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APPLICATION OF STATISTICAL MEASURES IN ANALYSIS OF OPENING THE EUROPEAN PUBLIC PROCUREMENT MARKETS

1. INTRODUCTION

Public procurement policy is a main instrument of innovation in production aiming, at the same time, to preserve traditional sectors *via* standards, financial incentives and the price mechanism.

The price mechanism is a direct production subsidy in favour of national firms which is equal to the difference between the international competitive price and the domestic one (Mardas 1995a). Such a difference reduces the public sector's demand for imports. On the other hand, the elimination of projectionist non-tariff barriers from public procurement tends to increase imports.

Discriminatory procurement does not necessarily constitute a trade barrier, nor does it necessarily affect international specialisation. From one side, the same discriminatory procurement policy may result in an increase of domestic output and in reduction of imports for some sectors of the economy and be completely inconsequential on trade and specialisation in other sectors.

The opening-up of the internal market influenced the public procurement in the European Union countries. Following the single European Act of 1987, the elimination of all non-tariff barriers introduced a new era for European integration implying significant effects on all industrial sectors which required restructing and adjustment under the new competitive environment.

The paper tries to analyse chosen European public procurement markets in terms of their liberalisation and influence of home biased public procurement on internal specialisation and trade flow. Using two series indicators the analysis examines the sectors or products which seem to be sensitive and possible protected by so cold „buy national" (Mardas 2005b, pp. 1633–1650).

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The main sources of information about public procurement are the national statistical offices of the selected Member States, the ministries and organisations dealing with public purchasing, input-output tables, the Tenders Electronic Daily service (TED), results of investigations conducted by OECD and the European Commission, and results of investigations conducted by D. Mardas.

2. DATA SOURCES OF PUBLIC PROCUREMENT

Governments at central and sub-central levels and other public entities are significant purchasers of public works goods and services, and these markets represent huge opportunities for international trade. With the largest opportunities, in value terms are mentioned, the industrialised countries, emerging economies and other markets with considerable potential.[1]

Consistent measurement of the size and structure of procurement markets for a large number of countries is not trivial task.

This task is even more challenging in the case of seeking to measure the shares of government procurement markets that are potentially opened to international trade.

The European Commission (EC) has carried out a number of studies in order to quantify the size of the EU procurement markets. In the paper the analysis was based on four main sources of information:

– studies conducted by the EC for the period 1993–1998 which delivered preliminary indicators of public procurement and the impact of public procurement policies,

– national public procurement published in the Official Journal (in Poland published in the Bulletin of Public Procurement),

– information referring to production, exports and imports given by statistical offices,

– information produced *via* specific surveys in cases where data on public procurement for analysed products are not currently available,

– studies conducted by D. Mardas for the years 1995–2005.

As regards the availability of presented sources of information, for some countries data were sufficiently available, but for others were not complete.

The Office of Public Procurement in Poland does not create the data bank which would be systematically supplemented and verified by a set of information on potential offering subjects including both national and foreign subjects,

[1] OECD, The Size of Government Procurement Markets, Journal on Budgeting, Vol. 1, 2002, No. 4, p. 3.

however some information is available. There are published yearly reports of this Office which offer number and value of public contracts with high values (over 30^{th} or 60^{th} euros). In the year 2006 the office conducted the so called "bottom up" approaches which refer to the process of gathering national data on procurement expenditure directly from the national entities responsible for procurement decisions.

3. METHODOLOGY OF THE PUBLIC PROCUREMENT MARKET'S ANALYSIS

Governments have traditionally used public procurement as an instrument of economic policy. Generally speaking, such a policy consisted in promoting the protection and development of domestic industry, by different forms, either reserving the contract to domestic bidders, and for establishing different kinds of domestic preferences. In order to examine this issue first step of statistical measures' construction consists of establishing whether markets are becoming more or less open, irrespective of the nature of the purchaser. Detailed information is presented in the table 1 (Mardas 1995a).

The most frequently quoted indicators in this field are import penetration ratios:

- import penetration at intra-community level (Ij),
- import penetration at intra-community level on sectorial (i) basis (Iij),
- import penetration of public procurement ($Ip_{(j)}$),
- the share of public procurement covered by domestic production, in the total domestic production broken down by sector (i) (Q $Qp_{(ij)}$),
- import penetration of public sector at sectorial level (Ip_{ij}).

In order to establish how important public procurement are in comparison with the domestic market as a whole series of indicators are proposed (see table 1):

- the share of public procurement covered by domestic production in the total domestic production broken down by sector (Q Qp_{ij}),
- public procurement of a particular product relative to the total public procurement (Pij),
- demand-public and private- of a considered product relative to total national demand (Dij),
- the importance of demand of public sector on national level ($Dp_{(ij)}$),
- proportion of domestic production which goes to public procurement (Q $Vp_{(ij)}$).

Table 1. Statistical indicators used for public procurement markets in the EU

Types of indicators	Number of formula
I. Indicators of international trade connected with public procurement	
– import penetration at intra-community level: $$Ij = \frac{Mjc}{Q.j + M.j - X.j}$$	(1)
– import penetration at intra-community level on sectorial (i) basis: $$Iij = \frac{Mijc}{Qij + Mij - Xij}$$	(2)
– import penetration of public procurement: $$Ip(j) = \frac{Mp(.j)}{V.j}$$	(3)
– import penetration of the public sector at sectorial basis: $$Ip(ij) = \frac{Mp(ij)}{Vij}$$	(4)
– ratio of import shares: $$Igs(ij) = \frac{ISG(ij)}{ISP(ij)}$$	(4a)
II. Indicators of domestic public procurement market	
– the share of public procurement covered by domestic production in the total domestic production broken down by sector (i): $$QQp(ij) = \frac{Qp(ij)}{Qij}$$	(5)
– public procurement of a particular product (i) relative to the total public procurement in the country j : $$Pij = \frac{Vij}{V.j}$$	(6)
– demand of the considered product relative to total national demand: $$Dij = \frac{Cij}{C.j}$$	(7)
– the importance of demand of public sector on national level: $$Dp(ij) = \frac{Pij}{Dij}$$	(8)
– proportion of domestic production which goes to public procurement: $$QVp(ij) = \frac{Qp(ij)}{Vij} = 1 - Ip(ij)$$	(9)
– public procurement as % of domestic output: $$PP(ij) = \frac{Vij}{Qij} \cdot 100$$	(9a)

Table 1 (contd.)

Types of indicators	Number of formula
III. Indicators of industrial structure	
– intra-industry trade index of Grubel and Lloyd: $$B_{ij} = \frac{(X_{ijc} + M_{ijc}) - \lvert X_{ijc} - M_{ijc} \rvert}{X_{ijc} + M_{ijc}}$$	(10)
– exports share of production: $$Eij = \frac{Xijc}{Qij}$$	(11)
– specialisation index of type of Balassa: $$Aij = \frac{\frac{Qij}{Q.j}}{\frac{Qic}{Q.c}}$$	(12)
– national production covered by the foreign firms in the total sectorial production: $$QQd(ij) = \frac{Qd(ij)}{Qij}$$	(13)
– export import ratio on intra EC level: $$Pij = \frac{Xijc}{Mijc}$$	(14)

Where:
Cij = demand-private and public- of the product (i) of the country (j)
C.j = total demand (.) of the country (j)
ISG(ij) = import share of the government of a product (i) of a country (j)
ISP(ij) = import share of the privat sector of a product (i) of a country (j)
Mjc = imports of country (j) at intra-EC level (c)
M.j = total imports (.) of country (j)
Mijc = imports of a product (i) of a country (j) at intra-EC level (c)
Mp(.j) = total imports (.) of public sector of country (j)
Mp(ij) = imports towards the public sector of a product (i) of a country (j)
X.j = total export (.) of a country (j)
Xijc = exports of a product (i) of a country (j) at intra-EC level (c)
Q.j = total production (.) of a country (j)
Qij = production of a product (i) of a country (j)
Qic = production of a product (i) of member state of the EC (c)
Q.c = total production (.) of member state of the EC (c)
Qp(ij) = domestic production towards public sector of a product (i) of a country (j)
Qd(ij) = national production covered by the activities of foreign firms of a product (i) of a country (j)
Vij = public procurement of a product (i) of a country (j)
V.j = total (.) public procurement of a country (j)

Source: European Commission, Statistical Performance Indicators for Keeping Watch over Public Procurement – Main Conclusions, Brussels, 11 July 1994, DG XV/B/4.

If the product (i) is characterized by low value of important penetration (Iij), i.e. less than the EC average, indicator of public production covered by the domestic production in total sectorial production (Q Qp_{ij}) is high (more than the national average), the share of public procurement of a particular product relative to total public procurement indicator (Pij) is high (more than the national average), and the share of domestic production public procurement is high (Q $Vp_{(ij)}$) (i.e. more than 50% of the total sectorial public procurement) we may say that public procurement market is relatively closed. The market is well protected with all consequences of such politics.

In order to justify the extent of the protection through public procurement practices additional indicators connected with industrial stucture of a given sector (i) are proposed (see table 1) (Starzyńska 2003, pp. 61–62):

- Grubel–Lloyd intra-industry trade indicator (Bij),
- export share of production (Eij),
- the Balassa specialisation index (Aij),
- the share of the national production covered by the foreign firms in the total sectorial production (Q $Qd_{(ij)}$),
- export-import ratio on intra-EC level (Pij).

This group of indicators showing the industrial structure of the sensitive product in terms of public procurement may be used to prove or reject the thesis that a particular sensitive product is truly protected by public procurement policies.

The Grubel–Lloyd intra-industry trade indicator Bij could provide us with further information on the production and market internationalisation process. If Bij $\rightarrow$ 1, the strong trend in favour of intra-industry trade is observed. In fact, if member state is both a major importer and a major exporter of the same components, then we may conclude that production of final goods is benefiting from the openness of the component-market, even if that production is itself strong and competitive.

On the other hand, if imports are excluded from purchasing by the public sector, than the market internationalisation is fully due to private consumption.

In order to show the competitive position of the sector (i) and country (j) a measure of exports share of production Eij is constructed.

Finally, the specialisation index Aij has been proposed. Strongly specialised firms obtain particular benefits from the public procurement market not due to protective policy but thanks to positive tendency of specialisation and productivity. If Aij > 2, country recorders trends in favour of traditional specialisation.

For products which display either strong or average performance against export competitiveness but they face an average or weak specialisation index public purchasing remains a main tool for structural adjustment. Figure 1 presents possible interaction between proposed measures and public procurement policy implication.

Bij	Eij	Aij	IMPACT OF PUBLIC PROCUREMENT POLICY	DEGREE OF PROTECTION	INTERVENTION IN THE MARKET
↓	↓	↓	VERY IMPORTANT	****	High
↑	↓	↓	DELICATE SITUATION	**	Average
↑	↓	↑	HANDICAPS	**	*Weak*
↑	↑	↓	PARTICULAR PROTEC POLIT. DE SAUVETAGE	*	*Weak*
↑	↑	↑	WELL PERFORMED	–	NON
↓	↑	↑	WELL PERFORMED	–	NON

Fig. 1. Interaction between public procurement indicators and industrial structure indicators

To analyse particular markets additional information about industrial structure may be obtained through:

- exports – imports ($E_{ij} - M_{ij}$) Eij per product,
- the change in specialisation (ΔA_{ij}),
- and the change in labour productivity (ΔLP).

4. MAIN CONDITIONS TO MEASURE THE IMPACT OF PUBLIC PROCUREMENT POLICIES

The interaction of the analysed series of indicators i.e. about public procurement (Mardas 1996) together with the industrial and trade structure indicators, leads to an important conclusion. The more the product is *sensitive* in terms of public procurement indicators and the more its industrial and trade indicators display poor performance, the more public purchasing practices remain crucial.

Given that a product is characterised as *sensitive* four major conditions are supposed to measure the impact of public procurement policies:

Condition 1: If $Aij > 2$, $Eij > \overline{Eic}$, and $Bij > \overline{Bic}$, (where $\overline{Eic}$ and $\overline{Bic}$ are the weighted averages at EC level), then the product (i) it is not sensitive in terms of public procurement. So "buy national" practices do not imply protection.

In this case any public contract in supplies can be better explained by the contractor's good industrial and trade performance rather than by any preferen-

tial treatment on behalf of the public sector. If however $Bij < \overline{Bic}$, then production of (i), although poorly protected, is less internationalised.

Condition 2: If $Aij > 2$, $Eij < \overline{Eic}$ and $Bij > \overline{Bic}$, then specialisation may be the result of preferential public procurement and the product (i) seems sensitive in terms of public procurement. The more the product is protected, the more the public procurement policies appear crucial.

If, moreover, the production of (i) is sufficiently internationalised (i.e. $Bij > \overline{Bic}$) then it is argued that protection is focused mainly on the final product and not to its components or any other intermediate good.

Condition 3: If $Aij < 2$, $Eij > \overline{Eic}$, and $Bij > \overline{Bic}$, then preferential public procurement concerns a case where good export performance and product internationalisation persist despite the poor specialisation. This may reflect a policy aiming to reinforce further of the product under consideration.

Condition 4: If $Aij < 2$, $Eij < \overline{Eic}$, and $Bij < \overline{Bic}$, then the product (i) is highly sensitive in terms of public procurement. Following this scenario, we can face a poor industrial structure and trade performance.

In this case the product is fully protected by: "buy national" policies. If production, however is sufficiently internationalised (i.e. $Bij > \overline{Bic}$), then protection is focused only on the final product.

This product hierarchy approach can help any surveillance authority to accomplish its task confined. Indeed condition 4 followed by condition 2 results that *sensitive* products seem to be the most affected by public procurement policies. In contrast group 3 and more group 1 products may justify their participation in public procurement due to their relatively good performance. Consequently following this approach, preferential public procurement policies affect differently all products identified as *sensitive* (Mardas 2005b, p. 1642).

5. EMPIRICAL RESULTS OF INVESTIGATIONS ON PUBLIC PROCUREMENTS

In 1995 the European Commission (EuroStrategy Consultants) examined the impact that the European procurement rules have had between 1987 and 1994 (Gordon, Rimmer, Arrowsmith 1998, p. 1). The study focused on procurement sensitive products and sectors. Table 2 presents nine sectors identified as being "procurement sensitive" at the NACE 2 digit level. Numbers from the Table 2 are shares in total public purchasing (PP), public procurement as a share of total output and additional information if products are tradable, that it can be transported long distances within and between member states.

Table 2. Indicators of public procurements in the EU

NACE	Description of sector	% of total PP[a]	PP as % output[b]	Tradable
50	Building and civil engineering works	33,5	31,0	Y/N
80	Business services	14,6	7,4	Y/N
34	Electrical goods (inc. Power gen. and telecoms) Paper production	3,7	11,4	Y
47	Metal products	3,6	5,1	Y
31	Office machinery	2,9	5,9	Y
33	Motor vehicles	2,2	12,9	Y
35	Other transport eqpt.	2,1	3,8	Y
36	Textiles and clothing, footwear	1,7	9,1	Y
45		1,0	1,7	Y

[a] % of total of PP see formula (6) in the Table 1.
[b] PP as % output see formula (9a) in the Table 1.

Source: EuroStrategy Consultants (1997), *The Single Market Review,* subseries III: *Dismantling of Barriers*, Vol. II, Public Procurement, Kogan Page, Earthscan, London.

If we focus on tradable manufactures (13 sectors) because they account for the bulk of traded commodities and production of manufactures often associated with economies of scale and monopolistic composition, we may notice that government import shares (IGS) are lower than private import shares (ISP) in all countries and in some countries the difference is quite remarkable (Trionfetti 2000, pp. 62–64) (see Table 3).

Table 3. Ratio of import shares ($Igs = \frac{ISG}{ISP}$)[a] by chosen countries and sectors (three digit-level)

NACE	DE	DK	ES	FR	IR	IT	UK
– Chemical products	0.57	0.92	0.39	0.00	0.47	0.35	0.38
– Metal products	2.47	1.17	0.49	3.88	0.00	0.41	0.95
– Agricultural and industrial machines	0.82	0.68	0.64	0.00	1.21	0.88	0.45
– Office machines	0.52	0.87	0.61	0.14	0.89	0.23	1.36
– Electrical goods	0.78	0.87	0.37	1.11	0.00	1.08	0.88
– Motor vehicles	0.73	1.00	0.53	1.80	1.06	0.35	1.10
– Other transport equipment	1.12	1.50	0.50	1.42	0.18	1.16	0.81
– Textile and clothing	0.86	0.82	0.07	0.00	0.79	0.71	0.05
– Leathers and footwear	0.80	0.85	0.38	0.00	0.00	0.05	0.00
– Timber and furniture	1.04	0.47	0.39	0.07	0.48	0.71	0.22
– Pulp, paper and printing	0.53	0.74	0.49	0.46	0.41	0.77	0.16
– Rubber and plastic	1.56	0.72	0.53	0.00	0.30	0.11	0.34
– Others manufactures	1.12	1.12	0.09	0.50	1.02	0.00	1.81

Where: ISG = import share of the government, ISP = import share of the private economy.
[a] See formula (4a) in the Table 1.

Source: F. Trionfetti (2000, pp. 62–64).

In 77 per cent of total ratios (91) the ratio is less than one. In 50 per cent the import share of governments is less than two thirds of the import share of the private sectors while the opposite is true in only 0.05 per cent. Generally speaking, the data provide overwhelming evidence that the import share of governments is systematically lower than the import share of the private economy. It means that the discriminatory behaviour exists.

In order to test the interaction between the public procurement indicators and the industrial or trade structure indicators some international comparisons have been made. Table 4 presents sectors for the EU as a whole, the United Kingdom and Poland in terms of public procurement sensitivity. Only strong and average sensitive products are considered.

Table 4. Sensitivity of public procurements in the European Union

Sectors	EU	United Kingdom	Poland
Mining and quarrying of expect energy producing materials	No	No	Yes
Manufacture of coal, refined petroleum products and nuclear fuel	No	Partially	Yes
Coke	No	Yes	No
Pharmaceuticals	No	Yes	Yes
Office data processing	Yes	Yes	Yes
Medical surgical equipment	No	Yes	Yes
Electrical machinery	Yes	Yes	No
Metal products	Yes	No	No
Motor vehicles	Yes	Yes	Yes
Textiles and clothing	Yes	Yes	No
Wood and wooden products	No	No	Yes
Footwear	Yes	Yes	No
Rubber	No	Yes	No
Paper	Yes	No	No
Aerospace and shipbuilding	No	Yes	No
Gas, water, glass	No	Yes	No

Source: A. Cox, P. Furlang, K. Hartley, M. Uttley (1995) and W. Starzyńska (2003).

While the EU as a whole is characterised by seven groups being strong or average sensitive in terms of public procurement, the United Kingdom proves around twelve products, and Poland only seven, not exactly the same as in previous cases.

More detailed information is delivered by investigations conducted by D. Mardas mostly for the year 1999 or 2001 for countries of the Central and Eastern Europe. Eight of them joined the European Union in 2004 and the remaining countries will join in 2007(see Table 5).

Table 5. Sensitive products in terms of public procurement. Share (in per cent) of products protected by "buy national" policies in total industrial production (Year of reference per country either 1999 or 2001)[a]

	Hungary	Czech Republic	Poland	Slovenia	Estonia	Latvia	Lithuania	Slovakia	Bulgaria	Romania
Worst position										
Strong protection	1.8	0.4	15.4		1.3	–	–	1.5	11.2	24.9
Average/weak protection	3.8	8.2	23.8	2.8	18.6	13.9	12.2	25.4	20.9	10.7
Intermediate position										
Strong protection				6.1	–	–	0.8	7.9	1.2	3.9
Average/weak protection	14.2	10.9	7.3	7.6	13.6	1.7	4.5	14.4	4.9	1.3
Subtotal	19.8	19.5	46.5	16.5	33.6	15.6	17.5	49.2	38.2	40.8
Well performed										
Strong protection			3.2	6.2	–	1.3	–	–		5.2
Average/weak protection		5.2		5.8	12.7	9.9	7.6	–		3.8
Total	19.8	24.7	49.7	28.5	46.2	26.8	25.1	49.2	38.2	49.8

[a] With the exception of the Czech Republic (1993) and Hungary (1997).

Source: D. Mardas (2005, p. 1644).

Table 5 contains results of investigations conducted for new members and candidates for the EU using formulas (4), (5), (6), (10), (11) and (12) (Mardas 2005b, p. 1644).

The countries most affected by the opening-up of their domestic public procurement market to the EU competition are Poland, Romania, the Republic of Slovakia, and Bulgaria. According to the results presented in Table 5 domestic production strong protected by "buy national" policy is estimated at 15.4 per cent of the total Polish production, while in Bulgaria the same percentage equals to 11.2 per cent and in Romania almost 25 per cent. If we take into account weak and intermediate production, the shares of all protected products by "buy national" rules in Republic of Slovakia, Poland, Romania, Bulgaria, and Estonia are 49.2, 46.5, 40.8, 38.2 and 33.5 per cent, respectively.

CONCLUSION

The interaction between presented indicators provide useful information about the impact of public procurement from both supply- and demand-sides. Analysis proved that European countries are characterised by relatively high percentage of public procurement. Poland, Romania, The Republic of Slovakia, Bulgaria, and Estonia seem to be more affected countries by the opening – up of their public procurement markets to EU competition. In better position there are Hungary, Czech Republic, Slovenia, Latvia, and Lithuania.

If we analyse strong and average sensitive sectors for the 12 "old" EU member states in comparison with Poland, some similarity in public procurement policies between Poland and the United Kingdom may be observed. Results of this study prove that even in "old" member states poor openness of public procurement markets exists.

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ZASTOSOWANIE MIERNIKÓW STATYSTYCZNYCH W ANALIZIE EUROPEJSKICH RYNKÓW ZAMÓWIEŃ PUBLICZNYCH

Zamówienia publiczne w Unii Europejskiej stanowią ważny segment rynku wewnętrznego. Proces dostosowywania się rozwiązań prawnych w zakresie zamówień publicznych trwał krócej lub dłużej w zależności od kraju i stosowanej przez niego polityki. Artykuł zawiera próbę ustalenia, jak liberalizacja i zniesienie preferencji krajowych w zamówieniach publicznych z jednej strony, a specjalizacja produkcji i wymiana handlowa z drugiej, mogą wpływać na politykę zamówień publicznych stosowaną przez dany kraj członkowski. Przy wykorzystaniu wskaźników struktury i natężenia zamówień publicznych, handlu zagranicznego oraz produkcji przemysłowej proponuje się cztery grupy przesłanek dla polityki gospodarczej w zakresie zamówień publicznych. Porównania międzynarodowe dla całej Unii Europejskiej, wybranych krajów członkowskich oraz stowarzyszonych z UE są próbą empirycznego zastosowania zaproponowanych miar w sektorowej analizie zamówień publicznych.