549	6.265998
2005	1.817586	8.462948	6.408283
2006	1.841587	8.609955	6.507236
2007	1.80167	8.798455	6.461089
2008	2.131243	9.015055	6.591739
2009	1.701825	8.94442	6.420245

Package Paperboard

Year	Ln(D)	Ln(Y)	Ln(P)
1990			
1991			
1992			
1993	2.259134	8.110127	6.692644
1994	3.051186	8.28778	6.688541
1995	3.153402	8.584665	7.017261
1996	3.200842	8.701513	6.934363
1997	3.341107	8.620652	6.789427
1998	3.231262	8.700847	6.82342
1999	3.185277	8.67488	6.742174
2000	3.208534	8.616314	6.686711
2001	3.341107	8.707648	6.694567
2002	3.475896	8.905987	6.722214
2003	3.490453	9.099409	6.812965
2004	3.655281	9.27996	6.842552
2005	4.044271	9.406565	6.505522
2006	3.960817	9.538708	6.665608
2007	4.070502	9.732581	6.784308
2008	4.044108	9.939289	6.860275
2009	3.757521	9.805709	6.955499

8 Denmark

Newspaper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	3.657847	10.18218	6.548339
1991	3.63919	10.18573	6.554288
1992	3.665947	10.27681	6.539593
1993	3.685354	10.20733	5.766568
1994	3.863087	10.29245	6.206818
1995	3.847153	10.45763	6.553197
1996	3.823941	10.46456	6.68251
1997	3.948529	10.3814	6.403551
1998	3.919073	10.39693	6.363926
1999	3.87543	10.39519	6.321383
2000	3.874947	10.30872	6.201195
2001	3.837354	10.30785	6.156783
2002	3.779893	10.38449	6.192808
2003	3.724797	10.58325	6.277228
2004	3.813543	10.72128	6.321752
2005	3.805793	10.7701	6.346989
2006	3.925992	10.82898	6.51139
2007	4.024866	10.95117	6.53179
2008	3.855459	11.03742	6.54178
2009	3.657279	10.93191	6.450387

Writing and Printing Paper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	4.936159	10.18218	6.828675
1991	5.000577	10.18573	6.83673
1992	4.766472	10.27681	6.528176
1993	4.620725	10.20733	6.226953
1994	4.672636	10.29245	6.248776
1995	4.577828	10.45763	6.372748
1996	4.62196	10.46456	6.287904
1997	4.684955	10.3814	6.175798
1998	4.71847	10.39693	6.235487
1999	4.782008	10.39519	6.246486
2000	4.452127	10.30872	6.137692
2001	4.762342	10.30785	5.985675
2002	4.713385	10.38449	6.049995
2003	4.71316	10.58325	6.190429
2004	4.692782	10.72128	6.273604
2005	4.663997	10.7701	6.217203
2006	4.769664	10.82898	6.402021
2007	4.822593	10.95117	6.519895
2008	4.804824	11.03742	6.595606
2009	4.660097	10.93191	6.326416

Package Paperboard

Year	Ln(D)	Ln(Y)	Ln(P)
1990	3.947837	10.18218	7.181964
1991	3.968711	10.18573	7.082087
1992	3.944273	10.27681	7.041495
1993	3.984501	10.20733	6.694763
1994	4.082837	10.29245	6.819568
1995	4.118449	10.45763	7.114146
1996	4.073732	10.46456	7.020342
1997	4.254528	10.3814	6.835053
1998	4.284606	10.39693	6.850233
1999	4.254528	10.39519	6.778796
2000	4.337503	10.30872	6.69173
2001	4.311404	10.30785	6.691851
2002	4.313016	10.38449	6.713975
2003	4.43525	10.58325	6.833743
2004	4.463105	10.72128	6.864014
2005	4.454932	10.7701	6.870875
2006	4.368454	10.82898	7.005945
2007	4.385655	10.95117	7.01654
2008	4.339578	11.03742	7.128791
2009	4.153194	10.93191	7.062408

9. Egypt

Newspaper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	0.696842	6.632002	7.943962
1991	0.696842	6.458338	7.633349
1992	0.696842	6.563856	7.711256
1993	0.696842	6.654153	7.686367
1994	0.696842	6.745236	7.762213
1995	0.696842	6.876265	7.509149
1996	0.696842	6.976348	7.53051
1997	0.696842	7.108244	7.402677
1998	-0.57237	7.16935	6.123513
1999	-0.50178	7.21891	6.040234
2000	-0.05593	7.297091	6.3206
2001	0.541153	7.256297	6.272428
2002	0.297231	7.132498	6.309918
2003	-0.49123	7.056175	6.169042
2004	-0.36671	6.986566	6.101841
2005	-0.36671	7.097549	6.101841
2006	-0.36671	7.25982	6.101841
2007	-0.31057	7.436028	6.10858
2008	-0.31057	7.639642	6.10858
2009	-0.06439	7.771067	6.346359

Writing and Printing Paper

Year	D	Y	P
1990	1.389764	6.632002	7.467865
1991	1.487289	6.458338	6.648266
1992	1.423349	6.563856	6.554257
1993	1.392434	6.654153	6.433528
1994	1.511334	6.745236	6.374658
1995	1.53955	6.876265	6.743117
1996	1.574876	6.976348	6.609165
1997	1.809757	7.108244	6.467073
1998	1.892201	7.16935	6.455965
1999	2.34022	7.21891	6.386207
2000	1.633188	7.297091	6.106049
2001	1.97772	7.256297	6.740062
2002	2.077977	7.132498	6.620013
2003	2.19635	7.056175	6.457792
2004	2.134482	6.986566	6.329388
2005	2.134482	7.097549	6.329388
2006	2.154332	7.25982	6.385466
2007	2.520955	7.436028	6.572518
2008	2.520955	7.639642	6.572518
2009	2.438817	7.771067	6.443993

Package Paperboard

Year	Ln(D)	Ln(Y)	Ln(P)
1990	0.811142	6.632002	8.370877
1991	0.85007	6.458338	6.809536
1992	1.02886	6.563856	6.651605
1993	1.125135	6.654153	6.523735
1994	1.081547	6.745236	6.381388
1995	0.275171	6.876265	7.049195
1996	0.260189	6.976348	6.670318
1997	1.155507	7.108244	6.738741
1998	1.346774	7.16935	6.348346
1999	1.335752	7.21891	6.349915
2000	0.587183	7.297091	6.665259
2001	0.970175	7.256297	6.892215
2002	0.893837	7.132498	6.83129
2003	1.021185	7.056175	6.573672
2004	1.434495	6.986566	6.503547
2005	1.434495	7.097549	6.550039
2006	1.379975	7.25982	6.733177
2007	1.520739	7.436028	6.733177
2008	1.520739	7.639642	6.617811
2009	1.678069	7.771067	6.550039

10 Finland

Newspaper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	3.737909	10.23477	6.454374
1991	3.294068	10.12623	6.42232
1992	3.04156	9.992002	6.227697
1993	3.584343	9.755104	6.035376
1994	3.664376	9.892123	6.098632
1995	4.15316	10.15066	6.494147
1996	4.036103	10.12807	6.549084
1997	4.009612	10.0828	6.256135
1998	4.082401	10.13388	6.275249
1999	4.042618	10.13579	6.217816
2000	4.022051	10.06603	6.143669
2001	4.035888	10.08685	6.2411
2002	4.078493	10.16562	6.142301
2003	3.886826	10.49579	6.16178
2004	3.673604	10.52726	6.226597
2005	3.468033	10.52726	6.289673
2006	3.350114	10.58373	6.330884
2007	3.080513	10.74802	6.411805
2008	3.950061	10.84312	6.474855
2009	3.643521	10.7163	6.442029

Writing and Printing Paper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	4.859304	10.23477	6.909794
1991	4.75665	10.12623	6.859575
1992	4.777107	9.992002	6.835465
1993	4.935255	9.755104	6.608425
1994	5.03995	9.892123	6.668249
1995	5.108224	10.15066	6.890126
1996	5.26429	10.12807	6.81078
1997	5.343376	10.0828	6.689505
1998	4.955917	10.13388	6.73773
1999	4.955005	10.13579	6.667246
2000	5.018887	10.06603	6.632764
2001	4.703313	10.08685	6.61376
2002	5.071724	10.16562	6.595968
2003	5.252734	10.49579	6.739396
2004	5.07934	10.52726	6.773865
2005	5.181037	10.52726	6.783314
2006	5.485702	10.58373	6.777257
2007	5.566732	10.74802	6.860985
2008	5.495707	10.84312	6.965863
2009		10.7163	6.928408

Package Paperboard

Year	Ln(D)	Ln(Y)	Ln(P)
1990	4.603717	10.23477	6.743761
1991	4.711113	10.12623	6.666138
1992	4.840387	9.992002	6.691532
1993	4.748669	9.755104	6.500786
1994	4.663404	9.892123	6.867393
1995	4.827231	10.15066	6.776577
1996	4.929921	10.12807	6.561934
1997	4.985816	10.0828	6.620232
1998	5.156695	10.13388	6.554544
1999	5.18775	10.13579	6.518108
2000	5.319195	10.06603	6.51959
2001	5.265059	10.08685	6.482484
2002	4.589752	10.16562	6.559441
2003	4.322677	10.49579	6.596692
2004	4.814945	10.52726	6.585536
2005	4.659878	10.52726	6.602405
2006	3.961697	10.58373	6.665884
2007	3.549492	10.74802	6.665884
2008	3.4679	10.84312	6.753421
2009	-3.9318	10.7163	6.697835

11 German

Newspaper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	0.811142	6.632002	8.370877
1991	0.85007	6.458338	6.809536
1992	1.02886	6.563856	6.651605
1993	1.125135	6.654153	6.523735
1994	1.081547	6.745236	6.381388
1995	0.275171	6.876265	7.049195
1996	0.260189	6.976348	6.670318
1997	1.155507	7.108244	6.738741
1998	1.346774	7.16935	6.348346
1999	1.335752	7.21891	6.349915
2000	0.587183	7.297091	6.665259
2001	0.970175	7.256297	6.892215
2002	0.893837	7.132498	6.83129
2003	1.021185	7.056175	6.573672
2004	1.434495	6.986566	6.503547
2005	1.434495	7.097549	6.550039
2006	1.379975	7.25982	6.733177
2007	1.520739	7.436028	6.733177
2008	1.520739	7.639642	6.617811
2009	1.678069	7.771067	6.550039

Writing and Printing Paper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	4.709757	9.979708	5.622287
1991	4.76845	10.02588	5.736798
1992	4.804092	10.15054	5.44099
1993	4.781596	10.11601	5.235564
1994	4.823033	10.17926	5.29691
1995	4.823819	10.33858	5.615571
1996	4.829596	10.30062	5.719948
1997	4.877633	10.17675	5.438624
1998	4.919281	10.18671	5.343166
1999	4.961576	10.16435	5.283437
2000	5.036558	10.0409	5.21874
2001	5.025061	10.03649	5.36754
2002	5.08868	10.09905	5.178419
2003	5.130228	10.28756	5.13192
2004	5.152672	10.40547	5.21058
2005	5.224131	10.42058	5.245995
2006	5.190589	10.46988	5.747269
2007	5.347892	10.60666	5.244544
2008	5.331536	10.69494	5.2319
2009	5.060181	10.60349	5.553391

Package Paperboard

Year	Ln(D)	Ln(Y)	Ln(P)
1990	4.195499	9.979708	7.097009
1991	4.262508	10.02588	7.080893
1992	4.22483	10.15054	6.969195
1993	4.213649	10.11601	7.050456
1994	4.317598	10.17926	6.809078
1995	4.196327	10.33858	6.648308
1996	4.186902	10.30062	6.674063
1997	4.252647	10.17675	6.411904
1998	4.341583	10.18671	6.457404
1999	4.35611	10.16435	6.371666
2000	4.448295	10.0409	6.289267
2001	4.398468	10.03649	6.31564
2002	4.36314	10.09905	6.240246
2003	4.375978	10.28756	6.169065
2004	4.457827	10.40547	6.098773
2005	4.428077	10.42058	6.024701
2006	4.44564	10.46988	5.973687
2007	4.472865	10.60666	5.918566
2008	4.434041	10.69494	5.950405
2009	4.202523	10.60349	6.126421

12 India

Newspaper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	5.613834	5.924256	5.613834
1991	6.057073	5.733341	6.057073
1992	6.074448	5.627621	6.074448
1993	5.419788	5.726848	5.419788
1994	5.225578	5.866468	5.225578
1995	5.646939	5.945421	5.646939
1996	6.648547	6.013715	6.648547
1997	6.863077	6.054439	6.863077
1998	6.132228	6.049733	6.132228
1999	5.774545	6.111467	5.774545
2000	6.087377	6.115892	6.087377
2001	5.618826	6.137727	5.618826
2002	5.888696	6.182085	5.888696
2003	5.962914	6.33328	5.962914
2004	6.119085	6.504288	6.119085
2005	6.45682	6.635947	6.45682
2006	6.788001	6.753438	6.788001
2007	6.700393	7.007601	6.700393
2008	7.053375	6.972606	7.053375
2009	6.352154	7.083388	6.352154

Writing and Printing Paper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	-0.20022	5.924256	7.469934
1991	-0.08777	5.733341	7.231689
1992	-0.0354	5.627621	7.170828
1993	0.023211	5.726848	7.149006
1994	0.162617	5.866468	7.036033
1995	0.211413	5.945421	6.994939
1996	0.231476	6.013715	7.132995
1997	0.245667	6.054439	6.697034
1998	0.336336	6.049733	6.715907
1999	0.456846	6.111467	6.774406
2000	0.497153	6.115892	6.691124
2001	0.464302	6.137727	6.378438
2002	0.471856	6.182085	6.441969
2003	0.492165	6.33328	6.440999
2004	0.498999	6.504288	6.933025
2005	0.542876	6.635947	6.984928
2006	0.534029	6.753438	7.132587
2007	0.523818	7.007601	7.085494
2008	1.197933	6.972606	7.233258
2009	1.223813	7.083388	6.914747

Package Paperboard

Year	Ln(D)	Ln(Y)	Ln(P)
1990	-0.27983	5.924256	7.624789
1991	-0.20174	5.733341	8.120093
1992	-0.13624	5.627621	7.105637
1993	-0.02491	5.726848	6.393714
1994	-0.03816	5.866468	6.365892
1995	-0.03557	5.945421	7.019778
1996	0.026184	6.013715	6.888355
1997	-0.03446	6.054439	6.779922
1998	0.209262	6.049733	6.779927
1999	0.29288	6.111467	6.779922
2000	0.298652	6.115892	6.784406
2001	0.273457	6.137727	6.600447
2002	0.281596	6.182085	6.4503
2003	0.245149	6.33328	6.449482
2004	0.19253	6.504288	6.511046
2005	0.315903	6.635947	6.687175
2006	0.308416	6.753438	6.813851
2007	0.391771	7.007601	6.766325
2008	0.933695	6.972606	6.908384
2009	0.884904	7.083388	7.412466

13 Indonesia

Newspaper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	-0.33379	6.431331	6.655011
1991	-0.35097	6.527958	6.195377
1992	-0.75526	6.593045	6.073213
1993	-0.85841	6.704414	6.063713
1994	-0.29971	6.802395	6.274647
1995	-0.22902	6.921658	6.529746
1996	0.035788	7.024649	6.367314
1997	0.112734	6.958448	6.112089
1998	-0.78309	6.12905	5.842184
1999	-0.0027	6.499787	6.052562
2000	-0.41007	6.650279	6.234247
2001	-0.26346	6.609349	6.313514
2002	-0.1993	6.794587	5.986368
2003	0.33205	6.964136	6.044119
2004	0.314548	7.041412	6.174486
2005	0.267489	7.137278	6.25982
2006	0.216863	7.36897	6.326436
2007	0.368311	7.527794	6.301885
2008	0.599282	7.683404	6.551835
2009	0.664153	7.728416	6.388612

Writing and Printing Paper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	0.620774	6.431331	6.74805
1991	0.643141	6.527958	6.576577
1992	0.889695	6.593045	6.587396
1993	0.694771	6.704414	6.489455
1994	1.028453	6.802395	6.643918
1995	0.999108	6.921658	6.721807
1996	1.073149	7.024649	6.722047
1997	1.433988	6.958448	6.739254
1998	0.497945	6.12905	6.373966
1999	1.248009	6.499787	6.327159
2000	1.58265	6.650279	6.582763
2001	1.669849	6.609349	6.435616
2002	1.680645	6.794587	6.440327
2003	1.721786	6.964136	6.481209
2004	1.350281	7.041412	6.579609
2005	0.682664	7.137278	6.599854
2006	-2.15807	7.36897	6.625721
2007	0.264021	7.527794	6.706063
2008	2.616755	7.683404	6.835451
2009	2.678146	7.728416	6.713496

Package Paperboard

Year	Ln(D)	Ln(Y)	Ln(P)
1990	1.179387	6.431331	6.293537
1991	1.313355	6.527958	6.122313
1992	1.662835	6.593045	5.982934
1993	1.863182	6.704414	6.184833
1994	1.98491	6.802395	6.248942
1995	2.026999	6.921658	6.030176
1996	2.209829	7.024649	5.870127
1997	2.423556	6.958448	6.109851
1998	2.480902	6.12905	5.890557
1999	2.577514	6.499787	5.839796
2000	2.592741	6.650279	6.039642
2001	2.680715	6.609349	5.943667
2002	2.666216	6.794587	5.924616
2003	2.702497	6.964136	6.067031
2004	2.784174	7.041412	6.230317
2005	2.778027	7.137278	6.477997
2006	2.765965	7.36897	6.42585
2007	2.912408	7.527794	6.623334
2008	2.938645	7.683404	6.705338
2009	2.925866	7.728416	6.693794

14 Ireland

Newspaper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	2.605158	9.520469	6.606328
1991	2.605158	9.524567	6.606328
1992	2.672093	9.634038	6.631053
1993	2.7235	9.565424	6.208295
1994	2.713579	9.648853	6.238608
1995	2.605158	9.829626	6.463809
1996	2.726519	9.919853	6.735135
1997	2.75469	10.00274	6.468464
1998	2.768483	10.07466	6.460119
1999	2.872473	10.15347	6.40688
2000	2.621159	10.14357	6.402101
2001	2.844302	10.20769	6.467344
2002	2.824125	10.34901	6.56236
2003	2.969129	10.58507	6.624847
2004	3.008449	10.72676	6.532396
2005	3.381935	10.78979	6.414578
2006	3.254202	10.86322	6.441562
2007	3.461631	10.99355	6.544342
2008	3.431284	10.99496	6.571545
2009	2.895659	10.81452	6.537625

Writing and Printing Paper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	3.756139	9.520469	6.897117
1991	3.781329	9.524567	6.897117
1992	3.718855	9.634038	6.833491
1993	3.475912	9.565424	6.618542
1994	3.717122	9.648853	6.841949
1995	3.315892	9.829626	6.888924
1996	4.494181	9.919853	7.012826
1997	3.52788	10.00274	6.740359
1998	3.979282	10.07466	6.869546
1999	3.844	10.15347	6.912918
2000	3.971085	10.14357	6.840656
2001	3.864902	10.20769	6.846563
2002	3.763271	10.34901	6.770318
2003	3.809534	10.58507	6.971112
2004	3.702533	10.72676	7.175241
2005	3.669702	10.78979	7.037062
2006	3.848988	10.86322	7.06094
2007	4.01071	10.99355	7.180005
2008	3.969652	10.99496	7.54179
2009	3.735519	10.81452	7.132008

Package Paperboard

Year	Ln(D)	Ln(Y)	Ln(P)
1990	2.957506	9.520469	7.174781
1991	3.368373	9.524567	6.91519
1992	3.115293	9.634038	7.054914
1993	3.204526	9.565424	6.86519
1994	3.303935	9.648853	6.8852
1995	3.468457	9.829626	7.130165
1996	3.330054	9.919853	7.457082
1997	3.257147	10.00274	7.064813
1998	3.327864	10.07466	6.987948
1999	3.368373	10.15347	6.916471
2000	3.153653	10.14357	6.921001
2001	3.139291	10.20769	7.006571
2002	3.250808	10.34901	6.933074
2003	3.290355	10.58507	7.0587
2004	2.862223	10.72676	7.220069
2005	2.705237	10.78979	7.21392
2006	3.132556	10.86322	7.203652
2007	3.160155	10.99355	7.262824
2008	3.230337	10.99496	7.209861
2009	3.122819	10.81452	7.154729

15 Italy

Newspaper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	2.284713	9.902637	6.614055
1991	2.184365	9.955083	6.566001
1992	2.251273	10.01171	6.368562
1993	2.190879	9.796181	6.104808
1994	2.324127	9.827686	6.162877
1995	2.319285	9.893892	6.623029
1996	2.175063	10.00568	6.671556
1997	2.306255	9.950228	6.319828
1998	2.358474	9.970492	6.273948
1999	2.368229	9.956839	6.305599
2000	2.456254	9.866253	6.201835
2001	2.518189	9.883744	6.347299
2002	2.470811	9.967682	6.283059
2003	2.513444	10.17214	6.357215
2004	2.555381	10.2989	6.399427
2005	2.551621	10.31996	6.421161
2006	2.61577	10.36136	6.487961
2007	2.615515	10.48125	6.58807
2008	2.581119	10.55534	6.651218
2009	2.425331	10.46519	6.619338

Writing and Printing Paper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	4.185345	9.902637	6.692173
1991	4.208852	9.955083	6.600102
1992	4.283473	10.01171	6.694018
1993	4.272629	9.796181	6.473563
1994	4.396499	9.827686	6.38291
1995	4.374155	9.893892	6.766268
1996	4.371457	10.00568	6.589245
1997	4.572108	9.950228	6.444803
1998	4.601271	9.970492	6.440835
1999	4.673891	9.956839	6.40901
2000	4.75671	9.866253	6.461862
2001	4.740731	9.883744	6.402781
2002	4.809417	9.967682	6.442093
2003	4.815312	10.17214	6.610278
2004	4.811068	10.2989	6.663328
2005	4.753811	10.31996	6.525946
2006	4.769443	10.36136	6.701241
2007	4.780375	10.48125	6.826587
2008	4.717742	10.55534	6.909012
2009	4.614374	10.46519	6.744131

Package Paperboard

Year	Ln(D)	Ln(Y)	Ln(P)
1990	3.710422	9.902637	7.095527
1991	3.72481	9.955083	6.982119
1992	3.82578	10.01171	6.86424
1993	3.775603	9.796181	6.761286
1994	3.901494	9.827686	6.709414
1995	3.857995	9.893892	7.046973
1996	3.844708	10.00568	6.907486
1997	3.931631	9.950228	6.71711
1998	3.863951	9.970492	6.911646
1999	4.018427	9.956839	6.647985
2000	4.018427	9.866253	6.657978
2001	4.051166	9.883744	6.628701
2002	3.985036	9.967682	6.641512
2003	4.042408	10.17214	6.754444
2004	4.067449	10.2989	6.789844
2005	4.09171	10.31996	6.764716
2006	4.135837	10.36136	6.788305
2007	4.108768	10.48125	6.890298
2008	4.14637	10.55534	6.973005
2009	4.059426	10.46519	6.909878

16 Japan

Newspaper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	3.390407	10.11674	6.544826
1991	3.399028	10.24427	6.574676
1992	3.368659	10.32735	6.622412
1993	3.284517	10.4611	6.745769
1994	3.303971	10.55174	6.77132
1995	3.333155	10.64466	6.887716
1996	3.379365	10.5164	6.7679
1997	3.391225	10.42822	6.62207
1998	3.392148	10.32588	6.547049
1999	3.380219	10.44857	6.635511
2000	3.417643	10.51295	6.673923
2001	3.419183	10.38003	6.504914
2002	3.413009	10.33348	6.396112
2003	3.396879	10.40768	6.447068
2004	3.423789	10.49269	6.481188
2005	3.414298	10.48086	6.463855
2006	3.416615	10.43846	6.416185
2007	3.397666	10.44185	6.40973
2008	3.364902	10.5509	6.577915
2009	3.305208	10.58294	6.648346

Writing and Printing Paper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	4.791785	10.11674	7.495459
1991	4.814293	10.24427	7.449744
1992	4.776912	10.32735	7.267826
1993	4.780687	10.4611	7.297152
1994	4.815983	10.55174	7.364543
1995	4.839125	10.64466	7.577825
1996	4.856774	10.5164	7.414268
1997	4.870243	10.42822	7.243275
1998	4.815367	10.32588	7.3314
1999	4.821506	10.44857	7.225988
2000	4.857755	10.51295	7.190583
2001	4.824719	10.38003	7.066793
2002	4.830864	10.33348	7.370756
2003	4.824531	10.40768	7.340281
2004	4.82365	10.49269	7.525153
2005	4.823545	10.48086	7.608369
2006	4.825851	10.43846	7.645513
2007	4.788275	10.44185	7.351094
2008	4.768245	10.5509	7.555985
2009	4.668459	10.58294	7.813187

17 Malaysia

Newspaper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	1.692885	7.790696	6.147469
1991	1.910298	7.873217	6.396189
1992	2.063042	8.032685	6.119564
1993	1.807489	8.130059	6.028876
1994	2.020506	8.212297	6.705942
1995	2.346292	8.363342	6.608444
1996	2.133233	8.465268	6.505629
1997	2.362378	8.433594	6.267909
1998	1.95325	8.081166	6.133652
1999	1.936086	8.149313	6.220546
2000	2.493663	8.295549	6.394756
2001	2.634819	8.261526	6.394756
2002	2.634819	8.322151	6.056863
2003	2.66535	8.388905	6.25913
2004	2.840684	8.491875	6.346526
2005	2.558022	8.572817	6.373319
2006	2.475814	8.681011	6.373319
2007	2.475814	8.840001	6.666982
2008	2.496548	8.999496	6.666982
2009	2.553062	8.839567	6.666982

Writing and Printing Paper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	2.754007	7.790696	3.322746
1991	3.081936	7.873217	4.373267
1992	3.492578	8.032685	1.772855
1993	3.239065	8.130059	4.373267
1994	3.368889	8.212297	1.772855
1995	3.453092	8.363342	2.737103
1996	3.642961	8.465268	1.176777
1997	3.588771	8.433594	5.955172
1998	3.55767	8.081166	6.872533
1999	3.769808	8.149313	6.435233
2000	3.519841	8.295549	6.435233
2001	3.669308	8.261526	4.823387
2002	3.660179	8.322151	3.742976
2003	3.583205	8.388905	4.634749
2004	3.747162	8.491875	5.111381
2005	3.697936	8.572817	5.064916
2006	3.878458	8.681011	5.06429
2007	3.935606	8.840001	5.06429
2008	3.880457	8.999496	4.823387
2009	4.1596	8.839567	5.064916

Package Paperboard

Year	Ln(D)	Ln(Y)	Ln(P)
1990	1.949815	7.790696	5.800635
1991	2.176193	7.873217	5.647679
1992	2.436547	8.032685	6.722124
1993	2.476312	8.130059	6.013184
1994	2.537582	8.212297	6.435647
1995	2.141974	8.363342	6.489888
1996	2.565645	8.465268	6.723914
1997	2.286786	8.433594	6.427195
1998	2.327192	8.081166	6.546863
1999	3.100064	8.149313	5.953138
2000	2.555556	8.295549	6.416931
2001	2.587116	8.261526	6.416931
2002	2.399577	8.322151	7.01035
2003	3.223003	8.388905	6.982547
2004	3.569732	8.491875	7.440455
2005	3.900096	8.572817	7.825963
2006	4.026217	8.681011	7.625558
2007	3.779	8.840001	8.278417
2008	3.655131	8.999496	8.278417
2009	3.666925	8.839567	8.278417

18 Netherland

Newspaper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	3.384028	9.889439	6.542192
1991	3.324087	9.909967	6.538355
1992	3.264609	10.00564	6.440248
1993	3.378676	9.972734	6.23798
1994	3.429017	10.03596	6.232098
1995	3.5303	10.20729	6.503856
1996	3.386458	10.20126	6.598951
1997	3.496459	10.11727	6.287945
1998	3.631958	10.1523	6.315518
1999	3.805647	10.16712	6.269525
2000	3.736844	10.09328	6.159822
2001	3.803783	10.12539	6.250737
2002	3.660652	10.20769	6.276019
2003	3.550411	10.40961	6.324305
2004	3.313267	10.53098	6.374713
2005	3.339254	10.57444	6.406126
2006	3.38666	10.63246	6.483124
2007	3.325163	10.77417	6.615205
2008	3.472069	10.87712	6.644346
2009	2.932622	10.77891	6.569956

Writing and Printing Paper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	4.530661	9.889439	6.833645
1991	4.564039	9.909967	6.786411
1992	4.61135	10.00564	6.429799
1993	4.630079	9.972734	6.414088
1994	4.643976	10.03596	6.517012
1995	4.692246	10.20729	6.763476
1996	4.708011	10.20126	6.660641
1997	4.723532	10.11727	6.494473
1998	4.801506	10.1523	6.6245
1999	4.97526	10.16712	6.642497
2000	4.698255	10.09328	6.52106
2001	4.847539	10.12539	6.577333
2002	4.900573	10.20769	6.495446
2003	4.8141	10.40961	6.657951
2004	4.810504	10.53098	6.67579
2005	4.855855	10.57444	6.717624
2006	4.735463	10.63246	6.75142
2007	4.761516	10.77417	6.954035
2008	4.901641	10.87712	7.194906
2009	4.87219	10.77891	7.216942

Package Paperboard

Year	Ln(D)	Ln(Y)	Ln(P)
1990	3.51761	9.889439	6.656882
1991	3.626247	9.909967	6.471314
1992	3.708632	10.00564	6.588454
1993	3.818564	9.972734	6.503406
1994	3.239695	10.03596	6.258284
1995	2.414019	10.20729	6.406454
1996	3.452007	10.20126	6.532912
1997	3.693169	10.11727	6.484733
1998	3.682547	10.1523	6.401271
1999	4.321778	10.16712	7.038812
2000	3.491009	10.09328	6.45862
2001	3.72134	10.12539	6.533912
2002	3.70662	10.20769	6.546951
2003	3.699547	10.40961	6.683398
2004	3.971206	10.53098	6.760203
2005	3.921063	10.57444	6.683502
2006	3.896717	10.63246	6.65203
2007	4.103878	10.77417	6.835867
2008	4.181785	10.87712	6.939912
2009	4.13917	10.77891	7.046827

19 Norway

Newspaper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	2.864184	10.23034	6.350601
1991	3.467933	10.24271	6.345696
1992	3.644894	10.30668	6.20702
1993	3.670543	10.21848	5.995955
1994	3.937001	10.26514	6.013933
1995	3.78389	10.43869	6.538687
1996	3.65812	10.50663	6.538687
1997	0.620277	10.48922	6.19508
1998	2.597935	10.43711	6.408499
1999	2.720995	10.48178	6.408529
2000	3.779334	10.53135	6.140757
2001	3.143852	10.54199	6.110526
2002	3.394208	10.65238	6.166828
2003	3.509232	10.80596	6.257183
2004	3.297069	10.93866	6.211376
2005	3.143585	11.08711	6.336952
2006	2.528703	11.18789	6.34142
2007	2.518622	11.31805	6.475267
2008	2.728898	11.44429	6.414839
2009	3.161421	11.24849	6.464863

Writing and Printing Paper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	4.329117	10.23034	6.758562
1991	3.997167	10.24271	6.71027
1992	3.928502	10.30668	6.731002
1993	4.078247	10.21848	6.556488
1994	4.143152	10.26514	6.424182
1995	4.374198	10.43869	6.896032
1996	4.306464	10.50663	6.766156
1997	4.046254	10.48922	6.496395
1998	4.003025	10.43711	6.561774
1999	4.01428	10.48178	6.459374
2000	3.875059	10.53135	6.445793
2001	3.854094	10.54199	6.412459
2002	3.756238	10.65238	6.464988
2003	3.74185	10.80596	6.605478
2004	3.671184	10.93866	6.669758
2005	3.782539	11.08711	6.691893
2006	3.791023	11.18789	6.653433
2007	3.788126	11.31805	6.759616
2008	3.673699	11.44429	6.755646
2009	3.618699	11.24849	6.602068

Package Paperboard

Year	Ln(D)	Ln(Y)	Ln(P)
1990	3.35799	10.23034	6.644741
1991	3.568669	10.24271	6.639078
1992	3.587974	10.30668	6.742599
1993	3.671296	10.21848	6.312527
1994	3.504657	10.26514	6.290182
1995	3.632009	10.43869	6.707451
1996	3.774757	10.50663	6.728975
1997	4.311841	10.48922	6.413562
1998	4.369401	10.43711	6.482924
1999	4.325156	10.48178	6.460898
2000	4.174087	10.53135	6.366403
2001	3.954783	10.54199	6.388349
2002	4.207373	10.65238	6.330005
2003	4.392429	10.80596	6.374919
2004	4.403349	10.93866	6.453536
2005	4.503893	11.08711	6.502367
2006	4.593287	11.18789	6.523988
2007	4.661578	11.31805	6.590257
2008	4.538237	11.44429	6.664934
2009	4.40186	11.24849	6.773819

20 Republic of Korea

Newspaper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	2.448824	8.724695	7.236452
1991	2.643722	8.871084	6.802432
1992	2.817781	8.929965	6.226066
1993	2.892292	9.014325	6.602677
1994	3.004749	9.161675	7.496727
1995	3.131962	9.347316	7.583762
1996	3.30769	9.4132	8.34324
1997	3.307389	9.326789	7.031971
1998	2.910254	8.917713	6.008083
1999	3.089394	9.164715	6.162187
2000	3.30897	9.336709	6.739177
2001	3.276857	9.273785	7.03277
2002	3.359586	9.400465	7.592677
2003	3.271403	9.506809	7.552048
2004	3.203526	9.617737	7.148038
2005	3.06856	9.772866	7.314024
2006	3.053131	9.888729	7.296874
2007	3.098723	9.982899	7.460991
2008	3.007397	9.860684	7.548907
2009	2.80763	9.747418	7.361867

Writing and Printing Paper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	4.085385	8.724695	7.268252
1991	4.207895	8.871084	6.176352
1992	4.308245	8.929965	6.441127
1993	4.342881	9.014325	6.987083
1994	4.398892	9.161675	6.889608
1995	4.477561	9.347316	7.090565
1996	4.487336	9.4132	7.095026
1997	4.597732	9.326789	7.123022
1998	4.289799	8.917713	7.097297
1999	4.519692	9.164715	6.610589
2000	4.716114	9.336709	6.694084
2001	4.745445	9.273785	6.750803
2002	4.666448	9.400465	6.425209
2003	4.755491	9.506809	6.62706
2004	4.800512	9.617737	6.514184
2005	4.786065	9.772866	6.70623
2006	4.815302	9.888729	6.692261
2007	4.905839	9.982899	6.848366
2008	4.934234	9.860684	7.002629
2009	4.918408	9.747418	7.064297

Package Paperboard

Year	Ln(D)	Ln(Y)	Ln(P)
1990	3.828641	8.724695	6.603387
1991	3.828641	8.871084	7.359764
1992	3.828641	8.929965	6.881382
1993	3.828641	9.014325	6.465772
1994	3.828641	9.161675	6.674536
1995	3.828641	9.347316	6.844249
1996	3.828641	9.4132	6.612105
1997	3.828641	9.326789	5.629511
1998	3.828641	8.917713	5.939916
1999	3.828641	9.164715	5.893472
2000	3.828641	9.336709	5.518853
2001	3.828641	9.273785	5.459542
2002	3.828641	9.400465	6.361789
2003	3.828641	9.506809	6.429848
2004	3.828641	9.617737	6.074646
2005	3.828641	9.772866	6.157375
2006	3.828641	9.888729	6.232337
2007	3.828641	9.982899	6.321277
2008	3.828641	9.860684	6.474015
2009	3.828641	9.747418	6.393981

21 Singapore

Newspaper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	1.233679	9.379661	6.461293
1991	0.964551	9.527848	6.556737
1992	1.429394	9.627734	6.37129
1993	-2.53712	9.803833	6.568352
1994	1.34771	9.915861	6.076699
1995	1.557227	10.03985	6.679313
1996	1.399003	10.15797	6.441933
1997	1.399003	10.22358	6.441933
1998	0.903926	10.10234	6.105421
1999	0.993538	9.985759	6.091633
2000	1.101752	10.07807	6.342031
2001	1.97079	10.00002	6.316835
2002	0.17903	9.984653	5.822282
2003	0.17903	10.02968	5.822282
2004	0.17903	10.17508	5.822282
2005	0.17903	10.27343	5.822282
2006	0.17903	10.35835	5.822282
2007	0.17903	10.50931	5.822282
2008	0.17903	10.51157	5.822282
2009	0.17903	10.5398	5.822282

Writing and Printing Paper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	4.249435	9.379661	6.963877
1991	4.329308	9.527848	6.874268
1992	4.069869	9.627734	6.501426
1993	4.013099	9.803833	6.898083
1994	4.495369	9.915861	6.8616
1995	4.388526	10.03985	6.379823
1996	4.168611	10.15797	6.385425
1997	4.168611	10.22358	7.41882
1998	4.257661	10.10234	7.970722
1999	3.924351	9.985759	6.962692
2000	3.94098	10.07807	6.906191
2001	3.715773	10.00002	7.035222
2002	4.051574	9.984653	6.593263
2003	4.051574	10.02968	6.593263
2004	4.051574	10.17508	6.593263
2005	4.051574	10.27343	6.593263
2006	4.051574	10.35835	6.593263
2007	4.051574	10.50931	6.593263
2008	4.051574	10.51157	6.593263
2009	4.051574	10.5398	6.593263

Package Paperboard

Year	Ln(D)	Ln(Y)	Ln(P)
1990	2.448825	9.379661	5.232741
1991	2.414924	9.527848	5.252427
1992	2.763734	9.627734	5.384683
1993	1.446795	9.803833	3.690857
1994	3.427502	9.915861	5.608429
1995	2.706048	10.03985	6.342545
1996	2.525787	10.15797	6.233048
1997	2.525787	10.22358	5.118362
1998	2.481615	10.10234	4.49757
1999	3.526112	9.985759	5.256111
2000	3.315926	10.07807	5.307456
2001	3.399196	10.00002	5.515536
2002	1.389434	9.984653	4.928448
2003	1.389434	10.02968	4.928448
2004	1.389434	10.17508	4.928448
2005	1.389434	10.27343	4.928448
2006	1.389434	10.35835	4.928448
2007	1.389434	10.50931	4.928448
2008	1.389434	10.51157	4.928448
2009	1.389434	10.5398	4.928448

22 UK

Newspaper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	3.199492	9.780642	6.603681
1991	3.190483	9.819399	6.638906
1992	3.152786	9.850087	6.463458
1993	3.119145	9.740851	6.199921
1994	3.359684	9.816185	6.162075
1995	3.377922	9.900684	6.489044
1996	3.431239	9.950657	6.611886
1997	3.46242	10.05638	6.393633
1998	3.496945	10.12234	6.39693
1999	3.47044	10.15054	6.338468
2000	3.368015	10.13018	6.205539
2001	3.751384	10.12202	6.288776
2002	3.596549	10.20998	6.26848
2003	3.396815	10.34942	6.28331
2004	3.462801	10.51295	6.386334
2005	3.567408	10.54165	6.357373
2006	3.570062	10.60497	6.42998
2007	3.586396	10.73839	6.554058
2008	3.559383	10.67558	6.294027
2009	3.511132	10.46775	6.260172

Writing and Printing Paper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	4.267529	9.780642	6.833944
1991	4.251746	9.819399	6.812312
1992	4.317936	9.850087	6.836625
1993	4.337747	9.740851	6.777849
1994	4.374171	9.816185	6.686398
1995	4.386631	9.900684	6.93907
1996	4.409729	9.950657	6.829504
1997	4.44952	10.05638	6.728373
1998	4.368208	10.12234	6.804744
1999	4.401695	10.15054	6.746253
2000	4.336252	10.13018	6.852481
2001	4.383184	10.12202	6.759954
2002	4.569222	10.20998	6.103102
2003	4.405911	10.34942	6.729675
2004	4.400518	10.51295	6.841161
2005	4.426327	10.54165	6.740452
2006	4.350657	10.60497	6.82428
2007	4.360641	10.73839	6.919508
2008	4.34572	10.67558	6.783868
2009	4.313791	10.46775	6.660491

Package Paperboard

Year	Ln(D)	Ln(Y)	Ln(P)
1990	3.880123	9.780642	7.047856
1991	3.878863	9.819399	6.97742
1992	3.955872	9.850087	6.871961
1993	3.921431	9.740851	6.783783
1994	4.110795	9.816185	6.75327
1995	4.10684	9.900684	6.451979
1996	4.146467	9.950657	6.408368
1997	4.20299	10.05638	6.81856
1998	4.192957	10.12234	6.841182
1999	4.268698	10.15054	6.68579
2000	4.230214	10.13018	6.68475
2001	4.248254	10.12202	6.644293
2002	4.074556	10.20998	6.950559
2003	4.34177	10.34942	6.704204
2004	4.375712	10.51295	6.815808
2005	4.392773	10.54165	6.788272
2006	4.366736	10.60497	6.809442
2007	4.343302	10.73839	6.918199
2008	4.180498	10.67558	6.99482
2009	4.066901	10.46775	6.841808

23 USA

Newspaper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	3.726	10.0449	6.383954
1991	3.672696	10.06233	6.372349
1992	3.658509	10.10279	6.338058
1993	3.690941	10.13963	6.281202
1994	3.696208	10.18784	6.198402
1995	3.680155	10.22408	6.465335
1996	3.611254	10.26716	6.468578
1997	3.652235	10.31831	6.311112
1998	3.671747	10.36366	6.358675
1999	3.69486	10.41427	6.249135
2000	3.704733	10.46541	6.317131
2001	3.582244	10.48844	6.365339
2002	3.544834	10.51317	6.184702
2003	3.54798	10.55049	6.155892
2004	3.502476	10.60433	6.229551
2005	3.423835	10.65806	6.348904
2006	3.366513	10.7069	6.43688
2007	3.228694	10.74518	6.35552
2008	3.092687	10.75729	6.484329
2009	2.741382	10.73112	6.394911

Writing and Printing Paper

Year	Ln(D)	Ln(Y)	Ln(P)
1990	4.933281	10.0449	6.441627
1991	4.920473	10.06233	6.344267
1992	4.961244	10.10279	6.374621
1993	4.985836	10.13963	6.337375
1994	5.02425	10.18784	6.31892
1995	5.108543	10.22408	6.582448
1996	5.07897	10.26716	6.430699
1997	5.136496	10.31831	6.401768
1998	5.130872	10.36366	6.509871
1999	5.180459	10.41427	6.465614
2000	5.131405	10.46541	6.537183
2001	5.101838	10.48844	6.523251
2002	5.122904	10.51317	6.510128
2003	5.108596	10.55049	6.514819
2004	5.111864	10.60433	6.535209
2005	5.143114	10.65806	6.559574
2006	5.157336	10.7069	6.625031
2007	5.129708	10.74518	6.639131
2008	5.082413	10.75729	6.676533
2009	5.006657	10.73112	6.33069

Package Paperboard

Year	Ln(D)	Ln(Y)	Ln(P)
1990	4.241263	10.0449	6.573642
1991	4.237526	10.06233	6.658639
1992	4.25942	10.10279	6.621259
1993	4.312862	10.13963	6.820282
1994	4.403476	10.18784	6.705395
1995	4.405661	10.22408	6.999994
1996	4.381481	10.26716	6.805931
1997	4.478111	10.31831	6.691785
1998	4.440135	10.36366	6.692024
1999	4.474043	10.41427	6.665039
2000	4.480166	10.46541	6.733235
2001	4.406516	10.48844	6.727721
2002	4.425609	10.51317	6.593046
2003	4.430187	10.55049	6.547552
2004	4.49914	10.60433	6.564976
2005	4.47816	10.65806	6.64522
2006	4.482488	10.7069	6.691757
2007	4.459242	10.74518	6.706637
2008	4.359267	10.75729	6.809877
2009	4.137737	10.73112	6.760907

CPI Table

1990	130.7	5.40%
1991	136.2	4.20%
1992	140.3	3.00%
1993	144.5	3.00%
1994	148.2	2.60%
1995	152.4	2.80%
1996	156.9	2.90%
1997	160.5	2.30%
1998	163	1.60%
1999	166.6	2.20%
2000	172.2	3.40%
2001	177.1	2.80%
2002	179.9	1.60%
2003	184	2.30%
2004	188.9	2.70%
2005	195.3	3.40%
2006	201.6	3.20%
2007	207.3	2.90%
2008	215.3	3.80%
2009	214.5	-0.40%