IMPORT AND EXPORT DEMAND ELASTICITIES BETWEEN THE U.S AND THE EUROPEAN UNION EURO CURRENCY ZONE

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ABSTRACT

Demand elasticity for imports as well as demand elasticity for exports are important concepts. They allow the economists to determine the impact of a variation of the exchange rate of a currency on the balance of trade of the concerned countries. For example, if the demand elasticity for exports to a country is inelastic, a relative decrease of the value of the home currency will increase the quantity of exports. However, the resulting revenue from exports will be less than before the depreciation of the home currency. The balance of trade will indeed worsen.

Before acting on the value of a currency to improve the balance of trade, a Nation must possess a very good knowledge of where the demand elasticity for exports or imports stands, a rational move being, maybe, out of this world.

INTRODUCTION

Demand elasticity is defined as the percentage change in quantity, relative to a percentage change in price. In international trade, similarly, demand elasticity for imports is defined as the percentage change in the quantity of imports divided by the percentage change in the relative price of imports. Demand elasticity for exports is defined as the percentage change in the quantity of exports divided by the percentage change in the relative price of exports. Those elasticity indexes are proper to each country dealing with another specific country (bilateral elasticity indexes), since they are function of what is exchanged (purchases with the discretionary or the disposable people's income for example), and who is trading. Elasticity indexes are indeed function of many other factors such as the existence or not of substitutes (similar product quality wise available

from another country with a lower price, resulting from a different variation of its currency exchange rate, for example), country' s tariff changes, subsidies etc ... We must admit that the elasticity concept is complex. However, it remains an interesting index for forecasting the impact of a variation of a currency exchange rate on the balance of trade and the current account, between two countries exchanging a significant amount of products, if we can recognize the true meaning of this index.

A privileged domain of observation was recently offered to our sagacity. Let us take advantage of this opportunity, to understand the complexity of the elasticity of demand for imports and exports.

DOMAIN OF OBSERVATION

Our domain of observation has been defined as The United States of America and the euro-zone of the European Union. The euro-zone is made of the entire European Union (15 countries), minus the United Kingdom, Denmark, Sweden and Greece. The euro-zone is an active trading partner of the U.S. exporting to the U.S. as much as $165 billion per year and importing from the U.S. as much as $118 billion a year (01/01/01). Those eleven countries are sharing a single currency, the euro, since January 1, 1999. This currency versus the U.S. dollar has a variable rate of exchange. This rate of exchange has been steadily declining for the past two years, modifying the competitiveness of euro- zone and U.S. products, making them relatively cheaper for the euro-zone products imported in the U.S. and relatively more expensive for the U.S. products exported to the euro-zone. By way of consequences, the U.S. demand for those euro-zone products may have changed, as well as the euro-zone demand for the U.S. products. It seems thus that those two international trade partners make the perfect set to study a little deeper those export and import elasticity indexes, as they may be in 2001.

IMPORT ELASTICITY INDEX

First we have compiled, on a monthly basis, the amount of imports from the euro-zone by the U.S for the period starting on January 1, 1999 to the end of February 2001 (26 months). A study of the imports from the main partners of the euro-zone (Austria, Belgium, Finland, France, Germany, Italy, Netherlands and Spain) did confirm the trend observed for the euro-zone (Table 1). Imports

from the euro-zone are increasing in current dollar term. For the past twenty-six months those imports in current dollars have been steadily increasing at a rate of $130.4 million a month .

Table 1

				Imports from the euro-zone									
Year	Mo.	euro/Dol.	Dol./euro	Euro-zone	Au.	Bel.	Fin.	Fra.	Ger.	Ital	Net.	Spa.	Others
1999	Jan.	0.8784	1,138434	9928	219	739	212	1851	3566	1596	611	415	2534
	Feb.	0.907586	1.101823	10892	252	684	227	1968	2951	1670	538	391	2211
	Mar.	0.930918	1.074209	12436	239	962	229	2201	4811	1964	716	445	869
	Apr.	0.943680	1.059682	11523	221	725	239	2125	4495	1770	656	390	902
	May	0.954343	1.047842	11472	227	795	232	2136	4427	1837	618	427	773
	June	0.968186	1.032859	12374	261	807	275	2123	4791	2024	687	424	982
	July	0.935127	1.069374	12976	251	778	266	2207	4859	2048	738	431	1398
	Aug.	0.945763	1.057348	12192	252	608	237	2320	4593	1974	669	457	1082
	Sept.	0.937667	1.066477	11352	248	740	214	2071	4279	1659	661	346	1134
	Oct.	0.956689	1.045272	13101	258	882	283	2235	4826	1921	838	427	1431
	Nov.	0.990435	1.009657	13566	241	764	250	2338	5235	1998	840	455	1445
	Dec.	0.990435	1.004543	12860	241	723	246	2333	5115	1979	901	445	877
2000	Jan.	1.021362	0.979085	11743	253	696	251	2321	4385	1802	731	480	824
	Feb.	1.037491	0.963864	12038	240	779	268	2125	4408	1950	727	499	1042
	Mar.	1.046774	0.955316	14843	274	985	319	2598	5499	2158	914	538	1558
	Apr.	1.100743	0.908477	13315	269	796	223	2482	4975	1981	792	451	1346
	May	1.068468	0.935919	13825	286	878	308	2618	4841	2062	858	466	1508
	June	1.046437	0.955624	13337	256	693	257	2324	4699	2105	772	481	1750
	July	1.081849	0.924344	13714	274	881	278	2375	4961	2244	828	513	1360
	Aug.	1.122854	0.890588	13682	259	683	246	2275	5135	2149	783	513	1639
	Sept.	1.140920	0.876486	13745	256	818	256	2325	4832	2318	779	373	1788
	Oct.	1.188072	0.841700	15013	306	948	322	2801	5129	2102	903	434	2068
	Nov.	1.151482	0.868446	14575	292	902	266	2762	4962	2138	854	497	1902
	Dec.	1.070348	0.934276	13909	268	871	255	2777	4911	2042	762	485	1538

2001	Jan.	1.077398	0.928162	14150	309	870	303	2548	4898	2102	833	543	1744
	Feb.	1.088312	0.918854	13247	302	841	290	2342	4866	1952	712	417	1525
	Mar.	1.132638	0.882895										
	Apr.	1.113832	0.897801										

On a year basis, the imports have increased apparently in non-adjusted for inflation value by 0.94. %. This value of imports has to be adjusted for inflation. The euro-zone inflation has been for the past two years 2 % per year. The value of the imports in constant dollars has in fact decreased by 1.06 % a year. This value of yearly imports, since the euro has depreciated at a rate of 11.88% a year, implies that the quantity of products imported during a year from the euro-zone has indeed increased by 10.82%. We have then established the quantities imported month after month, base January 1999, taking into account the inflation and the euro currency depreciation (Table 2).

Table 2

1999	Imports from the euro-zone					2000	Imports from the euro-zone				
	$ from euro-zone	$ adjusted for euro-zone inflation	Imports quantity	Import elasticity Real-time	Import elasticity 3 months		$ from euro-zone	$ adjusted for euro-zone inflation	Import quantity	Import elasticity Real-time	Import elasticity 3 months
Jan.	9928	9928	8721	- 3.78		Jan.	11743	11508	11754	- 24.22	1.93
Feb.	10892	10874	9869	- 6.14		Feb.	12038	11777	12219	1.20	- 7.64
Mar.	12436	12395	11538	4.72		Mar.	14843	14497	15175	0.21	- 8.41
Apr.	11523	11465	10820	- 0.45	1.96	Apr.	13315	12982	14290	- 2.81	3.83
May	11472	11396	10875	- 6.13	- 0.20	May	13825	13456	14378	- 1.79	- 0.69
June	12374	12271	11881	0.33	- 6.49	June	13337	12959	13561	-0. 89	1.16
July	12976	12846	12013	4.65	- 0.98	July	13714	13303	14391	- 1.18	2.00
Aug.	12192	12050	11396	- 9.49	3.66	Aug.	13682	13249	14876	- 3.13	1.59
Sept.	11352	11201	10502	- 8.03	- 2.35	Sept.	13757	13287	15159	- 2.00	- 0.57
Oct.	13101	12904	12346	- 1.96	-14.27	Oct.	15013	14488	17212	- 1.66	- 3.41
Nov.	15566	13340	13212	9.49	7.88	Nov.	14575	14041	16167	- 3.35	3.92
Dec.	12860	12624	12567	- 8.03	2.49	Dec.	13909	13376	14317	5 .71	3.00

We have then studied, on a monthly basis, the variation of quantity of products imported in the U.S, products coming from the euro-zone over the variation of the rate of exchange of the euro with respect to the dollar for the period starting on January 1, 1999 to the end of February 2001. This is the import elasticity index (Table 2).

Visual observation does show a definite trend. Most of the monthly import elasticity indexes computed are negative numbers, what is expected. Some exceptional positive numbers are explainable by some micro trade variations. Large negative numbers across the board are explainable by some product seasonality, euro exchange rate variation anticipation, and accounting practices.

However are these elasticity of demand for imports indexes as calculated following the described above process meaningful? In fact, these indexes might be erroneous because we have neglected the time dimension.

Imported merchandises at time t1 (December for example) is the result of transportation orders at time t2 (November for example). (t1-t2) is then the transportation duration. The shipment leaving the exporting country might the result of short negotiations (ordering time) and some manufacturing time (October for example). It is also the results of currency variation appreciation expectation by the importers, a currency future appreciating or depreciating being a factor to accelerate or slow down the mean flow of merchandises.

This time lag between a decision and its effect has been widely studied by economists who have called this timely effect the J-curve effect. What we know for sure is that the elasticity indexes computed from real time variation of imports related to real time variation of currency exchange rate are not correct. The value of imports cannot be real time related to the spot rate of the currency. But by how much time can we relate imports or exports to the spot rate of the currency? Studies of the import elasticity index taking into account two-month, three-month, four-month or six-month moving average exchange rates or a three-month import time lag did not modified fundamentally the elasticity indexes.

Along the twenty-six month period, when performing a bivariate regression analysis, the import elasticity index is not a constant but varies time wise linearly from -2.15 to -0.73. The demand elasticity for imports in 1999 is elastic. Then, in 2000, the demand elasticity is becoming unitary elastic and even inelastic at the end of 2000. A further depreciation of the euro would increase the quantity exported to the U.S. by a smaller percentage.

EXPORT ELASTICITY INDEX

We have compiled, on a monthly basis the amount of export to the euro-zone from the U.S for the period starting on January 1, 1999 to the end of February 2001 (26 months). A study of the exports to the main partners of the euro-zone (Austria, Belgium, Finland, France, Germany, Italy, Netherlands and Spain) did confirm the trend observed for the euro-zone (Table 3). Exports to the euro-zone seem, in value, to increase. For the past twenty-six months, those exports have been steadily increasing in current dollars at a rate of $31.27 million a month.

Table 3

Y.	Mo.	Exports to the euro-zone											
		euro/Dol.	Dol./euro										
				Euro-zone	Aus.	Bel.	Fin.	Fra.	Ger.	Ita.	Net.	Spa.	Oth.
1999	Jan.	0.878400	1.138434	8374	271	939	124	1702	1980	730	1504	468	354
	Feb.	0.907586	1.101823	8717	200	1101	156	1605	2192	771	1641	455	819
	Mar.	0.930918	1.074209	10066	242	1231	157	1767	2764	821	1669	485	930
	Apr.	0.943680	1.059682	8988	201	1096	217	1546	2331	1066	1552	415	564
	May	0.954343	1.047842	12535	201	1069	127	1672	2173	750	1513	660	4370
	June	0.968186	1.032859	12242	199	984	137	1564	2089	768	1619	491	4361
	July	0.935127	1.069374	7699	121	862	141	1290	1995	889	1367	349	685
	Aug.	0.945763	1.057348	8226	295	929	126	1296	2155	689	1689	387	660
	Sept.	0.937667	1.066477	8607	184	1009	99	1442	1995	765	1647	452	1014
	Oct.	0.956689	1.045272	9373	273	1087	132	1606	2501	1030	1630	460	654
	Nov.	0.990435	1.009657	9177	212	1019	133	1393	2225	837	1781	782	795
	Dec.	0.995477	1.004543	9878	189	1057	121	1926	2388	979	1802	727	689
2000	Jan.	1.021362	0.979085	8072	173	967	102	1471	2045	775	1515	455	569
	Feb.	1.037491	0.963864	8940	219	1039	107	1564	2197	864	1790	409	751
	Mar.	1.046774	0.955316	10299	226	1317	138	1783	2792	899	1949	452	743
	Apr.	1.100743	0.908477	9606	206	1134	125	1705	2695	856	1662	590	633
	May	1.068468	0.935919	9547	257	1083	115	1601	2407	790	1758	752	784

	June	1.046437	0.955624	9821	202	1153	122	1692	2296	921	1837	582	1016
	July	1.081849	0.924344	8745	151	1145	124	1460	2275	868	1575	470	677
	Aug.	1.122854	0.890588	9657	201	1207	137	1649	2413	870	1865	523	702
	Sept.	1.140920	0.876486	10042	241	1174	143	1615	2441	1368	1839	474	747
	Oct.	1.188072	0.841700	10382	215	1190	157	1779	2568	966	2188	599	720
	Nov.	1.151482	0.868446	10260	287	1375	144	1815	4273	858	2017	469	822
	Dec.	1.070348	0.934276	10677	176	1176	156	2119	2644	965	1978	548	915
2001	Jan.	1.077398	0.928162	9879	214	1153	133	1643	2601	923	1821	506	885
	Feb.	1.088312	0.918854	10412	206	1151	132	1983	2030	890	1826	534	760
	Mar.	1.132638	0.882895										
	Apr.	1.113832	0.897801										

On a year basis, the exports in value have increased by 0.29 % in current dollar terms. The figure has to be adjusted for U.S. inflation. This inflation has been, for the U.S., 2.8 % a year. The value of the exports to the euro-zone in constant dollars has indeed decreased by 2.51 % a year. We have established the quantities exported month after month (base January 1999), taking into account the U.S. inflation (Table 4).

We have then studied, on a monthly basis, the variation of quantity of products exported from the U.S, products going to the euro-zone, over the variation of the rate of exchange of the euro with respect to the dollar for the period starting on January 1, 1999 to the end of February 2001. This is the export elasticity index (Table 4).

Table 4

1999	Export to the euro-zone					2000	Export to the euro-zone				
	$ to euro-zone	$ to euro-zone adjusted for inflation	Export quantity	Export elasticity Real-time	Export elasticity 3 months		$ to euro-zone	$ to euro-zone adjusted for inflation	Export quantity	Export elasticity Real-time	Export elasticity 3 months
Jan.	8374	8374	8374	1.16		Jan.	8072	7846	7846	6.36	2.87
Feb.	8717	8697	8697	5.57		Feb.	8940	8669	8669	15.59	27.58
Mar.	10066	10019	10019	- 8.48		Mar.	10299	9963	9963	- 1.43	- 2.80

Apr.	8988	8925	8925	29.13	10.04	Apr.	9606	9270	9270	0.29	- 0.55
May	12535	12418	12418	- 1.81	- 1.02	May	9547	9191	9191	- 1.24	2.89
June	12242	12099	12099	13.18	- 33.79	June	9821	9431	9431	- 3.56	- 2.35
July	7699	7591	7591	5.64	5.66	July	8745	8378	8378	2.35	- 2.93
Aug.	8226	8092	8092	- 4.99	2.98	Aug.	9567	9143	9143	2.88	- 2.20
Sept.	8607	8446	8446	4.12	- 2.39	Sept.	10042	9573	9573	0.76	0.93
Oct.	9373	9176	9176	- 0.68	- 2.08	Oct.	10382	9873	9873	0.46	- 0.38
Nov.	9177	8963	8963	14.02	- 8.26	Nov.	10260	9733	9733	- 0.51	2.34
Dec.	9878	9624	9624	- 7.93	-10.14	Dec.	10677	10104	10104	-12.20	-49.45

Visual observation does show a definite trend. Most of the monthly export elasticity indexes computed are, as expected, negative numbers (Table 4). Some of them are positive. Those real time positive indexes are explainable by export of larger quantities than usual of some U.S. products (like commercial airplanes) where the U.S. has achieved some monopolistic status, or real supremacy. In twenty-six months, the euro has lost about 1 % a month (11.88% per year).

When performing a bivariate regression analysis, the export elasticity index indeed is not a constant but varies from -6.73 to a positive number (+1.5), (Chart 4) a positive number, which does not have any economic meaning. However, it seems that we are now in a period of total inelasticity. An increase in the value of the dollar will not decrease the quantity of U.S. products exported to the euro-zone.

THE MARSHALL-LERNER CONDITION

The general condition for exchange rate stability is referred to as the Marshall-Lerner condition. The ultimate impact on the current account balance depends upon the changes in spending on imports and changes in revenue from exports associated with the change in exchange rate. If domestic demand is inelastic, the impact of a currency depreciation is ambiguous. It does depend on the amount of revenue generated by the partner country on exports. If the increase spending on imports is greater than the revenue on exports, the current account balance will worsen. Unstable result will not occur as long as the sum of the absolute values of the export and import elasticity indexes is greater than 1.0 in case of initial balance of trade.

In case of initial unbalanced of trade, the condition becomes:

$ Exports ---------- x [(Export elasticity index)] + [(import elasticity index)] > 1 $ Imports

In our example, for year 2000, $imports = $165.73 billion, $exports = 118 billion

Export elasticity index = [0.01], Import elasticity index = [0.79].

The Marshall-Lerner inequality for stability is not satisfied (0.57). A depreciation of the dollar by a small percentage will not improve the balance of trade, but will worsen the balance of trade and the resulting current account.

CONCLUSIONS

From the U.S. perspective, there is an import elasticity index between the euro-zone and the U.S., which is not a constant, but a variable. This import elasticity index between the U.S. and the euro-zone was established by observation during a period of a continuous almost linear decrease in the rate of exchange between the euro and the dollar at a decreasing level, starting at -2.15 in January 1999 to -.79 in February 2001.

The absolute value of the import elasticity index is larger than one (zone elastic) when the relative value of the dollar with respect to the euro is low, and smaller than one (zone inelastic), when the relative value of the dollar with respect to the euro is high. Today, this very small import elasticity index (inelastic index, indeed) let us presumes that a small depreciation of the dollar, or a small relative appreciation of the euro will, everything else being equal, have a negative impact on the balance of trade of the U.S. Indeed the balance of trade of the U.S. will worsen.

From the U.S. perspective, the export elasticity index is not a constant, but a variable. The export elasticity index between the U.S. and the euro-zone was established by observation during a period of continuous decrease in the rate of exchange between the euro and the dollar at a decreasing level from -6.73 in January 1999 to zero at the end of 2000. The absolute value of the export elasticity index is larger than 1 (zone elastic) when the relative value of the dollar with respect to the euro is low, and smaller than 1 (zone inelastic), when the relative value of the dollar with respect of the euro is high.

For the past ten months, the absolute value of the export elasticity index has been below 1.00; which means that any small depreciation of the dollar, or a small appreciation of the euro will not decrease the euro-zone trade surplus. This trade surplus will indeed be increasing.

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