

The effect of DTT availability on households' willingness to subscribe to Sky's pay TV services

Report of an econometric study

Paul Seabright

Toulouse School of Economics

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1. Introduction

1. I have been engaged by Herbert Smith to undertake an econometric study to measure the extent to which variations in the geographical availability of television services broadcast via digital terrestrial television (“DTT”) affect households’ willingness to subscribe to Sky’s pay TV services, as compared with how variations in the geographical availability of cable television affect households’ willingness to subscribe to these services. I understand that this study may be submitted by Sky in connection with its response to the second consultation paper on pay TV in the United Kingdom by Ofcom. I have undertaken this study jointly with my colleagues Professor Bruno Jullien and Professor Thierry Magnac of the Toulouse School of economics.
2. This report is structured as follows. In section 2 I set out the instructions I have received from Herbert Smith. In section 3 I summarize briefly my qualifications and experience; a *curriculum vitae* is attached as Appendix One, as are a *curriculum vitae* each for Professors Jullien and Magnac . In section 4 I provide an introduction to the methodology of the study, describing this as far as possible in non-technical terms. In section 5 I summarize the results of the study. A detailed technical description of the study, intended for readers familiar with econometric concepts, is attached as Appendix Two.

3. The relevant part of my letter of instructions from Herbert Smith states the following:

We would like you to conduct an econometric study to measure the extent to which variations in the geographical availability of television services broadcast via the Digital Terrestrial Television ("DTT") platform affect households' willingness to subscribe to Sky, as compared with how variations in the geographical availability of cable television affect households' willingness to subscribe to Sky. Your study should consider separately subscriptions to Sky for (i) basic television only; (ii) any premium package; (iii) premium sports only; (iv) premium movies only; and (v) premium sports plus movies. For the avoidance of doubt, at this stage, we do not require you to express any conclusions on the definition of any relevant market which could be drawn from the results of your study.

We note that you are aware that Sky undertook a similar study in its unpublished paper entitled "Regression analysis of effect of DTT on Sky subscriptions" submitted by Sky to the Competition Commission in the context of the investigation of Sky's acquisition of a stake in ITV. We will provide you with a copy of that paper and the underlying data. We would like you to conduct your study independently of this previous study, using any further variables or data (that Sky could provide within appropriate time constraints) which you would view as necessary for conducting your study.

2. My qualifications and experience

4. I am a Professor of Economics at the Toulouse School of Economics in France. Prior to my appointment there in the year 2000 I was Reader in Economics at the University of Cambridge, having begun my academic career as a Fellow of All Souls at the University of Oxford where I obtained my D.Phil. degree. My full *curriculum vitae* is given in Appendix 1 to this report. My academic research has been in a range of fields but has focused principally on industrial organisation and competition policy, on which I have published three jointly-authored books and many scientific articles. This work has frequently involved rather detailed technical analyses, theoretical and/or empirical, of conditions in specific economic markets, including broadcasting markets, about which I was editor of a volume published in 2007 by Cambridge University Press entitled *The Economic Regulation of Broadcasting Markets*. I have also undertaken consultancy for private sector firms and for public authorities (including

such competition agencies as The Competition Authority in Ireland and the DG-Competition of the European Commission, to whose Economic Advisory Group on Competition Policy I belong). I have been an economic expert in a number of competition investigations, such as the *Airtours* and *Microsoft* cases.

3. The methodology of the econometric study

5. DTT has been available in the United Kingdom since 1998. Between 1998 and 2002 it was used for a mix of pay TV and free-to-air TV services, but the original pay TV service closed in 2002. Since late 2002, DTT has been used predominantly for free-to-air TV services, which are marketed under the brand name "Freeview". Pay TV services also began to be broadcast using DTT again from 2004. Take-up of DTT services has been very rapid since the launch of Freeview, with an estimated 16.7 million homes having access to DTT services in September 2008, with 9.4 million of those households having no other access to digital television services¹. The speed of the adoption of this service has astonished many industry observers; Freeview described itself in a 2006 press release as "one of the fastest growing consumer entertainment services ever to launch in the UK"². Nevertheless, DTT's coverage of the country remains significantly incomplete, for technical reasons; a map of DTT coverage in July 2004 is attached as Figure 1. Variations in this coverage therefore provide a measure of variation in the alternatives available to potential subscribers to Sky.³ The econometric study set out in this report measures the extent to which variations in the availability of Freeview affect households' willingness to subscribe to Sky, based on data from February 2008 and a comparison of these with data from February 2007.

¹ Ofcom Digital Television Update Q3 2008

² See <http://www.freeview.co.uk/press/pr010306>

³ In light of the focus of this study on the effect of free-to-air TV services available via DTT, which are marketed under the brand name "Freeview", from this point onwards, we use the terms "Freeview" and "DTT" interchangeably. Although this is not a precise approach, it corresponds to popular conceptions of DTT broadcasting in the UK and does not affect the results of the study in any way.

6. The idea of using Freeview availability for this purpose is not new to our study, but was first undertaken in the unpublished paper “Regression analysis of effect of DTT on Sky subscriptions” submitted by Sky to the Competition Commission in the context of the investigation of Sky’s acquisition of a stake in ITV. The latter paper asks a similar question to our econometric study, although our econometric study goes beyond the previous work in a number of ways described below, including the use of more recent data from 2008. In doing so we are fortunate to have obtained from Sky a dataset consisting of an updated version of the data used for the modelling in Sky's study, as well as data on a number of additional variables supplied at our request. As a result the econometric study is able to corroborate the strong negative relationship between Freeview availability and Sky subscriptions estimated in Sky's study and to verify the extent of its robustness to a number of statistical concerns.
7. This work has been conducted jointly with Professor Bruno Jullien and Professor Thierry Magnac, who are both my colleagues at the Toulouse School of Economics. I have reviewed the work of Professors Jullien and Magnac, and am satisfied that their analysis is complete and correct, and I accept full responsibility for the study as a whole. The full technical study is attached as Appendix 2 to this report. Here, in the main body of this report, I describe the study’s methods and results in non-technical terms. Before doing so, however, I make a few preliminary comments on the nature of econometric studies.
8. Econometrics is the use of statistical techniques to assess causal relationships between variables. It is an alternative to the use of controlled experiments, which are the investigative method of choice in much of the natural sciences. Controlled experiments subject a group of experimental subjects (“the treatment group”) to an intervention (“the treatment”) and compare the results to those in a group of subjects (“the control group”) who are chosen to be as similar as possible to the subjects in the treatment group but who have not been subjected to the intervention. Those results that differ between the two groups are known as the “treatment effect”, provided the difference is greater than is likely to have come about by chance, a matter that can be assessed by a range of conventional statistical tests.
9. Controlled experiments are rarely possible in economics and other studies of human society, because the phenomena being studied often come about for reasons

independent of the investigators' intention, and it is therefore not possible to ensure that the individuals not subject to the intervention are a genuine control group. For this reason econometrics has devised a large number of methods to assess the relevant similarities between the subjects who have and those who have not undergone the intervention, and to make adjustments for the respects in which they are not otherwise similar. Many different control variables can be taken into account simultaneously in this way if there are enough observations in the sample.

10. The way we approach this study is to analyse a dataset provided to us by Sky consisting of evidence about the levels of subscriptions to basic-only and various premium plus basic packages⁴ at the level of UK postcode districts, and to link these to the extent to which households in each postcode district are physically able to receive DTT, the service via which Freeview is transmitted. Two qualifications need to be stated at the outset.
11. First, data on which particular households have access to a DTT signal is not available. Instead information on access to DTT at the level of postcode districts is available. There are around 2,900 postcode districts in the UK, of which usable data on 2,777 (a number large enough to yield statistically reliable results) are available. This information indicates what proportion of households in the district have access to DTT signals, and this can be compared with the proportion of households who subscribe to Sky (postcode district-level information on subscribers to other pay TV retailers' services is not available to us).
12. Secondly, as I discuss in detail below, even though our "control group" consists of people who have no opportunity to adopt Freeview rather than those who have chosen not to do so, it is not possible to be sure without further investigation that they are sufficiently similar in other respects to the "treatment group" of households who do have the opportunity to adopt Freeview. So it is necessary to use a large range of tests to ensure that our findings are not contaminated by differences between the groups. Our results, which indicate a high degree of substitutability between Sky's pay TV services and multichannel free-to-air TV services, are in fact robust to all of these tests, with one qualification, as described below.

⁴ For simplicity, these are referred to hereafter as "basic" and "premium" packages respectively.

13. Finally, it should be borne in mind that the econometric study compares the effect on willingness to subscribe to Sky of having access to *additional* free-to-air TV services broadcast via the DTT platform compared to a base case in which virtually all individuals already have access to analogue free-to-air TV services and many have access to digital free-to-air TV services broadcast via DTH satellite⁵. This will evidently give an estimate of substitution that is at least somewhat lower than if the base case consisted of having no access to free-to-air TV services at all. So it is reasonable to see our estimates of the substitution between Sky and Freeview as a conservative estimate of the substitution between Sky and all digital free-to-air TV services, and an even more conservative estimate of the substitution between Sky's pay TV services and all free-to-air TV services (digital and analogue combined).
14. To my knowledge there does not exist any other econometric study that has used the same kind of data as our own study, for either the UK or any other country⁶.

4. Results of the study

4.1 Overview

15. The results of the econometric study are very clear. Postcode districts that have higher access to Freeview have, on average, significantly lower levels of subscriptions to Sky's pay TV services. The effect is large enough to imply that Freeview is an important competitive constraint upon Sky. Not only that, but it is *as important* a constraint as the availability of cable-delivered pay TV services in the case of premium subscriptions, and substantially *more important* than the availability of cable-delivered pay TV services in the case of basic subscriptions.
16. We have undertaken a number of checks for robustness, as I discuss below. Even after taking into account other possible factors that may play a part in explaining these

⁵ In this report I have used the terms "digital" and "multichannel" interchangeably when describing TV services, except when the context makes clear that one term is more appropriate than the other.

⁶ The closest comparison (and it is not very close) is with some studies in the United States; we refer to these in more detail in Appendix 2, paragraph 57.

findings, the econometric study provides very clear conclusions. Table 1 summarizes the key findings, reporting the effect of an increase of 20 percentage points in Freeview availability in a postcode district. Such an increase, which is well within the normal range of variation between postcode districts in the overall population, for instance, might represent the difference between a postcode district in which 60% of households have access to Freeview and one in which 80% have access to Freeview.

17. First, Table 1 shows the simple correlation between Freeview availability and subscriptions to Sky's pay TV services (in other words without allowing for other factors). This correlation is such that a 20% increase in Freeview availability is associated with a fall of 1.79 percentage points in basic subscriptions to Sky from their average value of █% (that is, a fall of slightly over █). It is also associated with a fall of 1.20 percentage points in premium subscriptions from their average value of █%. Secondly, the table shows the estimate of the correlation between Sky subscriptions and Freeview availability when adjusted for other possible explanatory factors in ways I discuss below: this is my "preferred specification" or "best judgment" about the likely causal impact of Freeview on demand for Sky's pay TV services. As can be seen, adjusting for other factors in fact slightly reduces the estimated effect. Nevertheless, as I discuss below, this remains an important and highly statistically significant effect, one that implies Freeview services are a significant substitute for Sky's pay TV services and for pay TV services generally.

Table 1

Effect of a 20% increase in Freeview availability on percentage of households in a typical postcode district that subscribe to Sky services, 2008

	Basic-only subscriptions	Premium-plus-basic subscriptions
Level of subscriptions in typical postcode	■%	■%
Effect on level of subscriptions:		
(i) Simple correlation	-1.79% ⁷	-1.20%
(ii) Adjusting for other factors (Preferred Specification)	-1.63%	-1.17%
T-test for Statistical Significance:		
(i) Simple correlation	39.4	15.2
(ii) Adjusting for other factors	7.6	2.3

18. As shown in Appendix 2, the hypothesis that this correlation is just due to chance can be rejected at a probability that is a tiny fraction of one per cent, and this finding therefore can be characterized as very highly statistically significant. The statistical significance of a particular empirical finding is measured by the probability that such a finding might have been produced by chance due to the intrinsic randomness in the data. Therefore the smaller the probability concerned the more statistically significant the finding. There are a number of conventional thresholds for treating degrees of statistical significance as sufficiently great to be worth reporting in scientific publications. A 10% threshold is normally the lowest degree of statistical significance to be worth reporting, with 5% a more normal threshold, and 1% representing a high

⁷ This figure, and other comparable figures, means a fall in the level of subscription by 1.79% - i.e. a fall, in this case, from ■% - ■%.

degree of statistical significance. It is worth emphasizing that statistical significance is a matter of degree, and findings that are reported as being just below one or other threshold of statistical significance do not by that fact lose their interest or relevance for the inquiry in question.

19. The way in which statistical significance is calculated in a study such as this one is via the computation of a so-called “t-statistic”, which is a measure of how far the measured effect differs from zero compared to how far it might have been expected to differ from zero purely by chance. Values of the t-statistic greater than about 1.6 indicate statistical significance at less than 10%, while values of around 2 or greater indicate significance at less than 5%, and values of around 2.6 or more indicate statistical significance at less than one per cent. The values reported in Table 1 are therefore all significant at much less than one per cent, except for the effect on premium subscriptions in the preferred specification which is significant at around 2%.
20. I discuss in more detail below what an effect of the magnitude reported in Table 1 implies for the degree of substitution between free-to-air TV services and pay TV services. However, it is first necessary to ensure that the simple correlation observed between Freeview availability and Sky subscriptions is really indicating something about causation. I discuss this in the next section.

4.2 Checking for robustness

4.2.1 Omitted variables

21. Some of the difficulties in inferring causation from the correlation described above concern whether factors that could be responsible for the observed correlation have been omitted. One likely factor is the availability of cable, which tends to be higher in areas that also have higher availability of Freeview. In fact, including cable availability as an explanatory variable somewhat reduces the significance of Freeview, though high Freeview availability remains strongly associated with lower Sky subscriptions, to a degree that is both statistically significant and economically

important. The econometric study also includes a number of other variables (known as “control” variables since they are not in themselves the explanatory variables of interest but are used to verify the statistical association between the variables in which the researcher is really interested). We control for household characteristics such as income, and also for the characteristics of localities such as the density of population. These other controls are highly significant, but including them strengthens rather than weakens the original negative correlation between Freeview availability and subscriptions to Sky. It is of course not possible to be absolutely certain that all relevant control variables have been included (no scientific study can ever be absolutely certain) but I believe we have made a thorough attempt to do so.

4.2.2 Endogeneity - is Freeview availability really a “random treatment”?

22. A more complex issue than that of omitted variables is the question of whether the availability of Freeview is genuinely random, akin to a truly randomised medical trial. It is necessary to consider whether there might have been unobserved factors that could have determined the geographical pattern of Freeview availability in ways that were correlated in turn with the tastes of viewers for Sky retail packages. If that were so, then Freeview availability could no longer be considered a truly random treatment and any estimation of its impact on demand for Sky subscriptions based on such an assumption would be less robust. In the terminology of econometrics, Freeview would be “endogenous”. The estimate of the effect of variations in Freeview availability on Sky subscriptions would contain a spurious element, consisting of the impact of factors that were correlated with subscriptions and also influenced Freeview availability, independently of any causal impact of the latter on the former. The estimate would therefore be biased to the extent of the inclusion of this spurious element.

23. To overcome these concerns, it is necessary to examine the effect of a truly random factor (known as an “instrumental variable”) that determines whether or not Freeview is available.⁸ The econometric study therefore seeks to find suitable instrumental

⁸ Appendix 2 describes the principles behind the use of instrumental variables and what makes a variable suitable for such a purpose.

variables for the availability of Freeview. We use the distance of localities from DTT transmitters as such a variable. The digital transmitters have been constructed on the largest of the old analogue masts that were erected across the UK around half a century ago, and there seems no reason to believe that the predetermined geographical distribution of these large masts is anything but random with respect to the underlying preferences of households for pay TV services as opposed to free-to-air TV services. In this way it is possible to obtain an estimate of the true underlying impact of Freeview availability on Sky subscriptions which is robust to concerns about endogeneity. Our estimates of the impact of Freeview availability on willingness to subscribe to Sky's pay TV services in fact become stronger when such concerns are taken into account in the way I have described. We also verify that these findings are robust over time, by estimating the relationship on data from February 2007, and find results that are virtually identical to those from February 2008. The conclusions that we draw from the data for 2008 would therefore be unchanged on the basis of data from the earlier year.

24. We discuss in Appendix 2 why a number of other plausible potential instrumental variables turned out not to be suitable.

4.2.3 Spatial correlation

25. Our methods of verifying whether the estimated effects are statistically significant draw on the standard tests, which essentially compare the size of the effect (here, the lower levels of Sky subscriptions observed in districts with higher Freeview availability) with the type of effect that might have been observed by chance given the amount of overall observed variation in the phenomenon under consideration. It is well known that small samples make it possible for apparent effects to appear by chance, and therefore a larger sample of independent observations increases the confidence one may have that the observed effect is really present in the data. But what if the observations are not really independent? Perhaps then the appearance of a larger sample would be misleading.
26. We investigate this possibility in our dataset by measuring the extent to which preferences for Sky subscriptions are spatially correlated – that is, how much neighbouring postcode districts tend to have similar preferences. Suppose, for

instance, that a given town contains ten postcode districts, but that the preferences of the town's inhabitants for pay-TV are very similar (because, say, the fortunes of the local football team create a powerful motivation to watch sports channels). Then, it might be feared, treating the ten districts as though they offered us ten independent random draws for our statistical investigation is too generous. They are, someone might claim, just ten near-clones of one single experiment.

27. The correlation between the preferences of neighbouring districts can be measured and then the statistical significance of our results can be calculated in a way that treats closely correlated neighbouring districts as counting for less than fully independent observations. Doing so makes no essential difference to the statistical significance of our results for Sky basic subscriptions, which remain statistically significant at a tiny fraction of one per cent.⁹ For premium subscriptions, our results are now significant at around two per cent. This is still well within the conventional margins of statistical significance.

28. My preferred specification reported in Table 1 is the specification that includes all relevant control variables, that also controls for the endogeneity of Freeview availability, and that calculates statistical significance allowing for the degree of spatial correlation. It is this specification that, I believe, best captures what the data reveal about the likely causal effect of greater access to Freeview upon households' willingness to subscribe to Sky's pay TV services.

4.2.4 Decomposition into different types of premium subscription

29. In the econometric study, we have investigated whether the effects for premium subscriptions differ according to the make-up of the premium package. We find that the effect of Freeview availability is strongest for sports-only and movies-only subscriptions. However, for combined sports-and-movies packages the effect of

⁹ It should be noted that whereas our tests for robustness with respect to omitted variables and to endogeneity actually modify our estimates of the effect under consideration (because they measure the effect with respect to what would have happened given the movements in other factors), the tests for robustness with respect to spatial correlation do not modify our estimates of the effects themselves, just our assessment of the degree of statistical confidence that we can have that these effects are not due to chance. In the language of econometrics, the former modify the "parameter estimates" while the latter modify only the "confidence intervals".

Freeview availability, while still negative, is now just over three-quarters as strong as that of cable availability. Its degree of statistical significance also falls when we take spatial correlation into account. When we do this, the t-statistic falls to just over 1 which means that it is no longer statistically significant even at ten per cent; this is due entirely to the effect of allowing for spatial correlation since the t-statistic without correction for spatial correlation is equal to 3.34 (significant at less than one per cent). The measured effects for sports-only and movies-only packages remain statistically significant at well under one per cent even when spatial correlation is taken into account.

4.2.5 Exclusion of outliers (extreme values)

30. One possible cause for concern in studies of this kind is that unusual or extreme values, known as “outliers”, may be having an undue weight on the results. There are various ways of testing the robustness of the results to this possibility, and we have chosen the simplest method, which is to drop the observations with the 5 per cent largest positive deviations from the predicted value, as well as those with the 5 per cent largest negative deviations. Removing these outliers makes essentially no difference to the estimated effect of Freeview availability on Sky basic subscriptions, but increases it by around 5% in the case of total premium-plus-basic subscriptions, and by over 20% in the particular case of sports-and-movies packages, enough to make the estimated impact of Freeview the same as the impact of cable. (However, given the high variability of sports-and-movies subscriptions between postcode districts the estimates are significant at slightly more than 10%). This means that the results reported so far are not being disproportionately driven by outliers – on the contrary, in reporting the results that include outliers I am being somewhat conservative in my conclusions. Thus my preferred specification still includes these outliers, but we have verified that if we were to remove them we would have found even stronger results.

4.3 How economically important are the results?

31. As well as asking whether the treatment effect is statistically significant (that is, larger than is likely to be explained by chance) it is also necessary to ask whether it is economically significant – that is, large enough to make an important difference to the competitive constraints on Sky. In the econometric study, we approach this question in two ways. First, a sense of the importance of the treatment effect of Freeview availability can be attained by comparing it with changes in the availability of cable in the same locality. This allows us to measure whether Freeview is as close a substitute for Sky’s pay TV services as cable TV services are. Since cable television has been traditionally regarded by competition law and policy (in the UK) as being an important enough competitive constraint to count as being in the same relevant market as satellite television, this provides a threshold for considering the effect of Freeview availability as economically important.
32. Tables 2 and 3 provide the estimates of the impact of Freeview availability and cable availability on subscriptions to Sky’s pay TV packages under our different methods of estimation.
33. In relation to basic-only subscriptions (Table 2), for my preferred specification (the one that includes all the relevant control variables and also takes into account endogeneity and spatial correlation) the estimates in the first row show that Freeview availability has an impact on Sky subscriptions that is over 50% stronger than that of cable availability. The results do not change greatly when outliers in the data are removed (see last row, Table 2).

Table 2**Size of impact of Freeview and cable availability on Sky basic subscriptions**

Level of subscriptions in average postcode district	■%	
	Reduction in level of subscriptions from:	
	a 20% increase in Freeview availability	a 20% increase in cable availability
Preferred specification (with outliers)	-1.63 %	-0.96 %
Specification with outliers removed	-1.62 %	-0.97 %

34. In relation to subscriptions to all packages that include premium channels (Table 3) for my preferred specification (which includes all the relevant control variables and also takes into account endogeneity), the estimates in the first row show that Freeview availability has an impact on Sky premium subscriptions equal to that of cable availability. Freeview availability has a somewhat greater impact on Sky premium subscriptions than cable availability when outliers in the data are removed (see row 2, Table 3).

Table 3**Size of impact of Freeview and cable availability on all Sky premium subscriptions**

Level of subscriptions in average postcode district	■%	
	Reduction in level of subscriptions from:	
	a 20% increase in Freeview availability	a 20% increase in cable availability
Preferred specification (with outliers)	-1.17 %	-1.09 %
Specification with outliers removed	-1.22 %	-1.13 %

35. Subdividing premium subscriptions into different package types (Table 4) shows Freeview availability to have:

- around the same level of impact as cable availability on movies-only subscriptions (although the effect is somewhat stronger once outliers in the data are removed);
- a stronger impact than cable availability on sports-only subscriptions (removing outliers in the data does not significantly alter the estimate of the impact of either service); and
- a weaker impact than cable availability on combined sports-and-movies subscriptions (although the difference in impact between Freeview and cable disappears when outliers in the data are removed).

Table 4

Size of impact of Freeview and cable availability on different types of Sky premium subscriptions

	Movies-only		Sports-only		Sports-and-movies	
Level of subscriptions in average postcode district	■%		■%		■%	
	Reduction in level of subscriptions from:					
	a 20% increase in Freeview availability	a 20% increase in cable availability	a 20% increase in Freeview availability	a 20% increase in cable availability	a 20% increase in Freeview availability	a 20% increase in cable availability
Preferred specification (with outliers)	-0.21%	-0.18 %	-0.52 %	-0.38 %	-0.37 %	-0.46 %
Specification with outliers removed	-0.20%	-0.20%	-0.50 %	-0.39 %	-0.46 %	-0.46 %

36. The econometric study therefore leads to the conclusion that Freeview availability has at least as strong an impact as cable availability on demand for all categories of Sky's pay TV services except the combined sports-and-movies premium services, where the study shows that its impact is slightly weaker than that of cable services though still of broadly comparable magnitude.
37. Secondly, the econometric study provides a calibration of the impact of Freeview availability in terms of consumers' willingness-to-pay. How much less is the average consumer willing to pay for Sky when the availability of Freeview in a locality increases, and is this a significant proportion of the monthly subscription fee? In order to make such calibrations it is necessary to make assumptions about possible values of the price elasticities of demand for Sky's pay TV services, since these elasticities cannot be estimated directly from the available data (as there have been few observed price changes over the period of data availability, whereas the number of subscriptions has increased and the range and quality of pay TV services and alternative services have changed rapidly over time). However, using low and high estimates from studies undertaken in the United States, which I believe provide a plausible idea of the likely values, I can estimate an amount by which the price of Sky subscriptions would have to rise in order to reduce the probability of subscribing by the same amount, for an average household, as would occur when Freeview becomes available for the first time. This provides a sense of whether Freeview is having a small or a large effect on the preferences of potential subscriber households.
38. Table 5 summarises our results. These results suggest that having access to Freeview reduces the willingness of a representative household to pay for a Sky basic subscription by between £[redacted] and £[redacted] per month (from around a third to over a half of the monthly subscription fee), and its willingness to pay for Sky's premium packages by a smaller but still economically important amount of between £[redacted] and £[redacted] per month (from [redacted]% to nearly [redacted]% of the monthly subscription fee for 2008). This average impact on the premium channels masks a difference between the sports-only and movies-only channels, where the willingness to pay is strongly sensitive to competition from Freeview, and the category of sports-and-movies premium packages, where our estimate is that the reduction in willingness to pay lies between £[redacted] and £[redacted] per month. This suggests, plausibly enough in my opinion, that subscribers to the combined sports-and-movies premium packages (around [redacted]% of all Sky

subscribers at the points in time to which the data relate) are those for whom Freeview represents less of a close substitute than for other subscribers¹⁰. When spatial correlation is taken into account, these last estimates can no longer be considered to differ from zero at conventional levels of statistical confidence. The remainder are all statistically significantly different from zero at a level of 1% or better, except for the estimate for Premium overall which is significant at 2%.

Table 5 Estimated reductions in average willingness-to-pay for Sky subscriptions for a representative consumer when Freeview becomes available, low and high elasticities

	Elasticity	Equivalent price increase
Basic (significant at < 1%)	1.5	£ [REDACTED]
	2.5	£ [REDACTED]
Premium (significant at around 2%)	1.5	£ [REDACTED]
	2.5	£ [REDACTED]
Premium sports-only (<1%)	1.5	£ [REDACTED]
	2.5	£ [REDACTED]
Premium movies-only (< 1%)	1.5	£ [REDACTED]
	2.5	£ [REDACTED]
Sports-and-movies (>10%)	1.5	£ [REDACTED]
	2.5	£ [REDACTED]

¹⁰ This does not consider any indirect substitution that may exist due to the fact that premium sports-only and premium movies-only packages may in turn be substitutes for sports-and-movies packages; the study measures only the direct impact of Freeview availability on the demand for each of these packages separately.

4.4 Overall assessment of the findings of the econometric study

39. My colleagues and I have found significant effects of the availability of Freeview on the willingness of consumers to subscribe to Sky's pay TV services. We have subjected our findings to a number of tests of statistical robustness. As far as basic subscriptions are concerned, I am confident that this study provides as strong evidence as one might reasonably expect that the availability of multichannel free-to-air TV services constrains the willingness of consumers to pay for subscriptions to Sky's basic pay TV services to an extent that:

- (i) is stronger than the effect of the availability of cable services;
- (ii) represents a reduction in willingness to pay that is a large fraction of the monthly subscription fee; and
- (iii) is far greater than could reasonably be due to chance.

40. It is worth emphasising once again that the study is a conservative estimate of the impact on Sky subscriptions of free-to-air TV services.

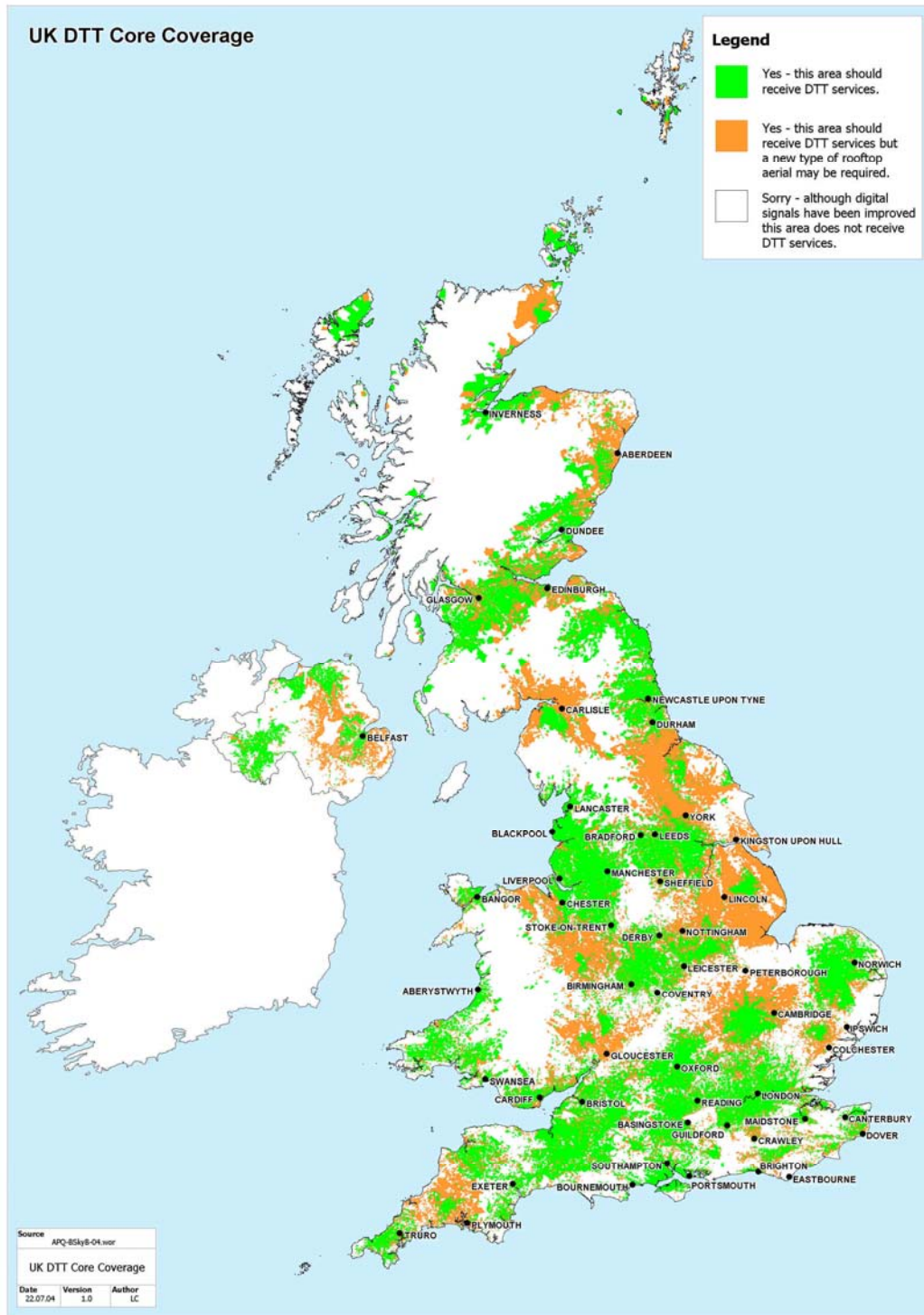
41. For premium services the conclusion to be derived from the econometric study is broadly similar with some differences in detail. Subscribers to Sky's premium packages, considered as a whole, do respond in a qualitatively similar if quantitatively more restrained way to the availability of Freeview. The smaller demand response than for basic packages is consistent with the view that there is greater differentiation between the content available in Sky's premium packages and that available via free-to-air TV services, even if there remains significant substitution between the two.

42. However, we have also examined the decomposition of premium packages into different types (sports-only, movies-only and sports-and-movies packages).¹¹ The rationale for doing so was to investigate whether there might be different types of consumer for some of whom free-to-air TV services are less of a close substitute than others. Our results imply that this is not true for subscribers to sports-only and movies-

¹¹ As noted above, in all cases, subscribers' packages also include basic pay TV channels.

only packages. However, for subscribers to combined sports-and-movies packages it is no longer possible, on the basis of our econometric study alone, to draw so confident a conclusion. The effect of Freeview availability on willingness to pay is somewhat weaker than in the other categories, although still of broadly comparable magnitude to that of cable availability; it is also less statistically significant once spatial correlation is taken into account.

Figure 1: DTT Availability in the United Kingdom, July 2004.



Source: Apogee Data Consulting.

Appendix 1: Vitae

Curriculum Vitae Paul Seabright

Date of completion: January 2009

Full name: Paul Bartlett Seabright

Date of birth: 8 July 1958

Nationality: British

Permanent Address: 4, rue Job,
31000 Toulouse,
France.

Tel/Fax: (+33) 561 62 89 71

Email: seabrigh@cict.fr

Office address: Institut d'Economie Industrielle,
Université de Toulouse-1
Manufacture des Tabacs
21, Allée de Brienne
31000 Toulouse
France

Tel. (+33) 5 61 12 86 17

Fax. (+33) 5 61 12 86 37

Sec. (+33) 5 61 12 86 21

www.idei.asso.fr

Appointment: Professor of Economics,
Université des Sciences Sociales de Toulouse

Other posts, fellowships etc.:

Research Fellow, Centre for Economic Policy
Research, London (since 1989).

Managing Editor, *Economic Policy*, 2001-2007

Chair of the Scientific Council, BRUEGEL, Brussels.

Visiting appointments etc:

I spent the academic year 1984-5 as a visitor at the Madras Institute of Development Studies, India, the academic year 1992-3 as a visitor at Institut d'Economie Industrielle, University of Toulouse, France, and the period January-June 2000 as Visiting Professor at the Institut d'Anàlisi Econòmica at the Universitat Autònoma de Barcelona.

I held the Ganshof van der Meersch Visiting Chair at the Université Libre de Bruxelles for the academic year 1997-8, and I was the Hooker Distinguished Visiting Professor 2006 at McMaster University in Canada.

I gave the Royal Economic Society Annual Public Lecture in 2005 and a plenary session lecture (with Wendy Carlin) at the World Bank's Annual Bank Conference on Development Economics in Bled, Slovenia, in May 2007.

I have been an invited visitor at the Santa Fe Institute, New Mexico, annually from 2005-2008.

Degrees: B.A. 1980 Oxford University; 1st class (congratulatory).
 M.Phil. 1982 Oxford University
 D. Phil(=Ph.D.)1988 Oxford University

Prizes: Scholarship to New College, Oxford, 1976; Gibbs Politics Prize, 1979 (prox. acc. 1978); Webb Medley Senior Economics Prize, 1980; H.M. Treasury Economic Cadetship 1980; Prize Fellowship (Philosophy and Economics), All Souls 1980; American Express Bank Review Essay Award, 1991. Shortlist, British Academy Book Prize 2005.

Previous appointments:

Prize Fellow, All Souls College, Oxford 1982-7.

Stipendiary Teaching Fellow, Churchill College, Cambridge 1986-7.

Junior Research Officer, ESRC project on "Risk, Information and Quantity Signals in Economics", Department of Applied Economics, Cambridge University, 1988.

Assistant Director of Research, University of Cambridge 1988-99 (Cambridge title equivalent to University Lecturer (UK) or Associate Professor with tenure (US))

Assistant Editor, Economic Policy 1988-94

Lecturer in Economics, College of Europe, Bruges, 1998-9

Reader in Economics, University of Cambridge 1999-2001

Professeur chargé de cours, Ecole Polytechnique, Paris, 1998-2003.

Research Grants:

I have led research projects funded by the Overseas Development Administration, the World Institute for Development Economics Research, the Economic and Social Research Council, the Leverhulme Trust, the European Commission, the Department of Trade and Industry, the Office of Fair Trading and the European Bank for Reconstruction and Development.

Current teaching activity

I teach courses in Environmental Economics (Master 2 level), Transport and Network Economics (Master 2), Economic Strategy (Master 2), Markets and Institutions (Master 1), The Information Economy (Master 1), as well as supervising Ph.D. students and a large and fluctuating number of masters students doing dissertations.

I was Director of the IUP Ingénierie Economique at the University of Toulouse-1 from 2002-4.

Consultancy:

I have been a consultant to many private sector firms, and also to the European Bank for Reconstruction and Development, World Bank, the United Nations and the European Commission. Either directly or through international agencies, I have been involved in the provision of economic policy advice to the Governments of France, Ireland, Morocco, Poland, the Russian Federation, Ukraine, the United Kingdom and Uzbekistan.

Other committees etc.:

I am a member of the European Commission's Economic Advisory Group on Competition Policy (convened by the Chief Economist at DG-COMP). I have also been a member of the Commission's Academic Panel on the Single European Market 1995-6, the Comité Scientifique de la Région Midi-Pyrénées 1995-, and the CEPS European Panel on Regulation 1997-8. I was on the Program Committee of the European Economic Association 1999. I am a member of the Steering Committee of the CEPR's annual report series on Monitoring European Integration. I was a Commissioner on the Independent Commission on UK membership of the Euro appointed by the Britain in Europe group.

Publications:

Monographs:

- M1) *Merger in Daylight: the economics and politics of European merger control* (with Damien Neven and Robin Nuttall), London, Centre for Economic Policy Research, 1993.
- M2) *Competition Policy and the Transformation of Central Europe* (with John Fingleton, Eleanor Fox and Damien Neven), London, Centre for Economic Policy Research, August 1996.
- M3) *Trawling for Minnows: European Competition Policy and Agreements between Firms* (with Damien Neven and Pénélope Papandropoulos), London, Centre for Economic Policy Research, June 1998.
- M4) *The Institutional Economics of Foreign Aid*, Cambridge University Press (jointly with Bertin Martens, Uwe Mummert and Peter Murrell), 2001.
- M5) *The Company of Strangers: A Natural History of Economic Life*, Princeton University Press, May 2004 – see www.pup.princeton.edu/titles/7706.html. Shortlisted for the British Academy Book Prize 2005.

Edited Volumes:

- E1) *The Vanishing Rouble: barter networks and non-monetary transactions in post-Soviet societies*, Cambridge, Cambridge University Press, 2000.
- E2) *EMU: Assessing the Impact of the Euro*, Blackwell (jointly with Richard Baldwin and Giuseppe Bertola), 2003.
- E3) *The Regulation of Broadcasting Markets* (jointly with Jürgen von Hagen), Cambridge University Press, May 2007.

Chapters in Books:

- C1) "Medicine, Monopoly and the Market Place", in *The Yearbook of Social Policy 1982*, London, Routledge and Kegan Paul.
- C2) "The Order of the Mind", in Colin Blakemore & Susan Greenfield (eds) *Mindwaves*, Oxford, Blackwell 1987.
- C3) "Sophisters, Economists & Calculators: on the notion of value in economics", in Brenda Cohen & Bryan Wilson (eds) *Value*, London & Tokyo, MOA Foundation, 1988.
- C4) "Regulation and Competition Policy in the European Community", in Cowling & Tomann (eds): *Industrial Policy after 1992*, London, The Anglo-German Foundation, 1990.

- C5) "Exchange Rate Policy When There Are Failures of Corporate Control: dilemmas for Eastern Europe", in O'Brien (ed) *Finance and the International Economy*, Oxford, O.U.P., 1991.
- C6) "Pluralism and the Standard of Living", in M. Nussbaum & A. Sen (eds): *The Quality of Life*, Oxford, Clarendon Press, 1993.
- C7) "A Model of the Role of Brokerage in Financial Intermediation", in Subramanian (ed) *Themes in Development Economics*, New Delhi, O.U.P., 1993.
- C8) "Regulation and Subsidiarity: Finding the Balance" (with Francis McGowan), in D. Mayes (ed): *Aspects of European Integration*, London, National Institute of Economic and Social Research, 1993.
- C9) "Regulation in the European Community and its Impact on the UK" (with Francis McGowan), in Bishop, M., J. Kay, J. & C. Mayer & D. (eds) *The Regulatory Challenge*, Oxford, Blackwell, 1995.
- C10) "Is Cooperation Habit-Forming?", in P. Dasgupta & K-G Mäler (eds): *The Environment and Emerging Development Issues*, Oxford, Clarendon Press, 1997.
- C11) "Governance, Democracy and Development: a contractualist view" (with Geoffrey Hawthorn), in Leftwich, A. (ed): *Democracy and Development*, Cambridge, Polity Press, 1996.
- C12) "The Aloofness of Liberal Politics: can imaginative literature furnish a private space?", in A. Baumeister & J. Horton (eds): *Literature and the Political Imagination*, London, Routledge, 1996.
- C13) "Transferability of Collective Property Rights: does trade destroy trust?", in Roemer (ed): *Property Rights, Incentives and Welfare*, London, IEA/Macmillan, 1997.
- C14) "Trade Liberalisation and the Coordination of Competition Policy" (with Damien Neven), in Waverman (ed.): *Competition Policy in a Global Economy*, London, Routledge, 1997.
- C15) "Subjective and Objective Indicators of Welfare Change Over Time: evidence from a resurvey" (with S. Janakarajan), in Harriss-White, B. & S. Subramanian (eds): *Illfare in India*, New Delhi, Sage Publications, 1998.
- C16) "Competition and Regulation in Transition Economies", chapter 6 of EBRD Transition report, 1996.
- C17) "Centralised and Decentralised Regulation in the European Union", in *The New Palgrave Dictionary of Economics and the Law*, Macmillan, 1998.
- C18) "Local Common Property Rights", in *The New Palgrave Dictionary of Economics and the Law*, Macmillan, 1998.
- C19) "Competition Policy Towards vertical restraints: Implementable Rules for Competition Authorities", in Stephen Martin (ed.): *Competition Policy in Europe*, Amsterdam, Elsevier, 1998.
- C20) "Banking System Performance", chapter in EBRD Transition Report (with Steven Fries and Colin Rowat, 1998.

- C21) "Competition and Enterprise Performance", chapter in EBRD Transition Report (with Wendy Carlin, Steven Fries & Mark Schaffer), 1999.
- C22) "Barter in Post-Soviet Societies: what does it look like and why does it matter?" (with Alena Ledeneva), in Seabright (ed): *The Vanishing Rouble* (see E1 above).
- C23) "Barter and Non-Monetary Transactions in Transition Economies: Evidence from a Cross-country Survey" (with Wendy Carlin, Steven Fries and Mark Schaffer), in Seabright (ed): *The Vanishing Rouble* (see E1 above).
- C24) "Conflicts of Objectives and Task Allocation in Aid Agencies: general issues and applications to the European Union", in Martens et.al. (ed.): *The Institutional Economics of Foreign Aid*, Cambridge University Press, 2001.
- C25) "Networks Good, Cartels Bad – but how could anyone tell the difference?" (with Jennifer Halliday), in Nyqvist (ed): *Fighting Cartels: Why and How?*, Stockholm, Swedish Competition Authority, 2001.
- C26) "Blood and Bribes: Ethical Restraints to Trade", in Cullenberg, S., & P. Pattanaik (eds): *Globalization, Culture and the Limits of the Market*, Oxford University Press, 2004.
- C27) "Efficiencies in Merger Control" (with Jrissey Motis and Damien Neven), in Fabienne Ilzkovitz & Roderick Meiklejohn (eds): *European Merger Control – Do We Need an Efficiency Defence?*, Cheltenham, Edward Elgar., 2005
- C28) "Competition and Market Power in Broadcasting: where are the rents?" in P. Seabright and J. von Hagen (eds): *The Regulation of Broadcasting Markets*, Cambridge University Press 2007.
- C29) "Bring Me Sunshine: Which Parts of the Business Climate Should Public Policy Try to Fix?" (with Wendy Carlin), *Proceedings of the Annual Bank Conference on Development Economics 2008*, Washington D.C., World Bank, 2009.

Articles in Journals:

- J1) "The Effects of Conflict on the Economy of Northern Sri Lanka", *Economic and Political Weekly*, 1986, no.2.
- J2) "Explaining Cultural Divergence: a Wittgensteinian Paradox", *Journal of Philosophy*, 1987, no. 1.
- J3) "The Pursuit of Unhappiness", *Ethics*, 1988 no. 1.
- J4) "Objectivity, Disagreement and Projectibility", in *Inquiry*, May 1988.
- J5) "Regulation in the European Community" (with Konstantine Gatsios), *Oxford Review of Economic Policy*, 1989, vol.5, no.2.
- J6) "Population Size and the Quality of Life II: Creating Persons" (symposium with Partha Dasgupta), *Proceedings of the Aristotelian Society*, supp. vol. 1989.

- J7) "Deregulating European Airlines" (with Francis McGowan), *Economic Policy*, 1989, no.9.
- J8) "Failure of Livestock Investments under IRDP", *Economic and Political Weekly*, September 1989.
- J9) "Social Choice and Social Theories", *Philosophy and Public Affairs*, 1989.
- J10) "Identifying Investment Opportunities for the Poor", *Journal of Development Studies*, October 1991.
- J11) "Quality of Livestock Assets Under Selective Credit Schemes: evidence from South Indian data", *Journal of Development Economics*, November 1991.
- J12) "Incentives and the Management of Enterprises in Economic Transition" (with Ken Mayhew), *Oxford Review of Economic Policy*, Spring 1992.
- J13) "Managing Local Commons: theoretical issues in incentive design", *Journal of Economic Perspectives*, Fall 1993.
- J14) "Regulatory capture, subsidiarity and European merger policy", *European Economy*, 1994.
- J15) "Accountability and Decentralization in Government: an incomplete contracts model", *European Economic Review*, January 1996.
- J16) "European Industrial Policy: the Airbus case" (with Damien Neven), *Economic Policy*, no.21, 1995.
- J17) "The Starfish Effect", *European Economic Review*, Papers and Proceedings, 1996.
- J18) "The Decentralization of Government: lessons from the theory of the firm" (with Jacques Crémer & Antonio Estache), *Revue d'Economie Politique*, 1996.
- J19) "The Effects and Policy Implications of State Aids to Industry: an Economic Analysis" (with Timothy Besley), *Economic Policy*, 1999.
- J20) "Skill versus Judgment and the Architecture of Organisations", *European Economic Review*, 2000.
- J21) "Understanding 'the essential fact about capitalism: markets, competition and creative destruction'" (with Wendy Carlin & Jonathan Haskel), *National Institute Economic Review*, January 2001.
- J22) "Competition, Privatisation and Productive Efficiency: evidence from the airline industry", *Economic Journal*, July 2001.
- J23) "A Minimum of Rivalry: evidence from transition economies on the importance of competition for innovation and growth" (with Wendy Carlin and Mark Schaffer), *Contributions to Economic Analysis and Policy*, Berkeley Electronic Press, September 2004.
- J24) "The Evolution of Fairness Norms", *Politics, Philosophy and Economics*, 5(1) 2006, pp. 33-50.

- J25) "Intermediation by Aid Agencies" (with Colin Rowat), *Journal of Development Economics*, 2006.
- J26) "Market entry, privatisation and bank performance in transition" (with Steven Fries, Damien Neven and Anita Taci), *Economics of Transition*, 2006.
- J27) "'Wasteful' Public Spending and State Aid Control" (with Mathias Dewatripont), *Journal of the European Economic Association* (conference volume), 2006.
- J28) "Continuous Preferences Can Cause Discontinuous Choices: an application to the impact of incentives on altruism", *Berkeley Electronic Journals in Theoretical Economics* (accepted for Topics, under revision for Contributions), forthcoming 2009.

Reports, Occasional Papers, etc:

- R1) *Competition Policy Research: where do we stand?* (with Kai-Uwe Kühn and Alasdair Smith), Occasional Paper no. 8, London Centre for Economic Policy Research, July 1992
- R2) *Making Sense of Subsidiarity: how much centralisation for Europe?*, Monitoring European Integration no.4, London, Centre for Economic Policy Research. (I was one of two drafters; the report had ten contributors)
- R3) *The Implications of European Monetary Union for U.K. Policy*, Centre for Economic Policy Research, June 1997 (I was one of a panel of contributors).
- R4) *Integration and the Regions of Europe: How the Right Policies can Prevent Polarisation*, Monitoring European Integration no. 10, London, Centre for Economic Policy Research, April 2000. (I was the drafter; the report has five contributors)
- R5) *Making Sense of Globalization: A Guide to the Economic Issues*, Policy Paper no. 8., London, Centre for Economic Policy Research, July 2002 (I was one of 2 main drafters)
- R6) *The consequences of saying no: An independent report onto the economic consequences of the UK saying no to the euro*, London, Britain in Europe (I was one of ten authors).

Discussions in Conference Volumes:

- D1) "Comments on John Roemer", in Nussbaum & Sen (eds): *The Quality of Life*, Oxford, Clarendon Press, 1993.
- D2) "Comments on Riccardo Faini", in I. Goldin & A. Winters (eds): *Structural Adjustment and Agriculture*, Cambridge, C.U.P., 1993.
- D3) "Privatization and Competition Policy", in D. Newbery & I. Szekely (eds): *Hungary: an Economy in Transition*, Cambridge, C.U.P., 1993.

- D4) "Comments on Raymond Noronha", in P. Dasgupta & K-G Maler (eds): *The Environment and Emerging Development Issues*, Oxford, Clarendon Press, 1997.
- D5) "Comments on Jean-Jacques Laffont", in Muet (ed). Proceedings of the Annual Bank Conference on Development Economics (Europe), 2000.
- D6) "Comments on Sugden and Gambetta", in Chater & Hurley (eds): *Perspectives on Imitation*, Cambridge, Mass., MIT Press, 2004.

I have also written numerous articles and reviews in: *The Cambridge Review*, *Common Knowledge*, *Economica*, *The Economic History Review*, *Economics of Transition*, *L'Expansion*, *The Financial Times*, *Investment Policy*, *The Journal of Common Market Studies*, *Journal of Development Economics*, *Journal of Economic Literature*, *The London Review of Books*, *The New Republic*, *The New York Review of Books*, *New York Times Book Review*, *The Philosophical Review*, *Ratio*, *South*, *The Times Literary Supplement*.

CURRICULUM VITAE

(September 2008)

Surname, name : Thierry MAGNAC, **Birthdate**: 27 April 1960

Citizenship: French **Marital status**: Married, two children

Address: Université des Sciences Sociales (IDEI & GREMAQ)

21 Allée de Brienne, 31000 Toulouse, France

Telephone: 33 5 6112 8871 **Fax**: 33 1 61128521

EMail address: magnac@cict.fr

Home address: B304, 7 Allée Charles Malpel, 31300 Toulouse, France

Education

- 1979-1982: Ecole Polytechnique, Ingénieur de l'Ecole Polytechnique (1982)
- 1982-1984: Ecole Nationale de la Statistique et de l'Administration Economique (ENSAE), Ingénieur Economiste-Statisticien (1984)
- 1987: PhD Thesis, EHESS, Paris

Current Employment and Associations

- Professor, Université des Sciences Sociales (GREMAQ), Toulouse (since February 2005).
- Director of Research, Fondation Jean-Jacques Laffont (since February 2007)
- Research fellow at Institut d'Economie Industrielle (IDEI), since May 2004.
- Associate at IFS, London (since 1992), research fellow at CEPR, London (since 1999), IZA, Bonn (since 2002) and CIREQ (Montréal, since 2003).

Experience

- Junior research fellow (1987-1995) and Senior research fellow (1995-2005) at Institut National de la Recherche Agronomique (INRA).
- Research fellow at DELTA (1988-1993), CREST (1995-2004) & LERNA (2004-2005).
- Head of Laboratoire d'Economie Appliquée, INRA-Paris Jourdan (1998-2001) and head of the Microeconomic Research Unit at CREST, Paris (Jan 2003-Jun 2004).

Teaching (Associate or invited professor)

- INE, Cotonou, Benin, (february 1988-89, 1991): Mathematical models of growth

- ENSAE, Paris (1988-2003): Linear econometrics, panel data and binary models.
- EHESS (1988-90, 91-94): Graduate econometrics.
- Department of Economics at University College, London (1990-91): undergraduate statistics and applied microeconomics
- Ecole Polytechnique, Department of Economics, Palaiseau (1992-2006): classes in micro, macroeconomics, courses in applied econometrics and labour economics.
- Universitat Autònoma de Barcelona, Barcelona, Spain (spring 1993): Discrete econometric models
- Université de Lausanne, Switzerland (may 1993): labour economics
- PUC, Rio de Janeiro, Brazil (may-jun 2000, dec 2002): duration, discrete data econometrics
- CEMFI, Madrid, Spain (February 2005): Semiparametric binary models
- School of Governance, Maastricht, Netherlands (February 2006-2007): Econometric evaluation methods

Other Research Administration

- Committee member of Meetings of the Econometric Society (1992, 1996-9, 2001-3, 2005-6), European Economic Association (1993, 1997, 2002-2004), LACEA (2002).
- Coorganizer of DELTA-CEPR 1990, Paris and EC² (European Conference in Econometrics), décembre 1992, Paris.
- Guest editor of *Annales d'Economie et Statistique*, 1993 (with P.A.Chiappori) and of *Journal of Econometrics*, 1997 (with C.Gouriéroux) and *Journal of Applied Econometrics* (with Pierre Dubois and Marc Ivaldi).
- Associate editor at *Econometrica* (since 2003), *Journal of the European Economic Association* (since 2005), *World Bank Economic Review* (since 2005), *Econometrics Journal*, (since 2007)
- Former associate editor at *Annales d'Economie et Statistique* (1992-2005), *The Economic Journal* (1997-2000), *European Economic Review* (1998-2002), *Investigaciones Economicas* (1997-2002), *Labour Economics*, (1995-1999). Also referee for *American Economic Review*, *Journal of Development Economics*, *The Review of Economic Studies*, *Journal of Econometrics*, *Journal of Human Resources*, *Journal of Public Economics*, *Review of Economics and Statistics*, *Review of Economic Studies*, *Journal of Political Economy*.
- Leader of the French team of SHARE (Survey of Health, Aging and Retirement in Europe): jan 2002- may 2003.

- Chair of Empirical Economics and Econometrics, European Meeting of the Econometric Society, Milan 2008.

PhD Students

- Alice Mesnard, *International Migrations*, EHESS, 1998. Alice is research fellow at the Institute for Fiscal Studies, London, UK.
- Pierre Dubois, *Contracts, risk and incomplete markets in agriculture*, EHESS, (in collaboration with Bruno Jullien), 1999. Pierre is senior research fellow at INRA-Toulouse School of Economics, Toulouse.
- Eric Maurin, *Measurement and analyses of income inequality*, EHESS, 2000. Eric is professor at EHESS, Paris.
- Anna d'Addio, *Mobility of young people on the French labour market*, Université Catholique de Louvain (in collaboration with Bart Cockx), 2000. Anna is employed by OECD, Paris.
- Jérôme Reboul, *Bankruptcy and firm financing*, (in collaboration with T.Mariotti), Toulouse School of Economics, 2007. Jérôme is employed by Ministère du Logement, Paris.
- Elise Coudin, *Small sample estimation based on sign tests and quantile regression* (in collaboration with Jean-Marie Dufour), Université de Montréal, 2007. Elise is employed by INSEE, Paris.
- Sarolta Laczó, *Risk sharing in LDCs*, (in collaboration with P.Dubois) Work in progress since oct 2005.
- Elodie Alet, *Grade retention at school*, Work in progress since oct 2006.
- David Pacini, *Ecological Inference*, Work in progress since oct 2007.

Languages

- English, French fluently read, spoken and written. Spanish and Portuguese read and spoken.

Publications (in refereed journals)

- "Formal and Informal Risk Sharing in LDCs" (in collaboration with P., Dubois and B., Jullien), 2008, *Econometrica*, 76:679-726.
- "Partial Identification in Binary Models with Discrete and Interval-Valued Regressors", (in collaboration with E., Maurin), 2008, *Review of Economic Studies*, 75:835-864.
- "Risk, Uncertainty and Discrete Choice Models" (in collaboration with A. de Palma, M. Ben-Akiva, D.Brownstone, C. Holt, D. McFadden, P. Moffatt, N. Picard, K. Train, P.Wakker, J. Walker), 2008, forthcoming *Marketing Letters*.
- "A Comment on the identification power in games by A.Araddillas-Lopez and E.Tamer", 2008, *Journal of Business & Economic Statistics*, 26:295-297.
- "Dynamique des salaires dans une cohorte" (in collaboration with Sébastien Roux), 2008, forthcoming in *Economie et Prévision*.
- "Collective Labor Supply: Heterogeneity and Nonparticipation" (in collaboration with R.Blundell, P.A..Chiappori and C.Meghir), 2007, *Review of Economic Studies*, 74:417-445.
- "Identification & Information in Binary Models", (in collaboration with E., Maurin), 2007, *Journal of Econometrics*, 139:76-104.
- "Droits à la retraite et mortalité différentielle", (in collaboration with A.,Bommier, B., Rapoport, M., Roger), 2006, *Economie et Prévision*, 168:1-16.
- "The impact of information on wine auction prices: results of an experiment", (in collaboration with S. Lecocq, M.-C. Pichery, and M. Visser), 2005, *Annales d'Economie et de Statistiques*, 77:37-58.
- "Binary Variables and Sufficiency: Generalizing Conditional Logit", 2004, *Econometrica*, 72:1859-1876.
- "The Dynamics of Local Employment Growth", (in collaboration with P.-P., Combes et J.-M. Robin), 2004, *Journal of Urban Economics*, 56(2):217-43.
- "How valuable is on-farm work to farmers?", (in collaboration with M.,Fall), 2004, *American Journal of Agricultural Economics*, 86, 267-281.
- "Le marché du travail à l'approche de la retraite : évolutions en France entre 1982 et 1999", (in collaboration with A.,Bommier, M., Roger), 2003, *Revue Française d'Economie*, 18: 23-82.
- "Analyse économique des politiques éducatives : l'augmentation de la scolarisation en France de 1982 à 1993", (in collaboration with D.Thesmar), *Annales d'Economie et Statistiques*, 2002, 65:1-34.

- "Identifying dynamic discrete choice models", (in collaboration with D.Thesmar), *Econometrica*, 2002, 70:801-16.
- "Départs en retraite : évolutions récentes et modèles économiques", (in collaboration with A., Bommier et M. Roger), *Revue Française d'Economie*, 2001, 16.
- "L'apport de la microéconométrie à l'évaluation des politiques publiques pour l'emploi", *Cahiers d'Economie et Sociologie Rurales*, 54 :90-113, 2000.
- "State dependence and unobserved heterogeneity in youth employment histories", *The Economic Journal*, 110:805-837, 2000.
- "Youth employment policies in France", (in collaboration with D.Fougère and F.,Kramarz), *European Economic Review* (44)4-6: 928-94, 2000.
- "Dynamic stochastic dominance in bandit decision problems", (in collaboration with J.M.Robin), *Theory and decision*, 47: 267-295,1999.
- "Estimation of transition models with recall errors" (in collaboration with M.Visser), *The Review of Economics and Statistics*, 81(3):466-74, 1999.
- "Savings, Layoff Risk and Labour Market Transitions", (in collaboration with R.Blundell et C.Meghir), *Journal of Business and Economic Statistics*, 15:153-164, 1997.
- "Seasonal Migrations of Labour", (in collaboration with G.Postel-Vinay), *Explorations in Economic History*, 34:1-26, 1997.
- "Occupational Choice and Liquidity Constraints", (in collaboration with J.M.Robin), *Ricerche Economiche*, 50:105-33, 1996.
- "Analyzing Incomplete Individual Employment Histories using Indirect Inference", (in collaboration with J.M.Robin et M.Visser), *Journal of Applied Econometrics*, 10:S153-169, 1995.
- "An Econometric Analysis of Labour Market Transitions using Discrete and Tenure Data", (in collaboration with J.M.Robin), *Labour Economics*, 1:327-346, 1994.
- "Welfare Aspects of Technological Adoption With Learning", (in collaboration with T.Verdier), *Journal of Public Economics*, 53:31-48, 1993.
- "Analyse économique de l'augmentation de l'offre de travail", *Economie et Prévision*, jan 1991, 97:21-34.
- "Segmented or Competitive Labour Markets", *Econometrica*, jan 1991, 59(1): 165-87 .
- " Un modèle économétrique des migrations saisonnières de main d'oeuvre", (in collaboration with J.P.Bompard, G.Postel-Vinay), *Annales d'Economie et de Statistiques*, sept 1990, 19:98-129.

- "Taxation and Labour Supply in France" , *Journal of Human Resources*, Summer 1990, 25(3):60-98, (in collaboration with F.Bourguignon).
- "Las teorías económicas de la movilidad profesional", (in collaboration with J.M.Robin), *Revista de Economía Pública*, mar 1990, 6:115-30.
- "Emploi, mobilité et chômage dans la France du 19e siècle", *Annales E.S.C.*, jan 1990, 1:55-76.

Chapters in books and other publications

- "Logit models of individual choices" forthcoming in *The New Palgrave Dictionary of Economics*, Mac Millan, 2007.
- "Parametric binary choice models" (in collaboration with Michael Lechner and Stefan Lollivier) forthcoming in eds L. Matyas and P. Sevestre, *Panel data Econometrics*, Kluwer: Amsterdam, 2008.
- "Fins de carrière et départs à la retraite: l'apport des modèles de durée" (in collaboration with Benoit Rapoport and Muriel Roger), *Solidarité et Santé de la Drees*, 3, 2006: 101-117.
- "Econométrie linéaire des panels : une introduction", *Actes des Journées de Méthodologie Statistique*, 2005.
- "Comment on "Les effets des dispositifs publics d'insertion en emploi" de Gilbert, Kamionka et Lacroix ", *Economie et Statistique*, 345:85-87, 2001.
- "Evaluation statistique de l'effet des stages sur l'insertion professionnelle des jeunes", *Economie et Statistique*, 304-305:75-94, 1997
- "L'évaluation des politiques publiques d'insertion des jeunes sur le marché du travail", (in collaboration with V.Lechene), *Les jeunes et l'emploi*, Cahiers Travail et Emploi, La Documentation Française, 1996.
- "Demanda de educación en las zonas rurales colombianas", (in collaboration with José Leibovich), *Coyuntura Económica*, 26: 129-150, 1996.
- "Measurement of Implicit Prices of Family Labour in Agriculture: An Application to Cote d'Ivoire", (in collaboration with S.Lambert), in F. Caillavet, H. Guyomard et R. Liffra, eds., *Agricultural Household Modelling and Family Economics*, Elsevier, Amsterdam, 1995
- "Analyse des déterminants des salaires", (in collaboration with V.Lechene) in F.Bouchayer eds., *Trajectoires sociales et inégalités*, ERES:Toulouse, 221-43, 1995.
- "Le processus de décision des ménages ruraux est-il récursif ? Une application au cas de la Côte d'Ivoire", (in collaboration with S.Lambert) in M. Benoit-Cattin, M. Griffon et P. Guillaumont, eds. *Economie des politiques agricoles dans les pays en voie de développement*, RFE, Paris, 1994.

- "Female Labour Market Participation and Wages in Colombia", in eds G.Psacharopoulos et Z.Tsannatos, *Women's Employment and Pay in Latin America*, World Bank, 1992.
- "External Trade and Income Distribution in Malawi", (in collaboration with F.Johnson) in F.Bourguignon et C.Morrisson, eds. *External Trade and Income Distribution*, OECD, Paris, 1989.
- "Analyse de l'offre de travail sur un marché concurrentiel et segmenté", PhD Thesis, EHESS, 1987 (Prize of the best PhD dissertation in 1987 awarded by the Association Francaise de Sciences Economiques).
- "Une étude économétrique de l'offre de travail féminine en Colombie", (in collaboration with R.Radji), *Statéco* , 4:67-90 , march 1985.

Working Papers

- "Public servants: a competitive advantage for public firms?" (in collaboration with Guido Friebel), 2007.
- "Set Identified Linear Models" (in collaboration with Christian Bontemps and Eric Maurin), 2007.
- "The effect of location on finding a job in the Greater Paris Area" (in collaboration with Laurent Gobillon and Harris Selod), 2007.
- "Informal Risk Sharing with Incomplete Contracts", (in collaboration with P., Dubois et B., Jullien), 2002.
- "Educating children: a look at family behaviour in Cote d'Ivoire", (in collaboration with P.deVreyer et S.Lambert), WP LEA-INRA, 99-05.
- "When should one use non-separable household models?", (in collaboration with S.Lambert), WP CREST, 97-31

Work in Progress

- "The impact of employment zones on unemployment exits" (in collaboration with Laurent Gobillon and Harris Selod)
- "Spatial Dynamics of Unemployment & Non Participation in Greater Paris", (in collaboration with Maa'j Fall, Laurent Gobillon, David Pacini and Harris Selod).
- "The estimation of double-indexed models (in collaboration with Laurent Gobillon)
- "Bolsa Escola: An Evaluation" (in collaboration with Gustavo Gonzaga and Daniele Machado)

- "A Empirical Model of Entry Exams" (in collaboration with José-Raimundo Carvalho)

Invited Sessions at Conferences

- "Non Linear Panel Data Models", *Sociedade Brasileira de Econometria*, Nova Friburgo, Dec 2002
- "Set Identified Linear Models", *Econometric Society European Meeting*, Vienna, August 2006.

CURRICULUM VITAE

Bruno JULLIEN

July 2008

Address

IDEI
Université des Sciences Sociales de Toulouse I
Manufacture des Tabacs, Aile Jean-Jacques Laffont
21, allée de Brienne
31000, Toulouse, France

Tel: 33 (0)5 61 12 85 61
Fax: 33 (0)5 61 22 55 63
Email: bjullien@cict.fr

Current positions

Directeur de Recherche CNRS, Toulouse School of Economics

Other, fellows hips...

Professor of Economics, CMPO, University of Bristol

Senior Researcher, IDEI, Toulouse

Research Fellow, CEPR

Research Fellow, CESifo

Co-editor of International Journal of Industrial Organization

Member of Oxera Economic Council

Education

- 1988: Ph.D. Economics, Harvard University.
- 1984: "Statisticien Economiste", ENSAE, Paris.
- 1984: DEA "Analyse et Politique Economique", Ecole des Hautes Etudes en Sciences Sociales (EHESS)
- 1982: Graduated from Ecole Polytechnique, Paris.

Previous positions:

- 1997-2005: Director of GREMAQ, University of Toulouse,
- 1992-2004: Professor, Ecole Polytechnique, Paris
- 1990-1996: Ecole Nationale de la Statistique et de l'Administration Economique, Paris.
- 1991-1996: Member of CREST-LEI, INSEE, Paris.
- 1988-1995: Member of CEPREMAP, Paris.
- 1990-1992: Chargé de conférence, EHESS, Paris.
- 1989-1991: Professor, Institut National des Télécommunications, Evry, France.
- 1986-1987: Research assistant, Harvard University.
- 1983-1986: Laboratoire d'Econometrie de l'Ecole Polytechnique, Paris.
- Visiting professor: University of Wuhan (China), European University Institute (Firenze, Italy), University of Lausanne.

Honors

- CNRS Bronze Medal, 1998
- Chevalier de l'Ordre des Palmes Académiques, 2003
- Sloan Dissertation Fellowship, Harvard University (1987-1988)
- Prix Louis Armand (Ecole Polytechnique, 1982).

Research interests

Industrial organization, contract theory, regulation, competition policy, networks, IT and Internet, the economics of information, insurance and risk.

Organization of conferences

1. Chairman of the Program Committee for Econometric Society European Congress (ESEM-TAE) 2006
2. IDEI/Bruegel Conference "Regulation, Competition and Investment in Network Industries", Brussels, 2007.
3. The Economics of the Health Care and the Pharmaceutical Industry, Toulouse,, 2008.
4. Competition Policy in Two-Sided Markets, Toulouse 2006
5. Regulation of Media Markets, Toulouse, 2004

6. The Economics of Electronic Communication Markets, Toulouse, 2004
7. Competition policy in international markets, Toulouse, 2003.
8. The economics of software and internet industries (2nd), Toulouse, 2003.
9. The economics of software and internet industries, Toulouse, 2001.
10. Economics and Psychology, Toulouse, 1999.
11. International conference in the economics of mobile communications, 1994.
12. Financial contracts and the theory of the firm, Banque de France, 1990.

Referee for reviews

Econometrica, Journal of Political Economics, American Economic Review, Review of Economic Studies, Rand Journal of Economics, Journal of Economic Theory, Economic Letter, Journal of Public Economics, Economic Journal, European of Economic Review, International Journal of Industrial Organization, Journal of Economics, Journal of Economic Dynamics and Control, Journal of Economics and Management Strategy, Annales d'Economie et de Statistique, Revue d'Economie Politique.

Journal articles:

1. "Competitive Business Cycles in an Overlapping Generations Economy with Productive Investment", *Journal of Economic Theory* (1988), vol. 46, N°1, p 45–65, reprinted in *Cycles and Chaos in Economic Equilibrium*, Princeton University Press (1992).
2. "Ordinal Independence in Nonlinear Utility Theory", *Journal of Risk and Uncertainty* 1, p. 355–387, with J. Green (1988).
3. "Optimal Learning by Experimentation", *Review of Economic Studies* , 58.,p.621–654, with Ph. Aghion, P. Bolton and C. Harris (1991).
4. "Dynamic Duopoly with Learning Through Market Experimentation", *Economic Theory*, 3, p. 517–539, with Ph. Aghion and M.P. Espinoza (1993).
5. "Information, stabilité des prix et bien-être", *Annales d'économie et de statistique* 32, p. 1–16, (1993).
6. "Measuring the Incidence of Insider Trading: A Comment on Shin", *Economic Journal*, vol 104, N° 427, p 1418–19, with B. Salanié, (1994).
7. "Competing Vertical Structures: Precommitment and Renegotiation", *Econometrica*, vol. 63, No 3, p 621–646, with B. Caillaud and P. Picard (1995).

8. "Managerial Incentives Based on Acquisition of Information", *Journal of Economic and Management Sciences*, vol. 4, N° 3, p 427–444, with B. Caillaud (1995).
9. "Tarification, Discrimination and Contournement", *Annales des Télécommunications*, vol 50, n° 2, p 348–358, with N. Curien and P. Rey (1995).
10. "National vs European Industrial Policies: Bargaining, Information and Coordination of Incentives", *European Economic Review*, vol. 40, n° 1, with B. Caillaud and P. Picard (1996).
11. "Hierarchical Organization and Incentives", *European Economic Review, Papers and Proceedings*, with B. Caillaud and P. Picard (1996).
12. "Information et organisation des processus de décision publique", *Revue d'économie politique*, vol. 106, n° 1, p. 15–37, with B. Caillaud and P. Picard (1996).
13. "L'impact des options extérieures sur les échanges en information asymétrique", *Revue économique* (1996).
14. "Common Market with Regulated Firms", *Annales d'Economie et de Statistique*, 47, p. 65–101, with B. Caillaud and P.P. Combes, (1997).
15. "La régulation des monopoles publics", in A. Perrot (ed.), *Concurrence et Réglementation*, Economica (1997), with P.P. Combes and B. Salanié.
16. "Pricing Regulation under Bypass Competition", *Rand Journal of Economics*, vol. 2, 29, p.259-279, with N. Curien and P. Rey, (1998).
17. "A Classical Model of Involuntary Unemployment: Efficiency Wages and Macroeconomic Policy", *Journal of Economic Theory*, vol. 78, 2, p.263-285, with P. Picard, (1998).
18. "Analyse économique du système CAT-NAT", *Risques* 34 (1998).
19. "Should More Risk Averse Agent Exert More Effort", *Geneva Papers of Risk and Insurance* 24, p.19-28, with Bernard Salanié and François Salanié (1999).
20. "Modeling Time Inconsistent Preferences", *European Economic Review, papers and proceedings*, 44, p. 1116-1124, with B. Caillaud (2000).
21. "Participation Constraints in Adverse Selection Models", *Journal of Economic Theory* 93, p 1-47 (2000).
22. "Estimating Preferences under Risk: The Case of Racetrack Bettors", *Journal of Political Economy* 108, 3, p. 503-530, with B. Salanié (2000).

23. "Corporate Demand for Insurance with Optimal Financial Contracting", *Economic Theory*, 16 (1), p. 77-105, with B. Caillaud and G. Dionne. (2000)
24. "Scientific Progress and Irreversibility: An Economic Interpretation of the Precautionary Principle", *Journal of Public Economics* 75, 229-253, with C. Gollier and N. Treich (2000).
25. "Economie de l'Industrie", *Encyclopédie Universalis* (2001).
26. "Competing Cybermediaries", *European Economic Review, papers and proceedings*, Vol 45, 4/6, 797-808, with B. Caillaud (2001).
27. "E-Commerce: quelques éléments d'économie industrielle", *Revue Economique*, 52, special issue: *Economie de l'Internet*, 97-118, with Alexandre Gaudeul (2001).
28. "Economie de l'information et Internet", *Revue Economique*, 52(3), p 633-642, with Alexandre Gaudeul (2001).
29. "Chicken and Egg: Competition among Intermediation Service Providers", *Rand Journal of Economics*, Vol 34, 2, 309-328 (2003), with Bernard Caillaud.
30. "La régulation en pratique », *Revue d'Economie Politique*, 3, 273-284, with J.C. Rochet (2005).
31. "Screening Risk-Averse Agents under Moral Hazard", *Economic Theory*, 1, 151-191, with Bernard Salanié and François Salanié (2007).
32. "Auction and the Informed Seller Problem", *Games and Economic Behavior*, 56, 2, 225-258, with T. Mariotti (2006).
33. "Asymmetric Information in Insurance: Some Testable Implications", *Rand Journal of Economics*, Vol 37, 4, Winter 2006, 783-798, with Pierre André Chiappori, Bernard Salanié and François Salanié (2006).
34. "Resale Price Maintenance and Tacit Collusion", *Rand Journal of Economics*, Vol 38, 4, Winter 2007, 983-1001, with Patrick Rey (2007).
35. "Advertising, Competition and Entry in Media Industries", forthcoming, *Journal of Industrial Economics*, with C. Haritchabalet and C. Crampes.
36. "Formal and Informal Risk Sharing in LDCs: Theory and Empirical Evidence", *Econometrica*, Vol. 76, 4, 679-726, with Pierre Dubois and Thierry Magnac (2008).

Books, chapters and reports

37. *Eléments de Microéconomie : exercices et corrigés*, Montchretien, Paris, with P. Picard, 1991, revised 2002.
38. "Pratique des prix imposés et collusion", Report for Direction de la Prévision, Ministry of Finance, France, 1997, with Patrick Rey and Thibaud Vergé.
39. *The Economics of Tacit Collusion*, Report for the DG Competition, European Commission, 2004, with M. Ivaldi, P. Rey, P. Seabright and J. Tirole.
40. *The Economics of Unilateral Effects*, Report for the DG Competition, European Commission, 2004, with M. Ivaldi, P. Rey, P. Seabright and J. Tirole.
41. "Mobile to Mobile Call Termination" in *Regulating Mobile Call Termination, Vodafone Policy Paper Series 1*, 2004, with Patrick Rey.
42. "Empirical Evidence on the Preferences of Racetrack Bettors", with Bernard Salanié, forthcoming in D. Hausch and W. Zemia (eds.) *the Efficiency of Sport and Lottery Markets*, Elsevier: Handbooks In Finance series.
43. "Two-Sided Markets and Electronic Intermediation", in G. Illing and M. Peitz (eds.), *Industrial Organization and the Digital Economy*, MIT Press, 2007.
44. "E-commerce, two-sided markets and info-mediation", with A. Gaudeul, forthcoming in E. Brousseau and N. Curien (eds.), *Internet and Digital Economics*, Cambridge University Press, 2007.
45. "Pricing and other business strategies for e-Procurement platforms", in Dimitri Spiga and Spagnolo (eds.) *Handbook of Procurement*, Cambridge University Press, 2006.
46. "The Economics of Tacit Collusion in Merger Analysis", *The Political Economy of Antitrust*, Vivek Ghosal and Johan Stennek eds, with M. Ivaldi, P. Rey, P. Seabright and J. Tirole, 2007.

Working Papers and work in progress

47. "Designing a Two-Sided Platform: When To Increase Search Costs?", *IDEI Working Paper*, n. 473, August 2007, with Andrei Hagiu.
48. "The Market for Lawyers: On the Value of Information on the Quality of Legal Services", *IDEI Working Paper*, n. 485, November 2007, with Elisabetta Iossa.
49. "Tying and Freebies in Two-Sided Markets", *IDEI Working Paper*, n. 445, March 2007, with Andrea Amelio.

50. "Retail Price Regulation and Innovation: Reference Pricing in the Pharmaceutical Industry", *IDEI Working Paper*, n. 432, December 2006. (with David Bardey and Antoine Bommier)
51. "Expertise and Bias in Decision Making", mimeo, with Sylvain Bourjade.
52. "Competing in Network Industries: Divide and Conquer", CEPR Discussion Paper 2885, IDEI Working Paper 112.
53. "Risk Sharing with Formal and Informal Contracts: Theory, Semi-Parametric Identification and Estimation", with Pierre Dubois and Thierry Magnac.
54. "Toward a Theory of Self-Restraints", IDEI Working Paper, with B. Caillaud and D. Cohen.