

# Costs-Benefits Analysis of the Community Patent

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## **Abstract**

For more than 40 years various countries and/or professional associations have acted, voted or lobbied against the implementation of the Community Patent (COMPAT). The econometric results and simulations presented in this paper suggest that thanks to its attractiveness in terms of market size and with a sound renewal fee structure, the COMPAT could generate more income for the European Patent Office (EPO) and for – nearly – all National Patent Offices (NPO). It would also drastically reduce the relative patenting costs for applicants.

**JEL Classification:** O34, O38, P14

**Keywords:** patent systems, community patent, patenting cost, renewal fees, maintenance rate.

## 1 A fragmented European patent system

From a “European Union” perspective the European patent system is highly fragmented. It is actually a sum of 27 national patent systems. The only centralized dimension corresponds to the patent granting procedure, composed of performing search reports, ensuring publications in due time, performing substantive examinations and processing operations, which are all performed by the European Patent Office (EPO). The other key actions are performed at the national level and include the filing of priority applications and the maintenance (validation fees, translation costs, renewal fees, litigation costs) of patents after their grant by the EPO<sup>1</sup>.

This fragmentation, which does not occur in other large economies like China, Japan or the USA, reduces the effectiveness of the European patent system, particularly through its prohibitive costs and the economic incongruities it generates. van Pottelsberghe and Mejer (2009) for instance simulate the cost reductions induced by the London Agreement (which reduced the translation requirements of a patent’s “description” section in 14 signatory countries). But the 30 percent drop in cumulated costs due to the London Agreement (when six countries are targeted) should not overshadow the still prohibitive costs of patenting in Europe, in both absolute and relative terms. A patent enforced in ‘only’ six countries costs at least four times more than a patent filed in any other large economies. With renewal fees and translation costs that increase linearly with the geographical scope for protection a patent targeting a large number of European countries can be up to 15 times more expensive than a US patent for instance.

These cumulated costs indubitably affect the demand for patenting and reduce the propensity of small and medium firms (SMEs) to rely on the patent system. The impact of cumulated fees on the propensity to patent has been estimated in several studies,

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<sup>1</sup> The patenting process can be more complex, as various routes can be taken to be protected in one or several European countries (see Guellec and van Pottelsberghe (2007) for a detailed description, especially Chapter 1 and Chapter 6). van Pottelsberghe (2009) shows that national patent systems actually have the ultimate power to validate or invalidate a patent, as they still grant patents independently from – and sometimes in opposition to – the EPO. In other words, even the examination process is not fully centralized, as it is possible to contour the EPO via parallel applications in NPOs.

which all reach the conclusion that the fee elasticity of patents is negative and significant, although much smaller than unity (about -0.4).<sup>2</sup>

But the negative impact of the fragmented system goes far beyond the prohibitive cost of patenting. Mejer and van Pottelsberghe (2009) show that heterogeneous national litigation expenses and practices induce i) a high level of uncertainty and a higher degree of managerial complexity; ii) high costs of litigations in case of multiple – or parallel – national litigations; iii) economic and legal incongruities due to easier ‘parallel imports’<sup>3</sup>, possible ‘time paradoxes’ and a defacto paradox of having an EU level competition policy and granting authority facing national jurisdiction supremacies on patent issues. In this respect, the implementation of the Community Patent (COMPAT) would not only reduce costs but would also improve the attractiveness and the effectiveness of the system, especially if it is associated with a centralized European patent litigation agreement (EPLA).<sup>4</sup>

A natural question that arises is therefore why the COMPAT has not been implemented so far? Why is it still under heavy negotiation tracks despite all the expected positive impact it would have on the European patent system? This is a complex issue, as many influential actors or lobby groups have been effective in baring the way to the COMPAT. Amongst them are lawyers and patent attorneys, and translators.<sup>5</sup> Some countries would like to see more languages than the three official ones (English, German and French). Last but not least is the position of National Patent Offices (NPOs), which naturally strive to survive and resist to a project that may drastically change their working environment. The current system offers a win-win situation between the EPO and all NPOs.<sup>6</sup> A natural “fear” – and logical question – is therefore to assess whether the

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<sup>2</sup> See de Rassenfosse and van Pottelsberghe (2007, 2008, 2009), Harhoff et al (2007, 2009) and van Pottelsberghe and François (2009). In short, the prohibitive costs of acquiring a European patent induce a smaller demand for patent filed at the EPO.

<sup>3</sup> The principle of free movement of goods in the EU makes it relatively easy for imitators, infringers or parallel importers to enter the European Union through a country where the patent has not been enforced, and then distribute it widely within Europe including the countries where the patent is enforced.

<sup>4</sup> See Harhoff (2009) for a cost-benefit analysis of the implementation of a centralized European litigation system for patent issues.

<sup>5</sup> Multiple parallel litigations and the monitoring of translation requirements secure real ‘business’ opportunities for patent attorneys and lawyers. For translators the COMPAT would be associated with much less translation requirements and a sharp increase in the reliance on machine translations.

<sup>6</sup> The renewal fees generated by European patents in each country are split into two shares: 50% is for the EPO and 50% is included in the budget of the NPOs.

COMPAT would reduce the renewal fee income of the NPOs and of the EPO. The EPO's income is also an important issue at stake, since 25 to 30 percent of its budget is composed of the renewal fees income generated by the NPOs. This budgetary issue has operational consequences and must therefore be properly addressed.

The objective of this paper is precisely to assess what would be the budgetary consequences of the COMPAT. Providing an answer is a complex task, which requires simulations, as the renewal fees receipts of a given country – generated by a current European patent – depend on three main factors: the average validation rate of a European patent in a given country, its maintenance rate over time, and the level of renewal fees. The latter variable is the only exogenous variable, whereas the two former ones depend on many factors (including the market size, the age of the technology, ...). The paper puts forward a simulation methodology that aims at comparing the renewal fees' receipts of an average European patent (under the current system) with the renewal fees' receipts generated by an average patent under the COMPAT.

The paper is structured as follows. Section 2 introduces the reasoning behind the simulations and describes the econometric model that aims at understanding the determinants of the maintenance rate of patents. It then simulates the renewal fees' income that would be generated by an average patent under the COMPAT. Section 3 analyzes the implications for the patent offices provided half the renewal fees receipts generated by the COMPAT is directed towards the NPOs' budgets and the other half is for the EPO. The implications of the COMPAT on relative patenting costs are illustrated in section 4. Section 5 summarizes the results and discuss their limitations. It briefly outlines the total economic effect of the COMPAT.

## **2 Simulations of renewal fees' income**

The NPOs would have to 'share' the revenue generated by a centralized COMPAT with the EPO and between themselves. And this 'share' might be smaller than the amounts currently collected as 'independent offices', with the maintenance of European patents in each chosen (six on average) national jurisdiction. Whether this 'shared' revenue would be larger or smaller than the local revenue generated today by the traditional European patent is an issue that can be analyzed with simulations. The answer is not

straightforward, as the total renewal fees income generated by the forthcoming COMPAT would depend on three broad factors:

- the renewal fee structure of the COMPAT (what level of renewal fees? It is clear that with very high fees there would be a relatively small use of it, and *vice versa*);
- the maintenance rate over time (which depends on the level of renewal fees and on other factors);
- the distribution key (how would the total renewal fees' income generated by the COMPAT be shared between NPOs?).

The methodological approach adopted to simulate the impact of the COMPAT on the renewal fees income of each NPO and of the EPO is composed of five main stages:

- S1. Compute the total renewal fees income generated by a current 'average' European patent in the 27 EU NPOs;
- S2. Understand the factors that influence the maintenance rate of patents in national jurisdictions;
- S3. Select an 'acceptable' renewal fee structure for the COMPAT;
- S4. From the results of (S2) and the chosen fee structures of (S3), simulate the maintenance rate of the COMPAT;
- S5. From (S4) and (S3), compute the renewal fees' income generated by the COMPAT.

The simulations are performed "at the patent level" to make the conclusions independent from the relative substitution between the European patent and the COMPAT, and independent from any hypothesis on the total number of patents granted by the EPO. Questions such as "*what will be the share of patents granted by the EPO that follow the COMPAT route?*" would therefore not affect the results (if all the patents granted by the EPO opt for the current European patent, there would be no change to the current situation). What matters is therefore the difference in the renewal fees revenues generated by an average European patent and by an average COMPAT. The cumulated renewal fees' income generated by one current European patent over its

entire life span depends on the number of countries it has been validated in, on the duration of the patent renewals in each of these countries – or its maintenance rate – and on the level of renewal fees. The total renewal fees' income generated by all the NPOs of the EU27 member states and of the EPO is VNPO (as defined in equations (1) and (2) below, it measures the income generated by one European patent “on average” over its entire lifecycle). For an average patent under the COMPAT, the main dimensions that matters are its maintenance rate and its renewal fees (as there is only one choice, the validation rate is automatically 100%). The distribution key will then define the income for each NPO.<sup>7</sup>

Three working hypotheses must be set before entering into the analysis. They are fairly acceptable and allow to reduce the number of alternative dimensions that could be taken into account for the simulations. First is the hypothesis of “run-in-period”, which suggests that the renewal fees' income simulations are run “at equilibrium”. The early changes in patenting behavior, and the required adaptation time to the new system are therefore not accounted for. This hypothesis is equivalent to the practice that consists in considering the long run equilibrium of incoming flows of renewal fees, over the entire lifetime of patents.

The second working hypothesis is that any patent starts to generate renewal fees income for NPOs from its 6<sup>th</sup> year onwards (up to its 20<sup>th</sup> year, depending on its maintenance rate). Before that, it is considered as a ‘pending’ application at the EPO. This hypothesis corresponds to the observed average delay before the decision to grant a patent at the EPO.<sup>8</sup>

The third working hypothesis is the irreversibility choice that must be made by the applicant. If an applicant opts for the COMPAT it is not possible to later switch back towards the current European patent system, and *vice versa*. Allowing such a system would simply induce a high complexity in both the simulation exercise and the tracking of what is actually going on in Europe.

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<sup>7</sup> Cf. appendix A for a synthesis of the main factors explaining the renewal fees income under the two regimes (European patent and the community patent).

<sup>8</sup> Lazaridis and van Pottelsberghe (2007) and van Zeebroeck (2008), between others, provide evidence on this average timing.

These three working hypotheses (run-in-period, 6<sup>th</sup> year grant, irreversible choice) and the patent-level methodological choice aim at assessing whether an average community patent (COMPAT) would generate more or less revenues than a current average European patent (EP) over its entire life span. Whatever the substitution degree between these two patents is, an actor (national patent office or the EPO) will be better off if the revenue it gets from an average COMPAT is higher than what he gets from one average European patent.

***S1. Compute the total renewal fees income generated by an ‘average’ European patent in the 27 EU NPOs***

For the national patent office of a country  $i$ , the renewal fees’ income generated by a European patent depends on three main factors:

- The validation rate: the probability that the patent is validated in country  $i$  ;
- The maintenance rate: the probability that it is maintained each year  $t$  for a maximum of 20 years ;
- The level of renewal fees.

Equation (1) shows the total renewal fees’ income ( $VNPO_i$ ) generated by an average European patent in the national patent office of country  $i$ :

$$VNPO_i = \sum_{t=6}^{20} \pi_i (1 - \delta_{it}) F_{it} \quad (1)$$

Where:  $\pi_i$  = The share of patents granted by the EPO which are validated in country  $i$

$\delta_{it}$  = The drop-out (or depreciation) rate of the average patent in country  $i$  and year  $t$  (ie the percentage of patents which are not renewed in the country)

$F_{it}$  = The renewal fees in country  $i$  and year  $t$

According to equation (1), the budgetary value of an average European patent for country  $i$  is the sum from year 6 to year 20 (the maximum duration period) of the product of the validation rate (or validation probability), the maintenance rate  $(1-\delta)$  and the level of the renewal fees. This amount can be divided by 2, as half of the revenue generated by an NPO is going back to the EPO and the other half is for the NPO itself (this 50/50 split will be accounted for in individual NPOs revenue simulations). Year 6 of the patent is taken into account for the start of the renewal fees’ income computation.

Adding the cumulated renewal fees’ income generated by the 27 member states of the European Union, as in equation (2), gives the total income ( $VNPO$ ) generated by an

average European patent over its life in the national patent offices of the European Union (and for the EPO).

$$VNPO = \sum_{i=1}^{27} VNPO_i \quad (2)$$

The value of a patent under the COMPAT can be measured with a similar formulae, with the exception that it is by definition associated with a validation rate equal to 100% (the COMPAT only has one ‘validation’ possibility, otherwise it is not a ‘COMPAT’). The total income generated by an average patent under the COMPAT (*VCOM*) is presented in equation (3).

$$VCOM = \sum_{t=6}^{20} \pi_c (1 - \delta_{ct}) F_{ct} \quad (3)$$

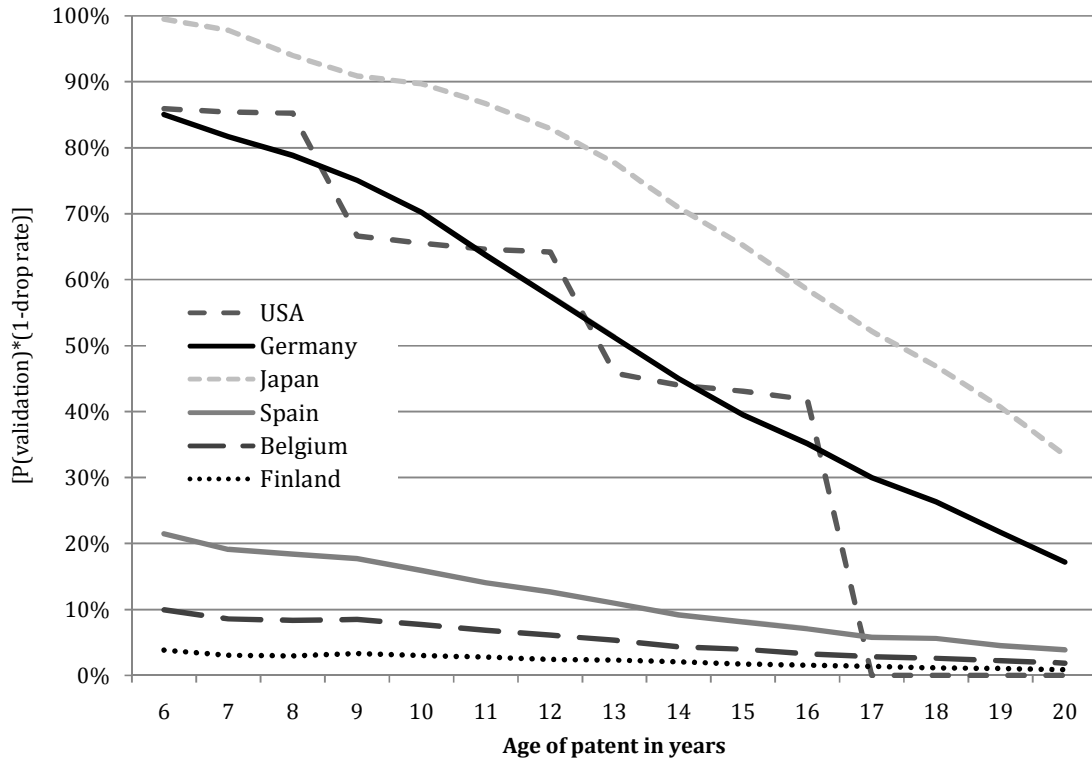
The major parameters are the maintenance rate of the COMPAT ( $1-\delta_c$ ) and the structure of its renewal fees. The former parameter obviously depends on the latter: very high fees would reduce the maintenance rate (or increase the drop-out rate).

Figure 1 illustrates the differences observed across countries in the validation/maintenance rates of European patent, and their evolution over the patent’s lifetime<sup>9</sup>. Japan, with a large homogenous economy and relatively low renewal fees has the highest maintenance rate all along the life span of a patent. Within Europe, Germany, by far the largest and the richest European country, has high validation/maintenance rates, similar to the US or Japanese one. After six years, 85 per cent of the patents granted by the EPO are enforced in Germany. This rate falls to 18 per cent for the patents aged 20 year. Finland, a smaller country, has much smaller validation/maintenance rates, about 5 per cent of the granted patents, which falls to about 1 per cent after 20 years. The maintenance rate for the US is dented because renewal fees must only be paid at three different stages in the life of a patent, confirming somewhat the important role played by renewal fees. From Figure 1 it is important to bear in mind that strong variations in maintenance/validation rates are observed across countries, and that they continuously drop over time.

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<sup>9</sup> For European countries the product of validation and maintenance rates is presented in the graph. The maintenance rates taken separately are pictured for a few European countries in appendix Figure B.

FIGURE 1 – VALIDATION/MAINTENANCE RATES OF PATENTS IN SELECTED COUNTRIES



Source: own calculation from data provided by the EPO and NPOs and trilateral statistical report, see appendix table C and appendix table D for data source and computation.

***S2 Understand the factors that influence the maintenance rate of patents in NPOs***

The maintenance rates presented in Figure 1 are a key factor for the calculation of the total revenue generated by one patent (for a given NPO or for Europe as a whole). Therefore, in order to simulate the revenue generated by an average patent under the COMPAT, the factors that affect the observed maintenance rates must be understood and measured.

The model adopted to understand the determinants of maintenance rate was designed according to the existing literature, logical considerations and intense interactions with national patent offices and patent professionals. The earliest paper that focuses on renewal data of European patents is probably the one by Schankerman and Pakes (1986), who rely on renewal data to approximate the distribution of patent value and its depreciation rate. Harhoff et al. (2008 and 2009) assess the determinants of validation

behavior (at the aggregate country level and at the patent level) within the European patent system, with a particular focus on market size, distance between countries, validation fees, early renewal fees and translation costs. van Zeebroeck (2008, 2009) investigates the strategic factors that affect the duration (or maintenance rate) of patents within Europe, with a patent-based approach. The author shows that European patents are validated in fewer countries over time but for a longer time frame. This duration is partly influenced by strategic factors, including the filing strategies adopted by applicants.

The model adopted in the present paper contributes to the literature by providing a first evaluation of the impact of renewal fees and other country or patent-specific factors on the aggregate maintenance rate of patents. The model is performed with a database composed of 15 European countries, the USA and Japan. The empirical model is presented in equation (4):

$$(1 - \delta_{it}) = C + \beta GDP_i + \theta NPOAGE_i + \gamma IPI_i + \sigma PATAGE_t + \alpha F_{it} + \varepsilon_{it} \quad (4)$$

The dependent variable corresponds to the average maintenance rate of granted patents ( $(1-\delta)$ , or one minus the drop-out rate) enforced in country  $i$  at year  $t$  ( $t=6, \dots, 20$ ). In other words, it is the share of patents that are renewed as a percentage of the total number of patents of the same cohort that were validated in the country. Fifteen years of renewals are therefore taken into account for each country. This variable is computed from the most recent information for each age-year of a patent (see appendix C for a description of the methodology). For instance, the maintenance rate for the 20<sup>th</sup> year is taken for the patent cohort of 1987 (ie, all patent filed in 1987 by the EPO) as the information for more recent cohorts is not yet available. The maintenance rate for the 10<sup>th</sup> year is taken from the cohort of 1997, and so on. This 'lag' of 20 years in the 20<sup>th</sup> year maintenance rate will probably change over time but is the only available and reliable information.<sup>10</sup>

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<sup>10</sup> Under the actual system with European patents, 10% of the patents granted by the EPO are never validated in any country and fall into the public domain as soon as the decision to grant is made by the EPO (see Lazaridis and van Pottelsberghe, 2007). These 'lapsed' patents do not generate any revenue in terms of translation, validation fees or renewal fees, and are therefore not taken into account. As we work at the patent level (how much renewal fee revenue would be generated by one European patent or one COMPAT), this early lapses do not affect the current simulations.

The country-level explanatory variables include the gross domestic product (*GDP*) in 2006, expressed in €; an indicator of the strength of the national patent system (*IPI*, which is computed by Ginarte and Park (1997) and updated by Park (2008)); and the age of membership of the country in the EPC (*NPOAGE*, going up to a maximum of 31 years for the founding members). This latter variable aims at testing whether the countries that have been part of the EPC for a longer period also have higher maintenance rates, thanks to a learning and adaptive process. The age of a patent (*PATAGE*) is a variable that is constant across countries but varies over time to capture the life cycle of the patented technology. It is expected that the older a patent (hence the technology) is, the lower is its maintenance rate. Finally, one variable varies across countries and over the life cycle of a patent: the renewal fees (*F*). They are expected to have a negative impact on the maintenance rate.

Table 1 provides summary statistics of the database. The sample of 17 countries was chosen over a larger sample because of data availability (there are currently 27 countries within the EU). As many countries have only recently joined the EPC, only small periods were available, with high standard deviations over time. Taking the 15 oldest EU member countries, added to Japan and the USA, allow to assess the long term determinants of relatively ‘stable’ maintenance rate. It is worth noticing that including more countries in the panel did not change the results (results are available upon request). The maintenance rates are presented in appendix D.

TABLE 1 - SUMMARY STATISTICS OF THE DATABASE

		<b>Min</b>	<b>Mean</b>	<b>Max</b>	<b>S.D.</b>
<b>Maintenance rates (%)</b>	<i>t=6</i>	39	63	100	21
	<i>t=10</i>	28	49	90	19
	<i>t=15</i>	14	28	65	14
	<i>t=20</i>	8	13	33	7
<b>GDP (in billion €)</b>		34	1,463	10,496	2,526
<b>Age of membership<sup>a</sup></b>		12	26	31	7
<b>Fees (€)<sup>b</sup></b>	<i>t=6</i>	59	115	188	40
	<i>t=10</i>	118	285	902	195
	<i>t=15</i>	190	512	1,060	273
	<i>t=20</i>	270	770	1,940	442
<b>IPI</b>		4.14	4.55	4.88	0.19

- a. For Japan and the USA, we assumed the same age of membership as the oldest EPC member states  
b. The US fees must only be paid at three different stages in the life of the patent (€776 at 9<sup>th</sup> year, €1,964 at 13<sup>th</sup> year and €3,256 at 17<sup>th</sup> year)

Source: raw data provided by the EPO and NPOs, trilateral statistical report, Eurostat and Park (2008); see appendixes D and E for further details.

The econometric results are presented in Table 2; they can be interpreted as follows. First, GDP, which reflects the market attractiveness or the wealth of a country, has a positive and highly significant impact on the maintenance rate. The countries with a higher GDP enjoy a higher maintenance rate. Looking at the standard errors, one may conclude that GDP is one of the two most important factors that influence the maintenance rate of European patents in a country. The second variable that plays a very significant role is the age of the patent. Its level of significance is as high as the level of significance of the GDP variable. The older a patent is, the lower its maintenance rate. This is true for all countries and follows the natural life cycle of a patented technology.

TABLE 2 - ESTIMATED PARAMETERS OF THE "MAINTENANCE RATE" MODEL<sup>11</sup>

Variable	(1)	(2)	(3)	(4)
<b>Intercept</b>	0.229 *** (0.041)	0.536 *** (0.038)	-0.680 ** (0.276)	-0.256 (0.207)
<b>GDP ('000 billion €)</b>	0.104 *** (0.008)	0.072 *** (0.007)	0.094 *** (0.009)	0.064 *** (0.007)
<b>Fees ('000 €)</b>	-0.350 *** (0.028)	-0.112 *** (0.027)	-0.354 *** (0.027)	-0.119 *** (0.026)
<b>Age of membership</b>	0.007 *** (0.002)	0.007 *** (0.001)	0.008 *** (0.002)	0.008 *** (0.001)
<b>Age of the patent</b>		-0.030 *** (0.002)		-0.029 *** (0.002)
<b>Intellectual Property Index</b>			0.198 *** (0.059)	0.172 *** (0.044)
*, ** and *** indicate significance at the 10%, 5% and 1% level, respectively; standard error are in parentheses				
<b>Adjusted R-Square (%)</b>	53.9	74.1	55.8	75.6
<b>Number of observations</b>	243	243	243	243

Source: cf. equation (4) in main text. The parameters are estimated with an heteroscedastic consistent estimator, over 17 countries and 15 years (unbalanced panel). The dependent variable is the maintenance rate, GDP is the 2006 gross domestic product; Fees stands for the national annual renewal fees (expressed in €); Age of membership corresponds to the country's date of signature for the EPC membership, Intellectual property index comes from Ginarte and Park (1997)'s updated results for 2005, Park (2008).

<sup>11</sup> These results differ slightly from those presented in the report for the European Commission (DG Internal Market) because the data for Intellectual Property Index were updated.

Then comes a country's age as member of the EPC. The estimated parameter suggests that the longer the EPC membership, the higher the maintenance rate of a patent. This is the illustration of an adaptation phase to an advanced European system. de Rassenfosse and van Pottelsberghe (2007) also find that the 'older' EPC member states transfer a higher number of their national patent applications to the EPO. The Intellectual Property Index plays a positive and significant impact, suggesting that the countries with a stronger patent system (in terms of subject matter, enforcement quality, and reliability) will logically see higher maintenance rates than the countries with weaker patent systems.

Finally, a country's renewal fees have a negative and significant impact on the maintenance rate of patents. The higher the renewal fees, the lower are the maintenance rates in a country. This variable is highly significant, but less than the patent life cycle and GDP variables. A comparison of column (2) with column (1) or (3) shows that a sharp drop in the impact of patent fees occurs when the patent age is included simultaneously with the fee variable. This is due to the correlation between the two variables. Most NPOs have fee schedules which systematically increase with patents' age, witnessing the two forces that push a patent towards the public domain: time and costs.

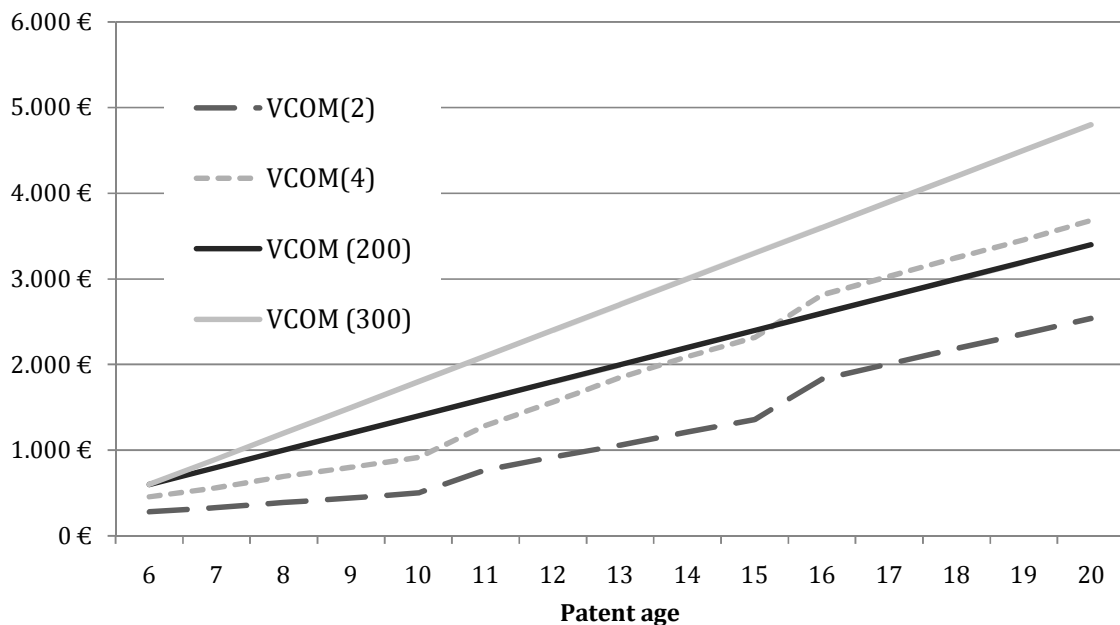
According to the adjusted R-square, the four variables explain 76 per cent of the variance in maintenance rates over time and across countries, which is a fairly good approximation.

### ***S3. Select an 'acceptable' renewal fee structure for the COMPAT***

Different structures of renewal fees can be considered for the COMPAT. Four alternatives are presented in Figure 2. One approach consists in summing up the renewals fee of the 2 or 4 countries that are the most frequently designated under the current European patent system. They are respectively called VCOM(2) and VCOM(4). Such additive fee structure was proposed in the European Council working document (EC, 2008, DG Internal Market). The document also suggests that the COMPAT renewal fees could correspond to the sum of up to height countries' current renewal fees.

An alternative and somewhat simpler renewal fees schedule can be put forward. It would be composed of a starting fee of €600 on year 6 of the patent age and then a constant increment of €200 or €300 (or more) each additional year in the patent age. These fee schedules are respectively named VCOM(200) and VCOM(300). The proposed VCOM(200) is actually close to the sum of four countries' renewal fees, or VCOM(4). These two fee schedules seem to be the most appropriate. Indeed, van Pottelsberghe and van Zeebroeck (2008) show that the average geographical scope of protection for a 15 years old patent is of about 4 countries. Therefore the VCOM(200) or VCOM(4) fee structure correspond to what the business sector is ready to pay. With VCOM(200), the applicant would pay a fee of about €3,300 to keep a patent enforced on its 20<sup>th</sup> year. With VCOM(300) the amount would be close to €5,000. The cumulated fees over time with VCOM(200) would be of €5,000 for 10 years and €30,000 for 20 years.

FIGURE 2 - POSSIBLE FEE STRUCTURES FOR THE COMPAT



Note: VCOM(2) and VCOM(4) correspond to the sum of the renewal fee structure of 2 and 4 countries, respectively. VCOM(200) and VCOM(300) characterize a fee structure that would start at €600 at year 6 and then add each year €200 and €300, respectively.

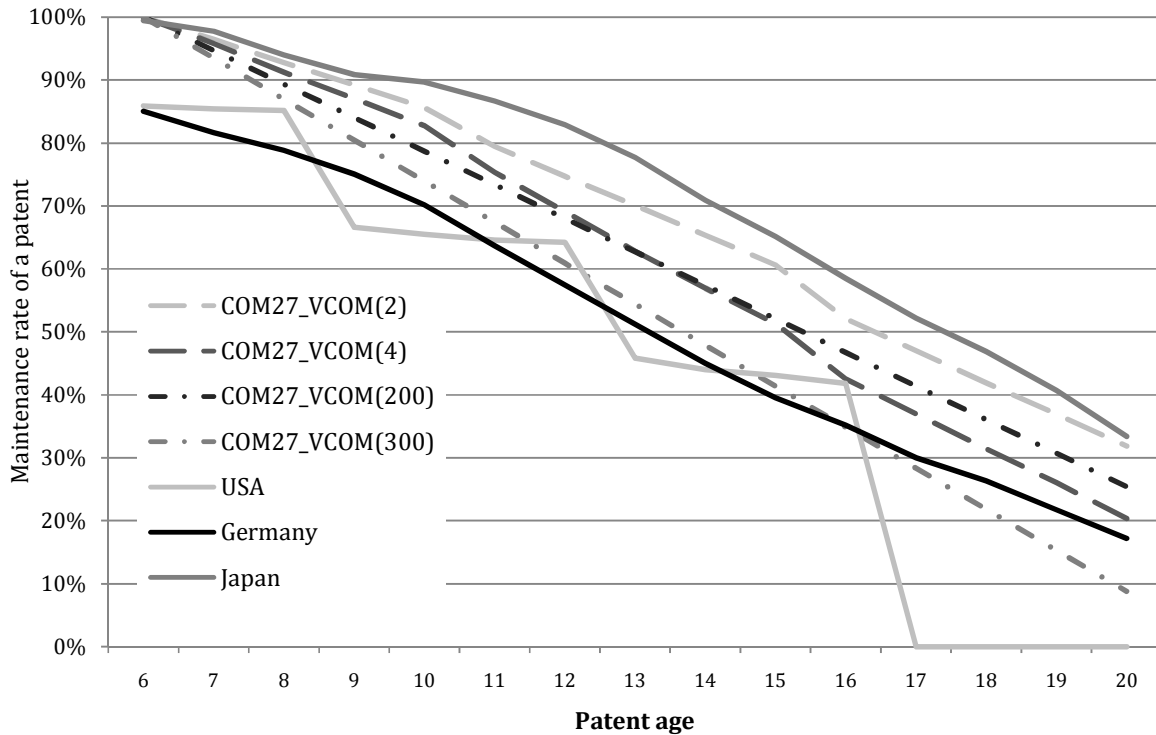
A comparison of these COMPAT renewal fee schedules with the fees of the current European patent system can be done in absolute and relative terms (cf. van Pottelsberghe and François, 2009). Indeed, renewal fees might be twice as high in country A as in country B, but if the former is four times larger than in the latter (i.e.,

with a much larger market potential), the relative fee is actually cheaper in country A than in country B. For instance, if the COMPAT would apply the 'relative' fee structure of the German patent office to the whole EU economic area, the renewal fees would be much higher. In fact, the German fees start very low and end up at about €2,000 at the end of the patent life cycle. If the same 'relative' fee (ie, same fee per capita or fee per GDP) is applied for the COMPAT, the renewal fee schedule would be quite prohibitive and reach €10,000 to €12,000 for the 20<sup>th</sup> year of protection. The renewal fee structure proposed with the VCOM(300) solution would end under €5,000, which is more affordable, but still more than twice as high as the absolute fee in Germany for the 20<sup>th</sup> year. Keeping in mind that the whole economic area covered by the COMPAT would be more than six times larger than the one currently covered by Germany, a VCOM(200) or VCOM(300) solution seems acceptable and corresponds to a good compromise between an absolute and a relative fee schedule. A probably more convincing argument is related to what the business sector seems to be ready to pay. As mentioned here above, 15 year old patents are on average maintained in four countries, which corresponds to VCOM(200). International comparisons of absolute and relative fees will be addressed in section 4.

#### ***S4. Simulate the maintenance rate of the COMPAT***

With the estimated parameters presented in column (4) of Table 2, and the potential fee schedules presented above, it is now possible to simulate maintenance rates for the future COMPAT (cf. eq. (4)). The GDP of the EU27 economic area is straightforward to compute, the patent age is available as such, and the age of membership is supposed to be of 0 year (i.e. no experience, because it is a new system). It could be argued that an age of 30 years could be taken into account, because the 11 founding fathers account for a large economic area within the EU27. But this assumption would not substantially affect the simulations, and we opted for a conservative approach (so that the risk is to underestimate the revenues generated by the COMPAT). The only variable that might vary substantially, and is subject to 'political' negotiations, is the renewal fees structure of the COMPAT.

FIGURE 3 - SIMULATED MAINTENANCE RATE WITH THE COMPAT



The simulated maintenance rates for the COMPAT were normalized to 1 at the 6<sup>th</sup> year. The series for the USA, Japan and Germany are actual series.

Source: own calculation from EPO data and the Trilateral statistical report for the US and Japan, and from the estimated parameters presented in Table 2 (column 4) and in equation (4).

The simulated maintenance rates under the COMPAT are pictured in Figure 3. They vary according to the chosen renewal fee structure. Most simulations fluctuate between the Japanese and German maintenance rates, and are above the latter all along the patent life cycle. This high maintenance rate of the COMPAT is primarily due to the large geographical scope that would be covered by a single patent, which is about six times larger than the German economy. Lower renewal fees, like VCOM(200) would logically induce a higher maintenance rate.

***S5. Compute the renewal fees' income generated by the COMPAT***

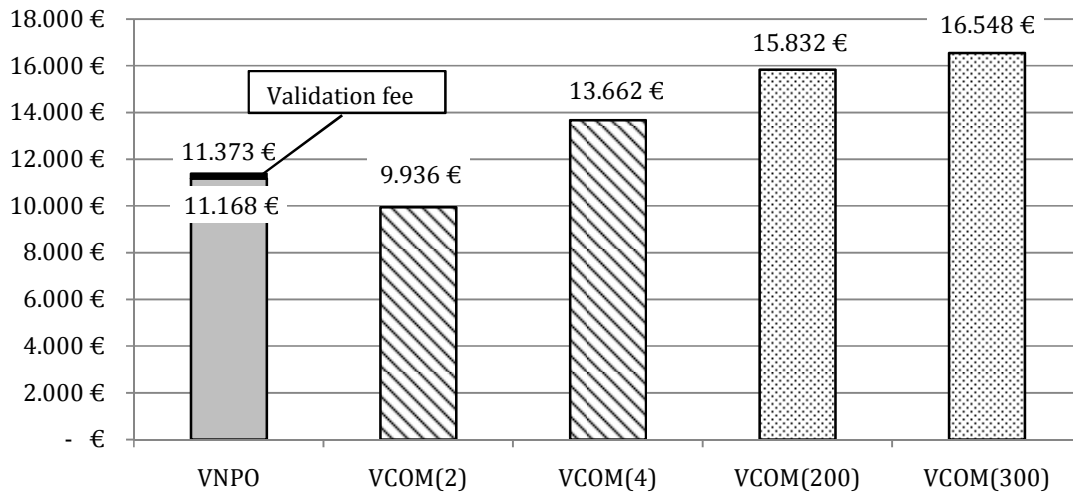
With the simulated 'maintenance rates' of the COMPAT it is now possible to calculate the renewal fee income that would be generated by an average patent under the COMPAT and compare it with the renewal fee income generated by an average European patent. Figure 4 presents the average total renewal fee income generated by one patent over its life time. The renewal fee income (VNPO) is calculated as in equation

(2) and depends on the number of countries in which the patent has been validated in and on the number of years it is maintained in each of these countries. The higher the number of countries (amongst 27 possible countries within the EU) and the longer the maintenance of the patent (with a maximum of 20 years from the priority date), the higher will be the total amount of renewal fees' income generated by the patent. The first bar (in grey) presented in Figure 4 corresponds to the actual fees income generated by a current European patent. A bit more than €11,000 is generated by the average patent Granted by the EPO.

The total renewal fees income generated by the COMPAT would obviously vary with the level of fees, as illustrated in equation (3). According to the estimated parameters presented in Table 2 (column 4) (and hence the simulated maintenance rate of the COMPAT depicted in Figure 3), the revenue generated by the COMPAT would vary from nearly €10,000 with the VCOM(2) renewal fees schedule up to €13,600 with the VCOM(4) renewal fees schedule. With the simpler fee schedule put forward in this paper, it would vary around €16,000 (with the VCOM(200) and VCOM(300) fee schedules).

In other words, the COMPAT would generate at least the same amount of cumulated fees' income than the current European patent, and probably substantially more, thanks to higher fees and higher maintenance rates. With our preferred VCOM(200) or VCOM(300) fee structure, the total income generated by one patent would be 150% higher than the current total income generated with the European patent.

FIGURE 4 - SIMULATED TOTAL RENEWAL FEES' INCOME UNDER THE COMPAT



Source: own calculation from the estimated parameters presented in Table 2, and observed data on maintenance rates in national patent offices (see appendix D.)

It is quite reassuring to reach the conclusion that the total renewal fees' income generated by a patent under the COMPAT could be substantially higher than the current cumulated renewal fees' income generated by each of the NPO. However, the key issue is now to assess to what extent the COMPAT would actually affect each NPO's income. This obviously depends on the adopted distribution key between NPOs, which is tackled in the following section.

### 3 Implications for patent offices

Four distribution keys can be considered for the sharing of the total renewal fees' income generated under the COMPAT; they are presented in Table 3. The actual distribution key (which is the share of each NPO in the total income generated by all NPOs) would actually be an unfair distribution, because it is highly biased in favor of large countries, and especially Germany. Applicants gradually reduce the number of countries for enforcement, and when they keep the patent 'alive' it is generally in the largest countries. Germany is frequently the last country in which a patent is kept enforced (see van Pottelsberghe and van Zeebroeck (2008) and van Zeebroeck (2008)). Therefore, thanks to its large market, Germany currently enjoys a more than proportional share of renewal fees' income generated by the average European patent.

The ‘council proposal’ weighting scheme<sup>12</sup> reflects the outcome of political negotiations and is quite complex, as it takes into account the countries’ size, their languages and their innovation potentials. It is so complex that it is not easy to compute (especially ten years from now, should the criterion used still be the same?), and probably not a good communication pitch if the community patent is created.

The GDP weighting scheme is for us the simplest, fairest and most effective distribution key. It is very easy to compute and communicate, and actually rewards countries with a high economic performance, which originates from innovative efforts. Catching up countries and dynamic economies would actually be rewarded by this scheme.

An alternative weighting scheme would be related to the population size of countries. This would reward large countries, but not their innovation or economic performances and is therefore less appropriate in our views.

TABLE 3 - PROS AND CONS OF FOUR ALTERNATIVE DISTRIBUTION KEYS

<b>Distribution keys</b>	<b>Assessment</b>
Actual distribution of NPOs’ renewal fees’ income	Unfair, large bias in favor of large countries, especially the largest (Germany)
“Council proposal” weighting scheme	Complex, not easy to compute and to communicate, takes into account the linguistic specificities.
GDP weighting scheme	Fair, easy to compute and communicate, favors countries with a high economic performance
Population weighting scheme	Bias in favor of large countries, unrelated to innovative efforts.

The relative differences observed between the four weighting schemes for a given level of revenue are illustrated in appendix table G. The choice of the distribution key has implications on the actual revenue sharing related to the renewal fees’ income generated by the COMPAT. Some countries could loose and other win, depending on the chosen key. Instead of analyzing cross country differences in distribution keys it is more relevant to consider the total revenue generated by an average patent, and then derive the revenue for each NPO, because a distribution key might be lower for a country, but

<sup>12</sup> As proposed in the European Council working document (EC, 2008) made available by the European Commission (DG Internal Market), see appendix F for more details.

the actual revenue higher due to a much higher total revenue generated by renewal fees.

This is illustrated in Table 4 (for the VCOM(200) renewal fee schedule) and appendix table H (for the VCOM(300) renewal fee schedule), which show the renewal fees' income generated by an average patent under the current European patent system (where the income is generated by each NPO<sup>13</sup>) and under the COMPAT, with a distribution key based on the alternative weighting schemes.

It clearly appears that with the VCOM(200) and the VCOM(300) renewal fee schedules, most of the NPOs would have a higher income with the COMPAT than with the European patent. This is due to the much higher total income generated by one patent (cf. Figure 4). Smaller countries would actually largely benefit from the COMPAT, because they have a relatively low revenue with the current European patent, due to the very low validation rate (Germany benefited from being the largest economic area: appendix G shows that Germany has 32% of the total renewal fees revenues generated by all NPOs under the current European patent system, whereas Germany accounts for 'only' 20% of EU GDP or 17% of EU population).

Table 4 shows that with the VCOM(200) fee structure, the EPO would earn nearly €8,000 per patent granted, on average. Germany would have an income that fluctuates between €1,300 and €2,100; depending on the adopted distribution key, against an actual revenue per patent of about €2,400. A large number of smaller countries benefit from a sharp, and fair, increase in their revenue thanks to the COMPAT.

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<sup>13</sup> The second column of these tables represents the share of VNPO by country, these figures are quite similar – for most countries – to those reported by the European Commission (see column 'Actual' in appendix G). The relative importance of Germany is different in the two table, which confirms the increasing attractiveness of the country over time. .

TABLE 4 - NPO'S RENEWAL FEES INCOME UNDER EP AND COMPAT WITH THE VCOM(200) RENEWAL FEE SCHEDULE

	VNPO		Level (€)			Relative net differences (%)		
	€	%	Proposed	GDP	Population	Proposed	GDP	Population
<b>EPO</b>	5,686		7,916	7,916	7,916	39	39	39
<b>Germany</b>	2,386	42.0	2,082	1,578	1,315	-13	-34	-45
<b>France</b>	802	14.1	871	1,229	1,013	9	53	26
<b>United Kingdom</b>	597	10.5	776	1,300	973	30	118	63
<b>Netherlands</b>	332	5.8	586	367	262	77	11	-21
<b>Austria</b>	227	4.0	451	175	133	99	-23	-42
<b>Italy</b>	576	10.1	720	1,006	945	25	75	64
<b>Spain</b>	230	4.1	483	668	711	110	190	209
<b>Sweden</b>	111	1.9	277	213	145	150	92	31
<b>Denmark</b>	71	1.2	206	150	86	190	111	22
<b>Belgium</b>	88	1.5	214	215	169	143	145	93
<b>Ireland</b>	55	1.0	111	121	69	100	117	24
<b>Finland</b>	70	1.2	111	114	85	58	62	21
<b>Portugal</b>	31	0.6	135	106	169	327	236	438
<b>Greece</b>	21	0.4	119	145	179	457	580	740
<b>Luxembourg</b>	13	0.2	40	23	8	211	81	-37
<b>Hungary</b>	15	0.3	71	61	161	364	299	952
<b>Cyprus</b>	10	0.2	47	10	13	363	-3	25
<b>Estonia</b>	5	0.1	55	9	21	1,045	84	329
<b>Czech Republic</b>	17	0.3	63	77	165	263	343	844
<b>Romania</b>	6	0.1	95	66	345	1,544	1,049	5,873
<b>Slovakia</b>	8	0.1	55	30	86	634	301	1,043
<b>Bulgaria</b>	6	0.1	63	17	123	902	171	1,847
<b>Slovenia</b>	4	0.1	32	21	32	646	396	653
<b>Lithuania</b>	1	0.0	55	16	54	4,913	1,359	4,816
<b>Latvia</b>	0	0.0	47	11	37	14,723	3,304	11,372
<b>Poland</b>	3	0.1	127	185	609	4,156	6,116	20,363
<b>Malta</b>	-	-	40	3	6	-	-	-

Source: own calculation based on total renewal fees' income presented in Figure 4 and on distribution keys presented in appendix E.

The relative net differences between the renewal fees revenues generated by the European patent (VNPO) and those generated by the community patent (VCOMs) are also presented in Table 4 for VCOM(200), on the right-hand side. The simulations with the VCOM(300) renewal fees schedule are presented in appendix H. For instance, with the VCOM(200) and the GDP distribution key, only Germany, Austria and Cyprus would have a lower revenue per patent. For Germany this is due to the loss of its leading

position within the European patent system in terms of market size, whereas for Austria this is due to very high national renewal fees that generate a higher income than the COMPAT would generate with the VCOM(200).

#### **4 Implications for relative patenting costs**

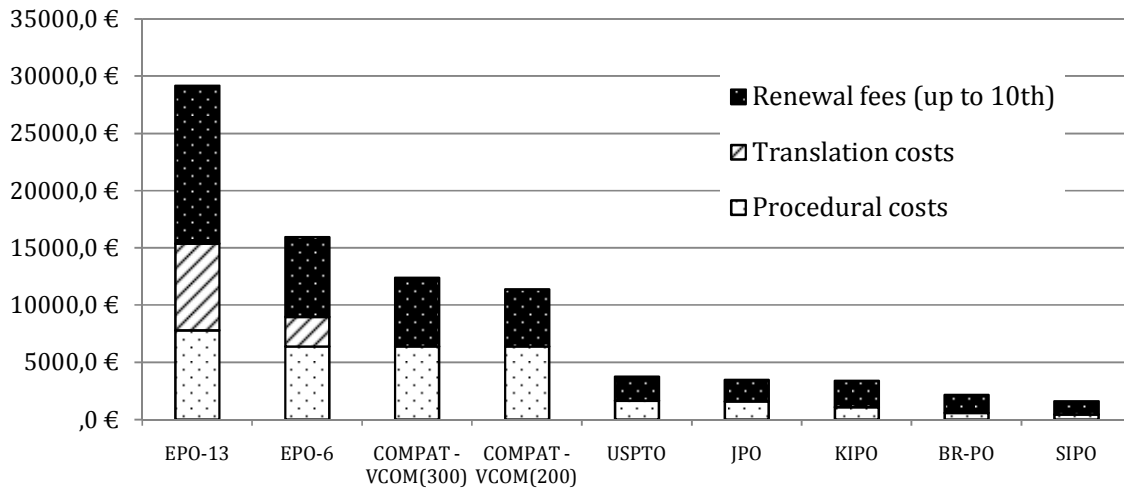
The first section underlines two types of failures induced by the currently fragmented patent system in Europe. First is the prohibitive cost of patenting, due to the cumulated national renewal fees that applicants must pay to keep their patent in force. Second are the incongruities generated by a system where national systems have the ultimate power to grant or invalidate a patent and the high uncertainty that occurs when several parallel litigations take place. These two types of failure would vanish with the COMPAT.

Figure 5 shows that 10 years of protection with the COMPAT (with the VCOM(200) fee schedule) would cost about €11,400, against €16,000 nowadays for a protection in 6 countries and nearly €30,000 for a protection in 13 countries. This must be compared with a total cost lower than €4,000 in all other large economic areas. It is worth noticing that the translation costs have disappeared for the cost of a COMPAT. This is due to the language arrangements for the potential COMPAT.<sup>14</sup>

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<sup>14</sup> With the future COMPAT applicants may submit their applications in one of the official languages of their EU member state. The costs for the translation of the applications into one of the EPO languages will be borne by the system. Translations of the claims and descriptions would be made available upon publication of the patent application for the provision of patent information. These translations will be carried out by a specialized central service on demand and will be based upon machine translation programs. For granted patents, and in case of litigation, official translations have to be secured by the patent holder (see Article 24a\_Revised Proposal for a Council Regulation on the Community patent, Council Working Document 8588/09).

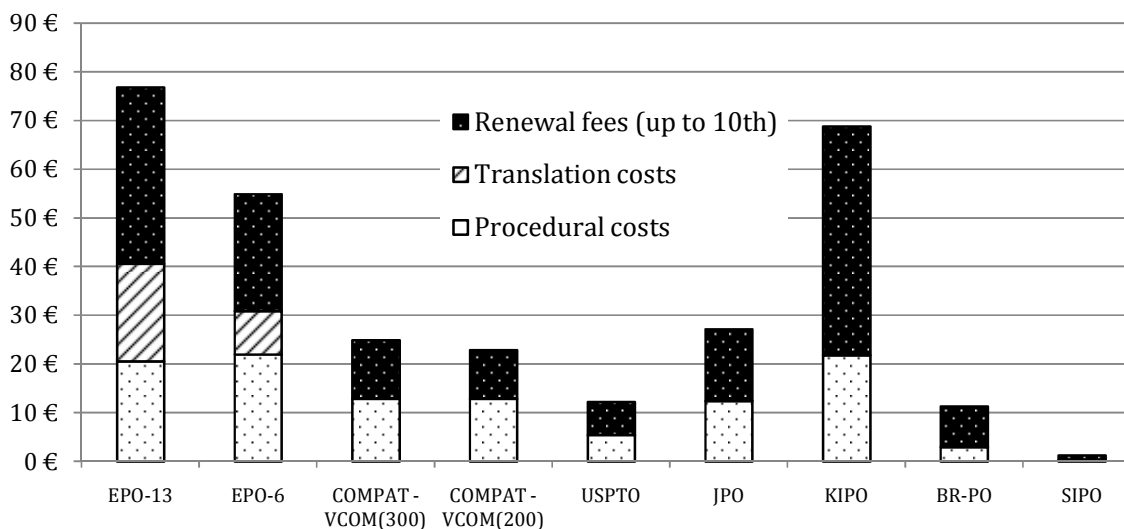
FIGURE 5 - INTERNATIONAL COMPARISON OF PATENTING COSTS WITH COMPAT



Source: van Pottelsberghe and Mejer (2009) and own calculations for the COMPAT figures

These absolute numbers do not account for the market size covered by the patents. Doing so would logically put Europe in a much better situation, thanks to its market of about 500 million inhabitants. Figure 6 shows that 10 years of protection with the COMPAT (with the VCOM(200) fee schedule) would cost about €22 (check) per million capita (it is close to €28 in Japan), against €55 per million capita nowadays for a protection in 6 countries and €76 for a protection in 13 countries. In the USA one patent costs only €12 per million capita.

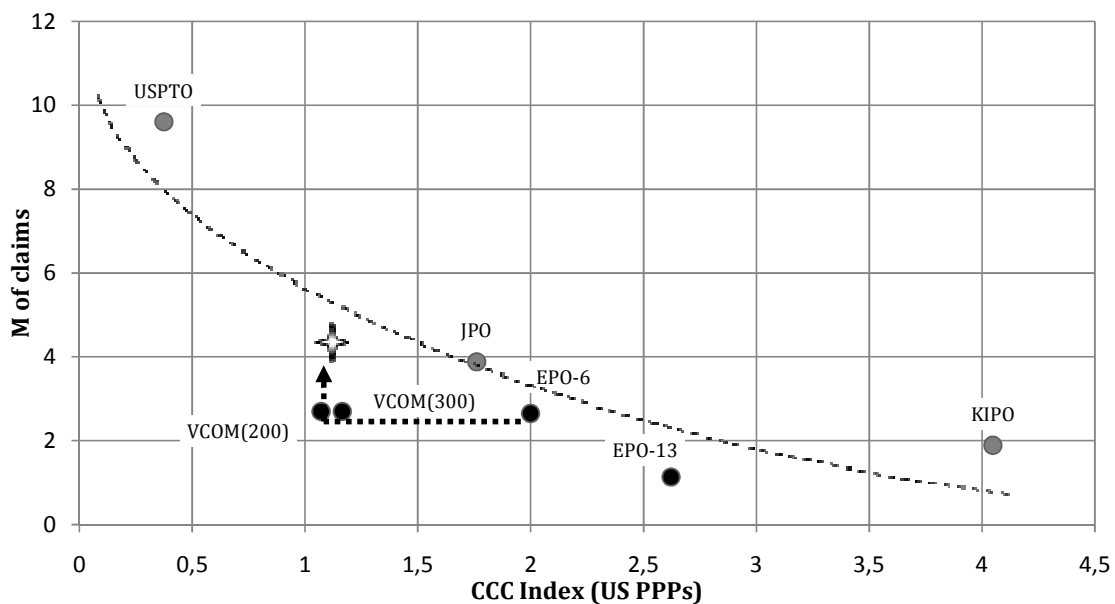
FIGURE 6 - INTERNATIONAL COMPARISON OF PATENTING COSTS PER MILLION CAPITA



Source: van Pottelsberghe and Mejer (2009) and own calculations for the COMPAT figures

Finally, accounting for the size of patents (number of claims per patent) leads to less biased results because applications at the USPTO are much larger (about 24 claims per patent) than their EPO counterparts (about 18 claims per patent). In Japan there are ‘only’ about 10 claims per patent.<sup>15</sup> The cost per claim per capita indicator put forward by van Pottelsberghe and François (2009) would place Europe (US purchasing power parity 1.2) between Japan (1.7) and the USA (0.4). Figure 7 suggests that the demand for patents (the millions of claims that were filed) in 2006 seems to be related to the relative fees, along a traditional demand curve.

FIGURE 7 - RELATIVE PATENTING COSTS AND THE DEMAND FOR PATENTS



Source: own calculation from data presented in this paper and from van Pottelsberghe and Mejer (2009).

Existing studies aiming at evaluating the fee elasticity of demand for patents converge towards an elasticity of about -0.4 (see de Rassenfosse and van Pottelsberghe (2007, 2008, 2009)). In other words, a fee increase of 10% would lead to a drop in patent filing of about 4%. Therefore, the 60% decrease in relative prices due to the implementation

<sup>15</sup> See Archontopoulos et al. (2007), van Zeebroeck et al (2009) and de Rassenfosse and van Pottelsberghe (2008) for evidence on the size of patent applications in the three offices and the evolution of these sizes.

of the COMPAT could induce a 24% increase (illustrated by the star in Figure 7) in the demand for patents at the EPO, everything else being equal otherwise.

In a nutshell, the COMPAT with a unified jurisdiction would reduce both the costs and uncertainty currently associated with the fragmented European patent system, while quality in the examination process would be held stable. The beneficial effects of the COMPAT (cost savings, construction of the single market, lower complexity) would make the patent system more accessible for SMEs and for universities in Europe. At the same time it would make the European market more attractive for both domestic and foreign companies.

## **5 Discussion on total impact**

This paper essentially aims at evaluating two main consequences of setting up the Community Patent (COMPAT) within the European Union. First it simulates the renewal fees' budgetary consequences for the European Patent Office (EPO) and the national patent offices (NPOs). Second it measures the consequences for the business sector in terms of absolute and relative fees. In order to perform these simulations the main question that occurs is related to the expected maintenance rate (or duration) of an average patent under the COMPAT, which in turn depends on the chosen renewal fees schedule.

This paper contributes to the economic literature that aims at understanding the patenting behavior of applicants. An econometric model explaining the observed maintenance rates of European patents in 15 EU countries, the USA and Japan over the past 20 years shows that four main factors play a significant role: the GDP size of a country, the age of the patent, the level of its renewal fees and the strength of its IP system. With the estimated impact of these four variables it is possible to derive the maintenance rate of the COMPAT, and hence the renewal fees income it would generate.

The patent-based simulations show that the EPO and most NPOs would actually gain from each patent filed under the COMPAT if an 'appropriate' fee schedule is adopted.<sup>16</sup>

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<sup>16</sup> The discussion presented in the paper puts forward a renewal fee schedule for the COMPAT composed of a starting base of €600 on year six of the patent and an additional €200 each consecutive year of renewal. This fee schedule is close to the cumulated renewal fees of about four NPOs with the current European patent system.

This is mainly due to a price effect (higher absolute fees) combined with a size effect (a new market for technology of about 500 million inhabitants) which would lead to a longer duration of patents. The main office that might see a significant drop in its renewal fees income is the German Patent Office, which has historically benefited from its 'largest economy' status in Europe and hence generates above than expected validation and maintenance rates (Germany is the country where most patents are validated at grant, and where they remain valid for the longest periods of time).

The cost consequences in absolute term are a drop of € 2,600 on average due to the end of translation requirements (as compared to a current protection in six countries). In relative terms a drop of 60% in the cost per claim per capita would be observed (because the market protection would jump from about 6 countries to a market of 500 million inhabitants). With a conservative "inelastic" fee elasticity of about -0.4%, one may expect an increase in the demand for patent protection of about 24%, everything else being equal otherwise. This increase in the attractiveness of the European patent system would generate additional new revenues for patent offices (on top of the simulations above): each patent under the COMPAT would generate more revenue than a European patent, and there would be an increase in the number of patent applications.

This exercise should be taken with a touch of caution, for both its reliance on an econometric model that lead to a simulated maintenance rate and its voluntary failure to take stock of other positive or negative effects of the COMPAT. To start with, no or very few patent offices had foreseen the sharp drop in revenue due to 2008 crisis, which illustrates the actual complexity of performing budgetary planning. It is clear that the very methodology adopted in the present paper does not grasp the whole set of factors that might influence the revenue of a patent office. We however believe that the analytical approach adopted here is convenient, as it puts aside the question on how many patent applications will be filed and, out of these, how many would follow the COMPAT route.

Other positive and negative effects can be partly measured. For instance there would be a loss for translators in many countries (and for the patent attorneys who serve as intermediaries). At the European level it would be on average of about € 2,600 per patent. Patent attorneys would also lose their income for interacting with several NPOs

and pay renewal fees each year (according to van Pottelsberghe and Mejer (2008) it would be of about € 3,750 per patent)<sup>17</sup>. On the other hand the EPO would have to bear the cost of processing the translations of incoming applications. The centralized approach combined with the continuous improvement of machine translations, would probably cost a few hundred € per patent on average (say €400), which is small when compared to the net increase of €2,200 in renewal fee income per patent under the COMPAT.<sup>18</sup> Let us assume that 50,000 patents are granted each year by the EPO, and that these patents all adopt the COMPAT. The business sector would spare  $(50,000 \times (2,600 + 3,750) =)$  €317.5 million. Patent offices (and the EPO) would earn an additional  $(2,200 \times 50,000 =)$  € 110 millions. Patent attorneys would lose (assuming that all companies outsource this 'interactive' service)  $(50,000 \times 3,750 =)$  €187.5 million in addition to their losses due to parallel litigations. Translators would lose €130 million.

But these financial or budgetary flows are only one dimension of patent systems. What also matters is that the COMPAT would drastically simplify the system and make it attractive, less incongruous and affordable for SMEs: an invisible hand with undoubtedly large benefits for the business sector. However, the COMPAT is implicitly associated with a risk of loss of power and control for NPOs, a risk which might well be more influential than the potential gains that are to be made with the COMPAT. In other words NPOs might still be on the side of anti-COMPAT lobbies (jointly with patent attorneys and translators): the jury is still out for the COMPAT, a project barred for 40+ years by institutions benefiting from the current European system, and controlling it.

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<sup>17</sup> Based on the median cost corresponding to several patent attorney's fees ('designation states' and 'filing patent translation' were assumed to disappear completely while two third of 'taking over representation' and 'maintenance (6<sup>th</sup> - 10<sup>th</sup>)' were dropped).

<sup>18</sup> The COMPAT is often presented as being inextricably associated with a Unified and Integrated European Patent Litigation System. Harhoff (2009) shows that on litigation expenses total private savings from having access to a unified Patent Court – as opposed to parallel litigations- would span the interval between €148 and €289 million. The upper-bound estimate for the operating costs of this Court is of €28 million.

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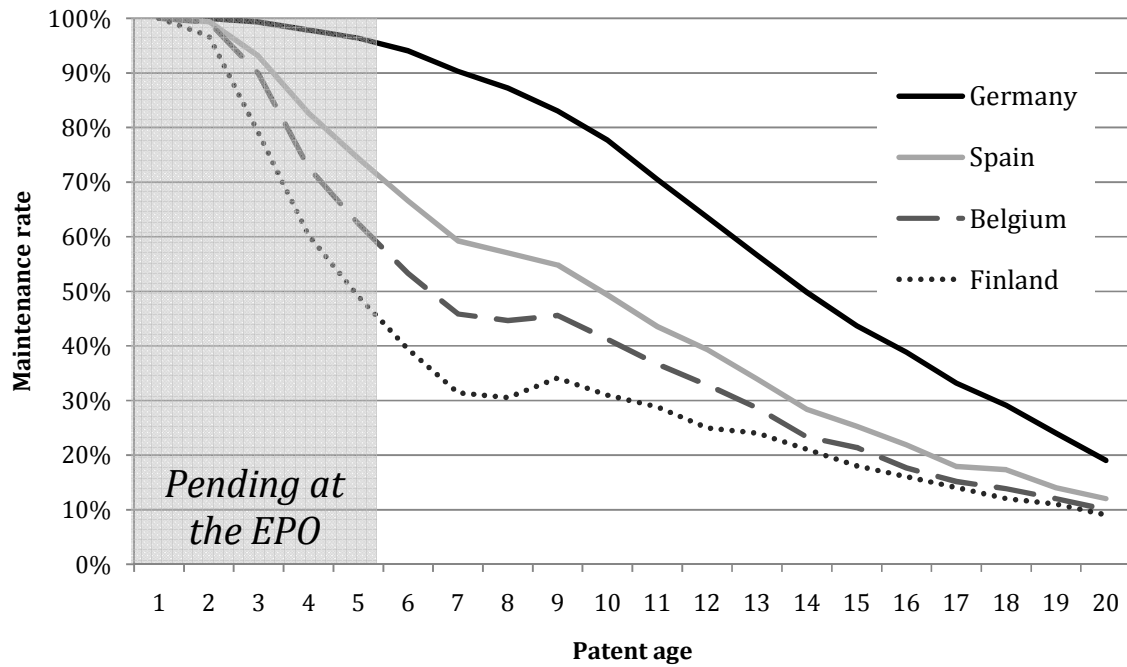
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**APPENDIX TABLE A. MAIN FACTORS EXPLAINING THE FEES-RELATED INCOME OF PATENT OFFICES**

European patent	COMPAT
- Validation rate in each NPO	- nr
- Maintenance rate in each NPO	- Maintenance rate of COMPAT
- Renewal fees of each NPO	- Renewal fees
- nr	- Distribution key

**APPENDIX FIGURE B. MAINTENANCE RATES OVER THE ENTIRE PATENT'S LIFETIME**



Source : Data provided by the EPO

**APPENDIX C. MEASUREMENT METHOD FOR MAINTENANCE RATES**

The dependent variable, of the model analyzed in this paper (eq. 4), corresponds to the maintenance rate of granted patents ( $(1-\delta)$ , or one minus the drop-out rate) enforced in country  $i$  at year  $t$  ( $t=6, \dots, 20$ ). 15 years of renewals are therefore taken into account for each country. As it is illustrated in the following table (representing the case of Germany), these maintenance rates were computed as the share of patents still in force at the end of each patent year, the denominator being the total number of patent validated in the country.

**APPENDIX TABLE C. MAINTENANCE RATES COMPUTATION**

Filing year	Grant	Patents still in force at the end of the patent year						
		6	7	8	9	10		
...	...	...	...	...	...	...	...	...
1996	44663	...	43228	41376	39055	36431	33943	...
1997	47147	...	45557	43721	41439	39032	36613	...
1998	49313	...	47336	45470	43266	40931	38658	...
1999	49466	...	47071	45289	43139	40895	0	...
2000	50655	...	47724	45753	43609	0	0	...
2001	45829	...	43114	41373	0	0	0	...
2002	38298	...	35556	0	0	0	0	...
...	...	...	...	...	...	...	...	...
<b>Maintenance rates (%)</b>			94	90	87	83	78	...

Source : Data provided by the EPO

In other words, maintenance rates were measured as the number of patents still in force at the end of the patent year divided by the number of patents of the same cohort that were validated in the country.. It can be noticed that '*diagonal-1*' data (highlighted in grey on the above table) was preferred because the more recent data seems to be biased due to the lack of the most recent data.

APPENDIX TABLE D. MAINTENANCE RATES AND VALIDATION RATES FOR THE ENTIRE DATABASE

	Maintenance rates (%)															Validation rates (%)
	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
<b>Germany</b>	94	90	87	83	78	70	64	57	50	44	39	33	29	24	19	90
<b>France</b>	90	85	80	75	69	62	55	48	42	37	32	27	25	21	17	78
<b>United Kingdom</b>	87	82	78	74	69	62	55	49	42	38	33	27	25	21	17	73
<b>Netherlands</b>	56	51	51	50	46	42	37	33	28	25	22	19	16	14	11	24
<b>Austria</b>	50	43	42	43	38	34	30	26	22	19	16	14	12	10	8	17
<b>Italy</b>	75	70	67	64	60	54	49	43	37	33	29	24	24	20	17	48
<b>Spain</b>	67	59	57	55	49	44	39	34	28	25	22	18	17	14	12	32
<b>Sweden</b>	52	44	43	43	39	35	31	28	23	20	17	14	13	11	9	19
<b>Denmark</b>	43	35	33	36	33	30	27	23	19	18	15	13	12	11	9	11
<b>Belgium</b>	53	46	45	46	41	37	33	29	23	21	18	15	14	12	10	19
<b>Ireland</b>	47	37	35	40	36	33	29	25	21	19	19	16	13	11	9	11
<b>Finland</b>	39	31	31	34	31	29	25	24	21	18	16	14	12	11	9	10
<b>Portugal</b>	46	35	32	34	30	28	25	22	18	16	14	12	11	9	9	8
<b>Greece</b>	40	30	29	32	28	26	24	21	17	15	12	11	11	9	9	6
<b>Luxembourg</b>	44	32	27	32	28	26	22	20	15	14	12	11	11	9	9	6
<b>USA</b>	86	85	85	67	66	65	64	46	44	43	42	-	-	-	-	100
<b>Japan</b>	100	98	94	91	90	87	83	78	71	65	59	52	47	41	33	100

The maintenance rate corresponds to the share of patents still in force at the end of the patent year and the validation rate is the share of granted EPO patents validated in EPC contracting states in 2006

Source: data provided by the EPO

APPENDIX TABLE E. OTHER VARIABLES IN THE DATABASE

	GDP (in billion €)	Age of membership	IPI	Renewal Fees (€)														
				6*	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<b>Germany</b>	2322	31	4,50	130	180	240	290	350	470	620	760	910	1060	1230	1410	1590	1760	1940
<b>France</b>	1807	31	4,67	150	150	150	150	150	300	300	300	300	300	600	600	600	600	600
<b>United Kingdom</b>	1913	31	4,54	86	111	136	160	185	210	234	259	284	308	333	370	407	444	494
<b>Netherlands</b>	540	31	4,67	185	220	280	340	400	500	600	700	800	900	1000	1100	1200	1300	1400
<b>Austria</b>	257	29	4,33	675	270	270	270	500	500	500	850	850	850	1400	1400	1400	1400	1400
<b>Italy</b>	1480	30	4,67	190	120	170	200	230	310	410	530	600	650	650	650	650	650	650
<b>Spain</b>	982	22	4,33	328	103	129	154	179	217	255	292	330	368	420	469	520	570	620
<b>Sweden</b>	313	30	4,54	413	143	169	201	238	238	285	301	322	349	375	402	428	455	476
<b>Denmark</b>	220	18	4,67	328	215	241	275	308	342	375	409	443	483	523	563	603	644	684
<b>Belgium</b>	317	31	4,67	85	100	125	145	170	195	220	250	290	330	370	410	455	500	545
<b>Ireland</b>	177	16	4,67	184	150	176	194	220	242	265	285	311	335	356	382	408	438	468
<b>Finland</b>	167	12	4,67	465	200	235	265	300	350	400	450	500	535	585	645	705	755	805
<b>Portugal</b>	155	16	4,38	135	98	114	137	172	201	228	275	321	366	412	458	504	549	595
<b>Greece</b>	213	22	4,30	370	84	98	114	134	154	184	214	242	272	322	358	392	430	472
<b>Luxembourg</b>	34	31	4,14	59	74	89	104	118	130	145	160	175	190	205	220	235	250	270
<b>USA</b>	10496	31	4,88	-	-	-	776	-	-	-	1964	-	-	-	3256	-	-	-
<b>Japan</b>	3485	31	4,67	88	269	269	269	902	902	902	902	902	902	902	902	902	902	902

\* for European countries, the validation fees (D. Harhoff et al. 2008, p 14) are included in the renewal fees for year 6  
Source: Eurostat, data provided by the EPO and Park (2008)

APPENDIX TABLE F. 'COUNCIL PROPOSAL' WEIGHTING SCHEME

Country	Population in million <sup>6</sup>	UE27 Dist. key		Language Criteria (1)				Promotion innovation 1stCriterion (2)					Promotion innovation 2ndCriterion (3)					Base Criterion (4)		Total (1+2+3+4)			
		Average on 7 years (2005 -2006 + 2008-2012)	%(without weighting)	EPO Official Language	Incentive premium for non-off. EPO language - Lump sum distribution (10 <sup>3</sup> €)	x% of Renewal Fees	Incentive premium for non-off. EPO language - % pop distrib. (10 <sup>3</sup> €)	% of each MS with non-official EPO languages	1st filings 2005/2006 <sup>4</sup>	1st filings/POP (mio)	Ranking	Ranking Reverse %	y% of Renewal Fees (10 <sup>3</sup> €)	%	EPO Granted Patent 2006 <sup>5</sup>	EPO Granted Patents/POP(mio)	Ranking	Ranking Reverse %	z% of Renewal Fees (10 <sup>3</sup> €)	%	MS share of the Remaining part of the Renewal Fees (10 <sup>3</sup> €)	Remaining % of the MS share of Renewal Fees	Total 10 <sup>3</sup> €
Germany	82,3	94.616	31,6%	Yes	0	0%	0	47.855	581	1	0,3%	24	0,3%	14.274	173,4	1	0,26%	24	0,3%	78.881	26,3%	78.929	26,3%
France	63,4	39.200	13,1%	Yes	0	0%	0	15.395	243	8	2,1%	190	2,1%	4.498	71,0	8	2,12%	190	2,1%	32.681	10,9%	33.062	11,0%
UK	60,9	34.898	11,6%	Yes	0	0%	0	15.825	260	7	1,9%	167	1,9%	2.254	37,0	11	2,91%	262	2,9%	29.094	9,7%	29.523	9,8%
Italy	59,1	25.751	8,6%	No	450	0,15%	4.807	9.862	167	12	3,2%	286	3,2%	2.317	39,2	10	2,65%	238	2,6%	21.469	7,2%	27.249	9,1%
Netherlands	16,4	24.083	8,0%	No	450	0,15%	1.329	5.577	341	6	1,6%	143	1,6%	1.919	117,4	5	1,32%	119	1,3%	20.078	6,7%	22.119	7,4%
Austria	8,3	20.173	6,7%	Yes	0	0%	0	3.171	383	3	0,8%	71	0,8%	656	79,1	7	1,85%	167	1,9%	16.818	5,6%	17.056	5,7%
Spain	44,5	16.211	5,4%	No	450	0,15%	3.615	3.479	78	14	3,7%	333	3,7%	361	8,1	15	3,97%	357	4,0%	13.515	4,5%	18.270	6,1%
Sweden	9,1	10.914	3,6%	No	450	0,15%	741	3.241	356	5	1,3%	119	1,3%	1.501	164,8	4	1,06%	95	1,1%	9.099	3,0%	10.503	3,5%
Denmark	5,4	7.914	2,6%	No	450	0,15%	442	1.979	364	4	1,1%	95	1,1%	507	93,2	6	1,59%	143	1,6%	6.598	2,2%	7.728	2,6%
Belgium	10,6	7.357	2,5%	No	450	0,15%	860	1.338	126	13	3,4%	309	3,4%	561	53,0	9	2,38%	214	2,4%	6.134	2,0%	7.967	2,7%
Ireland	4,3	4.228	1,4%	Yes	0	0%	0	706	164	11	2,9%	262	2,9%	121	28,1	12	3,17%	286	3,2%	3.525	1,2%	4.072	1,4%
Finland	5,3	3.903	1,3%	No	450	0,15%	428	2.110	400	2	0,5%	48	0,5%	885	167,9	2	0,53%	48	0,5%	3.254	1,1%	4.227	1,4%
Portugal	10,6	3.156	1,1%	No	450	0,15%	861	172	16	27	7,1%	642	7,1%	19	1,8	19	5,03%	452	5,0%	2.631	0,9%	5.036	1,7%
Greece	11,2	2.674	0,9%	No	450	0,15%	908	631	56	19	5,0%	452	5,0%	30	2,7	17	4,50%	404	4,5%	2.229	0,7%	4.444	1,5%
Luxemburg	0,5	1.581	0,5%	Yes	0	0%	0	85	181	9	2,4%	214	2,4%	67	142,6	3	0,79%	71	0,8%	1.318	0,4%	1.604	0,5%
Hungary	10,1	671	0,2%	No	450	0,15%	818	714	71	15	4,0%	357	4,0%	35	3,5	16	4,23%	381	4,2%	559	0,2%	2.565	0,9%
Cyprus	0,8	503	0,2%	No	450	0,15%	63	31	40	21	5,6%	500	5,6%	15	19,5	13	3,44%	309	3,4%	419	0,1%	1.741	0,6%
Estonia	1,3	365	0,1%	No	450	0,15%	109	24	18	26	6,9%	619	6,9%	2	1,5	20	5,29%	476	5,3%	304	0,1%	1.957	0,7%
Czech Republic	10,3	323	0,1%	No	450	0,15%	836	597	58	18	4,8%	428	4,8%	21	2,0	18	4,76%	428	4,8%	269	0,1%	2.411	0,8%
Romania	21,6	309	0,1%	No	450	0,15%	1.753	941	44	22	5,8%	523	5,8%	0	0,0	27	7,14%	642	7,1%	258	0,1%	3.626	1,2%
Slovakia	5,4	245	0,1%	No	450	0,15%	438	156	29	24	6,3%	571	6,3%	8	1,5	21	5,56%	500	5,6%	204	0,1%	2.163	0,7%
Bulgaria	7,7	223	0,1%	No	450	0,15%	624	268	35	23	6,1%	547	6,1%	4	0,5	23	6,08%	547	6,1%	186	0,1%	2.354	0,8%
Slovenia	2,0	179	0,1%	No	450	0,15%	163	371	185	10	2,6%	238	2,6%	21	10,4	14	3,70%	333	3,7%	149	0,0%	1.333	0,4%
Lithuania	3,4	76	0,0%	No	450	0,15%	275	71	21	25	6,6%	595	6,6%	0	0,0	26	6,88%	619	6,9%	63	0,0%	2.001	0,7%
Latvia	2,3	74	0,0%	No	450	0,15%	185	117	51	20	5,3%	476	5,3%	2	0,9	22	5,82%	523	5,8%	62	0,0%	1.696	0,6%
Poland	38,1	157	0,1%	No	450	0,15%	3.099	2.286	60	17	4,5%	404	4,5%	17	0,4	24	6,35%	571	6,3%	131	0,0%	4.655	1,6%
Malta	0,4	9	0,0%	No	450	0,15%	33	26	65	16	4,2%	381	4,2%	0	0,0	25	6,61%	595	6,6%	8	0,0%	1.465	0,5%
<b>Total UE27</b>	<b>495,0</b>	<b>299.793</b>	<b>100%</b>		<b>9.443</b>	<b>3,2%</b>	<b>22.425</b>	<b>117.028</b>	<b>4.393</b>			<b>8.994</b>	<b>3,0%</b>	<b>30.095</b>				<b>8.994</b>	<b>3,0%</b>	<b>249.937</b>	<b>83,4%</b>	<b>299.755</b>	<b>100%</b>

Source: European Commission (DG Internal Market, doc 8928/08)

**APPENDIX TABLE G. FOUR POTENTIAL 'DISTRIBUTION KEYS'**

	Actual*	Proposed*	GDP**	Population*
Germany	31.6%	26.3%	19.9%	16.6%
France	13.1%	11.0%	15.5%	12.8%
United Kingdom	11.6%	9.8%	16.4%	12.3%
Netherlands	8.0%	7.4%	4.6%	3.3%
Austria	6.7%	5.7%	2.2%	1.7%
Italy	8.6%	9.1%	12.7%	11.9%
Spain	5.4%	6.1%	8.4%	9.0%
Sweden	3.6%	3.5%	2.7%	1.8%
Denmark	2.6%	2.6%	1.9%	1.1%
Belgium	2.5%	2.7%	2.7%	2.1%
Ireland	1.4%	1.4%	1.5%	0.9%
Finland	1.3%	1.4%	1.4%	1.1%
Portugal	1.1%	1.7%	1.3%	2.1%
Greece	0.9%	1.5%	1.8%	2.3%
Luxembourg	0.5%	0.5%	0.3%	0.1%
Hungary	0.2%	0.9%	0.8%	2.0%
Cyprus	0.2%	0.6%	0.1%	0.2%
Estonia	0.1%	0.7%	0.1%	0.3%
Czech Republic	0.1%	0.8%	1.0%	2.1%
Romania	0.1%	1.2%	0.8%	4.4%
Slovakia	0.1%	0.7%	0.4%	1.1%
Bulgaria	0.1%	0.8%	0.2%	1.6%
Slovenia	0.1%	0.4%	0.3%	0.4%
Lithuania	0.0%	0.7%	0.2%	0.7%
Latvia	0.0%	0.6%	0.1%	0.5%
Poland	0.1%	1.6%	2.3%	7.7%
Malta	0.0%	0.5%	0.0%	0.1%

Source: \* appendix G., \*\* Eurostat 2006 (million €)

**APPENDIX TABLE H. NPO'S RENEWAL FEES INCOME UNDER EP AND COMPAT WITH THE VCOM(300)  
RENEWAL FEE SCHEDULE**

	VNPO		Level			Relative net differences		
	€	%	Proposed	GDP	Population	Proposed	GDP	Population
<b>EPO</b>	5,686		8,274	8,274	8,274	46	46	46
<b>Germany</b>	2,386	42.0	2,176	1,649	1,375	-9	-31	-42
<b>France</b>	802	14.1	910	1,284	1,059	14	60	32
<b>United Kingdom</b>	597	10.5	811	1,359	1,017	36	128	71
<b>Netherlands</b>	332	5.8	612	384	274	85	16	-17
<b>Austria</b>	227	4.0	472	183	139	108	-19	-39
<b>Italy</b>	576	10.1	753	1,052	987	31	83	71
<b>Spain</b>	230	4.1	505	698	743	119	203	223
<b>Sweden</b>	111	1.9	290	223	152	161	101	37
<b>Denmark</b>	71	1.2	215	156	90	203	120	27
<b>Belgium</b>	88	1.5	223	225	177	154	156	102
<b>Ireland</b>	55	1.0	116	126	72	109	127	30
<b>Finland</b>	70	1.2	116	119	89	65	69	26
<b>Portugal</b>	31	0.6	141	110	177	347	251	462
<b>Greece</b>	21	0.4	124	151	187	482	611	778
<b>Luxembourg</b>	13	0.2	41	24	8	225	89	-34
<b>Hungary</b>	15	0.3	74	64	169	385	317	1,000
<b>Cyprus</b>	10	0.2	50	10	13	384	2	30
<b>Estonia</b>	5	0.1	58	9	22	1,096	92	349
<b>Czech Republic</b>	17	0.3	66	81	172	280	363	887
<b>Romania</b>	6	0.1	99	69	361	1,618	1,101	6,143
<b>Slovakia</b>	8	0.1	58	32	90	667	319	1,094
<b>Bulgaria</b>	6	0.1	66	18	129	947	184	1,935
<b>Slovenia</b>	4	0.1	33	22	33	679	419	687
<b>Lithuania</b>	1	0.0	58	17	57	5,140	1,425	5,039
<b>Latvia</b>	0	0.0	50	11	38	15,393	3,458	11,891
<b>Poland</b>	3	0.1	132	193	636	4,349	6,397	21,288
<b>Malta</b>	-	-	41	4	7	-	-	-

Source: own calculation based on total renewal fees' income presented in Figure 4 and on distribution keys presented in appendix H.