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The Relevance of the EU Entry Price System for Imports of Fresh Fruits and Vegetables

by
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Summary:

The EU protects EU growers of 15 kinds of fresh fruits and vegetables against international competition not only by the means of ad valorem tariffs of up to 20%, but also by the EU entry-price system (EPS), which is designed to restrict imports below the product-specific, politically designated entry price level. This study investigates the influence of the EPS on import prices of fruits and vegetables per product and country of origin. We utilise a unique data set comprising about 60,000 observations of daily synthetic import prices.

We develop two indicators for the effectiveness of the EPS, which serve as variables in a cluster analysis identifying four classes differing in the relevance of the EPS. Results suggest that the relevance of the EPS is heterogeneous among products as well as countries of origin for most fruits and vegetables. Thus, an adequate assessment of the importance of the EPS requires not only a product-specific but also a country-specific analysis. Overall, our results indicate that the effectiveness of the EPS is highest for the import of artichokes, courgettes, cucumbers, lemons, plums and tomatoes. The influence of the EPS on apples, clementines and pears is significantly lower, and of least relevance for EU imports of apricots, mandarins, oranges, peaches and nectarines and table grapes. The EPS has the greatest effect on countries which neighbour the EU, whereas it is of minor importance for exports from far-away countries with the exception of China and South Africa.

1 Introduction

The EU is the largest importer of fresh fruits and vegetables in the world, in 2005 accounting for 47% of world fresh fruits and vegetable imports (intra-EU trade excluded, EU-27) (FAO, 2007). It has established a comprehensive import system for fresh fruits and vegetables, which protects EU growers of 15 kinds of selected fruits and vegetables against international competition not only by the means of ad valorem tariffs of up to 20%, but also by the EU entry-price system (EPS). Analogous to a minimum import price, the EPS aims to restrict imports below the product-specific, politically designated entry price (EP) level. This system was established in 1995, replacing the former reference price system (RPS).

Various authors have analysed the functioning and effects of this highly complex system and have compared it to the former reference price system (see Williams and Ritson, 1987; Swinbank and Ritson, 1995; Grethe and Tangermann, 1999; Martin and de Gorter, 1999; Cioffi and del' Aquila, 2004; Chemnitz and Grethe, 2005; Goetz and Grethe, 2007; García-Álvarez-Coque et al 2007; Martinez-Gomez 2007; López and Muñiz, 2007). As a general conclusion, the effects of the EPS appear relatively difficult to assess and differ strongly between countries of origin and products.

This study is unique in that it comprehensively analyses the effectiveness of the EPS for all products and countries of origin based on a uniform approach. The central question is whether the EPS influences EU import prices. In other words, would EU import prices change if the EPS were abolished? In particular, we investigate the relevance of the EPS on a disaggregated level, i.e. for each of the 15 fruits and vegetables and all major exporting countries individually. We utilise a unique data set comprising about 60,000 observations of the standard import value (SIV), a synthetic import price calculated by the European Commission (EC) based on wholesale price notations, for the period 1995 to 2005 (European Commission, 2005a). We derive two indicators to measure the influence of the EPS. One indicator is taken from previous studies, supplemented by a newly developed indicator. These indicators serve as variables in a cluster analysis that identifies four clusters of product-specific and country-specific imports of fresh fruits and vegetables which differ according to the degree they are affected by the EPS.

The effectiveness of the EPS is particularly topical for four main reasons. First, from an EU producer's perspective it is interesting to see how policy-dependent the sector is. Any liberalisation of trade in fresh fruits and vegetables between the EU and Southern Mediterranean countries[1] (SMC) within the Barcelona Process is strongly resisted by EU producers, as SMC exports of fresh fruit and vegetables to the EU directly compete with

[1] The SMC comprise the following ten Mediterranean countries: Algeria, Egypt, Israel, Jordan, Lebanon, Morocco, the Palestinian Authority, Syria, Tunisia and Turkey.

southern EU production due to overlapping production and marketing campaigns (García Álvarez-Coque and Jordán Galduf, 2007).[2]

Second, for any quantitative analysis of liberalisation of trade in fresh fruits and vegetables especially between the EU and SMC, knowledge of the impact of the EPS on the EU import price is required, as García Álvarez-Coque and Jordán Galduf (2007) point out. Some applied studies which analyse the liberalisation of EU fruit and vegetable trade disregard the EPS (e.g. Bunte, 2005). Our paper provides a basis for deciding for which products it is important to take the EPS into account in simulation analyses.

Third, the EPS is criticised from a development policy perspective. This is based on the assumption that the EPS restricts fruit and vegetable exports especially from developing countries, which have a clear comparative cost advantage in the labour-intensive production of fruits and vegetables compared with developed countries (Diop and Jaffe, 2005). Our analysis sheds light on the question for which countries the EPS is of particular relevance.

Fourth, in the context of the ongoing Doha negotiations of the World Trade Organization (WTO), knowledge about the effectiveness of the EPS could serve as a basis for deciding how much negotiation effort to put into its maintenance (from an EU perspective) or its dismantling (from a third-country perspective).

This article is structured as follows. Chapter 2 describes the functioning of the EPS and Chapter 3 presents a literature review. The indicators used to analyse the effectiveness of the EPS are derived and discussed in Chapter 4. Empirical results of the cluster analysis are presented in Chapter 5, while an outlook on the further development of the effectiveness of the EPS is given in Chapter 6. Chapter 7 concludes.

2 Structure of the EU entry-price system

The EU protects growers of 15 kinds of selected fruits and vegetables against international competition not only by the means of ad valorem tariffs of up to 20%, but also by the EPS. The EPS came into effect on 1 July 1995, replacing the former RPS. Analogous to a minimum import price, the EPS is designed to restrict imports below the product-specific, politically designated EP plus ad valorem tariff (Table 1). If the EP is undercut, an additional specific tariff is levied, which proportionally varies depending on the gap between the product’s actual import price and the EP. When the EP is undercut by 8% or more, the maximum specific

[2] In some EU regions, fruit and vegetable production plays an important role for agricultural incomes. There are 35 EU regions in which fruits and vegetables represent more than 45% of the gross added value of the region’s agricultural sector (García Álvarez-Coque and Jordán Galduf, 2007). These regions are in Spain, Greece and Italy (8 each), the Netherlands (5), Belgium (4), and Portugal and France (1 each).

tariff, referred to as the maximum tariff equivalent (MTE)[3], of up to 80% of the EP is charged. For example, the EPS is applied to oranges during the EU orange harvest season in the time period December 1 to May 31. The MFN tariff for oranges seasonally varies between 3.2% and 16.0% whereas the MFN EP remains constant at a level of 354 €/t. If oranges are exported to the EU at a price of 336.3 €/t, the EP is undercut by 5%. This implies that the exporter has to pay an additional specific tariff of 17.7 €/t which is equal to the gap between the import price and the EP. If the entry price for oranges is undercut by 8% or more, an additional specific tariff at the level of the MTE of 71 €/t is charged.

Table 1: Basic elements of the EPS

	MFN tariff (%)	**MFN EP**		**Pref. EP**	**Specific tariff**	
		Level (€/t)	Period of application	Level (€/t)	As a % of MFN EP	MTE (€/t)
Apples	4.8 - 11.2	457 - 568	01.01.- 31.12.	-	41.9 - 52.1	238
Apricots	20.0	771 – 1,071	01.06.- 31.07.	-	21.2 - 29.4	227
Artichokes	10.4	654 - 826	01.11. - 30.06.	571	27.7 - 35.0	229
Cherries	12.0	916 – 1,494	21.05.- 10.08.	-	18.3 - 29.9	274
Clementines	16.0	649	01.11. - 28.02.	484	16.3	106
Courgettes	12.8	413 - 692	01.01. - 31.12.	413-424	22.0 - 36.8	152
Cucumbers	12.8 - 16.0	481 – 1,105	01.01. - 31.12.	449	34.2 - 78.6	378
Lemons	6.4	462 - 558	01.01. - 31.12.	-	45.9 - 55.4	256
Mandarins	16.0	286	01.11. - 28.02.	-	37.1	106
Oranges	3.2 - 16.0	354	01.12. - 31.05.	264	20.1	71
Peaches/ nectarines	17.6	600 - 883	11.06. - 30.09.	-	14.7 - 21.7	130
Pears	4.0 – 10.4	388 - 510	01.07.- 30.04.	-	46.7 - 61.3	238
Plums	6.4 – 12.0	696	11.06. - 30.09.	-	14.8	103
Table grapes	8.0 – 17.6	476 - 546	21.07. - 20.11.	-	17.6 - 20.2	96
Tomatoes	8.8 – 14.4	526 – 1,126	01.01. - 31.12.	461	26.5 - 56.7	298

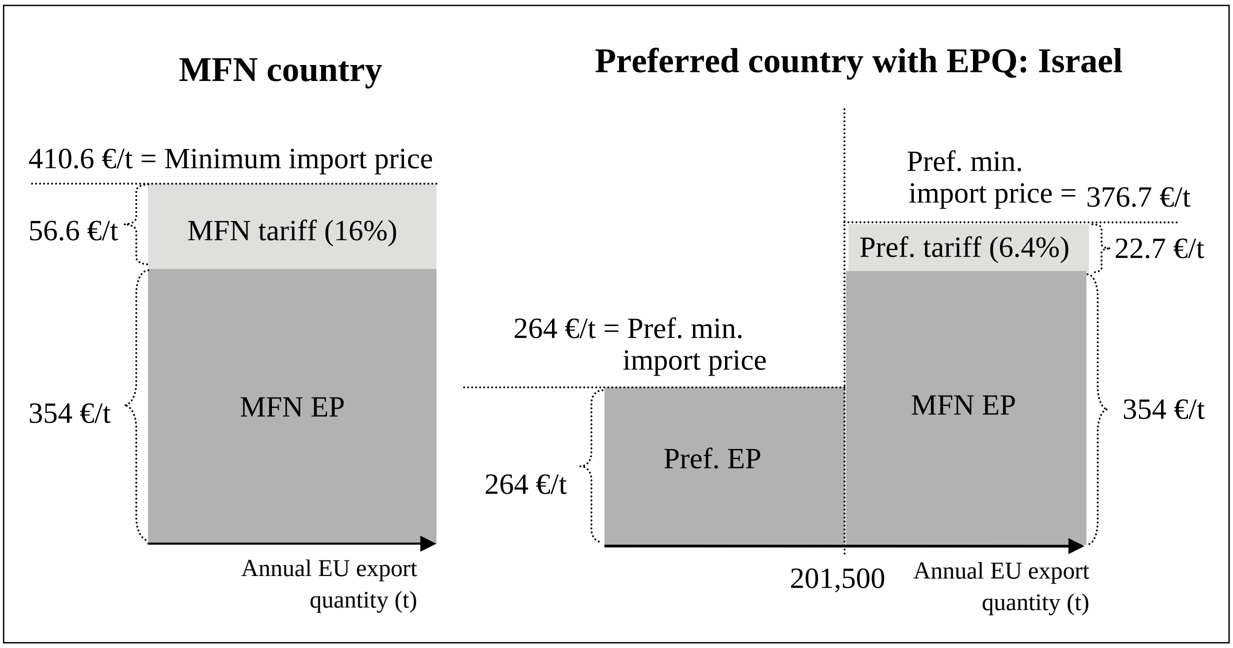
Sources: European Commission (2007), own calculations.

Concurrently to protecting EU growers, the EU aims to foster exports to the EU of these fruits and vegetables from preferred trading partners by granting preferential market access. In most cases, preferential market access to the EU market for fresh fruits and vegetables is restricted to ad valorem tariff reductions, and thus the EPS still applies. Exceptions are market access under the Everything-but-Arms Initiative, and preferential market access for the Balkan countries, for which the EPS does not apply. In addition, in some cases EU trade preferences for fresh fruits and vegetables include a preferential EP, which is lower than the most

[3] The designation “maximum tariff equivalent” stems from the Uruguay Round, in which the MTE was established as the tariffied equivalent of the former RPS.

favoured nation (MFN) EP. Preferential EPs, which are limited quantitatively up to a certain export amount by entry price quotas (EPQs), are granted exclusively to Morocco[4] for artichokes, courgettes, cucumbers, clementines and tomatoes, while a preferential EP for oranges is also granted to Cyprus (pre-EU), Egypt and Israel. As an example, Figure 1 compares the EU orange market access conditions for MFN countries to those for Israel, a preferred trading partner in the time period January, 1 to March, 31. A MFN country has to comply with an EP of 354 €/t and is subject to a tariff amounting 16%. In contrast, Israel may export oranges to the EU tariff free and has to comply with a lower EP of 264 €/t within an EPQ of up to 201,500 t. If Israel's exports exceed the quota, the MFN entry price applies and an ad valorem tariff amounting 40% of the MFN tariff (6.4 %) is charged.

Figure 1: EPS market access conditions for oranges for a MFN country compared to a preferred country (Israel)



Sources: European Commission (2007), own calculations.

Monitoring compliance with the EPS faces the difficulty that a large share of fruit and vegetable imports in the EU is on commission, implying that the import price is not determined until the product is sold in the EU market. Therefore, the EC calculates a synthetic import price, the standard import value (SIV). Fruit and vegetable prices, surveyed for each product and export country individually, are collected on representative fruit and vegetable wholesale markets in all EU Member States. The daily SIVs are calculated as a weighted average of collected wholesale market prices, less a marketing and transportation margin and applied tariffs.[5] Exporters have three options to declare fruits and vegetables which are subject to the

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4 Since January 2006, Jordan has enjoyed preferential EPs similar to Morocco; however, this period is not covered in this analysis.

5 Details of the calculation of the SIV are provided by Regulation 3223/94 (OJ 1994, L337/66).

EPS. The first is the SIV method, whereby the product is declared based on the product-specific SIV as surveyed by the EC on the respective import date. This method is easy to apply for the importer and does not lead to specific tariffs being charged if the SIV is higher than the EP. Alternative methods apply when products are declared at values indicated on invoices. These methods are used when there is an incentive for the importer to apply an alternative method, either because the SIV is below the EP, resulting in additional specific tariffs; or far above the EP, resulting in high ad valorem tariffs being charged. In such cases, the EU's import charges can be based on the free on board (f.o.b.) invoice price adjusted for insurance and freight costs and thus the actual cost insurance freight (c.i.f.) price (second method). The third option is customs clearance according to the deductive method, whereby import duties are charged in compliance with the effective selling price of the shipment, which has to be proven by invoice.

The EPS can be circumvented (both legally and illegally), so that some product is finally sold at prices below the EP (García-Álvarez-Coque, 2002). According to information from importers, illegal circumvention (e.g. based on false invoicing) is more prevalent in small-scale trading, particularly between related trading partners. Storage can offer a means of legal circumvention, as storable products can be imported at any time while customs clearance is delayed until some later date when the SIV is above the EP. Once cleared at a favourable SIV, the product can be sold later on EU markets at any price (Cioffi and del' Aquila, 2004).

3 Previous studies

Various authors have analysed the functioning, effects and especially degree of protectiveness of the highly complex EPS and its predecessor the RPS. Williams and Ritson (1987) examine the influence of the RPS on prices and quantities of fresh fruits and vegetables in the UK market in the period 1979-1984. Their product and export country specific analysis is conducted based on monthly UK wholesale price and import quantity data and the record of countervailing charges, which correspond to the specific tariff under the EPS. They classify 14 kinds of fruits and vegetables into four groups according to their sensitivity to the reference price mechanism, based on the frequency and duration of countervailing charges. The influence of the RPS on the marketing of products in three of the identified four groups is characterised by "probably no" (aubergines, apples and pears), "some" (plums, courgettes, cherries and table grapes) and "substantial" (cucumbers, tomatoes, Golden Delicious apples, peaches). They find that Spanish exports of tomatoes and cucumbers are temporarily excluded from the market by the RPS. The fourth group comprises all kinds of citrus fruits (clementines, lemons, mandarins and oranges) for which low relevance of the RPS is observed, although Williams and Ritson expect this to increase in the future.

Swinbank and Ritson (1995) analyse the influence of the RPS by determining the number of countervailing charges applied in the period 1988-1994 based on SIV data. The study covers all fruits and vegetables subject to the RPS for all major exporting countries. They find that the RPS has the most protective effects for lemons, with Turkey and Cyprus particularly affected. Overall, they identify Spain and the Canary Islands[6] as the most affected exporters, accounting for about one-third of all cases of countervailing charges (Swinbank and Ritson, 1995, 346).

Analogously, Cioffi and del' Aquila (2004) analyse the effects of the EPS for apples, oranges and tomatoes based on the number of days on which the SIV was below the EP. They point out that the time distribution of these events in relation to the marketing season of each product has to be taken into account, in particular for highly storable products such as apples, in order to assess the protectiveness of the EPS correctly. The analysis is conducted for the major exporting countries in the period 1995-2000. They find that the EPS has low relevance for imports of apples and oranges, but has a relatively strong influence on tomatoes. In addition, they show that the incidence of SIVs below the EP for apples originating in the southern hemisphere countries of South Africa, Chile, New Zealand and Argentina is concentrated in October and November, which falls outside the main export period for these countries (March to September). They attribute such episodes when SIVs fall below the EP outside the main export season to residual quantities of stored apples (Cioffi and del' Aquila, 2004, 175).

Several recent case studies have investigated the relevance of the EPS for individual SMC and specific fruits and vegetables. Chemnitz and Grethe (2005) find that the EPS is of high importance for tomato imports from Morocco. The EU import price which is measured as the SIV is below the MFN EP in 71% of the observations for tomatoes originating in Morocco in the period 2000-2003. As a result, the preferential entry price is heavily utilised and monthly Moroccan tomato export quantities are almost equal to the size of the respective entry price quota in the period 2000-2004. This ‘fine tuning’ is accomplished by a public Moroccan export control and coordination authority which coordinates and monitors Moroccan tomato exports.

García-Álvarez-Coque et al. (2007) analyse different policy scenarios for the liberalisation of the EU import regime for fresh tomatoes based on a comparative static partial equilibrium model that accounts for the EU-25, Morocco and the rest of the world (ROW) as major suppliers. They find that eliminating the EPS would have serious consequences for EU tomato producers, reducing sales by 20% in some periods of the year, whereas Morocco and the

[6] Although Spain and the Canary Islands entered the EU in 1986, they had to comply with the reference price system indirectly through a system of offer prices until 1993.

ROW would benefit. In addition, prices could decrease by up to 10% in the first quarter of each year. Trade effects resulting from liberalisation of the EPS would also be largest in this period.

In their analysis of the EU import regime for oranges, Goetz and Grethe (2007a) show that the EPS is of low relevance for orange exports from SMC. In particular, the SIV is about 70% higher on average than the applied, preferential EP for Moroccan oranges in the period 1995-2004. The SIV of Moroccan oranges is only lower than the EP in 7% of all observations, implying that Morocco does not profit from its preferential entry price for oranges. This is supported by analysis of Morocco's orange quota filling rate, which includes the preferential entry price quota as well as a preferential tariff rate quota. Since 1997, Morocco's orange quota filling rate has been below 50%.

Martinez-Gomez (2007) finds that the value resulting from the preferential entry price for exports of Moroccan clementines to the EU accounts for about 25% of the total value of preferences, with the remaining 75% attributed to preferential ad valorem tariff reductions.

López and Muñiz (2007) develop a method to measure the impact of different options for tariff cuts under the Doha Round of the WTO on market access for products covered by the EPS. For lemons, cucumbers and tomatoes, they find that reducing the EP by the same amount as the MTE can generate much larger reductions in expected duties than maintaining it constant at current levels. The authors point out that this effect is sensitive to the difference between the actual import price and the EP.

In summary, all recent studies on the restrictiveness of the EPS cover only a single product/country of origin combination or a subset of products/countries of origin. None analyses the effectiveness of the EPS in general. Results on single products/countries of origin are heterogeneous.

4 Specification of indicators to analyse the effectiveness of the EPS

In this study, the relevance of the EPS for the import price of each of the 15 selected types of fruits and vegetables, and for the primary exporting countries, is individually investigated. This Chapter specifies, empirically illustrates and discusses limitations of the utilized indicators.

We define the relative difference between the SIV and the respective EP as GAP as follows:

(1) $$GAP_{ijt} = \frac{(SIV_{ijt} - EP_{ijt})}{EP_{ijt}}$$

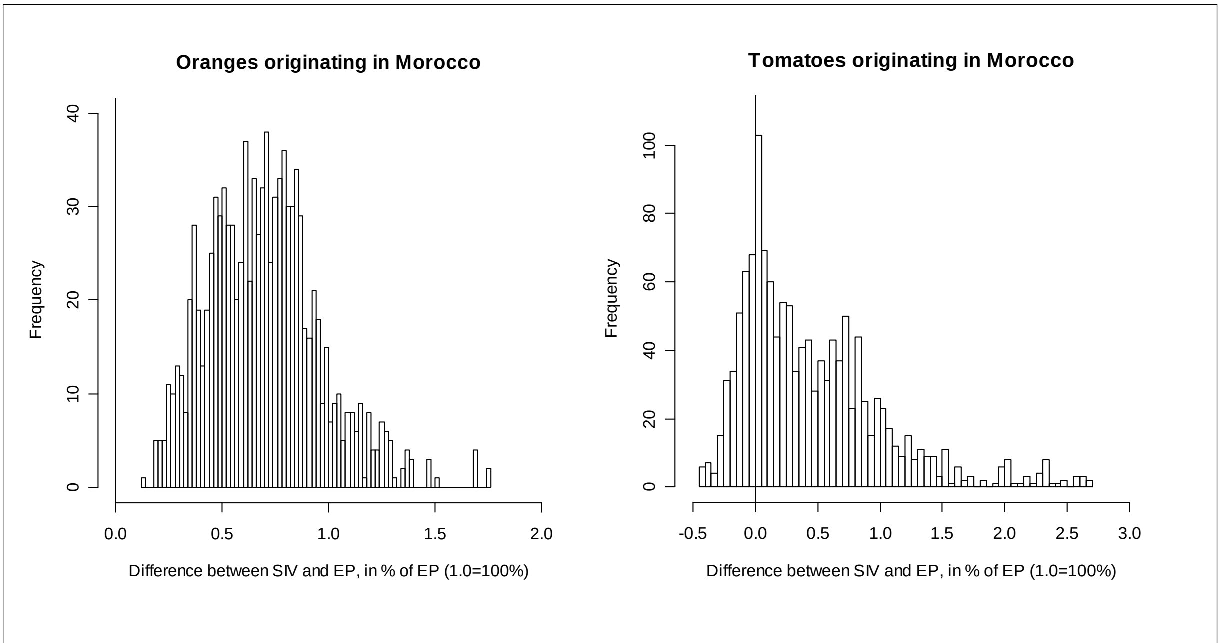
with i=kind of product, j=country of origin and t=time. Since preferential EPs are granted to just some countries, EP_{ijt} depends not only on the kind of product but also the country of origin. Besides, EP_{ijt} varies seasonally for some fruits and vegetables. If $GAP_{ijt} > 0$, the import price is higher than the EP, and if $GAP_{ijt} < 0$, it is lower.

Several characteristics of the distribution of GAP_{ijt} can be identified which are related to the relevance of the EPS. Import price observations with $GAP_{ijt} < 0$ indicate that there exists an export supply below the EP. The higher the share of observations with $GAP_{ijt} < 0$, the higher the export supply at prices below the EP. In such cases, the EPS is relevant.

Assuming that circumvention of the EPS is only possible to some degree, and/or that circumvention involves additional costs (e.g. for storage), a high share of observations with $GAP_{ijt} < 0$ indicates that abolishing the EP would result in an increase of export supply at prices below the EP. The stronger the degree of circumvention and/or the lower the cost of circumvention, the less the EPS restricts the existing export supply below the EP, and the lower the effect of abolishing the EP would be.

This can be illustrated by two examples, oranges and tomatoes originating in Morocco. Case studies show that the EPS is of low relevance for EU orange imports originating in Morocco (Goetz and Grethe, 2007). In contrast, the EPS is highly relevant for imports of tomatoes originating in Morocco (Chemnitz and Grethe, 2005; García-Álvarez-Coque et al., 2007). Figure 2 compares histograms and Figure 3 boxplots[7] for the distributions of GAP_{ijt} for these two cases in the period 1997-2005.

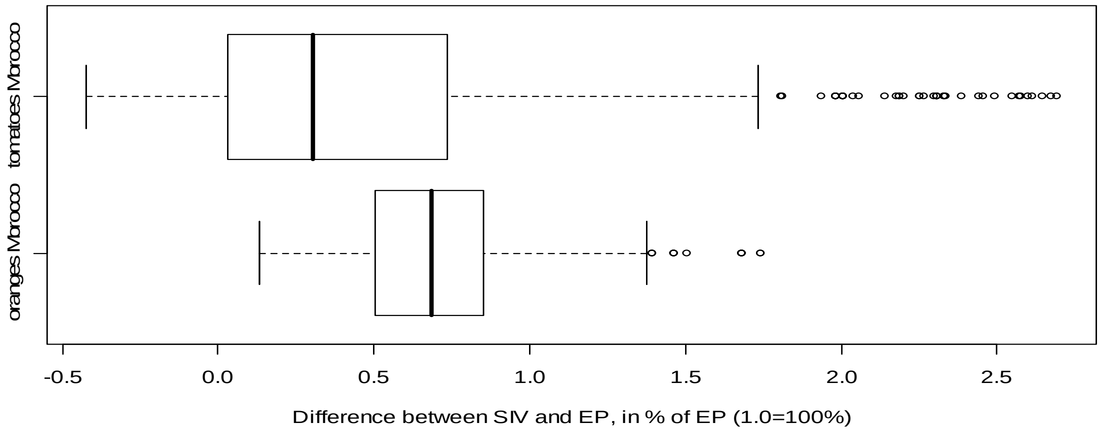
Figure 2: Histograms of GAP_{ijt} for oranges and tomatoes originating in Morocco



Sources: European Commission (2005a, 2007), own calculations.

[7] A boxplot clearly reveals the basic characteristics of the data set. It is composed of a box which represents 50% of all observations. The length of the box indicates the interquartile range, which is a measure for the variance. The line within the box indicates the median value of the dataset. The dashed horizontal line represents observations with a value of at most 1.5 times the interquartile range. Observations with larger or smaller values are represented by individual points.

Figure 3: Boxplots of GAP_{ijt} for oranges and tomatoes originating in Morocco



Sources: European Commission (2005a, 2007), own calculations.

The figures show that $GAP_{ijt} > 0$ for all observations for oranges, whereas $GAP_{ijt} < 0$ for a substantial share (21%) of observations for tomatoes. Thus, the export supply for oranges originating in Morocco is exclusively above the EP, whereas tomatoes exported by Morocco are also supplied at prices below the EP.

Thus, we define the share of observations with $GAP_{ijt} < 0$ in all observations of GAP_{ijt} as the first indicator of our analysis of the relevance of the EPS:

(2) $neg.GAP_{ij}$ = (number of observations GAP_{ijt} with $GAP_{ijt} < 0$)

/ (number of observations GAP_{ijt})

with i=kind of product, j=country of origin and t=time. This is correlated with the importance of the EPS. The smaller $neg.GAP_{ij}$, the less relevant the EP for the import price for product i exported by country j. Conversely, the larger $neg.GAP_{ij}$, the higher the influence of the EPS on the EU import price. As explained above, this requires SIV to be below the EP within the actual import season of the product. A similar variable is used in previous studies on the effectiveness of the EPS and RPS (see Cioffi and dell' Aquila (2004) and Swinbank and Ritson (1995), respectively).

One drawback of $neg.GAP_{ij}$ as an indicator for the relevance of the EPS is that it is confined to the effects of the EPS on observations with $GAP_{ijt} < 0$ and does not cover the influence of the EPS on observations with $GAP_{ijt} > 0$. Therefore, we derive a second indicator from the assumption, which is supported by anecdotal evidence, that exporters often supply their product at the lowest possible price while complying with the EP, thereby utilising their competitive cost advantage only to such a degree that additional specific tariffs are avoided. In other words, exporters could supply at lower prices but do not do so in order to avoid triggering specific tariffs. This implies a concentration of observations with $GAP_{ijt} > 0$ slightly above the EP. Here, the EP is relevant for exporters and has a significant influence on the price of the export supply. Hence, if the EP were abolished, export supply at prices below the EP would increase. Conversely, the EPS has no influence on observations with $GAP_{ijt} > 0$ with SIV being significantly higher than the EP. The degree of accumulation of observations with $GAP_{ijt} > 0$ slightly above the EP can be measured by the quantile with p=0.05 of the distribution of GAP_{ijt} with $GAP_{ijt} > 0$. The quantile with p=0.05 measures the highest GAP_{ijt} value in the set of observations that belong to the bottom 5% of the distribution of observations with $GAP_{ijt} > 0$. The lower the value of the 0.05-quantile, the more observations accumulate slightly above EP. This indicator explicitly addresses the influence of the EPS on import price observations with $GAP_{ijt} > 0$.

As an example, it becomes directly evident from Figure 3, that observations with $GAP_{ijt} > 0$ concentrate slightly above the EP for tomatoes, whereas for oranges the value of GAP_{ijt} is significantly higher than the EP with the minimum value of GAP_{ijt} amounting to 0.13. The 0.05 quantile is 0.03 for tomatoes and 0.31 for oranges. In other words, the smallest 5% of the observations with $GAP_{ijt} > 0$ exceed the EP by at most 3% for tomatoes compared with 31% for oranges. This suggests that the EPS is much more effective for tomatoes from Morocco than for oranges from Morocco, confirming the case study results cited above.

Thus, the degree of concentration of observations with GAP_{ijt} around the EP measured by the 0.05 quantile of the distribution of GAP_{ijt} with $GAP_{ijt} > 0$ serves as the second indicator in our analysis. Since the variance of GAP_{ijt} may vary by product and country of origin, and the 0.05 quantiles of distributions with differing variance are not exactly comparable, the 0.05 quantile is standardised by the standard deviation. In addition, large values are weighted less by taking logarithms, as the effectiveness of the EPS is only proportional to the 0.05 quantile within a certain interval:

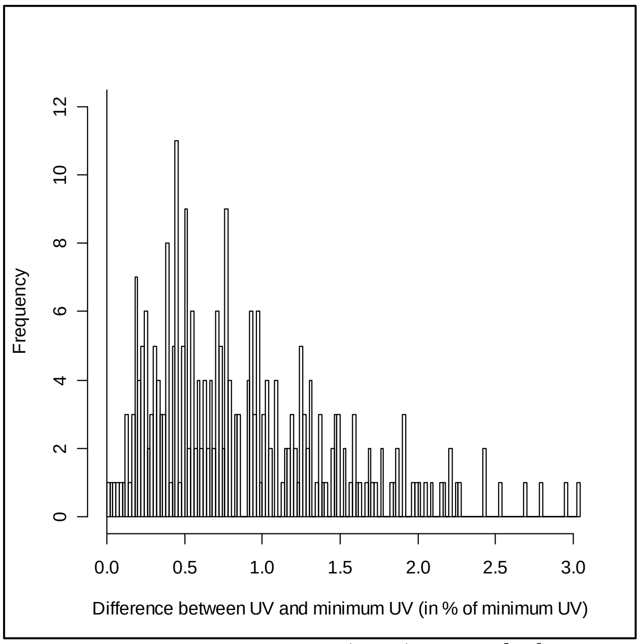
$$(3) \qquad Q^{*}_{0.05ij} = \ln\left(\frac{Q_{0.05ij}}{sd(GAP_{ij})}\right)$$

The less GAP_{ijt} is concentrated around the EP, the larger $Q^{*}_{0.05ij}$ and the lower the influence of the EPS on the EU import price. For oranges and tomatoes originating in Morocco, $Q^{*}_{0.05ij}$ equals 11.83 and 0.54, respectively. However, the converse case has to be interpreted with care, as an accumulation of prices around the EP could also be caused by other factors, as the following example illustrates. Figure 4 shows the histogram of the EU import price for pineapples, measured as the unit value (UV). UVs are surveyed by the EC on a biweekly basis for fruits and vegetables which are not subject to the EPS (European Commission, 2006). We transform the UV according to

$$(4) \qquad {UV_{it}}^{*} = \frac{UV_{it} - \min(UV_i)}{\min(UV_i)},$$

with i=product and t=time. Thus, UV^*_{it} differs from SIV^*_{ijt} in that it does not describe the difference to EP_{ijt} but rather to the minimum UV_i .

Figure 4: Histogram of UV^*_{it} for pineapples



Sources: European Commission (2006), own calculations.

Figure 4 shows that the distribution of UV^*_{it} for pineapples exhibits an accumulation close to its minimum value with $Q^*_{0.05}$ = 2.97, even though an EP for pineapples does not exist. In this case, the accumulation is not caused by the EPS. Instead, it could be associated with strong price competition, if the sum of production and marketing costs is similar to the minimum UV_i for many suppliers.[8] Therefore, a low value of $Q^*_{0.05ij}$ in combination with a particularly low value of $neg.GAP_{ij}$ may but does not necessarily indicate that the EPS is relevant. In such cases, the importance of the EPS cannot be determined unambiguously based on these indicators alone.

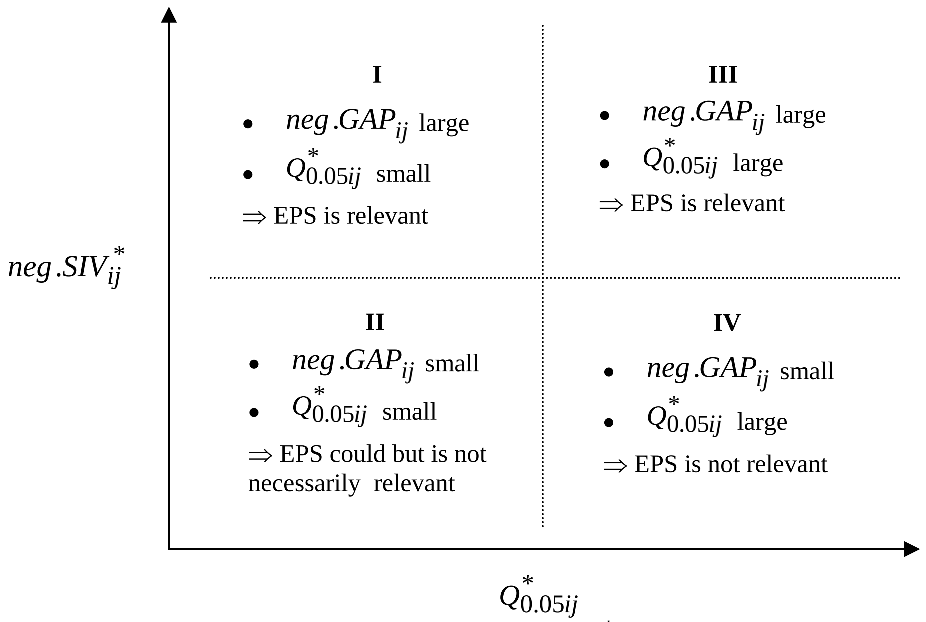
The possible combinations of $Q^*_{0.05ij}$ and $neg.GAP_{ij}$ can be categorised (Figure 5). Quadrant I represents cases in which $neg.GAP_{ij}$ is high and $Q^*_{0.05ij}$ is low, indicating that a relatively large export supply at prices below the EP exists, with the export supply above the EP concentrated slightly above the EP level. This implies that the EPS does influence the EU import price. In contrast, quadrant IV comprises combinations of a small value for $neg.GAP_{ij}$ and a large value for $Q^*_{0.05ij}$. In this case, there is no large export market segment below the EP, and market supply is not concentrated strongly at prices just above the EP. This suggests that the EPS is of relatively low relevance for the EU import price. A combination in

[8] Also, Deaton and Laroque (1989) find that price distributions of storable products tend to be truncated on the left.

quadrant II implies that the export market supply below the EP is small but that market supply above the EP accumulates around the EP. Here, the EPS could be important, but not necessarily so, as explained above.

Combinations of large values of both $neg.GAP_{ij}$ and $Q^*_{0,05ij}$ in quadrant III imply that market supply at prices below the EP exists, but that prices above the EP are not concentrated just above the EP. This could indicate a segmented market consisting of a low-quality segment with a price level below the EP as well as a high-quality segment with a price level far above the EP[9]. Alternatively, observations in quadrant III could be explained by a high degree of circumvention of the system. In such cases, the EPS is relevant for the EU import price.

Figure 5: Classes of combinations of the two indicators of the effectiveness of the EPS



It should be pointed out that the two indicators $Q^*_{0.05ij}$ and $neg.GAP_{ij}$ complement each other, but are theoretically not necessarily related. For example, if the EP is highly relevant and a country's exports to the EU are strongly organised and managed well in order to comply with the EPS by supplying products at a price at least as high as the EP, the value of $neg.GAP_{ij}$ as well as $Q^*_{0.05ij}$ might be low. In this case, the effectiveness of the EPS is high, although $neg.GAP_{ij}$ is low. Thus, $neg.GAP_{ij}$ alone would not correctly determine the effectiveness of the EPS. Instead, the high relevance of EPS would become evident in a low value of $Q^*_{0.05ij}$.

The remainder of this chapter aims to further justify the indicators selected for measuring the relevance of the EPS. We describe other measures correlated to the effectiveness of the EPS and difficulties that would arise if applied in the context of this study.

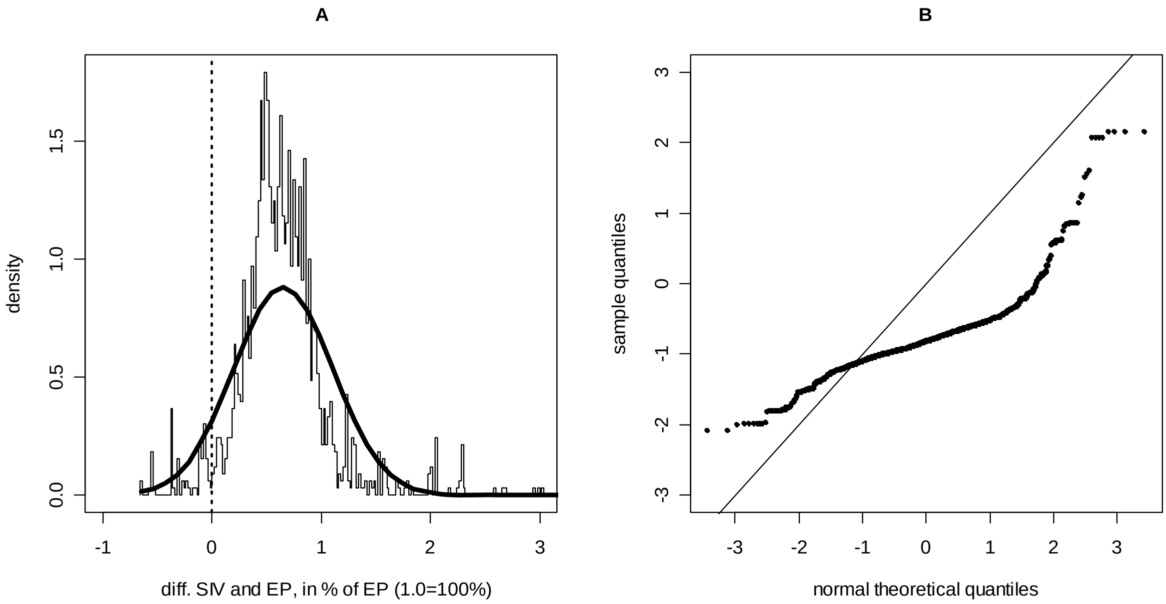
9 The idea of a twofold segmentation of the EU fruits and vegetables market can also be found in Cioffi and dell' Aquila (2004, 179).

The skewness coefficient[10] is a further distribution moment which can reflect the impact of the EPS. For example, the skewness of the distribution of GAP values for oranges from Morocco, for which the EPS is of low importance, is rather low at 0.62, but is relatively high at 1.19 for tomatoes originating in Morocco, for which the EPS is highly relevant. This represents an additional hint that the EPS is highly effective for tomatoes from Morocco, as the asymmetric distribution with the relatively short left tail is probably caused by traders avoiding selling below the entry price. However, skewness is also strongly influenced by accidental extreme values, which are typical for fruit and vegetable data. Figure 6 shows A) the histogram and normal density function and B) the qq-plot[11] of the distribution of GAP_{ijt} for apples from South Africa, which is characterised by a large number of extreme values and a skewness coefficient of 2.04. Yet, as the graphs directly show, the influence of the EPS is low since observations with $GAP_{ijt} > 0$ neither accumulate slightly above the EP, nor is there a high share of observations with $GAP_{ijt} < 0$. In contrast, skewness is rather low for lemons originating in Argentina at 0.77 (Figure 7), although the distribution of GAP_{ijt} is characterised by a high share of negative observations and an accumulation of observations with $GAP_{ijt} > 0$ slightly above the EP. In the latter case, the low value of skewness is caused by a high share of negative observations which increase the symmetry of the distribution of GAP_{ijt}. Therefore, a robust estimate of skewness that excludes extreme values from the dataset, would improve results only in some cases but not all. Thus, we do not consider skewness as an indicator in this study.

[10] Skewness is a measure for the asymmetry of a probability distribution. A positive skew indicates that the right tail of the distribution is longer than the left tail, whereas a negative skew indicates that the left tail of the distribution is longer than the right tail. The measure of skewness used here is $S = E(X-\mu)^3/\sigma^3$ with η the mean values and σ the standard deviation of f(x).

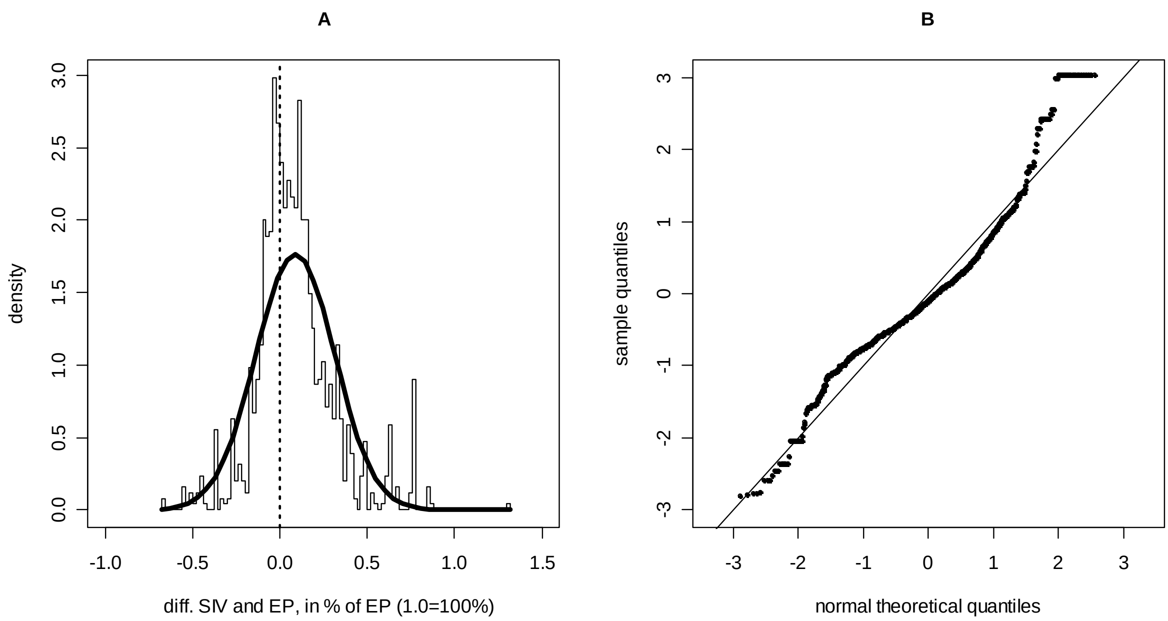
[11] A quantile-quantile (qq) plot is a tool for comparing two distributions. In our application, the empirical distribution is compared to a normal distribution. If these two distributions are equal, their quantiles are equal, implying that the empirical quantile values are on the diagonal line.

Figure 6: GAP_{ijt} apples from South Africa – A) histogram and normal density function, B) QQ-plot GAP_{ijt}



Sources: European Commission (2005a, 2007), own calculations.

Figure 7: GAP_{ijt} lemons from Argentina – A) histogram and density function, B) QQ-plot GAP_{ijt}

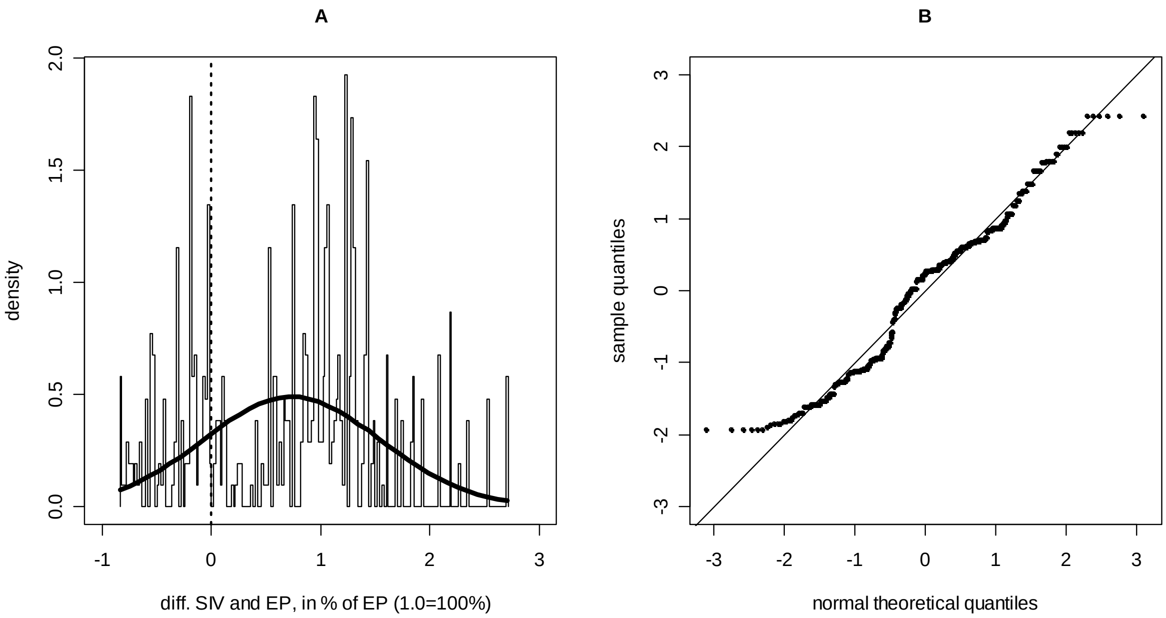


Sources: European Commission (2005a, 2007), own calculations.

Furthermore, for our analysis we do not assume either that GAP_{ijt} would be normally distributed in the absence of an EP, or that the EP generates a truncation of the distribution, as López and Muñiz (2007) do, for two reasons. First, due to the existence of observations of GAP_{ijt} with $GAP_{ijt} < 0$, distributions of GAP_{ijt} which are influenced by the EP are not necessarily represented by a truncated distribution. This becomes particularly evident from Figure 7 which presents the histogram (A) and the corresponding qq-plot (B) of the distribution of GAP_{ijt} for lemons originating in Argentina with 36% of GAP_{ijt} <0.

Second, the assumption that SIV is normally distributed seems inadequate in general. As shown above, price distributions may be truncated. Furthermore, price distributions may be two peaked, as shown in Figure 8 A) for artichokes originating in Egypt.

Figure 8: GAP_{ijt} artichokes from Egypt – A) histogram and normal density function, B) QQ-plot



Sources: European Commission (2005a, 2007), own calculations.

5 Empirical results

The indicators $neg.GAP_{ij}$ and $Q^{*}_{0.05ij}$ derived above are calculated for 81 country- and product-specific distributions of GAP_{ijt}, each consisting of between 65 and 2,678 observations[12].

We conduct a cluster analysis with the aim to attribute country- and product-specific imports of fresh fruits and vegetables into classes which differ in the relevance of the EPS.

Although $neg.GAP_{ij}$ and $Q^{*}_{0.05ij}$ exhibit substantial correlation (correlation coefficient = -0.59, which is significantly different from zero at p=0.01), both indicators are used as variables in the cluster analysis for reasons given in Chapter 4.

[12] The number of available observations of SIVs for a product of a particular exporting country varies depending on the number of days the product is traded on EU wholesale markets. Moreover, series of observations of up to two years length are excluded from individual datasets due to data inconsistencies. Altogether, we utilise about 57,000 observations of SIV in the time period 1995-2005.

The cluster analysis is conducted in several steps. We first identify any outliers (here, “plums from Turkey”) using the Single-Linkage method and remove them from the dataset. Then, the optimal number of clusters and the respective cluster means are identified by the Ward method, which serves as a starting partition in the consequent application of the K-Means method to determine the elements of each cluster. Although Scree test results indicate that the optimal number of clusters is three, we allow four clusters in the K-Means method. Since objects in cluster 1 are distinctively different from all other objects, these could be treated as outliers. If the Scree test is conducted for the dataset excluding the objects in cluster 1, then three clusters are optimal. Therefore, we choose the four-cluster result from the Ward method as the starting partition for the K-Means method, which identifies the optimal four-cluster solution for 80 objects.

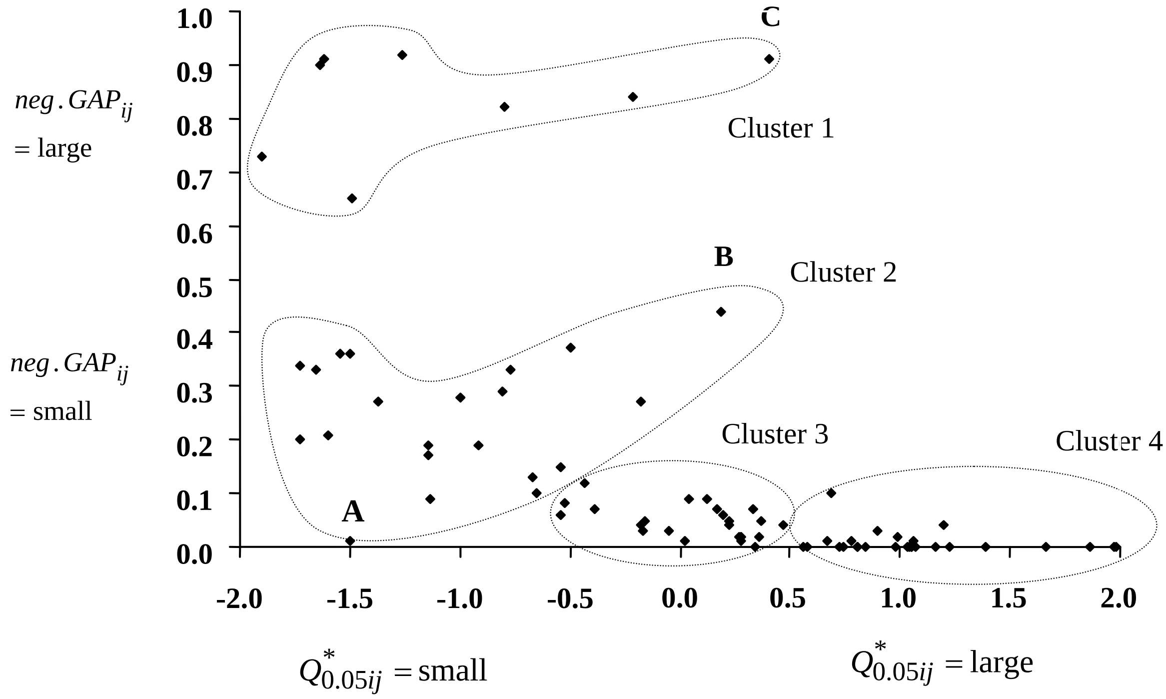
Several criteria suggest that the obtained four-cluster solution is of high quality. F-values are smaller than 1 for both variables in each cluster, indicating that the clusters are very homogeneous (Table 2). Further, eta = 0.93 on average implies that the two variables $neg.GAP_{ij}$ and $Q^{*}_{0.05ij}$ are significantly different and that the within-cluster variance is low. In addition, $eta^2 = 0.86$ shows that 86% of the variance of $neg.GAP_{ij}$ and $Q^{*}_{0.05ij}$ can be attributed to differences between clusters on average. The stability of the cluster solution is high. Cross-tabulation indicates that 74 objects, corresponding to 92.5% of the total, are classified congruently by the Ward and the K-means methods. In addition, the kappa number is equal to 0.90.

Results of the cluster analysis are presented in Table 2 and in the cluster plot (Figure 9). The cluster plot is organised in the same dimensions as Figure 5 above: the vertical axis displays the share of negative observations in its original dimension, while the horizontal axis displays the size of the 0.05 quantile in its normalised, logarithmised and z-standardised form. Table 3 additionally presents detailed results for all objects.

Table 2: Cluster characteristics

	Cluster 1 n = 8 (10%)		**Cluster 2** n = 21 (26%)		**Cluster 3** n = 26 (33%)		**Cluster 4** n = 25 (31%)	
	$neg.GAP_{ij}$ (stand.)	$Q^{*}_{0,05ij}$ (stand.)	$neg.GAP_{ij}$ (stand.)	$Q^{*}_{0,05ij}$ (stand.)	$neg.GAP_{ij}$ (stand.)	$Q^{*}_{0,05ij}$ (stand.)	$neg.GAP_{ij}$ (stand.)	$Q^{*}_{0,05ij}$ (stand.)
F-value	0.15	0.65	0.19	0.28	0.02	0.10	0.01	0.15
t-value (mean)	2.65	-1.06	0.31	-1.04	-0.47	0.10	-0.61	1.11
Relevance EPS	← → low							

Figure 9: Cluster plot



Cluster 1 consists of eight (10%) of the eighty objects, which are characterised by an extremely high value of $neg.GAP_{ij}$, varying between 0.65 and 0.92, while $Q^*_{0.05ij}$ varies over a broad range between -1.90 and 0.41. T-values for cluster 1 indicate that $neg.GAP_{ij}$ is higher and $Q^*_{0.05ij}$ substantially lower than on average.

Products that are characterised by a significantly lower, yet still high, value of $neg.GAP_{ij}$ for most products (between 0.09 and 0.44 except for one case (point A)), and a low value of $Q^*_{0.05ij}$ (between -1.73 and 0.19) belong to cluster 2. Like cluster 1, the t-value is higher and lower than on average for $neg.GAP_{ij}$ and $Q^*_{0.05ij}$, respectively. Cluster 2 comprises 21 objects accounting for 26% of all objects.

Objects assigned to cluster 4 are distinguished by a very low value of $neg.GAP_{ij}$ (at most 0.1) and a high value of $Q^*_{0.05ij}$ (at least 0.67). In addition, objects in cluster 3 are characterised by a rather low value of $neg.GAP_{ij}$ (< 12%) and high value of $Q^*_{0.05ij}$ (< 0.47), which are higher and lower than the values of objects of cluster 4 on average, respectively. For both clusters 3 and 4, $neg.GAP_{ij}$ is lower and $Q^*_{0.05ij}$ higher than average. Cluster 3 and cluster 4 are composed of 26 and 25 objects accounting for 33% and 31% of all objects, respectively.

Thus, the 4 identified clusters are not congruent with the 4 quadrants in Figure 5.

Cluster results suggest that the EPS is of highest relevance for objects in cluster 1, which display a very high share of negative observations for all objects and a strong accumulation of SIVs close to the EP for most products. Furthermore, for objects belonging to cluster 2 the

EPS is relevant, although to a lesser extent. The share of negative observations is lower than for cluster 1, but still at 9% or more for all but one product. In addition, SIVs are concentrated closely above the EP for most products in cluster 2. Thus, clusters 1 and 2 can by and large be attributed to quadrant I in Figure 5. The relevance of the EPS is lower for objects in cluster 3, and lowest of all for all objects attributed to cluster 4. The share of negative observations is very low for both clusters, and only for some products in cluster 3 is there some concentration of SIVs near the EP level. Clusters 3 and 4 match with quadrant IV in Figure 5.

In the following, three objects depicted in Figure 9 are discussed more in detail. Oranges originating in the US (A) are characterised by a particularly low value for $neg.GAP_{ij}$ of 0.01 as well as for $Q^{*}_{0.05}$. In other words, this object is characterised by an extremely low share of observations with $GAP_{ijt} < 0$, but a strong accumulation of observations with $GAP_{ijt} > 0$ closely above the EP. Therefore, this object could be attributed to quadrant II in Figure 5, for which the EPS could be, but is not necessarily of high relevance. Importers point out that the observed accumulation of observations close to the EP for oranges originating in the US is not caused by the EPS. In general, oranges exported by the US are highly priced and therefore their share in the EU market is very low.

Two objects – clementines originating in Turkey (B) and plums originating in Bulgaria (C) – are characterised by high values of $neg.GAP_{ij}$ and concurrently relatively high values of $Q^{*}_{0.05}$. These objects might correspond to objects belonging to quadrant III in Figure 5, which may indicate that market supply is segmented in a low-quality segment with a price level below the EP, and a high-quality segment with a price level far above the EP. Indeed, importers confirm that there are two kinds of clementines of different quality exported by Turkey which are characterised by large differences in price levels. For plums, by contrast, importers attribute the apparent existence of two market segments to annual price differences for plums. The amount of plums harvested in the EU varies considerably from year to year, implying large annual price differences.

The affiliation of individual fruits and vegetables is with some exceptions heterogeneous throughout countries of origin (Table 3). For example, the EPS is of low importance for the major apple exporters to the EU such as Argentina, New Zealand and South Africa, but relevant for minor exporters such as China, Turkey, Poland and Uruguay. Regarding pears, the EPS is only relevant for exports from China.[13] In addition, the EPS is of high relevance for the major tomato suppliers (Morocco and Turkey), but of low importance for Israel and Tunisia.

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[13] For a detailed analysis of the relevance of the EPS for fruits and vegetables originating in China, see Goetz and Grethe (2007b).

To draw some more general conclusions with regard to the relevance of the EPS for particular kinds of fruits and vegetables, country-specific results for each product are weighted by their respective share in the total quantity of EU imports during the period covered by the EPS (Table 3). For example, the countries of origin for apples that are attributed to clusters 3 and 4 account for 59% and 38% of total EU apple imports, respectively. This aggregation shows that the EPS is most relevant for the import of artichokes, courgettes, cucumbers, lemons, plums and tomatoes (dominant shares in clusters 1 and 2); significantly lower for apples, clementines and pears (dominant shares in cluster 3); and least relevant for apricots, mandarins, oranges, peaches and nectarines and table grapes (dominant shares in cluster 4). For their part, apples are easily stored, offering broad opportunities to circumvent the EPS (which is particularly the case for apples originating in countries in the Southern Hemisphere). Therefore, it can be expected that the removal of the EPS for apples would only have a very limited effect on the EU market.

Furthermore, to assess the relevance of the EPS for individual export countries, the incidence of clusters is aggregated per country over all products. The group of countries which are repeatedly attributed to clusters 1 and 2 and thus for which the EPS is of high relevance comprises Turkey (5 out of 11 products), the eastern European countries of Bulgaria, Poland, Romania and Hungary before EU accession (8 out of 11), the neighbouring eastern European countries of Bosnia-Herzegovina, Serbia-Montenegro and Macedonia (1 out of 1 each), Morocco (3 out of 6), South Africa (2 out of 4) and China (2 out of 2).

In contrast, the EPS is of low relevance for Israel (4 out of 5 objects are clearly assigned to clusters 3 and 4), the US (3 out of 3), and Jordan, Canada and New Zealand (2 out of 2 each).

The results also suggest that the influence of the EPS on the SMC (with the exception of Cyprus) is mixed, with the exception of mandarins and table grapes, which are attributed to cluster 4 for all SMC. For example, the EPS has a higher influence on tomato exports from Morocco and Turkey than from Israel or Tunisia; and greater impact on orange exports from Egypt, Tunisia and Turkey than from Israel or Morocco. It is striking that the EPS is of high relevance for Moroccan exports of courgettes, cucumbers and tomatoes, for which Morocco enjoys preferential EPs. Overall, out of 38 SMC objects, the EPS is of high relevance for 8 objects (21% in cluster 4), and of low if any relevance for 30 objects (79% in clusters 3 and 4).

Table 3: Cluster analysis of results

	$neg.GAP_{ij}$	$Q^*_{0,05ij}$ (z-standard)	Number of observations	Share in total extra-EU import	Cluster
Apples	**EPS of lowest relevance** (a: >0.98; b: cluster 1: <0.01, cluster 2: <0.04, cluster 3: <0.59, cluster 4: 0.38				
Argentina	0.09	0.04	1275	0.10	3
Australia	0.00	0.98	714	0.01	4
Brazil	0.05	0.37	1179	0.07	3
Canada	0.00	1.05	1543	0.01	4
Chile	0.05	0.22	1412	0.20	3
China	0.10	-0.65	1493	0.02	2
New Zealand	0.04	1.20	1315	0.30	4
Poland	0.91	-1.62	813	<0.01	1
South Africa	0.04	0.47	1648	0.21	3
South Korea	0.02	0.28	340	<0.01	3
Turkey	0.20	-1.73	337	<0.01	2
Uruguay	0.13	-0.67	788	<0.01	2
USA	0.01	0.67	2212	0.06	4
Apricots	**EPS of lowest relevance** (a: 0.87; b: cluster 3: 0.26, cluster 4: 0.61)				
Hungary	0.10	0.69	130	0.26	3
Turkey	0.00	1.16	323	0.61	4
Artichokes	**EPS of higher relevance** (a: 0.96; b: cluster 2: 0.96)				
Egypt	0.27	-0.18	519	0.96	2
Cherries	**EPS of lowest relevance** (a: <0.83; b: cluster 2: 0.01, cluster 3: <0.13. cluster 4: 0.72)				
Bulgaria	0.19	-1.14	160	0.01	2
Canada	0.00	1.05	1543	0.02	4
Hungary	0.06	0.20	154	0.12	3
Iran	0.03	-0.05	175	<0.01	3
Turkey	0.01	0.78	440	0.60	4
USA	0.00	1.04	466	0.10	4
Clementines	**EPS of lower relevance** (a: 0.99; b: cluster 2: 0.01, cluster 3: 0.98)				
Turkey	0.44	0.19	356	0.01	2
Morocco	0.01	0.28	799	0.98	3
Courgettes	**EPS of lower relevance** (a: 0.97; b: cluster 3: 0.11; Morocco: 0.86				
Jordan	0.00	0.56	119	0.01	3
Morocco	0.09	-1.13	979	0.86	2
Turkey	0.04	-0.18	2204	0.10	3
Cucumbers	**EPS of lower relevance** (a: 0.67; b: cluster 2: 0.21, cluster 3: 0.45)				
Bulgaria	0.29	-0.81	344	0.11	2
Egypt	0.00	0.34	205	0.01	3
Jordan	0.00	0.58	571	0.06	3
Morocco	0.28	-1.00	385	0.10	2
Turkey	0.07	-0.39	1788	0.38	3
Lemons	**EPS of higher relevance** (a: <0.97; b: cluster 2: 0.96, cluster 3:<0.01)				
Argentina	0.36	-1.54	1273	0.66	2
Cyprus	0.02	0.27	789	<0.01	3
South Africa	0.19	-0.92	1254	0.09	2
Turkey	0.15	-0.54	1253	0.15	2
Uruguay	0.33	-0.77	812	0.05	2
Zimbabwe	0.34	-1.73	313	<0.01	2

	$neg.GAP_{ij}$	$Q^*_{0,05ij}$ (z-standard)	Number of observations	Share in total extra-EU import	Cluster
Mandarins	**EPS of lowest relevance** (a: <0.94 ; b: cluster 4:<0.94)				
Cyprus	0.00	1.98	219	0.06	4
Israel	0.00	1.86	514	0.16	4
Jamaica	0.00	0.81	492	<0.01	4
Morocco	0.01	1.06	395	0.07	4
Pakistan	0.02	0.99	97	<0.01	4
Turkey	0.00	1.66	819	0.63	4
Oranges	**EPS of lowest relevance** (a: <0.94; b: cluster 2: <0.02, cluster 3: 0.25, cluster 4: 0.67				
Cyprus	0.01	0.02	502	0.03	3
Egypt	0.05	-0.16	669	0.09	3
Israel	0.00	1.39	834	0.21	4
Morocco	0.00	1.23	1035	0.46	4
South Africa	0.37	-0.50	220	0.01	2
Tunisia	0.03	-0.17	762	0.07	3
Turkey	0.08	-0.52	1016	0.06	3
USA	0.01	-1.50	191	<0.01	2
Peaches/Nectarines	**EPS of lowest relevance** (a: 0.71; b: cluster 3: 0.06, cluster 4: 0.65)				
Israel	0.09	0.12	65	0.06	3
Turkey	0.00	0.84	485	0.65	4
Pears	**EPS of lower relevance** (a: <0.94; b: cluster 2: 0.02, cluster 3: <0.88, cluster 4: <0.04)				
Argentina	0.07	0.17	923	0.43	3
Chile	0.07	0.33	796	0.17	3
China	0.33	-1.65	799	0.02	2
Hungary	0.02	0.36	559	<0.01	3
New Zealand	0.00	0.81	136	<0.01	4
South Africa	0.02	0.28	1243	0.27	3
Turkey	0.00	1.03	1124	0.03	4
Plums	**EPS of highest relevance** (a: 0.86; b: cluster 1: 0.71, cluster 4: 0.15)				
Bosnia-Herzegovina	0.82	-0.80	128	0.01	1
Bulgaria	0.91	0.41	123	0.03	1
Hungary	0.73	-1.90	388	0.44	1
Israel	0.03	0.90	494	0.15	4
Poland	0.90	-1.64	134	0.05	1
Romania	0.65	-1.49	349	0.15	1
Serbia-Montenegro	0.92	-1.26	144	0.03	1
Table grapes	**EPS of lowest relevance** (a: <0.75; b: cluster 2: <0.01, cluster 4: 0.73)				
Cyprus	0.04	0.22	159	0.02	3
Egypt	0.00	0.72	141	0.01	4
Hungary	0.17	-1.14	309	<0.01	2
Israel	0.00	1.07	317	0.01	4
Turkey	0.00	0.74	756	0.40	4
USA	0.00	1.97	598	0.31	4
Tomatoes	**EPS of higher relevance** (a: 0.98; b: cluster 1: 0.01, cluster 2: 0.91, cluster 3: 0.08)				
Israel	0.06	-0.54	520	0.06	3
Macedonia	0.84	-0.21	268	0.01	1
Morocco	0.21	-1.60	1325	0.83	2
Poland	0.36	-1.50	181	0.01	2
Tunisia	0.12	-0.43	651	0.01	3
Turkey	0.27	-1.37	1593	0.06	2

a: The sum of import shares of all countries of origin in total extra-EU imports for the respective product in the time period for which the EPS applies.

b: The sum of import shares of all countries of a specific cluster in total extra-EU imports of one product in the time period the EPS applies.

Observation period: 1995-2005 for cherries, clementines and mandarins, and 1997-2005 otherwise.

6 Future developments that could impact the effectiveness of the EPS

Several future developments may influence the effectiveness of the EPS. Most importantly, the EPS will be eroded for three reasons. First, the EPS is fixed in nominal terms, which means that it is devalued each year due to inflation. Second, the EU is seeking to conclude regional trade agreements (RTAs) with many countries and is increasingly including agricultural products in these RTAs. Current negotiations include a potential agreement with the MERCOSUR countries and further liberalisation with the SMC as part of the Barcelona Process. Due to improved market access for fresh fruit and vegetables caused by tariff or entry price reductions agreed upon as part of RTAs, the difference between EU prices and international prices will decline, further decreasing the relevance of the EPS. Third, the EU import regime for fruit and vegetables will be subject to any agreement on agriculture that may be reached in the Doha Round of trade negotiations in the WTO. Various aspects play a role in how such an agreement could influence the EPS; the following paragraphs try to anticipate how the results could look like.

A banded approach for tariff reductions has been agreed in the Doha Round and the first question therefore concerns which tariff band fruit and vegetables would fall into. For products which are subject to the EPS, ad valorem equivalents have to be established in order to determine tariff reductions. As the ad valorem equivalents notified to the WTO are not yet available, the ad valorem equivalents in Table 4 are calculated based on Eurostat (various issues) import unit values. Potential reduction rates are based on the EU proposal (European Commission, 2005b).

A second question is how tariff reductions would influence entry prices. During the implementation period of the Uruguay Round Agreement, entry prices were reduced by the same amount of € per ton as the respective specific tariffs. As entry prices were higher than the specific tariffs, their relative reduction was below the 20% reduction rate which was applied to specific tariffs. As a result, the higher the specific tariff in relation to the entry price was, the more entry prices were reduced in relative terms. Whether the EU will apply this approach again is an open question and subject to negotiation.

A third question is to what extent the EU is able and willing to declare tariff lines for fresh fruit and vegetables as “sensitive”. The consequences are still unclear owing to the enormous differences in the current proposals with respect to the share of tariff lines which should be eligible for this category (1-8%), as well as the still-missing agreement on the size of tariff rate quotas (TRQs), which should be opened for these products as well as in and above TRQ tariff reduction rates.

Table 4 provides an initial, very rough assessment of how future entry prices and specific tariffs could look if the respective products were not declared sensitive and if the EU were to apply the Uruguay Round approach to the reduction of entry prices.

Table 4: Potential development of AVEs and EPs after the conclusion of the Doha Round

	IUV 1999-2001 (€/t)	Ad val. tariff (%)	Base MTE (€/t)	Max. total AVE (€/t)	Base EP (€/t)	Potential red. rate (EU)	Final MTE (€/t)	Final EP (€/t)	Reduction of EP
Tomatoes	766	8.8 - 14.4	298	53%	526 - 1,126	40%	179	407-1,007	11-23%
Cucumbers	747	12.8 - 16.0	378	67%	481 - 1,105	50%	189	292-916	17-39%
Artichokes	1,279	10.4	229	28%	654 - 826	35%	149	574-746	10-12%
Courgettes	1,033	12.8	152	28%	413 - 692	35%	99	360-639	8-13%
Oranges	454	3.2 - 16.0	71	32%	354	40%	43	326	8%
Clementines/ mandarins	691	16.0	106	31%	286 - 649	40%	64	244-607	7-15%
Lemons	640	6.4	256	46%	462 - 558	40%	154	360-456	18-22%
Table grapes	1,471	8.0 - 17.6	96	24%	476 - 546	35%	62	442-512	6-7%
Apples	757	4.8 - 11.2	238	43%	457 - 568	40%	143	362-473	17-21%
Pears	735	4.0 - 10.4	238	43%	388 - 510	40%	143	293-415	19-25%
Apricots	1,431	20.0	227	36%	771 - 1,071	40%	136	680-980	8-12%
Cherries	1,619	12.0	274	29%	916 - 1,494	35%	178	820-1,398	6-10%
Peaches/ nectarines	1,601	17.6	130	26%	600 - 883	35%	85	555-838	5-8%
Plums	1,111	6.4 - 12.0	103	21%	696	35%	67	660	5%

Sources: European Commission (2005b, 2007), Eurostat (various issues), own calculations.

Table 4 shows that ad valorem equivalents (AVEs) vary between 21% and 67%, resulting in potential reduction rates between 35% and 50% for specific and ad valorem tariffs. Applying the resulting reduction of MTEs to the entry prices reduces them by between 5% and 39%. These reductions will cause the effectiveness of the EPS to decline strongly.

In contrast to these three factors that tend to erode the effectiveness of the EPS, the improvement of transport and marketing infrastructure in many developing countries may result in lower EU import prices, which would in turn enhance the importance of the EPS.

If developing countries manage to reduce transport costs substantially by establishing freight routes with high trade volumes and large vessels, highly efficient ports, and a competitive shipping services industry, the cost-competitiveness of their fresh fruit and vegetable supply would improve and they could increasingly serve lower-price EU market segments, potentially supplying products below the EP. However, we would expect the effects eroding the EPS to outweigh the potential improvement in marketing and transport infrastructure in developing countries in the short run.

7 Conclusions

The results of this analysis suggest that the relevance of the EPS is heterogeneous among products and among countries of origin for most kind of fruits and vegetables. Thus, an adequate assessment of the importance of the EPS requires not only a product-specific but also a country-specific analysis.

With respect to product-specific results, we find that the effectiveness of the EPS is highest for artichokes, courgettes, cucumbers, lemons, plums and tomatoes. The influence of the EPS on apples, clementines and pears is lower, and the EPS is of lowest relevance for apricots, mandarins, oranges, peaches and nectarines and table grapes.

With respect to country-specific results, we find that the EPS is of particular relevance for fruit and vegetable exports from the EU's neighbours such as Morocco, Turkey and Eastern Europe. These countries would benefit most if the EPS were removed. In contrast, the EPS is of minor importance for exports from far-away countries with high transport costs such as Canada, Israel, New Zealand and the US, with the exception of China and South Africa. Results suggest that abolishing the EPS would enable the latter two countries to utilise their competitive cost advantage more fully.

We also find that the EPS is of high relevance for Moroccan exports of courgettes, cucumbers and tomatoes, despite the fact that Morocco enjoys preferential EPs. This implies that Morocco exhausts the preferential EPs for these products.

However, the EPS is of little relevance for developing countries other than the EU's direct southern neighbours today. Since LDCs are not covered by the EPS anyhow as part of the EBA initiative, the EPS is of no relevance for Sub Saharan Africa except for South Africa. Furthermore, exports from Latin American countries (Brazil, Argentina, Chile and Uruguay) are mostly attributed to cluster 3, thus the EPS is of minor importance. This may also be due to substantial sea transport costs for these countries, with transport in a refrigerated container amounting to e.g. 165 $/t for Brazil, 175 $/t for Argentina and 250 $/t for Chile.[14]

Overall, in 36% of the analysed country-specific and product-specific cases we find the EPS to be of relatively high relevance. In contrast, the EPS is of rather low, if any, relevance for 64% of the investigated cases. Any further reduction of EPs as part of the negotiation process of RTAs or a potential conclusion of the Doha Round will lower the relevance of the EPS even further.

In cases in which the EPS is determined to be highly relevant, it can be expected that the removal of the EPS would result in an increase of exports to the EU at prices below the EP. However, this effect depends on the degree to which the EPS is currently circumvented and

[14] These data were provided by the private sector.

the costs involved. Therefore, particularly for apples originating in the Southern Hemisphere countries, the EPS might be of even lower relevance than the results of our cluster analysis suggest.

Our results are in line with the findings of García-Álvarez-Coque et al. (2007) and Martinez-Gomez (2007) regarding Moroccan exports of tomatoes and clementines. In addition, our results conform with those of Cioffi and del' Aquila (2004) for apples, oranges and tomatoes. However, our findings only partially conform with those of López and Muñiz (2007), since we analyse the relevance of the EPS not only in product-specific but also country-specific terms, which reveals substantial differences in the relevance of the EPS for countries exporting cucumbers and tomatoes to the EU.

Generalising the results of this analysis for the whole EU fruit and vegetable trade, it is necessary to take into account that the analysis has been conducted based on EU wholesale market prices[15], even though the majority of the fruit and vegetable trade is conducted directly by exporters to retailers and not via the wholesale market in several EU countries. For example, the share of the fruit and vegetable trade via wholesale markets is only about 20% in Germany, and is even lower in the UK[16], compared with shares of about 65% in Spain and Italy, and even higher in France (Gibbon, 2003). Prices of products traded directly can differ significantly from products traded via wholesale markets. For example, importers estimate that fresh fruit and vegetable prices on wholesale markets are on average about 10-20% higher than prices of directly traded products in Germany. This would limit the scope for traders to apply the deductive method or the fob invoice method for customs clearance in case of a low SIV which reflects wholesale market prices.

Yet German importers[17] explicitly confirm the results of this study. They emphasise that the EPS is indeed relevant for products assigned to clusters 1 and 2 in our analysis. Regarding cluster 3 products, they confirm that the EPS has some influence on clementines, but has rather low relevance for apples and pears. They point out that the EPS is of no relevance for products attributed to cluster 4, i.e. apricots, mandarins, oranges, peaches and nectarines and table grapes.

For any simulation modelling of trade liberalisation for fruits and vegetables between the SMC and the EU, we conclude that there is little value in modelling the effects of the EPS for cluster 4 products, i.e. exports of apricots, cherries, mandarins, nectarines and peaches and

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[15] Exceptions are prices gathered in the UK, Netherlands and Finland, which are requested directly from the importers, as the fresh fruit and vegetable trade via the wholesale market has very low importance. In Greece, these data are collected from the customs authority.

[16] Information provided by ZMP, Germany.

[17] Results of the cluster analysis were discussed in detail with three German fruit and vegetable importers.

table grapes by Turkey; mandarins and oranges by Morocco; mandarins, oranges, plums and table grapes by Israel; and table grapes by Egypt, for which the EPS is indeed a paper tiger. Rather, it seems promising to concentrate on cluster 2 cases, for which the EPS constitutes a powerful market barrier.

Finally, we note that the EPS is a complex system and, compared to a tariff, its effectiveness is not transparent. Clearly it is in contradiction with the spirit of the WTO rules on market access for agricultural products which prohibit non-tariff barriers. Its administration, further development and administration by importing companies involve transaction costs, for example for storage in order to avoid customs clearance when the SIV is below the EP. In light of the redundancy of the EPS for many products and origins found here, which is likely to increase as the EPS is eroded by bilateral and multilateral trade liberalisation, its abolition would be an important step in the direction of a more liberal and transparent trading regime.

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