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Would you civil union me?

Civil Unions and taxes in France: Did the reform of income taxation

raise the rate of civil unions?

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Abstract

This paper looks whether the choice to contract a civil union is motivated by fiscal reasons. Since 1999, in France, different-sex couples can contract either a marriage or a civil union, called a pacs. It is a new legal form of union, more flexible than marriage. The pacs turned to be successful, 30% of new unions in 2007 were pacs. In 2005, the income taxation of pacsed partners changed to benefit more to pacsed couples. This paper investigates the link between the reform of the income taxation and the growing number of pacs by analyzing the impact that should be observed if couples' answer was the optimal one. It shows that 38% of the newly contracted pacs since 2005 can be attributed to the reform, but that estimation is an upper bound of the effect of the reform. This tends to show that the choice to contract a pacs is determined by short-term views. Then it questions the link between marriage and civil union, the pacs could be either thought as a substitute or a complementary to the marriage.

Key words : civil union, marriage, income taxation, incentive effect

JEL Classification : H31, J12, K36

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1 Introduction

Most countries tax the income of individuals. The effect of the taxation of labor income on the labor supply has been widely documented. But its effect depends both on individual's and household's characteristics. For example, its effect on the labor force participation of women depend on the outside income, i.e. on the husband's income. However, the way the income taxation of household is considered varies widely from one country to another. Some countries only tax individuals regardless of their household situation, such as Austria, Denmark, Hungary or Japan. Other countries consider the whole household, such as France, Germany, Belgium and Ireland. A few ones adopt a kind of mix system, either by giving the choice to married couple to opt for a collective or an individual taxation (such as in the United-States) or by taxing individuals for labor income and taxing households for capital income (such as Italy). The way households are taxed depend crucially on the way equity is taken into account. A strict equality requires that all individuals are taxed the same way, which lead to an individual taxation system. But this system does not take into account the inequality of the standard of living. Therefore, if two persons earn the same income but one lives alone and the other lives with a dependant person, it could be fair to tax households according to the individual standard of living entailed by their family situation, and then to tax less the secondary earner. As Atkinson and Stiglitz developped [1980], the choice of policy for the system of taxation is questionned by the necessity of equity between tax payers. But, two concepts of equity should be distinguished. On the one hand, the vertical equity takes account of the "ability to pay", roughly meaning that richer individuals could pay more taxes than poorer one. On the other hand, the horizontal equity states that only relevant characteristics should be taken into account when calculating the amount of tax paid, meaning that similar individuals should be treated equally. Taxing individuals regardless of their household status could then respond to the horizontal equity but not to vertical equity. On the contrary, taking into account the household could respect vertical equity but not horizontal equity.

In France, since 1945, the income taxation is based on the idea that the relevant fiscal unit is the household, with the system of the *quotient familial*. Its main aim is to take into account the standard of living of individuals in the family. It considers the number of consumption units living with the total income of the household. Its main consequence for a couple is that the more the earnings are different between the spouses, the less the total amount of tax due is. So, the amount of tax paid depends both on the level of income and on the difference in the incomes earned by the spouses. For most couples, the amount of tax paid is greater with individual taxation instead of collective taxation. In 1945, the couple was the cornerstone of the family and it was defined by the marriage since cohabitation was not at all an habit. Therefore, the decision to marry was led by social habit and not by taxation. So, the *quotient familial* was established only for married couples. Nowadays, cohabitation is much more popular, most couples starting their common life with a period of cohabitation, but the *quotient*

familial still targets married couples. Therefore, the income taxation system can be viewed as an incentive to marry since it benefits more to married couples.

In the economic literature, the choice to marry has been mostly studied as the choice of being in a couple rather than being single. For Becker [1973, 1974, 1981], individuals decide to marry when the expected flows of utility of the union is greater than the flows that would be expected if single. From that point of view, being married or being in cohabitation is clearly equivalent. Recently, the economic literature has started to study the choice of being married rather than staying in cohabitation. Drewianka [2000] proposed a model to study the choice to marry rather than cohabitation based on Becker's framework. As the tax system benefit more to married couples than to cohabiting couples, it increases the expected flows of utility for married couples compared to cohabiting couples. Then a marriage-friendly taxation system could be considered as an incentive to marry. However, the taxation system could also lead to a penalty for married couples. Alm and Whittington [1996] analyse the amount of what is commonly called the "marriage tax" or the "marriage subsidy" for American couples. They show that its importance varied a lot during the last decades.

The decision to marry is led by many considerations on the benefits and the costs of marriage, which can be very high compared to the gain or the loss entailed by the income taxation. So, do couples take into account the tax system when they decide to marry ? Alm and Whittington [1995, 1999] show that the "marriage tax" has led to a small but significant decrease of the marriage rate. Using similar data, Sjoquist and Walker [1995] show that the "marriage tax" did not lead to a decrease of the marriage rate but to a change in the timing of marriage, couples delaying their marriage in order to be less penalized. More recently, Chade and Ventura [2005] show that large changes in the "marriage tax" are associated to small changes in the number of marriages. So, the effect of the income taxation on marriage rates is not very clear : does it delay marriage or does it affect the decision to marry ? By the way, whatever the effect, it does change the behaviour of couples, but very weakly. On the other hand, Alm and Whittington [1997] find that an increase of the "marriage tax" does not affect the divorce rate. In France, the effect of income taxation on marriage has not been much studied, except by Buffeteau and Echevin [2003]. They use a reform of income taxation in 1995 that makes marriage more attractive by increasing the amount of taxes paid by cohabiting couples with children. They find a small but significant effect on the marriage rate.

With 4.56 marriage for 1000 inhabitants, the marriage rate in France is quite similar to the marriage rate in other countries of Western Europe (between 4 and 5 in 2003) but it is much less than in the United-States (around 7.5 in 2003). Couples tend to marry less and if they do, they marry older. In France, about 300,000 marriages were celebrated in 1975 and 275,000 in 2006. Does it mean that French couples are less sensitive to fiscal incitation than what they used to be ? That is *a priori* difficult to assess since couples' behavior has changed. In 1994, men and women married on average at 28.7 and at 26.8 respectively, but in 2006, they married both 2.5 years later. Then, marriage often

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occurs after a long period of cohabitation. In 2006, in France, 38% of men and women aged between 25 and 29 lived with their partner and are not married whereas 22% are married. Moreover, the divorce rate raised dramatically.

But the most important change in the institution of marriage in France was the creation of a new legal form of union called the pacs. It was inspired by other European countries. In 1987, Denmark paved the way to other countries by creating a new legal form of union, the registered partnership. Then, a lot of countries, especially in Europe, created registered partnerships or civil unions[1]. They were made for same-sex couples, in order to satisfy their claim for legal recognition. Most of countries decided to create a median way between marriage and cohabitation because it was controversial to allow same-sex couples to marry, but same-sex couples had become an important lobby so their legal recognition was highly demanded. The report directed by Kees Waaldijk [2005] shows that the rights given to partners by civil unions are very different from one country to another. In Netherlands or in Sweden, civil unions are very close to marriages. In France or in Belgium, at least when it was created, civil unions were very different from marriages. Three main features distinguish most of civil unions from marriages, whatever the country. First, partners are less committed because duties towards the other partner are weaker. Second, civil unions do not give as many benefits to partners as marriage do. Third, civil unions are easier to break. In most countries, civil unions are exclusively made for same-sex couples. The French system is quite different. As in the Netherlands or in Belgium, different-sex couples can contract a civil union. In France, from its creation in 1999 to the end of 2007, 385,031 pacs were contracted. From 22,276 pacs contracted in 2000 to 102,148 in 2007, the pacs turned to be very successful. Then, in 2007, around 30% of the unions celebrated were pacs. Different-sex couples have found a legal form that fits very well their need : the Ministry of Justice declared that in 2007 only 7% of new pacs were contracted by same-sex couples [Carrasco, 2007]. It is interesting to note that a similar pattern was observed in Belgium and in the Netherlands, where civil unions are mostly contracted by different-sex couples but not in Quebec or in New-Zealand where civil unions contracted by different-sex couples are very rare as the figure 1 shows. However, the figure 2 shows that in these five countries, the rate of persons involved in a civil union contracted by a same-sex couple is quite similar and quite stable.

When the pacs was created, the political area was very divided on the topic, nobody would have predicted such a success. However, it is difficult to explain the growing number of pacs because a very few data are available on pacsed couples. The increasing number of pacs contracting asks many questions in France. Who are pacsed couples ? Why do they contract a pacs ? Is the pacs a substitute to the marriage, a first step toward marriage or a substitute to cohabitation ? Since a very few microdata are available, pacsed couples are mostly unknown. Carrasco [2007] describes that they are as old as married couples and that despite they are easier to break, pacs are not more destroyed

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[1]In the rest of the text, let's call civil unions all that new legal forms of unions.

than marriages. Both the relationship between marriage, pacs and cohabitation and the reason to contract a pacs are difficult to understand because of that lack of data. Still, benefits attached to pacs changed progressively. In 1999, the pacs was creating in order to be different from the marriage but still attractive to satisfy same-sex couples claims for recognition. There were three main differences between the marriage and the pacs. First, the pacs was not recognized as a matrimonial status. Second, married couples benefited more from the tax system than pacsed couples. Third, it was easier to break out a pacs than a marriage. Three reforms have made the pacs closer to the marriage than what it was. In 2005, the income taxation for pacsed couples was changed in order to be the same as for married couples. This change result from the claim for equity between couples, as there was no reason why a pacsed couple would be taxed differently from a married couple. It was announced in September 2004 and settled on the 1st of January 2005. A more general reform occurred on the 23rd of June 2006 and was settled on January 2007, which had the consequence to make the commitment stronger between partners. In 2007, inheritance tax system was changed both for pacsed and married couples. They are now the same for both types of couple. Then, the 2005 reform coupled with the 2007 reform made the tax system similar for both married and pacsed couples. The three reforms changed the pacs into a real alternative to the marriage. It is now a well known fact that pacs is interesting for fiscal reasons, but there is not any study that looks whether fiscal reasons are really taken into account by couples in their decision to contract a pacs. The most interesting change is the reform of the income taxation in 2005. Its main consequence is that it can lead to a huge relief on the amount of taxes paid the year of the pacs, depending on the date of the pacs and on the difference of incomes between the partners. It leads to a relief on the amount of income taxes paid for the next two years, compared to the amount of income taxes paid by partners that had pacsed before the reform. Three years after the year of the pacs, the income taxation is the same after and before the reform. Therefore, a positive impact of the reform on the number of pacs contracted means that short-term points are taken into account in the decision to pacs. The last interesting point is that in 2005 nothing changed for the pacs except the income taxation . Then, it is possible to estimate the impact of the reform. However, the divorce laws changed in 2005, making divorce easier. This is not directly a change of the laws on pacs but making the marriage less binding can impact the number of pacs contracted.

This article aims to estimate the effect of income taxation on the decision to contract a pacs. Then, the main goal is to identify the number of pacs that could be attributed to the reform. To study the impact of the reform, I use the particular form of the reform. It is now optimal for couples to contract a pacs during the second or the third quarter. Then a comparison of evolution of the number of pacs contracted during the optimal quarters to the other quarters using county panel data leads to identify the effect of the reform. My results suggest that the reform had a huge impact, 38% of the pacs contracted after 2005 can be attributed to the reform. It tends to show that couples adjust their behavior quickly and properly.

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The rest of the paper proceeds as follow. Section 2 describes French system of income taxation for married and pacsed couples. Section 3 presents the strategy of estimation, the estimates of the impact of the income tax reform on the number of pacs contracted and it gives some robustness checks. Section 4 studies the impact of the reform on dissolutions. Section 5 proposes an interpretation of the results, by assessing a link between the pacs and the marriage. Section 6 concludes.

2 The system of income taxation in France

2.1 The potential impacts of the reform

On the 1st of January 2005, the income taxation was changed for pacsed partners. Now, pacsed couples are given the opportunity to pay less income taxes the year they get pacsed by filling three tax returns. This leads to pay less taxes because of the way income is taxed in France.

The income tax is a progressive tax calculated on the income earned within one year. First of all, a 10% relief is applied, then only 90% of the annual income is submitted to the income taxation. The amount of income up to a certain amount t_1 is taxed at a rate r_1, then the remaining money, up to a certain amount t_2 is taxed at rate r_2, etc... The amount $t_{i+1} - t_i$ is taxed at a rate r_i, with $r_{i+1} > r_i$ and $t_{i+1} - t_i > t_i - t_{i-1}$. So, the income tax on the income I can be represented by f, a piecewise linear continuous and convex function.

$$f(I) = \sum_{i=0}^{4} 1_{\{I > t_i\}} \min(I - t_i, t_{i+1} - t_i) * r_i$$

with $t_0 = 0$, $t_5 \rightarrow +\infty$ and $r_0 = 0$.

A tax relief targets low-income households. If the amount of tax is less than an amount D, so if $f(I) < D$, the household does not pay exactly $f(I)$ but it benefits from a tax relief which is important if $f(I)$ is very low.

Let $\tilde{f}$ be the amount paid by the household. Therefore,

$$\tilde{f}(I) = \begin{cases} \max\left(f(I) - \frac{D - f(I)}{2}, 0\right) & \text{if } f(I) \leq D \\ f(I) & \text{if } f(I) > D \end{cases}$$

When they are not married, the two partners have to fill one tax return each. So they pay $\widetilde{f^{(C)}}(I) = \tilde{f}(I_m) + \tilde{f}(I_f)$ where I_m and I_f denote the male's income and the female's income. When they are married, the two spouses have to fill only one tax return instead of two. They pay two times what someone earning the average income would have paid. Therefore, they pay $\widetilde{f^{(M)}}(I) = 2\tilde{f}(\frac{I_m + I_f}{2})$. Because of the convexity of f, $f^{(C)} > f^{(M)}$. However, Legendre and Thibaut [2007] explain that it could be sometimes more interesting to stay in cohabitation because of the tax relief, which introduces non-linearities in the tax system for low income. So, $f^{(C)} > f^{(M)}$ does not necessarily implies $\tilde{f}^{(C)} > \tilde{f}^{(M)}$

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for low incomes. This particularity does not affect the phenomenon studied here because its importance on income tax is far less important. Figure 3 gives examples of the benefit of being married rather than unmarried for different levels of incomes, for a couple without children. The more the incomes are different, the more couples benefit from being married. Children are also taken into account by the tax system. We only consider couples without children for the simulations, but the presence of children does not affect the main effect of the income taxation. An interested reader should report to Buffeteau and Echevin [2003], Thibaut and Legendre [2007] or Amar and Guerin [2007] for futher explanations on that point.

The year they marry, the partners have to fill three tax returns, each fills his own for the amount of income earned from the 1st of January to the marriage day and they fill a common tax return for the income earned from the marriage day to the 31st of December. If they get married after a period of (t*100)% of the year, they have to pay an amount of tax of :

$$\widetilde{f^{(YM)}}(I) = \tilde{f}(t * I_m) + \tilde{f}(t * I_f) + 2\tilde{f}\Big(\frac{(1-t)(I_m + I_f)}{2}\Big)$$

As the rates are not changed when incomes are earned on a few months, the partners can minimize the amount of taxes by choosing the right date of marriage. Then, the amount of income taxes to be paid for the year of the wedding depends on the difference of incomes between the partners and on the date of the wedding. The minimizing date most of the time occurs during the second or the third quarter. Figure 4 shows examples of the amount of taxes paid by three couples depending on the day they marry.

Before 2005, the pacsed partners had to wait for the third year after their pacs and then, they could fill one tax return for the incomes earned during the whole year. Then, the date of pacs did not have any effect on the amount of tax paid. Since 2005, pacsed couples have to fill three tax returns for the year of the pacs, exactly as married couples do. Notice then that after three years, before the reform, the income was taxed the same way for both married and pacsed couples. The reform leads to reduce significantly the amount of taxes paid for the year of the pacs. If the incomes of partners are significantly different, it leads to reduce the amount paid the two years after the pacs. After, the amount of taxes paid is the same before and after the reform.

Most of the time, couples marry and celebrate their marriage the same day. So, as the partners have many factors to deal with when deciding the date for marriage, it is hard to believe that couples choose the date of the marriage in order to minimize the amount of taxes paid. On the contrary, a pacs is not as celebrated as a marriage. If it is celebrated, the celebration is not organized on the date of the pacs because the pacs is contracted in a court, when it is open and it is a private celebration. Then it is possible to choose the optimal date to contract the pacs and to celebrate it later. As there are not so many factors that could determine the pacs day as for marriage, couples are able to choose

the date in order to minimize the amount of tax paid.

The reform makes the pacs more attractive to couples, because it can lead to pay less taxes the year of the pacs. Moreover, breaking a pacs was easy and costless[2], then the commitment induces by a pacs was not very strong. However, if the pacs was broken during the same year or during the following year, the effect on the income tax was canceled. Notice that when a pacs is broken at least two years after it was contracted, the partners have to fill three tax returns for the income earned the year of the dissolution, one for the couple for the period from 1st of January to the dissolution day and one for each partner from the dissolution day to the end of the year. A letter is sufficient to break a pacs[3], which makes it easy and fast to break. Then, the partners have the opportunity to pay less taxes the year the pacs is broken by choosing the optimal date.

Thus, under the assumption that if couples answer to the incentive induced by the reform, the answer is optimal, four effects should be observed. First, as the pacs is made more attractive, more pacs should be contracted after 2005. Second, couples tend to get pacsed during the second or the third quarter. Third, couples do not break their pacs during the same year or during the following year. Fourth, couples who break their pacs do it during the second or the third quarter. I use the first and the second effects to identify the effect of the reform and the third and the fourth effect for the robustness checks.

2.2 Data available

A pacs is not contracted at the town hall as marriages but at the closest court from the place where at least one partner lives. Then, data belong to the Department of Justice. Micro data have been highly protected for a long time. The legislator feared for homophobia and violence towards pacsed people. Therefore, they decided to protect couples by registering pacsed couples on a secret file that was not available, even for statisticians from the Department of Justice and by preventing national surveys from asking couples if they were pacsed or not. Therefore, the main surveys in France, such as Enquête Emploi, do not include any information about pacs. The growing number of pacs led the legislator not to fear anymore. The protection disappeared in 2005 but micro data are still not available, except for statisticians from the Department of Justice. That is why some descriptive figures on pacsed couples are available thanks to Carrasco [2007]. Then, only aggregated data are available, which make it impossible to know crucial information, such as the incomes of the partners.

As a consequence, all the information we have is the number of pacs contracted and broken in each court, for each quarter. I gathered this information into the number of pacs contracted and broken in each county, for each quarter. I do not take into account the French counties overseas, so I consider 96

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[2]It has changed in 2006. It is still easy to break a pacs but the reform of the pacs of 2006 made the commitment between partners stronger and it gives the partners the right to court his partner for the damages induced by the dissolution.

[3]A letter is sufficient if both the partners agree on the dissolution. If only one partner wants to dissolve a pacs, he has to send a letter through a bailiff.

counties. My estimates do not consider the 1999 year because there is only half a trimestre (The pacs was settled on the 15th of November 1999.) and the number of pacs could be too high because of a potentially huge number of same-sex couples who could not register before and then they could catch up different sex couples. Then I consider 8 years, i.e. 32 quarters. Therefore I have 3072 observations.

3   Estimating the effect of the reform

3.1   An econometric model for the reform

The empirical strategy stands on the idea that two categories of couples contract a pacs after the reform. The first one is made of couples that would have contracted a pacs even without reform. The second is made of couples that contract a pacs in order to benefit from the reform. We are interested in estimating the number of couples belonging to the second group. The empirical strategy is based on two crucial assumptions. The first one says that when partners decide to contract a pacs because of the reform, they do it properly. Therefore, they get pacsed during the 2nd or the 3rd quarters. The second one says that couples that would have contracted a pacs even without the reform are not going to change their schedule because of the reform, in order to take into account the benefit of getting pacsed during the summer. Then, the reform should not change the number of pacs contracted during the 1st and the 4th quarters. This is a strong assumption because it means that couples that would have pacsed anyway are not willing to delay their pacs in order to benefit from the reform. But if couples that would have pacsed without the reform reports their pacs from the winter to the summer, we should observe a significant change in the trend of the number of pacs contracted during the first or the fourth quarters. Figure 5 shows that the number of pacs contracted during the first quarter keeps raising continuously after 2005, after a small decrease. The number of pacs contracted the forth quarter increases continuously until 2006. Figure 6 shows that there were more pacs contracted during the first and forth quarters than during the second and the third quarters. The shape of the curves is quite similar on the one hand for years 2000 to 2004 and on the other hand for 2005 to 2007. It shows that a change of the seasonality occurred exactly in 2005. Moreover, the number of pacs contracted in the first and the forth quarter is quite similar each year. There might be some factors that explained this seasonality that also explain that the number of pacs is not decreasing for those quarters after the reform. The seasonality before the reform could be explained by the incentive for teachers to pacs. Indeed, it is easier for teachers to move to the region they want to live in if they are married or pacsed. As they apply for the moving in Decembre or in January, this could explain why more pacs are contracted in the first or the last quarter of the year. Because this system was not change with the reform, teachers still have the incentive to pacs during the first or the forth quarter. Moreover, many households do not have to pay any tax because they do not earn enough. In 2007, there were about 35 millions fiscal households and 19 millions among them had to pay income taxes. Those figures were

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quite similar in 2005. Then, that kind of households should not care about the reform and then, they do not take into account the date.

So, the impact of the reform is evaluating by comparing the changes in the number of pacs contracted during the quarters for which the number of pacs should increase due to the reform to the changes of the quarters for which the number of pacs should not increase.

Let consider first y_{it}, the number of pacs contracted in county i during the quarter t. Semestre 1 is made of the fourth quarter and the first quarter of the next year and semestre 2 is made of the second and the third quarters. s_1 and s_2 are dummies indicating if the period corresponds to a first or a second semestre respectively. As the divorce law also changed in the 1st of January 2005[4], the residuals do not necessarily follow the same distribution before and after the reform. This assumption on residuals is necessary because it is not possible to make an assumption on the sign of the bias introduced by the change of the divorce laws on the number of pacs contracted. Indeed, Matouschek and Rasul [2006] propose three economic justifications of marriage and each justification predicts a different evolution of the number of marriage contracted after a reduction of the costs of divorce. Then, the number of pacs contracting could change after a reduction of the costs of divorce depending on the degree of substitutability or complementarity between pacs and marriage. The first explanation is that the marriage is consider as giving an exogenous benefit to couples, the second is that marriage is considered as a way to commit and third as a signalling device, as for Bishop [1984]. According to the first and the third explanations, making divorce easier should increase the number of marriage. According the second one, it should decrease the number of marriage. The results given by Wolfers [2007] tend to support the second explanation. If pacs and marriage are supposed to be substitute, the first and the third explanation should lead to observe less pacs and the second more. But if they are supposed to be complementary unions, the contrary should be observed. Trandafir [2008] aims to estimate the effect of the introduction of a registered partnership and the legalization of same-sex marriage on different-sex marriage in the Netherlands. In the Netherlands, both same-sex couples and different-sex couples can contract a registered partnership. Then, the registered partnership could have a direct effect on marriage as couples could be more willing to contract a registered partnership rather than a marriage. The same-sex marriage could have an indirect effect as it could change the meaning of the institution of marriage. He finds a decline in the marriage rate which is more accurate in more liberal locations but he cannot attribute this effect to the same-sex marriage or to the resgistered partnership. Therefore, it tends to show that the links of the marriage and the pacs are not very clear yet, this assumption on residuals is necessary. Let β denote the effect of the reform. As couples answer optimally to the reform, β should be observed only during the the second semestre.

The dependant variable is the log of the number of pacs contracted in county i at date t, a level specification would constrain the number of pacs to grow by the same absolute amount for each county,

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[4]France adopted a sort of unilateral divorce in 2005.

which would be inappropriate given the variation in the size of the population across counties.

The basic estimated equation is :

$$log(y_{it}) = c + \alpha_i + \sum_{T=2001}^{2007} \alpha_T 1_{(year=T)} + \delta_1 s_1 + [\delta_2 + \beta 1_{(t \geq t_1)}]s_2 + X_{it}\gamma + u_{it} \qquad (1)$$

where t_1 stands for the 1st of January. α_i are county fixed effects and α_T are year fixed effect. The α_T allows us to take into account the natural growth of the number of pacs, relatively to the fixed effect of 2000, assuming that $\alpha_{2000} = 0$. t_0 denotes the period of the reform and t denotes the current period. The X_{it} are time varying variables, in order to control for the structure of the population in the counties. In order to identify the intercept, I assume $\delta_1 + \delta_2 = 0$. Then, α_T gives the average number of pacs contracted during the year T and the δ's give the deviation due to the seasonality.

The key variable is the interaction between the second semestre and a dummy for the period after the reform. The equation accentuates that δ_2 pacs are contracted during the second semestre before the reform and $\delta_2 + \beta$ after the reform. The coefficient of interest is β and it can be estimated thanks to a difference in difference estimator. The β coefficient can be interpreted as the number of pacs contracted during the second semesters after the reform relatively to the second semestres before the reform. Before the reform, the average number of pacs contracted in each period during the year T in each county, compared to the number of pacs contracted in 2000 is $\alpha_T + \frac{s_1+s_2}{2} = \alpha_T$, under the assumption $\delta_1 + \delta_2 = 0$. However, after the reform, the average number of pacs contracted on year T, compared to year 2000 is $\alpha_T + \frac{s_1+s_2+\beta}{2} = \alpha_T + \frac{\beta}{2}$. Therefore, $\beta/2$ gives the annual deviation from the year fixed effect due to the reform.

This econometric strategy makes it possible to disentangle the effect of the reform from the natural growth of the number of pacs contracted given by the α_T. The so-called natural growth stems from the fact that the pacs was a new legal system in 2000. It is possible that most of couples were not well-informed about the benefits of being pacsed. The information spread slowly in the population and it can depend on the number of couples already pacsed the first few years after it was created. Then, the outcome can be highly serially correlated. Following Bertrand, Duflo and Mullainathan [2004], I take into account that the statistics of tests are wrong because of the wrong standard deviations. Then the p-values are computing using block bootstrap. It is relevant to use this method because the number of counties (96) is large compared to the number of periods (32).

Another specification could be less restrictive for the evolution of the number of pacs contracted

during the second semestre[5]. The second estimating equation is :

$$log(y_{it}) = c + \alpha_i + \sum_{T=2001}^{2007} \alpha_T 1_{(year=T)} + \delta_1 s_1 + \left[\delta_2 + \sum_{T=2001}^{2007} \lambda_T 1_{(year=T)}\right] s_2 + X_{it}\gamma + u_{it} \qquad (2)$$

The equation (1) considers only one change in the number of pacs contracted during the second semestre relatively to the number of pacs contracted during the period of reference. The equation (2) considers as a reference an average situation for the second semestres given by $\delta_2 s_2$. Then, a deviation from this situation is given for each year by the λ_T's. Therefore, the pattern of the λ_T's reconstructs the evolution of the number of pacs contracting during the second semestre given a reference situation. Notice that this specification does not privilege 2005 relative to the other years. Then, different patterns could be observed. First, the reform can have an sudden effect, which would be transposed into a break of the trend of the λ_T's. In that case, $\lambda_T = a_0 + bT + a_1 1_{T \geq 2005}$. Second, the reform could have a long term effect, which changes modify the trend of the λ_T's. In that case, $\lambda_T = a_0 + b_0 T + b_1 T \times 1_{T \geq 2005}$. Third, the effect could be a mix of the two. A change in the trend of the λ_T's before and after the reform could be attributed to the reform's impact. Therefore, the short-term impact of the reform can be estimated by

$$\lambda = \lim_{T \to t_1^+} \lambda_T - \lim_{T \to t_1^-} \lambda_T$$

.

The long-term effect is given by a change of the trend, which can be computed several years after the reform. For example, after two years, it is given by :

$$\Delta 2 = (\lambda_{2007} - \lim_{T \to t_1^+} \lambda_T) - (\lim_{T \to t_1^-} \lambda_T - \lambda_{2003}) \qquad (3)$$

Then, the pattern of λ_T's gives how this deviation compared to the reference situation evolves.

If Δk is close to zero, the reform only has a sudden effect and then, λ is quite similar to β in the first specification. It gives the deviation of a second semestre after the reform compared to a second semestre before the reform. However, in the first specification, β gives the average deviation of all second semestres after the reform compared to the average deviation of all semestres before the reform. In the second semestre, the deviation of the second is computing for each second semestre compared to the deviation of the second semestre in 2000.

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[5]It is inspired by the specification Amy Finkelstein [2007] uses to evaluate the impact of the introduction of Medicare in the United-States.

3.2 Main results

Table 1 gives the main results of the estimation of specification 1 and 2. Notice first that the introduction of the X_{it} do not change a lot the estimations of the key coefficients[6]. Therefore, I use the specification without the controls to present the main results.

β is found to be equal to 1.006 and significantly different to 0. The best way to understand the value of β is to compute the growth rate of the number of pacs contracted by year with the reform and the growth rate that would have been observed without the reform.

It is possible to compute the effect of the reform with the estimation of the first specification. The overall number of pacs contracted in county i in year T is given by

$$Y_{iT} = 2 \times e^{(\alpha_i + \alpha_T)}(e^{\delta_1} + e^{\delta_2}e^{\beta 1_{\{T \geq 2005\}}})$$

The growth rate g_T between year $(T+1)$ and year T is given by :

$$g_T = \begin{cases} e^{(\alpha_{T+1} - \alpha_T)} - 1 & \text{if } T \geq 2005 \text{ or } T+1 < 2005 \\ e^{(\alpha_{T+1} - \alpha_T)} \times \left(\frac{e^{\delta_1} + e^{(\delta_2 + \beta)}}{e^{\delta_1} + e^{\delta_2}} \right) - 1 & \text{if } T+1 = 2005 \end{cases}$$

Therefore, except for the year of the reform, the annual growth rate only depends on year fixed effect. The year of the reform, the annual growth rate also depends on the semestre. With the reform, $g_{2005} = 45\%$. Without the reform, it would have been $\widetilde{g_{2005}} = -10\%$. The results suggests that the number of pacs would have decreased in 2005 without the reform. As the strategy of identification comes from a comparison from the first and forth quarters to the other ones, this result comes from the decreasing number of pacs observed during the first quarter 2005. It seems strange, maybe the assumption that couples that would have pacsed anyway are not going to report the date of their pacs is too strong. If so, β over estimate the real impact of the reform. Similarly, the growth rate between 2004 and 2006 and 2004 and 2007 can be computed. Then, $g_{2006} = 86\%$ and $g_{2007} = 148\%$ while $\widetilde{g_{2006}} = 15\%$ and $\widetilde{g_{2007}} = 53\%$. Whatever the year considered, the impact of the reform is huge but the number of pacs would have increased even without the reform of income taxation.

The predicted number of pacs in France is given by $Y_T = \sum_i Y_{iT}$. Table 2 gives the predicted number of pacs by year, Y_T and the predicted number of pacs that would have been contracted without the reform. A raise of 89,000 pacs can be attributed to the reform which represents 23% of the total number of pacs contracted. For each year since the reform, 38% of pacs contracted can be attributed to the reform, i.e. 22,000 for 2005, 29,000 for 2006 and 38,000 for 2007. Figure 8 gives the evolution of the number of pacs predicted with and without the reform.

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[6]The controls are the age structure, the structure of the employment sector and the unemployment rate for the population in each county.

The second specification gives the effect of the reform through the λ_T's. The pattern is given by figure 7. Before 2005, the λ_T's increase slightly, which means that the deviation from what would have been the second semestre, relatively to the year fixed effet is slightly bigger every year. That means that before 2005, there was not any deviation during the second semestre from one year to another. This clearly shows that the number of pacs contracted did not vary much across second semestres before 2005, which confort the idea that the change in the variation is due to the reform. The disruption of the trend in 2005 is very clear. In order to make the pattern of the λ_T's clearer, it is possible to explicit its functional form :

$$\lambda_T = a_1 + b_1 t_1 + a_2 1_{T \geq 2005} + b_2 t_2 1_{T \geq 2005}$$

The pattern of the λ_T's is estimated with block bootstrap. That means that the λ_T's are estimated 2000 times by block bootstrap on the initial data. For each estimation of the λ_T's, the parameters a_1, a_2, b_1 and b_2 are estimated by the MCO estimators $\hat{a}_1^{(h)}$, $\hat{a}_2^{(h)}$, $\hat{b}_1^{(h)}$ and $\hat{b}_2^{(h)}$. That gives 2000 estimations of the parameters, for h between 1 and 2000. Then the estimator by bootstrap is given by the mean of the estimation. For example, $\hat{a}_1 = \sum_{h=1}^{2000} \hat{a}_1^{(h)}$.

The estimation gives :

$$\lambda_T = \underset{(0.067)}{-0.20^{(*)}} + \underset{(0.024)}{0.083^{(**)}} \times t_1 + \underset{(0.096)}{0.93^{(***)}} \times 1_{T \geq 2005} - \underset{(0.046)}{0.11^{(*)}} \times t_2 \times 1_{T \geq 2005} \qquad (4)$$

where t_1 stands for a trend and t_2 stands for a trend after 2005. Then, the most important change in the pattern of the λ_T's is due to break in 2005. After 2005, the λ_T's tend to decrease slightly but they do not vary a lot. Thus, the variation across second semestres after 2005 is not important. Then, the number of pacs contracted during the second semestre have moved from one steady state, with the number of pacs around δ_2 to another steady state, with the number of pacs around $\delta_2 + \lambda$. Table 6 gives the evolution around 2005 estimated with (3) and shows that it is similar and slightly decreasing before and after the reform. The only change introduced by the reform in the pattern of the λ_T is then a disruption of the slightly decreasing trend. Then, the interpretation of λ is very close to that of β in specification 1. As λ is slightly different from β, we compute the number of pacs estimated without the reform. Since 2005, about 36% of the number contracted each year can be attributed to the refom, i.e. around 22,000 in 2005, 28,000 in 2006 and 36,000 in 2007. Then, in three years, 86,000 pacs more pacs were contracted because of the reform, i.e. 22% of the overall number of pacs contracted.

The first and the second specification give similar results. So around 36% or 38% of the number contracted each year can be attributed to the reform. This suggest that fiscal incentives are quite

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strong in the decision to contract a pacs.

3.3 Robustness checks

The first way to test for robustness is to drop one year for the estimation. The specification (2) is then estimated on that reduced sample. The key coefficients are still the λ_T's. Table 8 gives the results of the estimations.. The results appears to be very robust since the estimations does not vary a lot, whatever the dropped year. Even dropping a year after the reform does not change the results. This result tends to support the idea that the reform had an impact in all the counties.

The second way to test for robustness is to drop some counties from the estimation. First, we can think that the Parigian population is richer and less attracted by traditional institution than the rest of France. So I drop Paris from the estimation. Second, I extend that idea to the Parigian suburbs, and drop the 8 counties of the Parigian region. However, the Parigian suburbs did not react the same way. The pacs more successful in the western suburbs, which are richer, than in the eastern suburbs. Third, I dropped the 20 counties (over 96) in which the highest numbers of pacs were contracted. They are mostly urban counties with a big town. Forth, I dropped the 20 counties in which the lowest numbers of pacs were contracted. They are mostly rural counties. Fifth, I consider the rates of pacs contracted for 1,000 peoples aged 20 to 65 and I drop the counties in which the pacs intensity was the highest. Sixth, I drop the counties in which the pacs intensity was the lowest. The results are given by 9. The estimations tend to vary a little, but never a lot. This tends to show that the results are robust.

3.4 What if couples delay pacsing?

The former estimates are based on the key assumption that couples that would have contracted a pacs even without the reform are not willing to delay their pacs date in order to benefit from the reform. This assumption seems quite strong. Let us assume that a part x of couples have delay their pacs in order to benefit from the reform. That means that a part x of the pacs contracted during the 2nd and 3rd quarters would have been contracted during the 1st or the 4th quarter without the reform. In order to take into account the possibility of delaying the pacs day, I compute a new number of pacs $\widetilde{y_{it}}$, which attributes to the delayed pacs to their "true" quarter, i.e. the quarter during which they would have been contracted their pacs without the reform. Let $y_{it}^{(j)}$ denotes the number of pacs contracted in county i during quarter (j). Then, assuming that a part x of couples have changed the date of their pacs and that there is only infra-year delaying, I compute:

$$\widetilde{y_{it}^{(j)}} = \begin{cases} (1-x)y_{it}^{(j)} & \text{if } j = 2 \text{ or } j = 3 \\ y_{it}^{(j)} + \frac{x}{2}\left(y_{it}^{(2)} + y_{it}^{(3)}\right) & \text{if } j = 1 \text{ or } j = 4 \end{cases}$$

Then

$$\sum_{j=1}^{4} \widetilde{y_{it}^{(j)}} = \sum_{j=1}^{4} y_{it}^{(j)}$$

Then, I estimate the effect of the reform using specification (1), using $ln(\widetilde{y_{it}})$ instead of $ln(y_{it})$ and for different value of x. I compute the predicted number of pacs with the reform and without the reform (with $1_{t \geq t_1} = 0, \forall t$) for each x. Some of the results are given in table 6. It shows that for each 1% more couples delaying their pacs, the effect of the reform is 1 point of percentage less important. If 1% of couples delayed their pacs from a first or a forth quarter to a second or a third quarter, then about 37% of the pacs contracted after 2005 can be attributed to the reform instead of about 38%. Notice that the reform has no effect at all if we think that 40% of couples delayed their pacs. This results tends to show that the estimation found above is an upper bound of the true number of couples. However, I made the assumption that the same part of couples delayed their pacs in each county. If this part is different from one county to another, it could change this estimation.

Then, the estimate of the impact of the reform could be improved by estimating the number of couples that could have delayed their pacs. In order to estimate the number of pacs that could have been delayed, I assume that the number of pacs contracting during the first and fourth quarters would have increased after the reform the same way as before the reform. Then, I estimate the way the number of pacs contracting during the first quarter increases by regressing the number of pacs contracting during the first quarter on a trend. Using the estimates, I compute the predicted number of pacs contracting during the first quarter after the reform. I compute the number of pacs contracted during the fourth quarter after the reform exactly the same way. This method tends to assume that more pacs were contracted during the first and the fourth quarter after the reform than the actual number of pacs contracted during those quarters. As this difference is assumed to result from couples delaying their pacs, I subtract from the second and third quarter the additional pacs attributed to the first and fourth quarters. Let $\tilde{y}_{iT}^{(j)}$ be the number of pacs contracted in year T after the reform during the quarter (j), taking into account the delayed pacs and $\hat{y}_{iT}^{(j)}$ the predicted number of pacs contracted during the first and the fourth quarters.

$$\begin{cases} \tilde{y}_{it}^{(1)} = \hat{y}_{iT}^{(1)} \\ \tilde{y}_{it}^{(2)} = y_{it}^{(2)} - \frac{1}{2}[(\hat{y}_{it}^{(1)} - y_{it}^{(1)}) + (\hat{y}_{it}^{(4)} - y_{it}^{(4)})] \\ \tilde{y}_{it}^{(3)} = y_{it}^{(3)} - \frac{1}{2}[(\hat{y}_{it}^{(1)} - y_{it}^{(1)}) + (\hat{y}_{it}^{(4)} - y_{it}^{(4)})] \\ \tilde{y}_{it}^{(4)} = \hat{y}_{iT}^{(4)} \end{cases}$$

Figure 9 gives the number of pacs estimated for each quarter using a linear trend.

The effect of the reform can be calculated using the specification (2). The pattern of the (λ_T)

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estimated is given by figure 10. The pattern can be sum up by the following estimated equation:

$$\lambda_T = \begin{array}{cccc} -0.283^{(*)}+ & 0.083^{(*)} \times t_1- & 0.226 \times 1_{T \geq 2005}- & 0.145^{(*)} \times t_2 \times 1_{T \geq 2005} \\ (0.118) & (0.032) & (0.125) & (0.060) \end{array}$$

Then the effect of the reform is not as clear as before. The impact mostly concerns the deviation from the trend after the reform. That means that the number of pacs contracted during the second semestres after the reform tends to be more and more different than the number of pacs contracted during the second semestre in 2000. The predicted number of pacs contracted with and without the reform is given by figure 11. The estimation of the number of pacs contracting without the reform is now more linear the previous estimation but the confident interval is very large, which shows that the estimation is not very precise. The number of pacs attributed to reform taking into account the number of pacs delaying their pacs is different from what was estimated without taking into account that calendar effect. The different results are given by table 6. Then, the maximum number of pacs that could be attributed to the reform is about 36% in 2005, whereas 24% of pacs contracted could be directly attributed to the reform of the income taxation. Therefore, it could be thought that around 12% of couples delayed their pacs in order to benefit to the reform. That difference tends to disappeared in 2007.

The estimation of 38% should be seen as an upper bound of the fiscal incentive. A better estimate of the impact of the reform is that about 31% of pacs contracted since 2005 are due to couples responding to fiscal incentive.

4 The dissolution of pacs

4.1 Number of dissolutions

This part is an attempt to see whether the number of pacs attributed to the reform seems reasonable, under the assumption that couples respond to the reform properly. It is based on the information given by the number of dissolution. The main assumption says that couples contracting a pacs because of the reform are not going to break the pacs the first two years of the pacs. I check if the number of pacs contracted because of the reform are compatible with the story on couples behavior induced by the reform.

Let Z_t denote the number of pacs broken-out in year t and Y_t the number of pacs contracted at date t. Among the pacs broken in year t, some are pacs contracted in t and broken the same year, some were contracted one year before, in $t-1$ and broken after one year, etc. Let T_t be the random variable for the duration of a pacs contracting in year t. The cdf of T_t is noted F_t. Then, $F_t(k)$ denotes the total number of pacs contracted during the year t that have been broken at the date k. Let $\tilde{f}_t$ be

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the density function of T, then $\tilde{f}_t(k)$ gives the probability that a pacs contracted in year t is broken at date k. However, the probability that a pacs contracted during the year j is broken is given by: $f_t(j) = P(b_{j-1} < T \leq b_j)$ where b_j stands for December, 31st of j. Then, $f_t(j) = F_t(b_j) - F_t(b_{j-1})$. Notice that $f_t(j)$ and $\tilde{f}_t(k)$ are different as $f_t(j)$ is a piecewise function.

The number of pacs contracted in year t and broken k years later is given by $Z^{(t)}(k) = f_t(t+k)Y_t$. Then, the number of pacs broken during year T can be written as :

$$
\begin{aligned}
Z_T &= \sum_{k=0}^{T-t_0} Z^{(t_0+k)}(T - t_0 - k) \\
&= \sum_{k=0}^{T-t_0} f_{t_0+k}(t)Y_{t_0+k}
\end{aligned}
$$

where t_0 is the year the pacs was created, i.e., 1999.

The reform should affect the behavior of couples toward breaking out their pacs. Let assume that there two kind of couples contracting a pacs after the reform. First, there are ζ_t couples that get pacsed because of the reform during year t. Second, there are $(Y_t - \zeta_t)$ that would have contracted a pacs even without the reform.

The latter face a probability $f_t(j)$ of breaking their pacs after j years. The former get pacsed because of the reform, so they do not break their pacs during the year they contracted their pacs or during the following one because if they do, they do not benefit from the tax relief. Then, if they want to break their pacs, they should delay it until they can benefit from the tax relief. Therefore, they face a probability of breaking out $f_t^*(j)$ such as

$$
f_t^*(j) = \begin{cases}
0 & \text{if } j \in \{0,1\} \\
f_t(0) + f_t(1) + f_t(2) & \text{if } j = 2 \\
f_t(j) & \text{if } j \geq 3
\end{cases}
$$

Then, after $t_1 = 2005$, the number of broken pacs could be re-written as:

$$
\begin{cases}
Z_T = \sum_{k=0}^{T-t_0} \left[f_{t_0+k}(t)Y_{t_0+k} \right] & \text{if } T < t_0 \\
Z_T = \sum_{k=0}^{t_1-t_0-1} \left[f_{t_0+k}(t)Y_{t_0+k} \right] + \sum_{k=t_1-t_0}^{T-t_0} \left[f_{t_0+k}(t)(Y_{t_0+k} - \zeta_{t_0+k}) + f_{t_0+k}^*(t)\zeta_{t_0+k} \right] & \text{if } T \geq t_0 \\
\quad = \sum_{k=0}^{T-t_0} \left[f_{t_0+k}(t)Y_{t_0+k} \right] + \sum_{k=t_1-t_0}^{T-t_0} \left[\left(f_{t_0+k}^*(t) - f_{t_0+k}(t) \right)\zeta_{t_0+k} \right]
\end{cases}
$$

I observe both the series of the $(Y_t)_{t \in 0,...,T}$ and the $(Z_t)_{t \in 0,...,T}$. However, the $f_t(j)$ are unknown since they are computed with the $F_t(b_j)$. Therefore, I impose a parametric form to the F_t assuming that T_t is a Weibull with parameters (α_t, θ_t). The Weibull specification is very convenient here since its parametric form is quite simple and it can fit many different cases. Then, I assume that $F_t(k) = 1 - exp(-\alpha_t k^{\theta_t})$.

Notice that if the population contracting a pacs in year t is different from that contracting a pacs in year t', then (α_t, θ_t) is not necessarily equal to (α'_t, θ'_t) for $t \neq t'$. However, we assume here that without the reform, the couple would have destroyed their pacs the same way before and after the reform, i.e. couples pacsing before the reform are not necessarily more or less stable than couples pacsing after the reform. Therefore, I impose the same density for T_t, for all years. I simulated the F_t for many values[7] of (α_t, θ_t) and I compute the $f_t(j) = F_t(b_j) - F_t(b_{j-1})$. The $f_t^*(j)$ are constructed with the $f_t(j)$. Then we can compute the simulated $\widetilde{Z_t}$ with the $f_t^*(j)$, $f_t(j)$, Y_t and the ζ_t given by the previous section. The choice is made by minimizing the distance between the observed serie of dissolutions and the simulted serie. Two criteria are taken into account : $\sum_{t=t_0}^{T} (\widetilde{Z_t} - Z_t)^2$, that gives the best fit for the whole period and $\sum_{t=t_0}^{t_1-1} (\widetilde{Z_t} - Z_t)^2$ for the period before the reform. The graph 14 draw the number of dissolution simulated with the couple (α, θ) that minimize each criterion. It compares the particular shape of the evolution of the estimated number of dissolution to the true number of dissolution. The dark line gives the true number of dissolution observed each year. The longdashes give the simulated number of dissolution that would have been broken with our story. The dots describe the number of pacs that would have been destroyed with the same values for the parameters taking into account that $f_t^*(k) = f_t(k), \forall k$.

None of the two simulated series is very satisfaying. The first criterion leads to an estimate that fit quite well the observed number of dissolutions observed after the reform but it underestimates the number of dissolution in 2004 and 2005. The couple that gives the best simulation is given by $(\alpha, \theta) = (0.06, 1.01)$. However, $\theta \approx 1$ means that the instantaneous probability of breaking a pacs is constant over time. This value is quite strange as we could expect that pacsed couples experience a critical date of pacs, such as married couples, leading to an increasing then decreasing instantaneous probability of divorce. The second criterion leads to a serie of simulated broken pacs that fit well the observed number of dissolutions before the reform but it overestimates the number of broken pacs after the reform. The couple that gives the best simulation is more plausible, with $(\alpha, \theta) = (0.02, 1.65)$. The dots give the simulation of what would have been the number of broken pacs by year if the pacs were dissolved the same way as before the reform. They clearly overestimate the number of dissolution.

Therefore, both the simulation do not explain well the shape of dissolution. But, both do better by imposing a null probability of breaking the pacs the same year it was contracted or the year after than by assuming a continuous instantaneous probability of breaking the pacs. This could be explained by two points. First, the story presented here describes well the behaviour of some of the pacsed couples but not all. Second, the couples contracting a pacs before the reform are not similar to those contracting a pacs after the reform. So, they do not face the same probability of separation. This tends to support that even the decision to contract a pacs can be driven by fiscal reasons, the decision to break a pacs is not especially lead by fiscal reasons, which is similar to the results of Alm and

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[7]I made 20,000 with α_t varying between 0.01 and 1 and θ_t varying between 0.01 and 2.

Whittington [1997].

4.2 Seasonality of dissolutions

This part tests for the rationality of couples. The aim is to check if even when they break up the contract, couples do it properly. If they break up their pacs, the income is taxed the same way it was taxed the year the pacs was contracted. Instead of filling two individual tax returns and then a common one, partners fill a common tax returns and then two individual ones. Therefore, it is also optimal to break up the pacs during the second or the third quarter. The system of income taxation has changed with the reform. Before 2005, the year the partners separated, each one had to fill one tax return for the income earned during the year, whatever the date of the separation. After the reform, pacsed couples benefit from that system if they fill a common tax return. They benefit from it if they break the pacs after 2 years. So, the seasonality for the dissolution of pacs could be the same as for the year the pacs is contracted.

This section analyses if couples tend to break up their union the most optimal way. Figure 12 gives the evolution of the number of dissolution by quarters. It shows that before 2004, most of dissolutions occurred during the third and the forth quarters. Since 2005, the number of dissolution is clearly higher during the third quarter and there are more dissolutions during the second quarter than during the forth quarter. Considering semestres as defined before, the seasonality was not clear before 2005. Since 2005, there are clearly more dissolution during the most optimal period, because of the increasing number of dissolution during the second quarter and the decreasing number of dissolutions during the forth quarter.

The effect of the reform on the number of dissolution should be similar to the effect on the number of contracted pacs. However, the timing is not as clear as for the choice to contract because there are clearly other reasons to break a pacs different from the incentive induced by the reform. The main difference if that the number of dissolution increases at each period because the number of pacs increase as long as more pacs are contracted each period and the first pacs contracted in France are getting older. Therefore, the second specification could be adapted, taking the log of the number of dissolution in each county instead of the log of the number of pacs contracted. This specification is useful to disentangle the natural growth of the number of dissolution given by the α_T's from the growth due to changes of the seasonality given by the λ_T's. However, this econometric estimates the impact of the reform on the dissolution under the same assumptions made before. First, I assume that couples answer properly to the reform. Second, I assume that couples that would have break their pacs without the reform do not report the break up in order to answer to the incentive. In that case, these assumptions are very strong. But the point is not exactly to find the number of dissolution attributed to the reform because the question is pointless but to see whether the seasonality changed after 2005. As this specification does not privilege 2005 relative to the other years, it permits to see if there is a

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break in the trend of the λ_T's in 2005. As I made for the series of pacs contracted, I use block bootstrap to compute the t-statistics.

Table 7 gives the results with and without controls. The λ_T's are significant after 2005 and not before. Then, the number of pacs dissolved during the second and third semestre differs significantly from the second semestre of 2000 which is the semestre of reference. The pattern of the λ_T's for the dissolution can be studied the same way it was studied for the number of pacs contracted. The figure 13 gives the shape of the λ_T. Let assume that λ_T could be written as : $\lambda_T = a_1 + b_1 t_1 + a_2 1_{T \geq 2005} + b_2 t_2 1_{T \geq 2005}$. The estimation of the pattern of the λ_T's gives that :

$$
\begin{array}{cccc}
\lambda_T = & -0.028 & -0.016 \times t_1 + & 0.27 \times 1_{T \geq 2005} - & 0.0076 \times t_2 \times 1_{T \geq 2005} \\
& (0.085) & (0.031) & (0.121) & (0.058)
\end{array}
\tag{5}
$$

None of the coefficient are significant. These results show that the seasonality has not changed a lot after the reform, meaning that couples do not choose the right period to break up their union more after the reform than before. The α_T are increasing with time, which traduces the increasing number of pacs, due to the growing stock of pacs.

5   Interpretation of the results

There are two ways that the reform of income taxation could change couples behavior. First, the reform has a direct effect: couples benefit from the tax relief induced by the reform, now or in the future. Second, the reform has an indirect effect: it can change the value of the pacs compared to the other unions and then, it changes the couples' behavior toward other marital contracts.

The direct effect of the reform is that couples tend to pay far less taxes for the year of the pacs and a little less for the next two years. Then the direct effect is a short term effect. The main results of the paper says that 38% of new pacs can be attributed to the reform, which tends to show that the decision to pacs can be led by short term views. The effect is found to be constant over time after the reform. Indeed, the shape of the λ_T shows that they are constant after 2005, which means that the number of pacs contracted during the second semester after 2005 remains at the same high level. The tax relief is effective only if couples do not break up their pacs during the next year but it also tends to give an incentive to break up the pacs two years after it was contracted. Then, the second direct effect of the reform is that it tends to promote short term stability of couples. Notice that according to the results the number of pacs would have increased even without the reform, which traduces the spread of the institution of the pacs in the population.

The indirect effect of the reform is that it changes the attractiveness of pacs relative to the other types of union, i.e. marriage and cohabitation. The question is : what would have done the pacsed

couples if they had not contracted a pacs ? They could either stay in cohabitation or get married. The economic analysis could summarize the choice to contract any type of union by a trade-off between costs and benefits. The traditional analysis says the higher the benefits of contracting a union are, the higher the costs linked to that union are. Indeed, the social benefits linked to the marriage are important, but the costs of contracting a marriage are also important because marriages are most of the time highly celebrated and the costs to break up the marriage are also important. A pacs gives some benefits, similar to the marriage, but not all and there are few costs to contract and to break up a pacs. There are neither legal benefits nor costs linked to the cohabitation. The reform changes the benefits to contract a pacs without changing the costs of the pacs. Let say that couples in each period choose between shifting from cohabitation to pacs or marriage and staying in cohabitation. The choice is based on a trade-off between each type of union. According to that pattern, the reform can motivate couples that would have stayed in cohabitation because the benefits given by the pacs are higher and now greater than the costs induced. But it can also motivate couples that would have married, because the pacs gives now some benefits common with marriage and the cost of a pacs is lesser than the cost of marriage. Then, assuming that the number of couples is constant, an obvious consequence of the reform could be the decrease of the number of marriages, the decrease of the number couples cohabiting and the increase of the total number of union contracted. However, an other indirect effect of the reform is that it changes the opportunity costs of other unions, including the cost of being single. It means that partners can be willing to find an other mate to form a better match in order to benefit from this new benefit. According to this pattern, the newly pacsed couples could also be fake couples, meaning two persons that contract a pacs without living together, but it is impossible to verify this assumption. Then, the impact on the evolution of the number of marriage is unclear and it is difficult to say whether the pacs jeopardizes the marriage or not. In order to study the possibility of a link between the time series of marriage and the time series of pacs, I tested the presence of a cointegration link between the series, using panel data. However, the presence of a unit root was rejected by the test of Im, Pesaran and Shin [2003] for the time series of marriage. So, if there is a link between the series of pacs and marriages, it is not a link of cointegration. Therefore, further analysis are required to investigate the link between pacs and marriages.

Then, this indirect effect questions the links between the pacs, the marriage and the cohabitation. The lack of micro data in France makes it very difficult to understand the use of the pacs couples make. Three main possible uses have been pointed out. First, pacs could be used as a substitute to marriage. A few years ago, couples that would have married now decide to contract a pacs. But the pacs could also be a complementary to marriage because couples that contract a pacs would have stayed in cohabitation or because it is a sort of what Margaret Mead [1970] would have called "a first step" toward marriage. Indeed, the pacs makes it possible to disentangle the short term effect of the marriage, such as the tax relief or as a mutual protection, from the long term effect of the marriage,

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because it supports couples specific investments such as children. Understanding the reasons why couples contract a pacs is necessary to define if the pacs is a success or not. If success is measured by the number of pacs contracted, it is definitely of success. But this paper does not give any answer in terms of welfare. It sheds light on the fact that a reform that only changes the amount of taxes paid within one year, so a reform that only entails punctual changes can have a huge effect. As this change is an immediate change, it shows that the decision to contract a pacs can be led by short-term views.

Therefore, this paper points out that fiscal incentives to contract a civil union are more taken into account than fiscal incentives to contract a marriage. This reveals that the decision to contract a pacs or a marriage are not leading by the same motivations.

6 Conclusion

The reform of the income taxation for pacsed couples in France does not represent an important change of the law. Its main consequence is that it make couples save money on the income tax paid for the year of the pacs. However, it affected the population by making the pacs far more attractive. So the reform can be viewed as an incentive to register a pacs even if it was not the legislator goal. The paper estimates that 38% of newly pacs contracted after 2005 can be attributed to the reform. Two main assumptions are useful for the estimation. First, couples are assumed to answer properly to the reform. This assumption does not seem strong. Second, couples that would have contracted a pacs anyway are assumed not to modify their behavior because of the reform. This assumption is maybe strong and can lead to overestimate the impact of the reform. Therefore, the estimation of 38% should be seen as an upper bound of the real effect of the reform. An over estimation of the effect of the reform, based on a weaker assumption on the behavior of couples shows that around 31% of newly pacsed contracted since 2005 can be attributed to the reform of income taxation. Some robustness checks validate the assumption that agents adopt an optimal behavior.

This reform gives some explanations to the success of the pacs, by estimating the impact of the reform of the system of income taxation. It shows that the decision to contract a pacs is often led by fiscal reasons. It also show that the decision to contract a pacs is led by short term analysis. Then, the pacs appears as a very flexible union and its elasticity to legal changes is quite high. So, the pacs can be viewed as a particular union, different from marriage and couples do not deal with pacs as they do for marriage. This elasticity can be linked to the recent evolution of the family, it is possible that the pacs responds to specific needs in the evolution of couples.

However, this analysis asks questions that the reform is not able to answer. The questions of the stability of couples, of the marriage market and search costs, of matching and investments in couples' specific good are fundamental in the economic analysis of marriage and family because of their clear consequences on public policies. This reform can not investigate those questions because it can not

distinguish between couples that contract a pacs and would have marry otherwise and couples that would have kept cohabitation. Then the link between the reform and the average quality of matches is not clear. It could be useful to investigate the links between marriage and pacs but micro data are needed for such an analysis.

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Table 1: Estimation results

	Specification 1	Specification 1	Specification 2	Specification 2
Semestre 1	0.285***	0.285***	0.289***	0.289***
Semestre 2	-0.285***	-0.285***	-0.289***	-0.289***
β	1.006***	1.006***		
λ_{2001}			-0.162***	-0.163***
λ_{2002}			0.016	0.015
λ_{2003}			0.092***	0.094***
λ_{2004}			0.091***	0.091***
λ_{2005}			1.036***	1.037***
λ_{2006}			1.021***	1.022***
λ_{2007}			0.981***	0.982***
Year 2001	-0.129***	-0.155	-0.048**	-0.077**
Year 2002	0.164***	0.092***	0.156***	0.080*
Year 2003	0.409***	0.315***	0.363***	0.265***
Year 2004	0.647***	0.533***	0.601***	0.484***
Year 2005	0.539***	0.387***	0.524***	0.366***
Year 2006	0.787***	0.535***	0.779***	0.516***
Year 2007	1.076***	0.820***	1.088***	0.817***
Intercept	3.533***	15.314***		14.959
County fixed effects	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes

Note : P-values estimated by block-bootstrap. Standard errors are not indicated then.

Table 2: Estimation results with the first specification

Year	Contracted pacs	Predicted pacs	Predicted pacs without the reform	Pacs attributed to the reform
2000	22108	20839	20839	
2001	19410	18310 (5172)	18310 (5172)	
2002	24979	24560 (6655)	24560 (6655)	
2003	31161	31371 (8302)	31371 (8302)	
2004	39576	39788 (10544)	39788 (10544)	
2005	59837	58103 (15943)	35727 (20005)	22376
2006	75624	74476 (20149)	45795 (25295)	28681
2007	101190	99421 (26961)	61133 (33772)	38288

Note: Standard errors estimated with delta method.

Data: Department of Justice, France. Computation bu the author.

Table 3: Estimation results with the second specification

Year	Contracted pacs	Predicted pacs	Predicted pacs without the reform	Pacs attributed to the reform
2000	22108	20860	20860	
2001	19410	18808 (5124)	18808 (5124)	
2002	24979	24531 (6594)	24531 (6594)	
2003	31161	31028 (8226)	31028 (8226)	
2004	39576	39362 (10447)	39362 (10447)	
2005	59837	58250 (15795)	36431 (28282)	21819
2006	75624	74544 (19963)	46780 (35786)	27764
2007	101190	99095(26712)	62769 (47624)	36326

Data: Department of Justice, France. Computation bu the author.

Table 4: Evolution of the λ_T

$\Delta 1$	-0.013	(0.066)
$\Delta 2$	-0.130**	(0.066)

The Δs gives the break in the trend of the λ_t

Table 5: Effect of the reform if some couples delay their pacs

% of couples that have delayed their pacs	effect of the reform (%)	effect of the reform (number of pacs)
0	38.5	89,000
1	37.5	87,000
5	33.5	78,000
10	28.5	67,000
25	14	33,000
40	0	0
70	-28.5	-67,500
100	-55	-132,000

Comment: If 5% of couples have delayed their pacs date, only 33.5% can be attributed to the reform.

Table 6: Number of pacs attributed to the reform with and without calendar effects.

Year	Pacs	Attributed to the reform			
		Without delay		With delay	
2005	59837	21819	36%	14431	24%
2006	75624	27764	37%	21460	28%
2007	101190	36326	36%	36880	36%
	236651	85909	36%	72771	31%

Table 7: Estimation results for the dissolution

	Specification 2	Specification 2
Semestre 1	-0.096***	-0.085***
Semestre 2	0.096***	0.085***
λ_{2001}	-0.028**	-0.008**
λ_{2002}	-0.078	-0.057
λ_{2003}	-0.127	-0.098
λ_{2004}	-0.065	-0.042
λ_{2005}	0.134***	0.156 ***
λ_{2006}	0.209***	0.232 ***
λ_{2007}	0.118***	0.141 ***
Year 2001	0.788	0.804
Year 2002	1.290	1.361
Year 2003	1.809	1.958
Year 2004	2.086	2.288
Year 2005	2.194	2.395
Year 2006	2.174***	2.339
Year 2007	2.649***	2.826
Intercept		14.959
County fixed effects	Yes	Yes
Controls	No	Yes

*Note : P-values estimated by block-bootstrap. Standard errors are not indicated then.*

Table 8: Robustness checks

	All sample	(2001)	(2002)	(2003)	(2004)	(2005)	(2006)	(2007)
				Dropped Year :				
λ_{2001}	-0.162***	-	-0.162***	-0.163***	-0.162***	-0.163***	-0.161***	-0.163***
λ_{2002}	0.016	0.015	-	0.015	0.016	0.015	0.017	0.017
λ_{2003}	0.092***	0.092***	0.093***	-	0.093***	0.092***	0.093***	0.092***
λ_{2004}	0.091***	0.092***	0.091***	0.090***	-	0.091***	0.091***	0.090***
λ_{2005}	1.036***	1.036***	1.036***	1.035***	1.036***	-	1.037***	1.036***
λ_{2006}	1.021***	1.022***	1.022***	1.021***	1.022***	1.022***	-	1.021***
λ_{2007}	0.981***	0.982***	0.982***	0.981***	0.981***	0.981***	0.981***	-
N	3072	2688	2688	2688	2688	2688	2688	2688

Note : P-values estimated by block-bootstrap. Standard errors are not indicated then.

Table 9: Robustness checks

	All sample	Paris	Paris and its suburbs	20 counties with highest numbers of pacs	20 counties with lowest numbers of pacs	20 counties with highest rates of pacs	20 counties with lowest rates of pacs
			Dropped Counties :				
λ_{2001}	-0.162***	-0.161***	-0.157***	-0.164***	-0.172***	-0.153***	-0.176***
λ_{2002}	0.016	0.014	0.003	0.032	0.015	0.045	0.020
λ_{2003}	0.092***	0.081**	0.102***	0.085**	0.125***	0.098**	
λ_{2004}	0.091***	0.092***	0.089***	0.097***	0.095***	0.112***	0.102***
λ_{2005}	1.036***	1.036***	1.036***	1.044***	1.062***	1.077***	1.040***
λ_{2006}	1.021***	1.022***	1.021***	1.030***	1.038***	1.060***	1.015***
λ_{2007}	0.981***	0.984***	0.986***	0.983***	1.003***	1.027***	0.976***
N	3072	2432	2432	2432	2432	2432	2432

Note : P-values estimated by block-bootstrap. Standard errors are not indicated then.
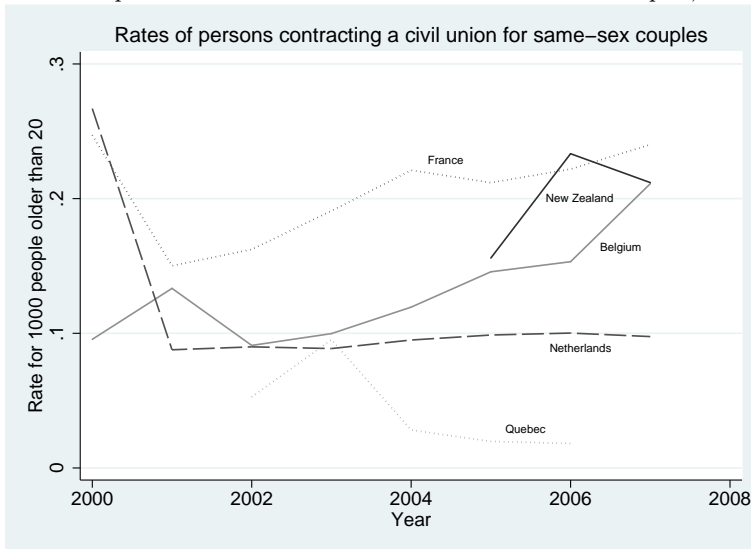
Figure 1: Rates of persons involved in a Civil Union of different-sex couples, in five countries
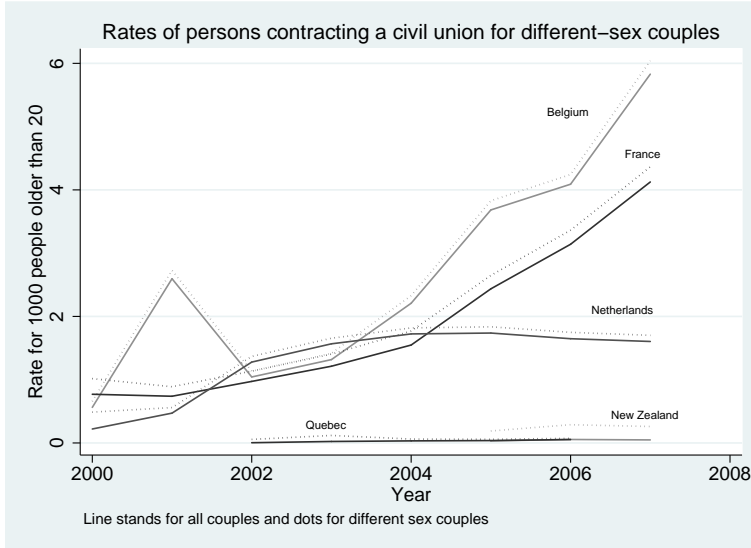
Comments: The dots give for each country the number of persons contracting in a civil union for 1000 persons. The lines give for each country the number of persons in a different-sex couple contracting in a civil union for 1000 persons.

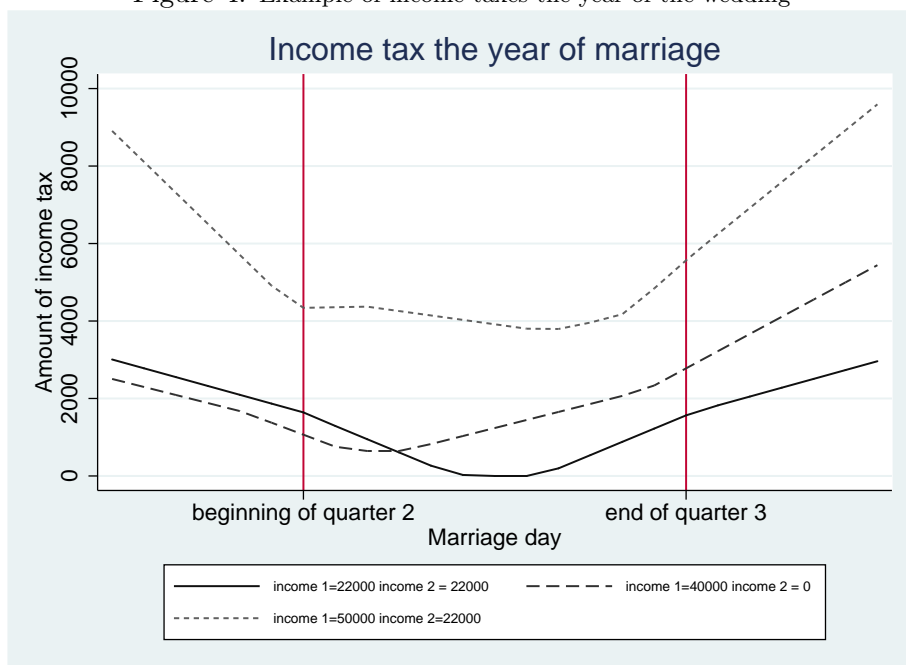*Data from: CBS for the Netherlands, SPF Economie for Belgium, Statistics New Zealand, Institut de la Statistiques Québec, Ministère de la Justice and INSEE for France.*

Figure 2: Rates of persons involved in a Civil Union of same-sex couples, in five countries

Data from: CBS for the Netherlands, SPF Economie for Belgium, Statistics New Zealand, Institut de la Statistiques Québec, Ministère de la Justice and INSEE for France.

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Figure 3: Example of income taxes for usual year

Benefit from being married rather than unmarried
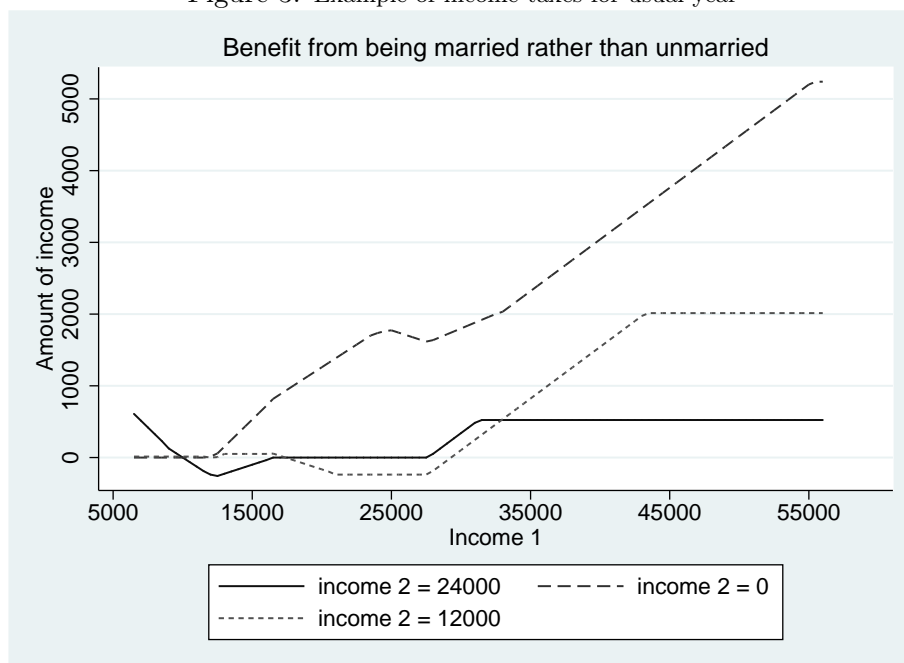
Comments: Income 1 and income 2 represent the income of each spouse. Income 2 is fixed at three values. Each line represents the difference between the total amount of income tax paid by a married couple and by a cohabiting couple for the same level of total income in the household depending on income 1. For example, if income 2 is equal to 12,000 (small dash) euros per year and income 1 is equal to 45,000 per year, the couple saves 2,000 of income tax by being married rather than in cohabiting.

Data: Simulations made by the author.

Figure 4: Example of income taxes the year of the wedding

Income tax the year of marriage

—— income 1=22000 income 2 = 22000	– – – – income 1=40000 income 2 = 0
- - - - - income 1=50000 income 2=22000	

Comments: Three different couples, represented by the incomes of the spouses. This graphic indicates the amount of income tax paid the year of marriage according to the date of marriage. For example, consider a couple such as the two spouses earn 22,000 euros per year each. If they get married on the 1st of January they pay about 3,000 euros of income tax and about 2,000 if they marry on the 1st of April.
Data: Simulations made by the author.

Figure 5: Evolution of the number of pacs contracted for each quarter

Number of pacs contracted in France by quarter

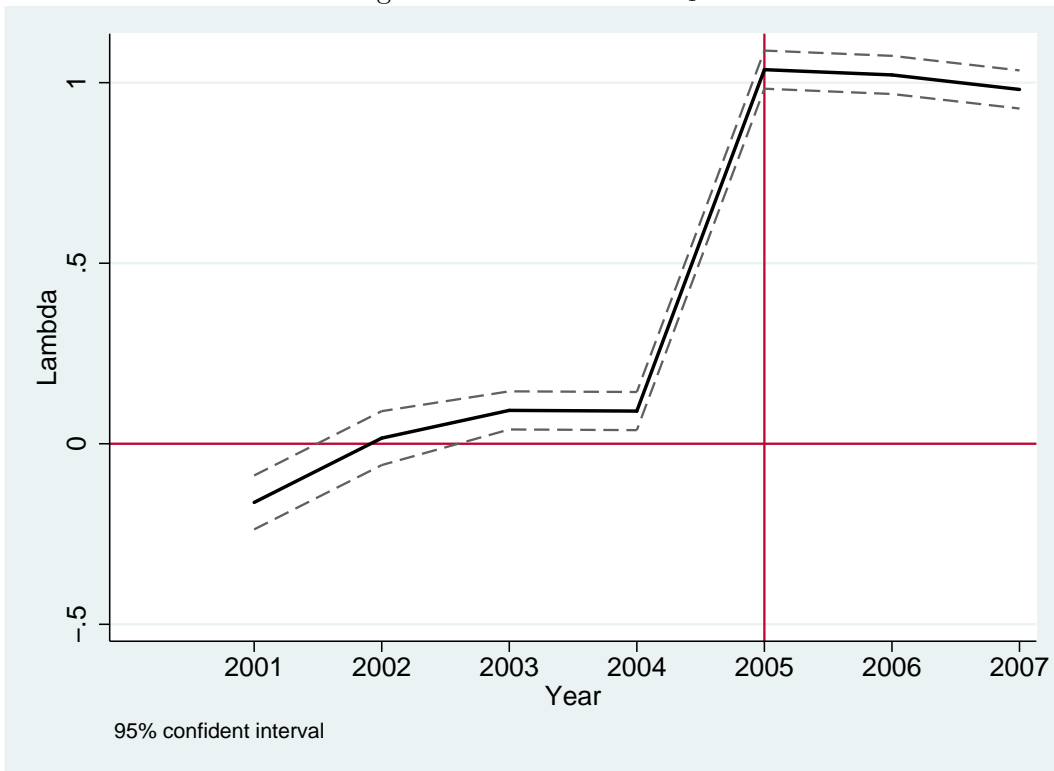|	
– – – – Quarter 1	—— Quarter 2
—— Quarter 3	– – – – Quarter 4
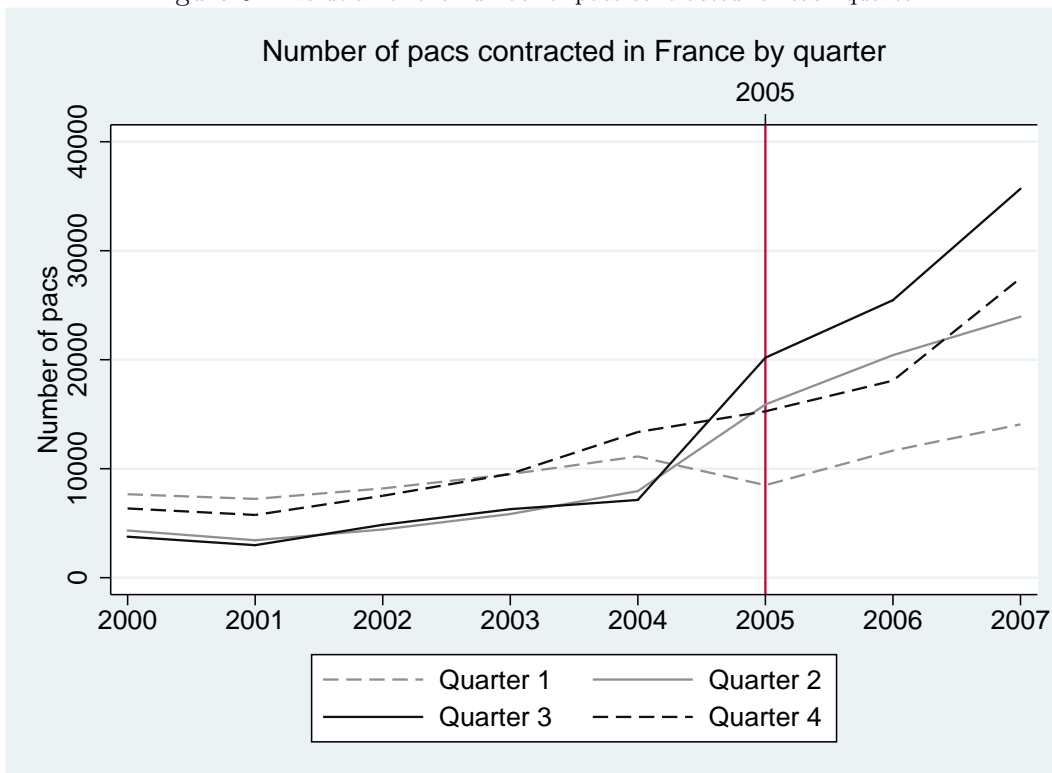
Data: Department of Justice, France

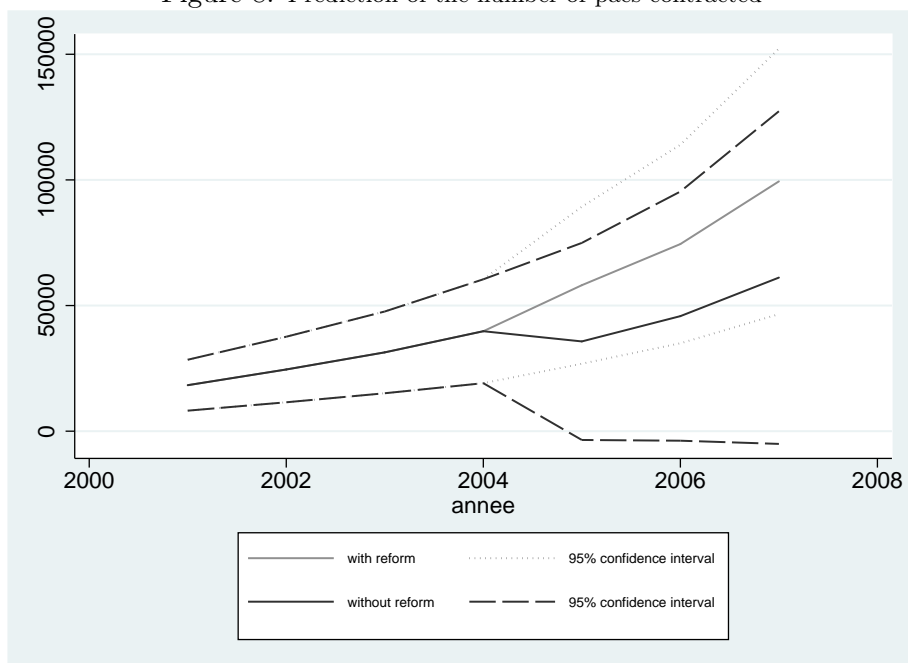Figure 6: Evolution of the number of pacs contracted for each quarter
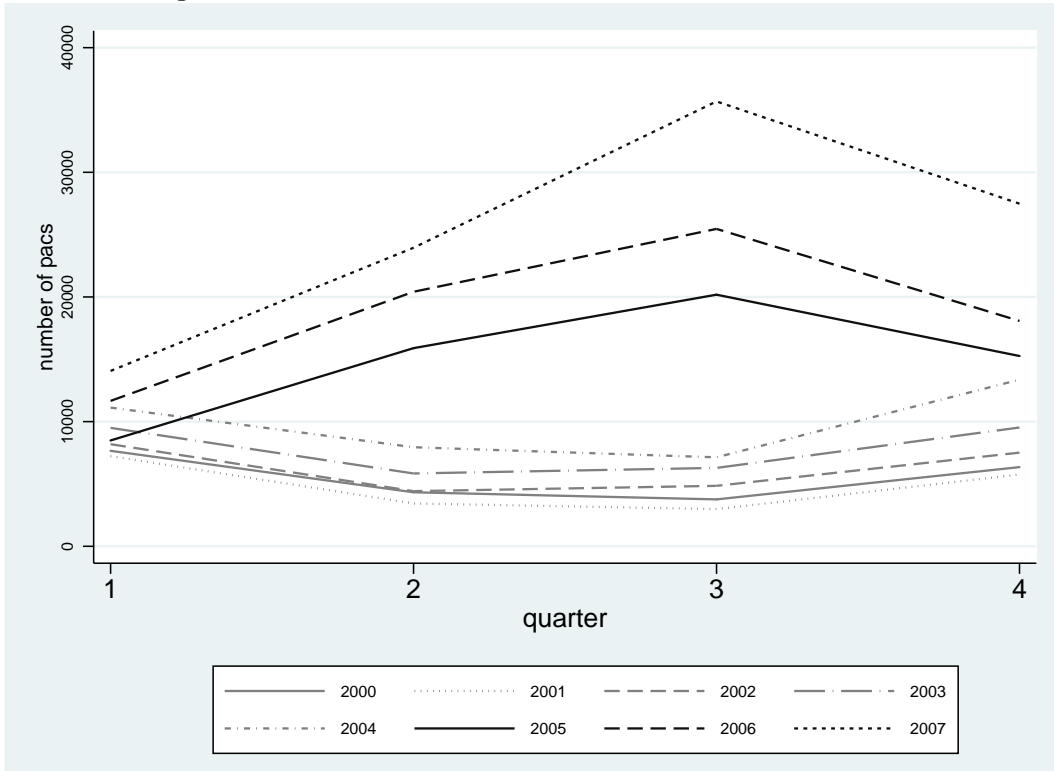
Data: Department of Justice, France

Figure 7: Estimation of the λ_T's

Figure 8: Prediction of the number of pacs contracted

with reform ·········· 95% confidence interval

without reform — — — 95% confidence interval

Comments: the standard errors are calculated with delta method.

Data: Department of Justice, France. Computation by the author.

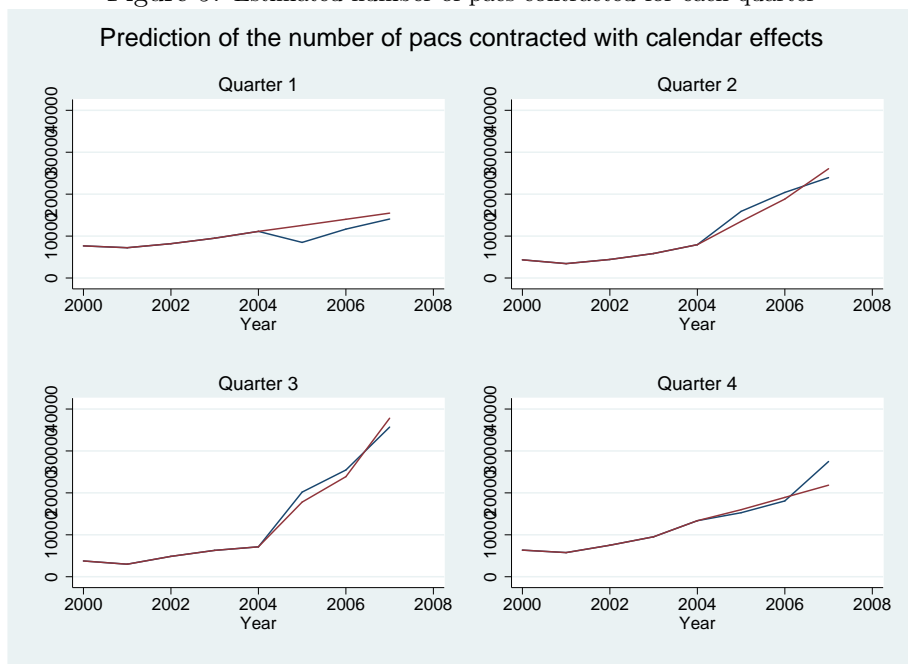Figure 9: Estimated number of pacs contracted for each quarter

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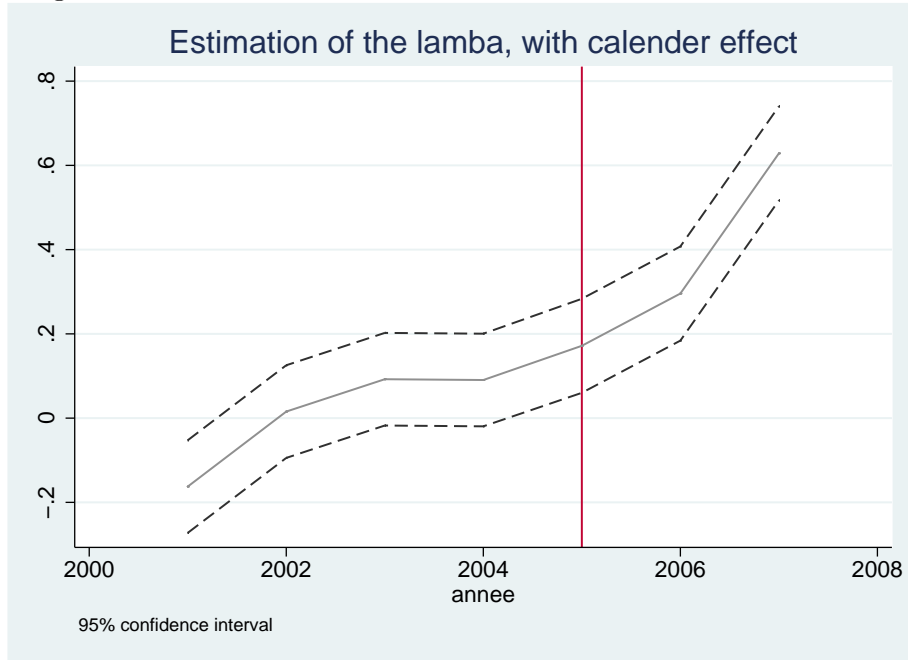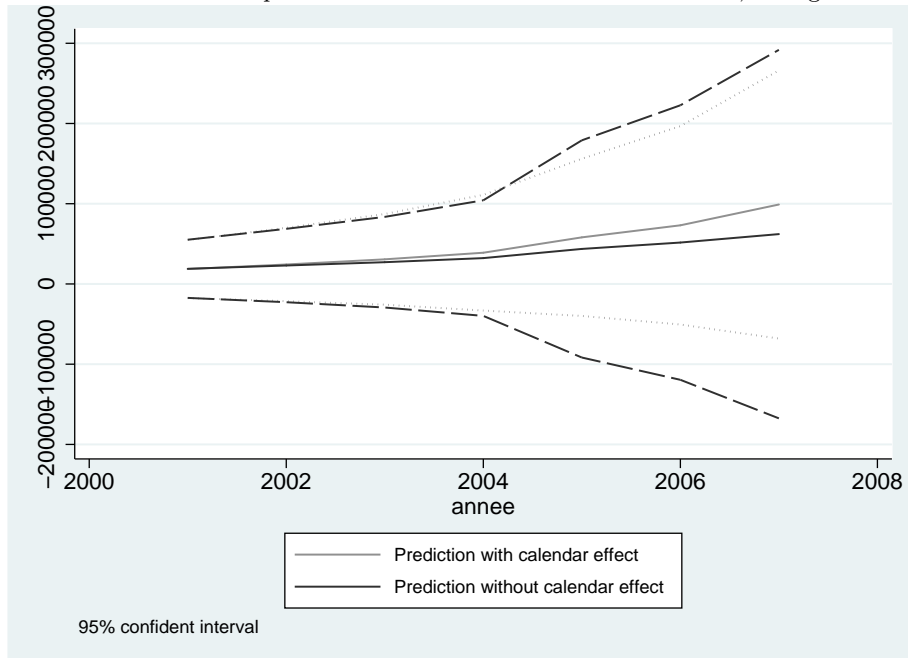Figure 10: Estimation of the λ_T's on the estimated number of pacs contracted.

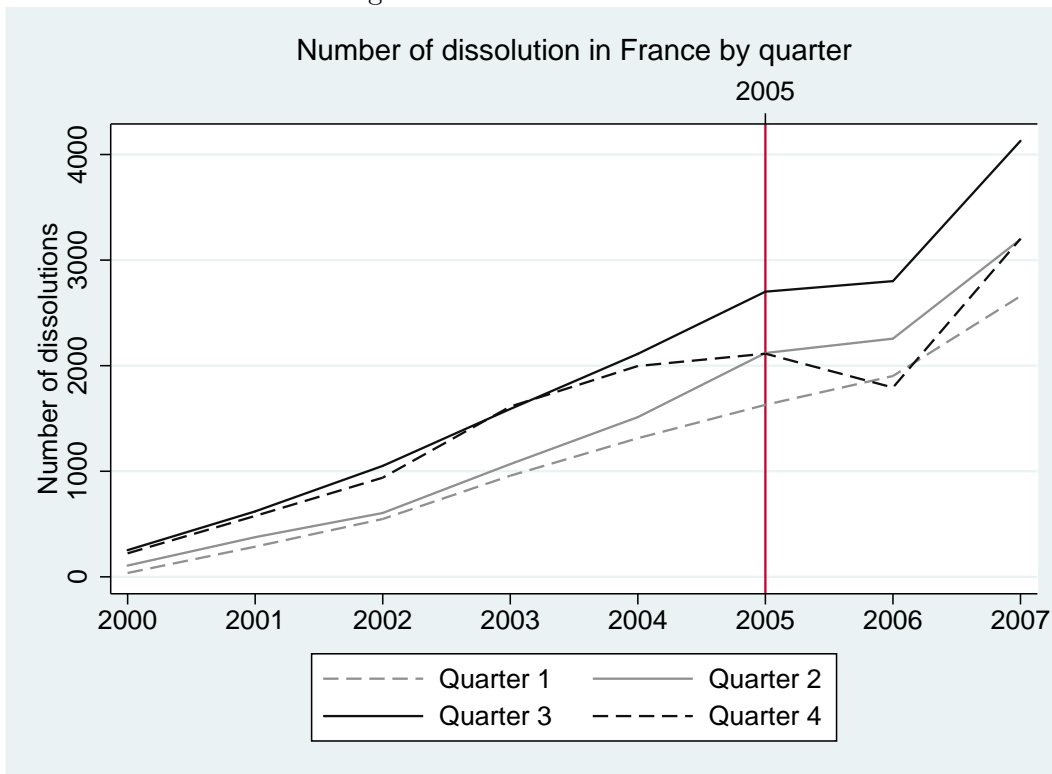Estimation of the lamba, with calender effect

95% confidence interval

Figure 11: Estimation of the number of pacs contracted with and without the reform, taking into account delayed pacs.

Prediction with calendar effect

Prediction without calendar effect

95% confident interval

Comments: Confident interval computed with delta method.

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Figure 12: Number of dissolutions

Number of dissolution in France by quarter

Data: Department of Justice, France.

Figure 13: Estimation of the λ_T's for the dissolutions

Second semestre, dissolution

95% confident interval
Standard errors computed with block bootstrap

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Figure 14: Simulation of the dissolution

Simulation of the pattern of dissolution of pacs

Legend:
- — — — True value
- ———— First criteria, without reform
- ·············· Second criteria, without reform
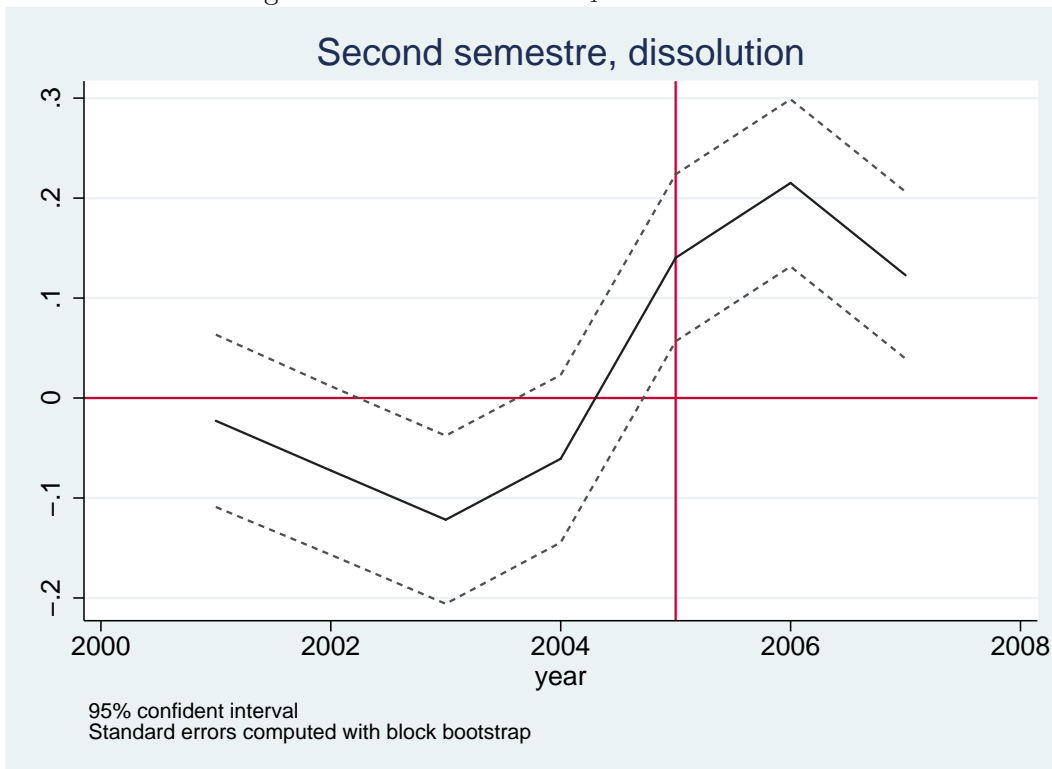- ·············· First criteria, with reform
- — — — Second criteria, with reform
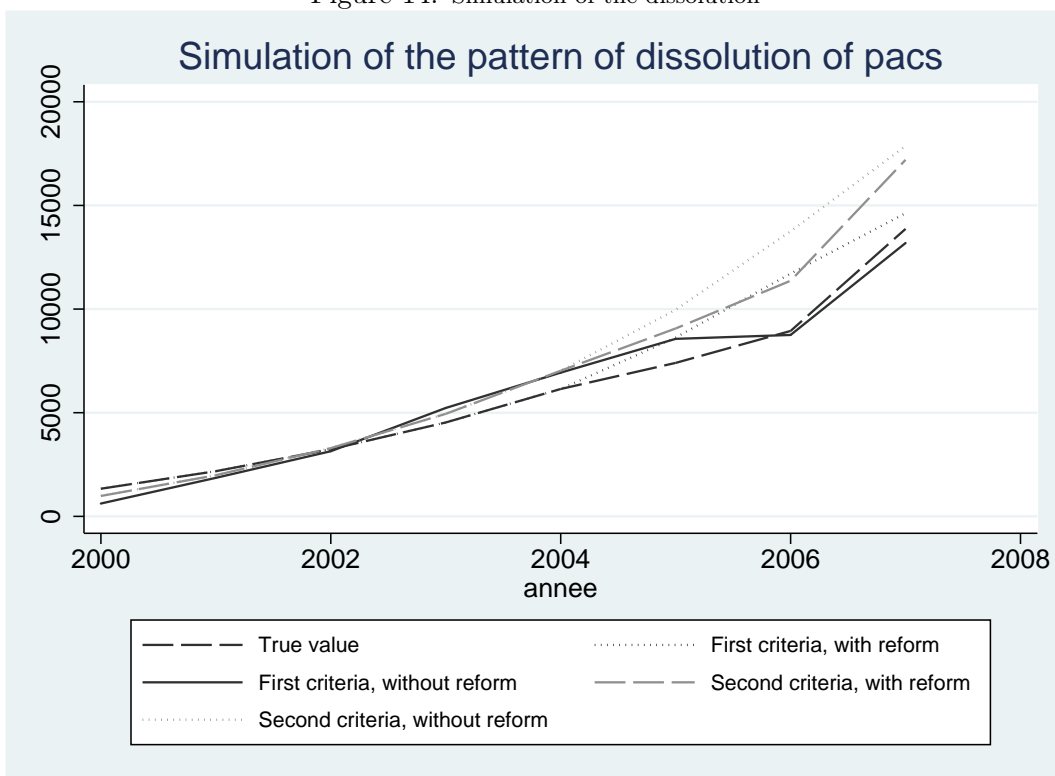
Comments: The first criterion minimize the sum of the squares of the residuals for the whole period, and the second criterion for the period before the reform. $(\alpha, \theta) = (0.06, 1.01)$ for the first and $(\alpha, \theta) = (0.02, 1.65)$ for the second

Data: Computation by the author