

PROSPECTIVE STUDY OF THE FOOTWEAR SECTOR.

PRESENTED TO:

SYSTEM DYNAMICS: ON THE MOVE

PROF. BERNARDINO CABRER BORRAS. Prof.Titular

PROF. AMPARO SANCHO PEREZ. Prof. titular.

UNIVERSIDAD DE VALENCIA

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The principal objective of this study is to determine the production trend until 1995, taking into account the future behaviour of the variables which are involved in the explanation of the home market demand as well as exports of footwear.

The forecasts have been made using a prospective model. By prospective is meant the effort involved to imagine the different futures which may be caused by the behaviour of the "actors" within the logical limits of the systems through which they act. In this paper a distinction is made between the variables whose dynamics are almost always constant and those which may be affected by the decision of the 'actors' or by unforeseeable events. The prospective study seeks to understand the plans which the actors will try to carry out and will affect its future behaviours.

These options become especially clear in the construction of partial or complete scenario. Scenario, according to the definition of Fontela (1980) is the script of a theatrical work about the future in which economic and social agents would be involved. To construct a scenario for the future is a creative task in which, implicitly or explicitly, all long-term decision makers play a part.

Hence to study a scenario of the development in the next decade is to analyse one of the potential futures, being fully aware of the essential unpredictability of the future and of our full freedom of choice.

As a first step we felt it reasonable to begin to study of the future with tendencial arguments. To do this we carried out a close study of the past trajectory with statistical and econometrics methods using all the available information and which we have normalized as from 1972.

Once the preliminary studies were complete, we 'simulated' the suggested model in order to collect the dynamic evolution of the system in tendencial conditions and following the idea of 'ceteribus paribus'.

It is undeniable that every change in the trend and behaviour must be contrasted with a clearly defined situation and that in this sense the tendencial scenario acquires its full significance.

We have likewise taken the future to the "more likely" aspects in the opinion of the research worker and hence we have considered different scenarios of the future which might affect our economy and we have analysed the possible implications.

From the point of view of a prospective economic analysis is still in a elementary phase, due principally to fact that it is very difficult to identify the phenomenous which influence the economy in some cases, and much more difficult to quantify in other. For this reason economic predictions must be considered as a key instrument when carrying out an economic study.

The prospective problem is more difficult when a fluctuated sector is to be analysed like in this work.

Sure enough the increasing rhythm of production in the footwear sector in the last year is the most dynamic of all de spanish industry. This evolution is due to the export factor.

A precise test of footwear sector evolution forward the figure nº1. We can see in this figure that the exports are the 50% of production.

In addition, we have to speak about the involved exports which are part of national consumption and the exports.

In the figure 2 we can see how the important of american market have been decreasing since 1972 to 1980 but before of this moment have been increasing slowly. At the some time the european market have a increasing forward the studied period.

We can realised a simplification of footwear sector with a model. This model have a double utility, first describe the sector funtionament and then it is the begining for a prospective analysis.

THE MODEL, METHODOLOGY, AND USING DATES.

The objetive of proposed model was to determine the production level under the hipotesis that "all we produce it is send". We have done the study with the interior market, american market, German, an English market since this countries are the 60% of spanish footwear exports.

FIGURE Nº 1

FOOTWEAR SECTOR EVOLUTION (MILLIONS OF PAIRS)

<u>YEAR</u>	<u>PRODUCTION</u>	<u>EXPORTS</u>	<u>INVOLVED EXPORTS</u>	<u>IMPORTS</u>	<u>(EXPORTS/PRODUCTION x 100)</u>
1971	131'1	68'9	64'9	2'7	51'87%
1972	134'4	69'6	67'8	3'0	51'79%
1973	127'6	62'8	67'4	2'6	49'22%
1974	129'4	75'7	56'9	3'2	58'50%
1975	135'23	81'8	57'63	4'2	60'49%
1976	140'19	91'7	52'89	4'4	65'41%
1977	138'32	84'2	58'02	3'9	60'87%
1978	139'8	82'9	60'6	3'7	59'30%
1979	139	75'2	70'3	6'5	54'10%
1980	126	62	75	11	49'21%
1981	136	70'7	75	7'7	51'98%
1982	148	71'9	84	8	48'58%
1983	160	86'5	81	7'5	54'06%
1984		105'3		6'2	

FIGURE N° 2

FOOTWEAR EXPORTS EVOLUTION (ASSIGNED COUNTRY)
(millions of pairs)

YEAR	TOTAL	USA	GERMAN R.F.	UNITED KINGDOM	FRANCE
1972	69'6	43	7	3'0	4'1
1973	62'8	37'1	6'3	2'8	4'4
1974	75'7	37'4	11'8	4'3	7'7
1975	81'8	41'1	12'2	4'7	8'9
1976	91'7	41'6	15'1	5'1	9'7
1977	84'2	35'3	13'6	4'5	7'8
1978	82'9	38'8	11'6	5'1	7'0
1979	75'2	27'4	13'2	6'5	7'2
1980	62	17'4	15'4	5'0	7'3
1981	70'7	20'7	16'7	6'7	7'9
1982	71'9	23'8	17	7'3	7
1983	86'5	28'4	18	10'2	8
1984	105'3	38'0	19'5	14'4	8'2

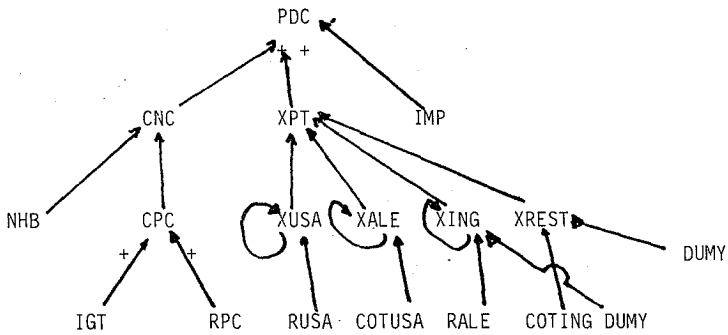
The model specification are:

This first equation to determine the footwear sector production (PDC) by addition of the interior consum with the Exports (XPT) and substraccion the imports.

The second equation is to determine the consum per capita like a function of per capita income and the tourisme receipts. In the beginning it is considered the product price, but the reduced variability at the considered period.

The exports has been desagregated in the American Export (XUSA) in German exports (XALE) english exports (XING) and the total exports is given by addition of their but every one of them are explained by a behaviour function. The used variables are the lagged exports, as spanish production penetration indicator, the relation between the cost of living index as indicator of competivity of product and the relation peseta/dollar, and a dummy variable which are in the strike and in other case.

We use a tendencial function to explain the rest of exports the completly model are exposed in ANEXO 1, and the flow diagram of the model are exposed below.



The used variables are measured in fisic unitates so the production, the consumption and the exports are expressed in pairs of footwear and the monetaries unitates are expressed in constant ptas.

THE MODEL ESTIMATION

The used methodology in the estimation work are the following:

We have used the cross section estimation of the income parameter with the ending to prevent the multicollinearity problem. This estimation are used like a information to estimate the equation of consumption function.

We used the unseemingly unrelated model because the results are more efficient than the ordinary least square. The estimation results are the following

$$\text{CPCP} = 1'077 + 0'002 \text{RPCP} \\ (4'021)^*$$

$$\text{DW} = 1'906$$

$$R^2 = 0'26 \quad F_{1,48} = 16'6$$

$$\text{CPC}_t = 0'04232 + 0'0019 \text{RPC}_t + 0'0014 \text{ING}_t \\ (3'89) \quad (4'69)$$

$$\text{DW} = 2'25 \quad R^2 = 0'90 \quad R_{2,3} = 28'33$$

$$\text{XUSA}_t = 31'62 + 0'552 \text{XUSA}_{t-1} - 24'74 \text{RUSA}_t + 0'322 \text{COTUSA}_t \\ (2'765) \quad (3'12) \quad (-4'22) \quad (4'75)$$

$$\text{XALE}_t = 5'56 + 0'306 \text{XALE}_{t-1} + 2'28 \text{RALE}_t$$

(*) In parenthesis values are t student statistic.
h is the h-Durbin Ststistique.

$$XING_t = -9'57 + 0'92 XING_{t-1} + 9'68 RING_t - 2'28 DUMY$$

$$XRETO_t = 23'97 + 0'535t - 5'958 DUMY$$

The obtained results are in accord with the economic expected results, we can see it observing the negative coefficient of cost of living index in USA exports because it is a inferior good to destination country. The coefficient of pta/dollar quotation which is a proxi variable of spanish footwear level price, have the positive signe. And the positive signe in the lagged variable is a indicative of positive tendency.

The behaviour in the German and English experts equation are, similar but in this countries de cost of living index is positive because the footwear is a first necessity good in this countries.

The equation of the rest of word experts have a tendencial fit.

MODEL SIMULATION.

Begining with the obtained model estimation we have simulated the variables consumption, exports import and production under diferents hipotesis in every more likely scenario. The simulation model are implementated in the UNIVAC 1100 of U.P.V.

The results of first scenario (the tendencial) are reflected in figure 4. The variables conditions by the instrumental variables obtained by extrapolation methods: so we assume real term increase in per capita income and turisme transfer about 1,5% and 3,5% respectively in the consumption function. The result obtained in consumption variable under this assumption suppose 2,56 per hab/pairs in the year 1995),it is a very reasonable value if we compare this with the actual consumption value in other countries (see figure 3).

FIGURE Nº 3
per capit consumption (nº of pairs/hab.)

	1980	1981
Spain	2'00	1'94
German	3'96	3'65
France	4'35	4'10
Italy	2'17	2'20
Portugal	0'91	1'10
USA	2'25	2'27
Japan	1'46	1'07

It is surprising in the low consumption level of USA 2'25 pair/Hab. It is possible because the footwear consumption is more diversified in this country.

We suppose the tendencial behaviour to the exogenous variables in the exports sector, so the dollar quotation to attain to 245 ptas this factor implicate a pta depretiation at the year about 8%. The relation between the costs of living have a tendencial behaviour in the first scenario, i.e. a increasing of 4% at the year in USA; 5'2% in German and 2'3% in England.

We suppose in the Imports behaviour a constant increase forward the analized period.

This hipotesis is difficult to remain given the tariffs cancellation with the EEC admission but the reduced statistique information about the imports variable it is a handicap to establish a model of them.

In the figure 4 are the results of the tendencial scenario.

Begining in the tendencial scenario we have analyzed alternative differents in which it is posible to move the future.

FIGURE N°4
TENDENCIAL SCENARIO
(10⁶ pairs)

<u>YEAR</u>	<u>PRODUCTION</u>	<u>EXPORTS</u>	<u>CONSUMPTION</u>	<u>IMPORTS</u>
1974	129'4	75'7	56'9	3'2
1975	135'23	81'8	57'6	4'2
1976	140'2	91'7	52'9	4'4
1977	138'3	84'2	58	3'9
1978	139'8	82'9	60'6	3'7
1979	139	75	70'3	6'5
1980	126	62	75	11
1981	136	70'7	75	7'7
1982	148	71'9	84	8
1983	160	86'5	81	7'5
1984	176'4	105'3	77'3	6'2
1985	186'7	117'7	7'3	9
1986	196'7	125'6	80'6	9'5
1987	204'9	132'0	82'9	10
1988	121'7	138'0	85'2	10'5
1989	220'8	144'2	87'6	11
1990	228'2	149'6	90'1	11'5
1991	234'9	154'4	92'5	12
1992	241'8	159'4	94'9	12'5
1993	248'8	164'4	97'4	13
1994	255'7	169'4	99'8	13'5
1995	262'4	174'2	102'2	14

SCENARIO A:

In this scenario we have exclusively modified the dollar average quotation.

We have analyzed the results under the hypothesis of the dollar average quotation remain constant forward the simulation period 1985 to 1995. The others variables remain cte.

Under this hypothesis we can observed that this suposse only affect the exports behaviour and it don't affect the consum variable.

The results of this simulated scenario are availables in the figure 5.

SCENARIO B:

In this scenario we have modified the per capita income in relation to the tendencial scenario.

We have remain constant the real terms income evolution in the period 1985-86. This suposse have implications in the consumption in the considered period. This have a effect in the production rate which are reduced in 0'45% in relation with the tendencial scenario.

FIGURE N°5

SCENARIO A: WITH DOLLAR QUOTATION CONSTANT FORWARD THE CONSIDERED PERIOD.

<u>YEAR</u>	<u>PRODUCTION</u>	<u>EXPORTS</u>	<u>CONSUMPTION</u>	<u>IMPORTS</u>
1974	129'4	75'7	56'9	3'2
1975	135'23	81'8	57'6	4'2
1976	140'2	91'7	52'9	4'4
1977	138'3	84'2	58	3'9
1978	139'8	82'9	60'6	3'7
1979	139	75	70'3	6'5
1980	126	62	75	11
1981	136	70'7	75	7'7
1982	148	71'9	84	8
1983	160	86'5	81	7'5
1984	176'4	105'3	77'3	6'2
1985	178'5	109'2	78'3	9
1986	181'7	110'6	80'6	9'5
1987	182'8	109'9	82'9	10
1988	182'5	107'8	85'2	10'5
1989	182	105'4	87'6	11
1990	180'8	102'2	90'1	11'5
1991	178'9	98'4	92'5	12
1992	183'1	100'7	94'9	12'5
1993	189'7	105'3	97'4	13
1994	196'3	100	99'8	13'5
1995	203	114'8	102'2	14

FIGURE N°6

SCENARIO B : With per capital income constant (in real terms) since 1985.

<u>YEAR</u>	<u>PRODUCTION</u>	<u>EXPORTS</u>	<u>CONSUMPTION</u>	<u>IMPORTS</u>
1974	129'4	75'7	56'9	3'2
1975	135'23	81'8	57'6	4'2
1976	140'2	91'7	52'9	4'4
1977	138'3	84'2	58	3'9
1978	139'8	82'9	60'6	3'7
1979	139	75	70'3	6'5
1980	126	62	75	11
1981	136	70'7	75	7'7
1982	148	71'9	84	8
1983	160	86'5	81	7'5
1984	172'9	105'3	73'8	6'2
1985	183	117'7	74'3	9
1986	191'8	125'6	75'7	9'5
1987	199	132'0	77	10
1988	205'9	138'0	78'4	10'5
1989	212'7	144'2	79'5	11
1990	218'7	149'6	80'6	11'5
1991	244'1	154'4	81'7	12
1992	229'1	159'4	83'2	12'5
1993	236'1	164'4	84'7	13
1994	242'1	169'4	86'2	13'5
1995	247'9	174'2	87'7	14

SCENARIO C:

In this scenario we suppose the dollar quotation and the per capital income remain cte at the same level of 1985.

The direct consequences of this suppose are in the consumption and exports results and indirectly in the production evolution.

The average rates in this suppose are 0'128% in the consumption and 0'105% in the exports. This variations imply a variation of 0'128% in the production rate.

SCENARIO D:

In this scenario we have modified the Spain cost of living ratio variables with expect ot German, USA and England in relation to the tendencial scenario. The modification are to remain constant. This variables at the same level of 1985 and this modifications affect the exports variable directly and the production indirectly.

The variations produced are the 3'1 points over the tendencial scenario.

We offert below a summary figure:

Scenario	Production	Exports	Consumption
Tendencial	4.05%	4.8%	3.05%
A Scenario	1.37%	0.5%	3.05%
B Scenario	3.5%	4.8%	1.803%
C Scenario	1.29%	0.55%	2.8%
D Scenario	6%	7.9%	3.05%

ANEXO I

$$\begin{aligned}
 PDC_t &= CNC_t + XPT_t - IMP_t \\
 CNC_t &= CPC_t \times NHB_t \\
 CPC_t &= a_1 + b_1 RPC_t + c_1 IGT_t + u_{1t} \\
 XPT_t &= XUSA_t + XALE_t + XING_t + XRESTO_t \\
 XUSA_t &= a_2 + b_2 XUSA_{t-1} + c_2 RUSA_t + d_2 COTUSA_t + u_{2t} \\
 XALE_t &= a_3 + b_3 XALE_{t-1} + c_3 RALE_t + u_{3t} \\
 XING_t &= a_4 + b_4 XING_{t-1} + c_4 COTING_t + d_4 DUMY + u_{4t} \\
 XREST_t &= a_5 + b_5 t + c_5 DUMY + u_{5t}
 \end{aligned}$$

SIGNIFICADO DE LAS VARIABLES

CNC	= Domestic consumption.
CPC	= Per capita consumption.
CPCP	= Regional per capital consumption.
COTING	= pta/£ quotation.
COTUSA	= Pta/dollar quotation.
	1 = strike year
DUMY	= Dummy variable
	0 = others
IGT	= Tourisme receipts.
IMP	= Total Imports.
NHB	= Number of habitants.
PDC	= Footwear production.
RALE	= Real relation interchange.
RING	= English real relation interchange.
RPC	= Per capita income.
RPCP	= Regional per capital income.

RUSA = Real relation interchange.
XALE = German exports.
XING = English exports.
XPT = Total exports.
XRESTO = Residue exports.
XTOTAL = Exports.
XUSA = Exports to USA.

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