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The Relationship between Civil Unions and Fertility in France: Preliminary Evidence

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Abstract

This paper explores the relationship between fertility and the introduction of new laws regulating cohabitation, in a context of low fertility and high out of wedlock childbearing.

We show that in France, while fertility and marriage rates moved closely together before 1999, since the introduction (in 1999) of the “Pacte Civil de Solidarité” (PACS) - a cohabitation contract less binding than marriage - this relationship is much weaker. Surprisingly, legal unions (defined as marriage plus PACS) and fertility continue to move together after this date.

We provide evidence of the relationship between the introduction of PACS and fertility, utilizing the regional variation in the number of PACS per woman (PACS intensity) and the differences in fertility before and after 1999. We show that French Departments with high PACS intensity did not show a different trend in fertility before 1999 than those with low PACS intensity (excluding Metropolitan Paris). However, they did experience an increase in their fertility levels after the introduction of PACS. This suggests the need to collect better and more detailed data, in order to assess whether the recent increases in French fertility can be partially explained by the availability of PACS.

Introduction

The relationship between marriage and fertility is complex. However, there seems to be agreement amongst social scientists that more committed couples tend to choose marriage as a contractual arrangement. At the same time, marriage ensures a certain level of commitment from the couple involved and longer-term relationships than simple cohabitation (Waite, 1995), possibly by imposing costs on exit (Golscheider and Kaufman, 1996). At the same time, a more committed relationship, or a longer-lasting one, is likely to facilitate childbearing and, as a result, increase couples' fertility (Grossbard-Shechman and Lemennicier, 1999). It is then possible to argue that the stability of marriage is one of the forces behind the fact that married women tend to have higher fertility than informally cohabiting ones.

If the correlation between marriage and fertility is related to the fact that marriage is useful as a commitment device, then the introduction of alternative legal arrangements formalizing cohabitation can also be related to fertility decisions. This paper will explore to what extent the introduction of a less restrictive contract than marriage for union formalization is related to fertility.

Specifically, the paper will focus on a new type of contract introduced in France in 1999, the Civil Covenant of Solidarity (Pacte Civil de Solidarité, PACS). PACS was introduced in France as a response to pressures from homosexual groups, and not from increasing demand for alternatives to formalize cohabitation from heterosexual couples. Finding a link between its introduction and changes in fertility would imply an unforeseen effect of a law of this kind, not derived from demand for legal cohabitation arrangements.

The motivation for this study goes beyond the specifics of the French case. Academic and policy debate about family change in developed countries is centered around fertility and marital or partnership status. The emphasis on the subdivisions of these topics varies by countries. In the USA and Great Britain, single motherhood is an important political and academic issue of discussion, whereas in France, fertility and divorce occupy a central point of attention (Martin and Théry, 2001).

In general, a traditional view of the family has been disrupted in the last decades in developed countries. Families have fewer children, and more couples do not marry and have children out of wedlock. This paper aims to find a link between these two topics, and the extent to which policies affecting one of them, marital and partnership status, might affect the other, fertility.

In 1999, the French government instituted the Civil Covenant of Solidarity (Pacte Civil de Solidarité, PACS). The law was mainly intended to provide a legal alternative for same-sex couples to formalize their cohabitation status under a legal contract, however the law also allowed opposite-sex couples to sign a PACS. Surprisingly, the system was very well received by heterosexuals and, by the year 2006, more than ten percent of the new legal unions (marriages and PACS) formed in France were PACS.

Theoretically, the impact on fertility of a contract of this kind is ambiguous. If PACS is a contractual arrangement that implies more commitment or ensures longer-lasting relationships than sole cohabitation, it can be related to increases in fertility. A cohabiting couple signing a PACS might increase its desired number of children in addition to sharing a household. However, as a less binding contract than marriage, in a context in which marriage is also an option for formalizing a union, the introduction of PACS could also have a negative effect on fertility rates. This depends on the extent to which couples that would marry in the absence of

PACS prefer to sign the now-available less binding contract. Thus, measuring the impact of the introduction of PACS on total fertility is an empirical question that we address on this paper.

This study might be useful to assess the potential effects of policies targeting legal partnerships in other countries, even when the increase of birth rates is not at the center of these policies. One case would be the introduction of domestic partnership in other European countries with low fertility rates, like Italy. Another case would be the introduction of Covenant Marriages in some states in the USA, or the extending practice of private firms of granting benefits to domestic partners (independently of the sex of the partners).

This paper presents preliminary empirical evidence suggesting that PACS is related to the recent increases in fertility in France. The aggregate data on union formation, marriage and fertility showed in Figure 1 can be useful at illustrating this. The figure graphs the Total Fertility Rate in France (births per 100 women), the total number of marriages, and the total number of legal unions (marriages plus PACS) signed between 1980 and 2006. While the relationship between these variables is not easy to interpret, given the complexity of the evolution of marriage and fertility rates over time, some key empirical facts are worth mentioning. First, before the introduction of PACS (1999), the number of marriages and fertility rates were strongly and positively correlated¹: More marriages were accompanied by higher fertility. However, since the introduction of PACS, the relationship between these two variables has been much weaker. Surprisingly, if we define the number of legal unions as the sum of PACS and marriages, the relationship between legal unions and fertility continues to be as strong as that of fertility and marriage before the introduction of PACS.

¹ This relationship holds when we use the birth rate (total number of births divided by the total number of women aged 20 to 35) instead of the total fertility rate as an indicator of fertility.

This phenomenon can be a result of the substitution between marriage and PACS, where women who are pregnant or want to have children may decide to sign a PACS instead of marrying their partners. However, fertility rates experienced a sharp increase since 1998, from 1.76 to 1.98 in 2006, while marriage rates only declined slightly during the same period, from 271.4 to 268.1 (in thousands). The fact that marriage rates have not abruptly declined since the introduction of PACS suggests little substitution between marriage and PACS. In the French context, PACS seems to be substituting cohabitation, and not marriage.

To our knowledge, no studies have attempted to relate the introduction of PACS to changes in fertility. In order to explore the relationship between PACS and fertility, this paper will utilize the variation in the adoption of PACS across French departments. We sort departments by their adoption of PACS and compare birth rate trends before and after 1999. We show in the empirical analysis in Section V that birth rate trends before the introduction of PACS do not vary significantly between departments with different intensities of PACS adoption; however, after 1999 the increases in birth rates are concentrated in the regions with highest rates of *pacsed*² women. This suggests the presence of a break in fertility trends around the date of PACS introduction, observed mainly for departments where more PACS were signed.

The paper is presented as follows. Section II will briefly discuss the motivation for this study, stressing the importance of fertility decrease in developed countries. It will also describe the context for the introduction of PACS in France and its main characteristics. Section III will explore in better detail the mechanisms through which the availability of cohabitation contracts can affect fertility decisions and will review some of the existing literature exploring the impact

² Through this paper we will use this adjective and a verb adaptation of an actual new terminology developed in France after the introduction of PACS in 1999. In French, “se pacser” is the reflexive verb used to define the act of signing a PACS. “Pacsé” is an adjective that defines the couples who have signed a PACS. In English, we will define couples that have signed a PACS as “pacsed” couples.

of marriage and divorce laws on fertility, and discuss the extent to which the introduction of PACS should be studied in a similar fashion. Section IV describes the nature of the data used in this paper, the empirical strategy used to assess the relation between the introduction of PACS and fertility, and the results. Section V concludes.

II. Fertility, Marriage and Civil Unions in Europe

Since the 1960s, most countries in Europe have experienced significant declines in their fertility rates. Fertility rates were lower than 2 children per woman for all EU countries in 2005. As a result, policy makers and social scientists have discussed the potential forces behind this phenomenon, and proposed changes in policy trying to encourage childbearing. These efforts also occurred in France, a country that shows relatively higher fertility rates than most European countries (Neyer, 2003).

Parallel to the concern about fertility, some countries have introduced, or are discussing the introduction of, civil union laws in response to demands to grant legal rights to same-sex couples. In some countries, like in France, the newly created type of contracts are also open to heterosexual couples, creating a new way for partners to legally commit to each other, an alternative to marriage. The impact of these laws on fertility, however, is not clear, therefore obscuring their interaction or counteraction with the policies to incentivize fertility.

The context in which civil unions are introduced and the legal rights and obligation required by them varies considerably across countries³. France is interesting for a variety of reasons. First, PACS, unlike similar contracts for other countries, is not restricted to homosexual couples. Second, PACS is clearly a much less restrictive contract than marriage. Third, PACS enjoys

³ Waaldijk (2005) collects information for different countries that have introduced civil unions and makes a comparison between them.

high popularity and has been signed by a high number of couples. Finally, France is the European country with the highest percentage of births outside of marriage⁴. Before the introduction of PACS, France already had a large population of couples cohabiting; some of these decided to have children but not to get married (at least for a time). In this scenario a new lawful commitment was introduced.

A Civil Covenant of Solidarity (*Pacte Civil de Solidarité*: PACS) is a form of registered partnership introduced in France in November 1999⁵. Formally, it is a contract between two persons of age, of different or same sex, signed to organize their lives together. PACS grants couples certain rights and obligations which lie between those of marriage and informal cohabitation. Appendix A presents an informative summary of the differences between marriage, PACS and informal cohabitation, as described by Borrillo and Waaldijk (2005)⁶. Some changes to the rights and obligations implied by PACS were introduced in 2005 and 2006⁷. Given such changes, this study will only focus on the period until 2005.

While this paper will solely characterize PACS as a contract less binding than marriage, we want to highlight the fact that PACS and marriage (and even simple cohabitation) do not (legally) imply a differential treatment of children. Social benefits of children are independent of their parent's civil status; a judge can also establish child support payments when the child's parents solely cohabited. Therefore, there is no clear reason to believe that couples sign a PACS because they want their children to have some legal protection. Given this, in the next section, we

⁴ Contrary to what happens in the US, out of wedlock birth rates are not at the center of policy concern in France (Martin and Théry, 2001).

⁵ By the *Loi n°99-944 du 15 novembre 1999*

⁶ The reader is encouraged to consult the mentioned reference for further details about the specific characteristics of PACS.

⁷ The *Loi de Finances pour 2005*, allowed pacsed couples to declare taxes jointly since the first year of PACS. The *Loi n° 2006-728 du 23 juin 2006*, introduced major changes that we will not address in this study, but that leave an open window for further research.

characterize the discussion of the potential impact of PACS on fertility by describing the theoretical implications of a contract of this kind simply as a commitment device, increasing the probability of a couple having children by facilitating specialization within the household.

PACS has become increasingly popular among heterosexual couples. In 2006, only 7 percent of PACS were signed by same-sex couples (Carrasco, 2007). As can be seen in Figure 1, the number of PACS is high relative to marriage and has considerably increased since its introduction in 1999. In 2000 22,276 PACS were signed in Metropolitan France. This number almost tripled to 60,473 in 2005. In 2005, about 2 PACS were signed for every 10 marriages, reflecting the PACS' increasing popularity among couples who want to formalize their unions or to take advantage of the granted benefits.

III. How does PACS affect fertility? Union contracts and Fertility.

French PACS is a form of contract that is clearly different than marriage symbolically and in practice. This paper characterizes PACS as a less binding, easier to break contract for cohabitation than marriage. Without explicitly addressing each of the characteristics of the PACS described in Appendix A, it is perhaps useful to mention that previous studies have argued that the simple celebratory ceremony that takes place with marriage has the potential to assure higher stability than simple cohabitation, despite the specific legal obligations that it implies (Grossbard-Schechtman, 1982). While the ceremonies surrounding the signing of PACS in France differ substantially, anecdotal evidence suggests that French couples regard it as some sort of “half-marriage”⁸. If the formality of marriage has the potential to facilitate childbearing within a household, and as a result increases fertility, the impact of the introduction of a less binding contract than marriage is ambiguous. Studying the impacts of the introduction of PACS

⁸ “Austrians seek right to partnership created for gays” available at: <http://news.bbc.co.uk/2/hi/europe/8687064.stm>

is then a little more complex than studying the existence of marriage or the introduction of changes in marriage laws. When PACS was introduced, the definition of marriage remained unchanged and PACS was offered as an alternative both to simple cohabitation and to marriage. As we mentioned earlier, to our knowledge, no studies have attempted to relate the introduction of PACS to changes in fertility. Nonetheless, existing theoretical and empirical literature studying the relationship between changes in marriage laws and fertility can shed some light on the foundation for this study.

Some of the most complete and insightful studies on the economics of marriage are provided by Becker (1973, 1974) and, more recently, Grossbard-Shechtman (1993). Most of their arguments, however, treat marriage as an outcome rather than one of the forces driving individual's decisions. This is not surprising, considering that the most important research in demography and economics seems devoted to understanding the forces behind the decline in marriage rates observed during the second half of the Twentieth Century. Grossbard-Shechtman (1982, 1993), however, does recognize the implications of the difference between marriage and cohabitation as a result of marriage being a legally or socially binding contract. According to Grossbard-Shechtman (1993), the formality of a marriage contract ensures greater union stability than cohabitation. Married individuals are more willing to provide "spousal labor" in exchange for the stability of marriage. This "spousal labor" can be in the form of time spent bearing children. More stable couples are more likely to have children, because of the contractual arrangement that marriage represents.

This claim is well supported by the data, although no causal relationship between the type of union and fertility can be inferred. Fertility rates for women who live in cohabitation are much lower than among married women in most European countries. For data taken from the Family

and Fertility Surveys (FFS) held in the mid-nineties around the world, Brown and Dittgen (2000) calculate the numbers shown in Table 1. While an exploration of the determinants of the differences in fertility levels across countries for different age groups and type of union could be interesting, for the purpose of this paper, we only highlight the differences in fertility by type of union. In France, for instance, cohabiting women aged 20-29 had, on average, 0.43 children at the moment of the survey, while married women in the same age group had 1.23 children. The same pattern holds for women aged 30-39 (1.15 children for cohabiting women and 2.21 for the married ones) and other countries in Europe. However, as stated, no causal relationship can be established between marriage and fertility from these data. For example, it might be the case that women with a stronger preference for children also have a strong preference for being married.

Not surprisingly, the interest in studying marriage laws as a variable that can potentially have impacts on fertility did not arise until developed countries started introducing major changes in the legal rights and obligations provided by a marriage contract. Between 1968 and 1977, most US states allowed unilateral divorce, making divorce much easier (Alesina and Giuliano, 2007). The relaxation of divorce laws made marriage less stable and, as a result, women and men now face much less certainty that a marriage will last throughout the period during which they expect to raise children (Willis and Haaga, 1996).

Gruber (2004) shows that, following the introduction of unilateral divorce in the United States, divorce rates increased, and children born in families exposed to unilateral divorce were less well educated and had lower family income. Stevenson (2007) shows how the introduction of unilateral divorce decreases the incentives to invest in marriage-specific capital during the first years of marriage. She finds a reduction in the probability of having children in the first 2 years of marriage after unilateral divorce is allowed. Drewianka (2006) also studies the effect of

unilateral and no-fault divorce. However, no specific impact of the introduction of these laws on the incentive to marry is mentioned in these studies. With the reduced cost of exiting marriage, couples who previously would have chosen to not sign a marriage contract are more likely to do so.

Alesina and Giuliano (2007) explore the effect of the introduction of unilateral divorce in the US both on marriage rates and fertility. They take into consideration the fact that making divorce easier does not only affect marriage stability, but also the probability that a couple will decide to get married. The value of marriage is diminished by facilitating divorce. This has two effects: on one hand, married couples decrease their fertility. On the other, un-married couples might decide to give marriage “a try”, now that marriage is not as binding of a contract as it was before divorce was allowed. If divorce is allowed, marriage rates go up. The total effect on fertility is ambiguous from a theoretical point of view, as married couples have fewer children but still more children than cohabiting couples and, at the same time, marriage rates go up. The extent to which the increase in marriage rates translate into higher fertility, and the facilitation of divorce translates into lower fertility for married couples than before determine the sign of the impact of the change in the law. The total effect of the introduction of divorce on fertility is ambiguous.

Alesina and Giuliano’s empirical strategy consists of using the differences in the date of introduction of unilateral divorce across states in the US. They create a state level yearly panel containing the total fertility rate and assess whether the introduction of unilateral divorce had an impact on it. Their results suggest a decrease in total fertility as a result of divorce laws. However, they do find evidence that the probability of marriage goes up for cohabiting couples willing to have children, as out-of-wedlock fertility also goes down.

The introduction of PACS can be understood in a similar fashion as the facilitation of divorce. However, the fact that marriage remains an option makes the problem a bit more complex. On one hand, some of the couples signing a PACS are doing so instead of cohabiting. Their union, now under a legal contract, becomes more stable. However, some of the couples signing a PACS might be doing it instead of getting married (or delaying marriage). These unions, as a result of being a less binding contract, are less stable. Fertility should go up if PACS is an alternative to cohabitation, and it should go down if it is substituting for or delaying marriage. If the former effect dominates, fertility should increase as a result of the introduction of PACS. If the latter is more prevalent, fertility should decrease. The theoretical effect of PACS on total fertility is then uncertain. It mainly depends on the degree of substitution between marriage and PACS.

In order to further investigate the empirical relationship between the introduction of PACS, marriage and fertility in France, the following section will explore the available information at a more disaggregated level. A description of the data and its limitations is presented in what follows.

IV. Empirics. IV.1.Data

The data available to study the relationship between PACS and fertility in France is rather limited; given this, we only explore the relationship at the department level. The main limitation is that we are unable to identify the characteristics of the couples signing a PACS. In particular, we cannot differentiate between couples who *paced* instead of marrying and couples who *paced* instead of solely cohabiting⁹. Our outcome of interest is birth rate, defined as the total

⁹ We would like to have socioeconomic information (*e.g. education, income, age groups*) about women and their partners and divide the analysis by subgroups; however, the data to do these divisions was unavailable at the moment of the study.

number of children born for every 1000 women aged 20 to 35 in each French department¹⁰. We stress that given the unavailability of more detailed data, this study only provides some preliminary evidence on the relationship between the introduction of PACS and fertility in France¹¹.

The data used for the analysis is department level aggregate data (96 departments) from 1994 to 2005 on the number of births, marriages, PACS and female population by age groups. Legal restrictions for the disclosure of information of the characteristics of *pacsed* couples before 2006 impose some limitations to our analysis, which we address in the following.

This section focuses on a time period between 1994 and 2005. As we mentioned in Section II, we want to focus on a period during which the characteristics of PACS remained fairly constant. In 2006 the French government introduced important reforms to the PACS law. Officially, until 2006, signing a PACS did not change couples' civil status. In 2006, since the reform, PACS has a matrimonial status. Moreover, other differences between PACS and marriage described in the Appendix A changed, especially regarding the rights to inheritance and division of assets in case of divorce.

For our study we only had access to aggregate information at the department level from 1994 to 2006 without specifics of age and sex of *pacsed* partners¹². The extent to which the observed number of PACS includes male to male same-sex couples (without an obvious impact on fertility) complicates the assessment of the connection between PACS and fertility at the

¹⁰ We also calculate our results using an age interval between 20 and 40 years. The main conclusions remain unchanged when doing this. We do not have information about the Total Fertility Rate for each year of the study at a department level, so we do the analysis only using the birth rate as an indicator of fertility.

¹¹ As one of our referees indicated, it would be useful to deepen the study with more information about the couples and the women signing a PACS, for example it would be useful to take into account and assess changes in the composition of married and cohabiting couples before and after the introduction of PACS.

¹² After 2006, official records started to include data about sex of PACS' signatories. Carrasco (2007) uses first and middle names available in records to recover the gender of couples who *pacsed* before 2006. We did not have this data disaggregated by departments at the moment of our study.

department level. Previous studies (Digoix et al, 2004) suggest that openly homosexual couples are highly clustered in specific French departments. A recent study by Prioux and Mazuy (2009) confirms Paris has a larger percentage of same-sex PACS, 17.4% in 2008, than the whole country, 5.6% in 2008.

For our empirical estimation we decided to approach the data from two different viewpoints. First, we calculate our estimates including all the 96 departments of metropolitan France. Then, we calculate the estimates excluding the “Île de France” region (Paris and its suburbs). The second approach leaves us with 88 departments. The exclusion of Paris and its suburbs is based on the fact that Paris constitutes an outlier in many demographic indicators, such as the percentage of same-sex PACS and fertility rates, as can be seen in Prioux and Mazuy (2009)¹³.

We define the variable PACS intensity as the total number of PACS divided by the number of women aged 20 to 35¹⁴. As we mentioned previously, at the time of the study we did not have available estimations of the number of same-sex PACS. While we could adjust the total number of PACS signed by subtracting a fixed percentage from the total number of PACS each year, using the newly collected information on the number of homosexual couples who *paced* after 2006, this technique would possibly overestimate the precise impact of the introduction of PACS on fertility, to the extent to which we could be incorrectly labeling some heterosexual PACS as homosexual. Keeping the definition of PACS intensity as the total number of PACS (homosexual or heterosexual), divided by the number of women aged 20 to 35, is a lower bound of the actual relationship between PACS and fertility. Therefore, the empirical relationship between PACS and fertility shown in this paper is, to some extent, conservative.

¹³ Other indicators might also set Paris aside from the rest of France, like the ratio of educated women with different preferences for fertility.

¹⁴ Historically this group encompassed most of France’s fertility. We also include in the appendix results using the number of women between 20 and 40 years. Our conclusions are not susceptible to this change age groups.

Some descriptive statistics for all departments and all departments excluding Paris and its suburbs are shown in Table 2. While the means for most variables are similar, Paris has the highest PACS intensity (PACS per woman) and highest population density of all French departments. As mentioned, part of the high number of PACS per woman in the Parisian region is driven by the high number of same-sex couples living in the region.

IV.2. Empirics.

PACS was introduced in France at a national level in 1999. However, as shown in Figure 2, the variation in the number of couples who have decided to sign this contract differs substantially across departments. The empirical analysis presented below will address this regional variation in PACS intensity (total number of PACS signed between 1999 and 2005, divided by the total number of women aged 20-35 in 1999) in order to explore the relationship between PACS and fertility. While we are not claiming to be able to disentangle any causal relationship between PACS and fertility with this method, as an unobservable variable could be explaining changes in both variables over time, we do believe that given the available information, this exercise does provide some preliminary evidence. The collection of more detailed data should motivate more work to explore why we observe a relationship between PACS and fertility in this paper.

The variation in the PACS intensity will determine the exposure of each French department to PACS. Our empirical strategy will consist of a “difference-in-differences estimation”, where the first difference is the time at which fertility (births per woman aged 20 to 35) is measured, and the second difference is the level of PACS intensity. We will compare fertility changes around the introduction of PACS in France between departments with different levels of PACS intensity.

Table 3 shows the average fertility levels in 1999 and 2004, for two groups: low and high PACS intensity French departments (those below or over the median of the number of PACS signed per woman), excluding Paris and its suburbs.

As shown, the difference in birth rate levels between places with high and low PACS intensity for the year 2004 (4.7 births per 1000 women) is nearly twice the size of this same difference for 1999 (2.5). High PACS intensity departments experienced a larger increase in their fertility levels than low PACS intensity departments between 1999 and 2004. The difference-in-differences estimate for the impact of PACS on fertility is equal to 2.27, positive, although not statistically different from zero at a high confidence level.

However, fertility levels differ between low and high PACS intensity department. It can be argued that PACS intensity is correlated with fertility levels, suggesting there is no reason to believe that high and low PACS intensity departments should show a similar fertility trend in the absence of PACS.

Given this, we show an indirect test for counterfactual fertility trends between low and high PACS intensity departments in the same table. We compare the differences in fertility for both high and low PACS intensity departments between 1994 and 1999 (a period during which PACS was not available).

As can be seen, the difference in the fertility level between low and high PACS intensity departments in 1999 is not significantly different from that same difference in 1994 (2.5 and 2.2, respectively). In other words, a difference in difference estimator using 1994 as the baseline and 1999 as the post-treatment year shows no relationship between our measure of PACS intensity and fertility before the introduction of PACS (The difference and difference indicator is 0.265 and statistically not different than zero with a standard error of 1.268). This is evidence of no

differential fertility trends between high and low PACS intensity departments in France, when PACS was unavailable.

Despite the limitations in our data, we perform a deeper analysis than the one above in Table 3. This analysis tests, on one hand, if fertility levels (and trends) changed after the introduction of PACS and, on the other, if fertility trends were different before the introduction of PACS between low and high PACS intensity departments.

A regression analysis exploiting all the yearly information from 1993 until 2005 and the variation in PACS intensity across French departments is provided in the following. This estimation will allow us to better observe if fertility trends before the introduction of PACS in 1999 were different between places where more or less PACS per woman were signed, and to what extent the increase in fertility for high PACS intensity departments coincides with the introduction of PACS in France.

Our estimation strategy will be the following:

$$F_{it} = \sum_i \alpha_i + \sum_t \partial_t + \sum_t \beta_t (PI_i \times \Gamma_t) + \sum_k \sum_t \gamma_{k,t} (X_{ki} \times \Gamma_t) + \varepsilon_{it}$$

Where F_{it} is our measure of fertility (births per 1000 women) in department i and year t ;

α_i are department fixed effects, which control for level differences in birth rates across departments;

∂_t are year fixed effects, which take care of non PACS-related fertility levels in each year in France.

Γ_t is a dummy that takes a value one for year t .

PI_i is our measure of PACS intensity, defined as the total number of PACS signed between 1999 and 2005 in department i , divided by the total number of women aged 20 to 35 in that department in 1999. In this regression, PACS intensity is not a dummy variable as in 3.

$X_{k,t}$ is a set of k control variables, including population density in each department in 1999, the unemployment rate in 1998 and the birth rate in 1998. We interact these control variables with year dummies, controlling for arbitrary differences in fertility each year, for departments with different observable characteristics. For example, by interacting the birth rate with the year dummies we control for differential trends in fertility over time for departments with different baseline fertility levels. The interaction between population density and unemployment rates in 1998 and the year dummies also control for differential trends in fertility over time for departments with different baseline levels in these characteristics. ε_{it} is an error term.

All β_t measure the difference in fertility in departments with different PACS intensity levels each year. A positive (negative) value of this coefficient for a given year will imply that the fertility differences are higher (lower) in places with higher PACS intensity than they were in the reference year, 1999.

Table 4 shows the regression results¹⁵. Column 1 shows the coefficients of the interaction between the year dummies and our measure of PACS intensity for all departments (including Paris and its suburbs). This regression does not control for department characteristics interacted with year dummies. No significant differences in terms of fertility between 1994 and 2005 are observed for departments with higher PACS intensity, except for the year 2000, for which a negative and significant coefficient is observed (-152). When including Paris, departments with

¹⁵ Full regression results are shown in Table A2.

high PACS intensity only seem to have experienced a differential fertility level from those with lower PACS intensity in the year 2000.

However, as stated earlier, we believe that the inclusion of Paris region might be biasing our results. Columns 2 to 4 show the results excluding Paris and its suburbs from the sample. Columns 3 and 4 add an increasing number of control variables interacted with year dummies (fertility in 1998 and unemployment and density in 1999).

The results observed in Columns 2 to 4 are consistent with the results previously obtained in Table 3. We observe that coefficients β_t associated to years between 1994 and 1998 seem statistically no different than zero. Therefore, no differential trend in fertility is observed related to PACS intensity levels before 1999. In other words, fertility levels before the introduction of PACS did not seem to differ between departments with different levels of PACS intensity.

However, interesting changes are observed after 1999. When we exclude Paris from the sample, while a trend break is not evident, the coefficients β_t associated to all years after 2000 increase in magnitude, and those from 2002 to 2004 show being significantly different than zero. Also, the positive sign of the coefficients does not change with the inclusion of control variables, furthermore, their significance level increases as well as their magnitudes. This provides some evidence that observable characteristics at the department level, other than PACS intensity, do not explain the differential levels in fertility for low and high PACS departments after 1999. The coefficients β_t show an increasing trend between 2001 and 2004, although the value is lower for 2005 than the previous year (156.6, 166.5 and 92.3 respectively for 2003, 2004 and 2005 in Column 4)¹⁶. This is consistent with the idea that PACS increased its popularity with time and,

¹⁶ This can be related to the fact that a change in the rules of taxation was introduced in 2005. *Pacsed* couples since the beginning of 2005 were able to declare joint taxes declarations since the first year of being *pacsed* (contrary to the previously 3 years required).

accordingly, its potential impact on fertility is more evident in later years than the date of its introduction. We believe these results suggest that the introduction of PACS has contributed to recent increases in fertility in France.

Caution is needed when trying to interpret our coefficients. First, our measure of PACS intensity is clearly not exogenous. People in French departments where more PACS were signed are likely to be different in many ways from those in places where few of the new cohabitation contracts were signed. People with different ideology, education, income levels and many other unobservable characteristics are likely to show differential fertility trends. The fact that when we control for the interaction between a few department level characteristics and the year dummies our results do not change considerably might not be sufficient evidence to interpret the coefficients of the interaction of PACS intensity and the year dummies as the impact of PACS on fertility. Despite the limitations imposed by the unavailability of data, Appendix B shows that the results shown in this paper are robust to changes in our estimation strategy, the way we define our outcome variable, and the inclusion of some potentially relevant control variables that could be driving changes in both.

To conclude, as discussed in the literature review, the introduction of laws of this kind can have unexpected impacts on fertility, and the direction of this impact can be negative or positive. Considering the tentative nature of the results shown in this paper -that PACS has had a positive impact on French fertility-, generalizing these results to argue that the introduction of laws of this kind will have a similar impact in other contexts, is not possible. While we have argued that the inclusion of Paris is likely to bias our results downwards, the non-significant coefficients (and very close to zero) found in the regressions when including it suggest the need of more caution when trying to infer a causal link between the introduction of PACS and fertility.

V. Conclusions

The introduction of new legal alternatives to formalize cohabitation is likely to have impacts on couples' fertility decisions. This paper explores the extent to which fertility and the introduction of the "Pacte Civil de Solidarite" (PACS) are related in the French context.

While marriages and fertility were closely related before the introduction of PACS, after 1999, this relationship seems much weaker. However, when considering PACS and marriages as the total number of legal unions, the relationship between fertility and unions continues to be high. Along with this, a high increase in fertility is observed in France after the year when PACS were introduced.

Utilizing the regional variation in PACS intensity across French departments and with information on fertility for several years before and after the introduction of this cohabitation contract, this paper shows that when excluding Paris and its suburbs from the analysis, higher increases in fertility are observed in regions with higher PACS intensity. This difference is not present before 1999, when PACS was introduced in France.

While all this is evidence supporting the hypothesis that PACS has had a positive causal impact on fertility, we take our results with caution, as any unobservable characteristic could have triggered an increase both in the number of PACS signed (or couples formed) and fertility in each of these departments, creating a spurious correlation between PACS and fertility.

However, these results do suggest the need to consider the potential changes in family structure and fertility decisions of individuals in all the countries where the introduction of Civil Unions is being discussed, especially given that, in most of them, policy makers seem to be concerned about fertility levels.

VII. References

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Tables and Figures

Table 1

<i>Average Number of children per couple by type of Union</i>				
	<i>Women aged 20-29</i>		<i>Women aged 30-39</i>	
	<i>Cohabiting</i>	<i>Married</i>	<i>Cohabiting</i>	<i>Married</i>
Sweden	0.53	1.48	1.56	2.2
France	0.43	1.23	1.15	2.21
Austria	0.37	1.26	0.76	1.83
Switzerland	0.05	0.99	0.25	1.87
Germany	0.2	1.31	0.66	1.78
Norway	0.5	1.36	0.84	2.14
Belgium	0.17	0.93	0.48	1.91

Source: Brown and Dittgen, mimeo. Calculations from Family and Fertility Surveys.

Table 2

Descriptive Statistics					
Without Paris and its suburbs					
	Obs	Mean	S.D.	Min	Max
PACS per woman	88	0.033	0.007	0.020	0.048
Unemployment (1998)	88	11.1	2.6	6.4	18.1
Density (1999)	88	95.1	83.0	14.0	486.0
Births per 1000 woman (1998)	88	113.8	17.2	57.6	157.4
All French Departments					
	Obs	Mean	S.D.	Min	Max
PACS per woman	96	0.032	0.007	0.020	0.051
Unemployment (1998)	96	11.0	2.6	6.4	18.1
Density (1999)	96	519.2	2315.3	14.0	20164.0
Births per 1000 woman (1998)	96	114.4	16.8	57.6	157.4

Table 3

Difference in births per woman by PACS intensity before and after the introduction of PACS

PACS intensity	Births per 1000 women		
	1999	2004	Diff
Low	115.2	120.2	4.984 [1.082]
High	117.6	124.9	7.254 [0.812]
Diff	2.5 [3.779]	4.7 [4.152]	2.270 [1.353]
	1994	1999	Diff
Low	103.1	115.2	12.083 [0.925]
High	105.3	117.6	12.348 [0.867]
Diff	2.2 [3.416]	2.5 [3.779]	0.265 [1.268]

*Standard errors in brackets

Table 4**Regression Results****Coefficient of the interaction between PACS intensity and year dummies**

	With Paris		Without Paris	
	(1)	(2)	(3)	(4)
PACS intensity*year 1994	-26.695 [86.490]	-48.786 [93.767]	-51.393 [91.667]	-81.342 [85.915]
PACS intensity*year 1995	3.877 [82.785]	-36.03 [83.573]	-37.629 [83.508]	-58.341 [80.984]
PACS intensity*year 1996	97.482 [76.640]	72.284 [76.274]	70.537 [74.698]	57.827 [75.146]
PACS intensity*year 1997	46.794 [67.434]	20.242 [65.364]	19.039 [65.134]	10.667 [65.676]
PACS intensity*year 1998	30.033 [62.986]	20.069 [65.915]	19.879 [66.508]	8.262 [65.901]
PACS intensity*year 2000	-152.207 [69.326]**	-102.612 [77.794]	-102.017 [76.730]	-78.569 [73.404]
PACS intensity*year 2001	10.966 [63.071]	85.793 [65.554]	86.227 [65.231]	91.538 [67.528]
PACS intensity*year 2002	19.391 [64.434]	107.696 [62.659]*	108.072 [62.280]*	120.35 [63.510]*
PACS intensity*year 2003	11.144 [81.181]	131.36 [78.403]*	132.484 [79.495]*	156.5 [77.783]**
PACS intensity*year 2004	32.604 [84.235]	134.86 [87.858]	136.17 [88.007]	166.359 [86.048]*
PACS intensity*year 2005	-35.93 [91.835]	59.011 [101.150]	60.821 [101.585]	92.31 [100.873]
Constant	71.339 [1.510]***	71.613 [1.463]***	71.305 [1.410]***	36.302 [2.596]***
Year Fixed Effects	Yes	Yes	Yes	Yes
Department Fixed Effects	Yes	Yes	Yes	Yes
Fertility in 1998 interacted with year dummies	No	No	Yes	Yes
Density in 1999 and Fertility and unemployment in 1998 interacted with year dummies	No	No	No	Yes
Observations	1152	1056	1056	1056
R-squared	0.95	0.95	0.96	0.96

Robust standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Figure 1.

Number of Marriages, PACS and Fertility in France
1980-2006

Source: Insee Etat Civil, Ministère de la Justice

Figure 2

PACS intensity by Departments in Metropolitan France (2005)

Source: Insee État Civil, Ministère de la Justice

Appendix A.

Differences between Marriage, PACS and Informal Cohabitation

The differences between Marriage, PACS and Informal Cohabitation are taken from a synthesis contained in Borrillo and Waaldijk (2006)¹⁸ and are summarized in what follows.

There are no major differences between the legal parenting consequences of cohabiting and *pacsed* couples. Married couples however have immediate parenting recognition of children born inside the marriage and they enjoy stronger adoption rights. Informal cohabiting and *pacsed* couples can adopt children as individuals but not as a couple. In France the social benefits for children are independent of the civil status of the parents.

Regarding private law, in general, married couples have stronger rights and commitments, followed by *pacsed* couples. Alimony and pension agreements are established by the couple at the moment of signing a PACS and they are not compulsory. Until 2007, unless the contrary was stated, in case of dissolution each partner was considered as owner of half the property bought by the couple since the PACS was signed. About inheritance, only married individuals have right to inheritance under the absence of a will. Also, under registered partnerships both partners are considered liable for the debts contracted during PACS. A PACS also grants one partner to be reallocated –when possible– in case the other is transferred by its job. This should have a special impact for those who work as civil servants.

Concerning Public Law, both married and *pacsed* couples have the right to common taxation. Before 2005, *pacsed* couples had to wait three years in order to be able to jointly declare taxes;

¹⁸ Here, we make a synthesis of the main differences, for more details consult the mentioned reference.

however, in 2005 the three years period was waived. Inheritance taxes are lower for married couples than those for *pacsed* couples and highest for informal cohabiting couples.

Other differences concern residence permits which are easier to obtain for *pacsed* than for informal cohabitants. Finally while informal cohabitants do not need to register their union, *pacsed* couples need to register their union at the office of the magistrate's court. Conditions for establishing and dissolving a PACS are much more lenient than those for married couples. To dissolve a PACS one of the partners is just required to give three months notification to the other partner and sign (unilaterally or bilaterally) the desire to end the union.

Table A.1

	Marriage	PACS	Informal Cohabitation
Change of legal civil status	Yes	No	No
Automatic Recognition of legal parenting when child is born	Yes	No	No
Possibility of adopting partner's children and become a second parent	Yes	No	No
Partners can adopt jointly a child	Yes	No, but one it is possible to adopt as a single parent	No, but one it is possible to adopt as a single parent
Properties	By default "regime legal de la communauté". Goods bought during marriage are common	The default is that the good prior to the PAC are property of each one. The goods bought during the PAC are divided by two, the contrary can be established.	Each partner is owner of the goods they owned before being together. Only the goods paid between the two are split into two.
Debts	Solidarity on the household debts and children's education (w/o excessive expenditures on credit)	Solidarity on debts related to the living expenses and current expenditures	Each one responds of their debts
Right to Inheritance under the absence of a will	Yes	No	No
Tax on Inheritance	50,000 Euros deduction for both partner and children. 76,000 for partner. After that a progressive tax from 5% to 40%	57,000 Euros deduction 40% over the next 15000, 50% over the rest.	1,500 Euros deduction 60% tax over the rest.
Income tax	Common declaration	Common declaration (3 year wait before 2005, immediate since 2005)	Revenues declared separately
Partner has right to public health insurance of the other	Yes	Yes	Yes
Statutory survival pension	Yes	No	No
Work	Common holidays and the right of being reallocated with partner when possible	Common holidays and the right of being reallocated with partner when possible	No rights
Foreign partner of resident national is entitled to residence	Yes	Yes, after one year	No
Separation	Divorce. Allimony or pension. Possible cover of damages	Declaration of separation. No compensation. Possible cover of damages depending on what was established in the contract when signed	No formality. No compensation. Possible cover of damages

Table A.2**Full Regression Results****Coefficient of the Interaction between PACS intensity and year dummies**

	Without Paris		With Paris	
	(1)	(2)	(3)	(4)
PACS intensity*year 1994	-26.695 [86.490]	-48.786 [93.767]	-51.393 [91.667]	-81.342 [85.915]
PACS intensity*year 1995	3.877 [82.785]	-36.03 [83.573]	-37.629 [83.508]	-58.341 [80.984]
PACS intensity*year 1996	97.482 [76.640]	72.284 [76.274]	70.537 [74.698]	57.827 [75.146]
PACS intensity*year 1997	46.794 [67.434]	20.242 [65.364]	19.039 [65.134]	10.667 [65.676]
PACS intensity*year 1998	30.033 [62.986]	20.069 [65.915]	19.879 [66.508]	8.262 [65.901]
PACS intensity*year 2000	-152.207 [69.326]**	-102.612 [77.794]	-102.017 [76.730]	-78.569 [73.404]
PACS intensity*year 2001	10.966 [63.071]	85.793 [65.554]	86.227 [65.231]	91.538 [67.528]
PACS intensity*year 2002	19.391 [64.434]	107.696 [62.659]*	108.072 [62.280]*	120.35 [63.510]*
PACS intensity*year 2003	11.144 [81.181]	131.36 [78.403]*	132.484 [79.495]*	156.5 [77.783]**
PACS intensity*year 2004	32.604 [84.235]	134.86 [87.858]	136.17 [88.007]	166.359 [86.048]*
PACS intensity*year 2005	-35.93 [91.835]	59.011 [101.150]	60.821 [101.585]	92.31 [100.873]
year 1995	3.316 [3.643]	4.05 [3.705]	-1.228 [6.903]	-1.429 [6.953]
year 1996	2.427 [3.456]	2.697 [3.489]	-1.81 [6.290]	-0.811 [6.363]
year 1997	4.166 [3.248]	4.462 [3.251]	-2.892 [5.676]	-1.781 [5.753]
year 1998	7.637 [3.120]**	7.347 [3.266]**	-5.309 [5.816]	-5.769 [5.761]
year 1999	11.286 [3.009]***	10.624 [3.267]***	-3.027 [5.595]	-2.5 [5.679]
year 2000	22.877 [3.154]***	20.578 [3.437]***	3.808 [6.100]	5.538 [6.397]
year 2001	17.157	13.996	-1.931	-2.785

	[3.098]***	[3.244]***	[5.807]	[5.815]
year 2002	15.145	11.331	-4.288	-2.773
	[3.172]***	[3.183]***	[5.640]	[5.749]
year 2003	15.848	10.974	-8.562	-5.931
	[3.636]***	[3.622]***	[7.202]	[7.220]
year 2004	16.636	12.344	-8.167	-5.99
	[3.704]***	[3.843]***	[6.744]	[6.798]
year 2005	20.894	16.92	-6.212	-4.233
	[3.870]***	[4.188]***	[7.455]	[7.597]
Fertility 1998*year 1994			-119.238	-165.598
			[35.980]***	[41.740]***
Fertility 1998*year 1995			-73.134	-102.645
			[36.646]**	[40.802]**
Fertility 1998*year 1996			-79.875	-104.424
			[32.262]**	[35.413]***
Fertility 1998*year 1997			-55.005	-73.095
			[26.582]**	[28.377]**
Fertility 1998*year 1998			-8.695	-21.191
			[26.652]	[27.084]
Fertility 1998*year 2000			27.23	57.982
			[30.866]	[33.192]*
Fertility 1998*year 2001			19.877	38.44
			[28.978]	[31.531]
Fertility 1998*year 2002			17.186	30.775
			[27.455]	[29.943]
Fertility 1998*year 2003			51.394	76.774
			[42.486]	[43.312]*
Fertility 1998*year 2004			59.914	98.796
			[33.549]*	[37.114]***
Fertility 1998*year 2005			82.802	125.238
			[39.138]**	[43.991]***
Unemployment 1998*year 1994				0.48
				[0.227]**
Unemployment 1998*year 1995				0.354
				[0.193]*
Unemployment 1998*year 1996				0.161
				[0.179]
Unemployment 1998*year 1997				0.089
				[0.164]
Unemployment 1998*year 1998				0.234
				[0.172]
Unemployment 1998*year 2000				-0.424
				[0.225]*

Unemployment 1998*year 2001				0.005 [0.175]
Unemployment 1998*year 2002				-0.244 [0.181]
Unemployment 1998*year 2003				-0.488 [0.199]**
Unemployment 1998*year 2004				-0.552 [0.208]***
Unemployment 1998*year 2005				-0.56 [0.241]**
Pop. Density 1999*year 1994				0.015 [0.006]**
Pop. Density 1999*year 1995				0.009 [0.006]
Pop. Density 1999*year 1996				0.01 [0.005]**
Pop. Density 1999*year 1997				0.008 [0.005]*
Pop. Density 1999*year 1998				0.002 [0.005]
Pop. Density 1999*year 2000				-0.008 [0.005]*
Pop. Density 1999*year 2001				-0.01 [0.005]**
Pop. Density 1999*year 2002				-0.002 [0.005]
Pop. Density 1999*year 2003				-0.004 [0.005]
Pop. Density 1999*year 2004				-0.01 [0.006]*
Pop. Density 1999*year 2005				-0.012 [0.007]*
Constant	105.755 [2.994]***	105.777 [3.252]***	119.429 [5.559]***	118.902 [5.663]***
Observations	1152	1056	1056	1056
R-squared	0.95	0.95	0.96	0.96

Robust standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Figure A1

Source: Eurostat.

Appendix B. Robustness.

Caution is needed when trying to interpret the coefficients presented in the main text. First, our measure of PACS intensity is clearly not exogenous. People in French departments where more PACS were signed are likely to be different in many ways from those in places where few of the new cohabitation contracts were signed. People with different ideology, education, income levels and many other unobservable characteristics are likely to show differential fertility trends. The fact that when we control for the interaction between a few department level characteristics and the year dummies our results do not change considerably might not be sufficient evidence to interpret the coefficients of the interaction of PACS intensity and the year dummies as the impact of PACS on fertility.

Despite the limitations imposed by the unavailability of data, in this appendix we explore to what extent the positive relationship observed between PACS intensity and increases in fertility in France is due to our estimation strategy, the way we define our outcome variable, and the exclusion of some potentially relevant control variables that could be driving changes in both. We then start by discussing some of the potential issues with our estimation strategy (and the sample used).

First, there is a possibility that our results are mainly driven by a few outliers. We present evidence suggesting this is not the case. Appendix Figure B1 plots the density of our measure of PACS intensity at the department level. The most evident outliers in our data are for the highest PACS intensity departments, like Paris.

In order to illustrate that outliers are not driving our results, Appendix Figure B2 plots the change in the number of births per 1000 women between 1999 and 2004 in each French department against our measure of PACS intensity.

While it is not easy to observe, the positive correlation between PACS intensity and the change in fertility is only observed for departments with intermediate levels of PACS intensity. Departments with high levels of PACS intensity (which can be thought of as outliers) are the ones driving the correlation between this variable and the change in fertility downwards.

In order to better illustrate this, Appendix Table B1 shows the results of a regression of the change in births per 1000 women against PACS intensity (and the controls included in our main specification) for different samples. The first three columns use the change in births between 1999 and 2004 as the dependent variable. The last three use the change in births between 1993 and 1999 as the dependent variables. The first column uses all departments and the change in fertility after the introduction of PACS, and shows no significant relationship between these variables (as in our main specification). The second column excludes Paris and its suburbs and uses the same dependent variable. It now shows a positive and significant relationship between both variables.

The third column excludes all departments with a measure of PACS intensity higher than 0.04, the possible outliers that could be driving our results. As shown, the relationship between the variables only gets stronger when we exclude outliers. The same three samples are used to run the same regression using the change in fertility before the introduction of PACS (1993 to 1999) as the dependent variable, and no significant relationship can be observed for any of the three samples shown. Outliers are, then, if anything, biasing our results downwards.

Bertrand, Duflo and Mullianathan (2004) have shown that, due to the serial correlation in the outcomes and regressors, the standard errors for the coefficients in a difference-in-differences estimation like the ones presented in our main specification are biased downwards. This should not be such a concern for our main specification, as we take this into account by clustering our

standard errors at the department level. However, the results shown in Appendix Table B1 should also add confidence to the reader that this problem is not the one driving the significance level of our coefficients. For the specification shown in B1, we do not need to correct our standard errors, as we only have one observation (the change in fertility) per department.

Other controls.

Other concerns can be attributed to the definition of our outcome variable and the exclusion of potentially relevant control variables.

First, there could be concerns about constructing our measure of births (and PACS) per woman using as a denominator women aged 20-35. While there is no clear evidence on this subject women willing to sign a PACS (or increasing their fertility) can be older than 35. We then suggest an alternative measure of births per woman, simply dividing the total number of births in each year by the total number of women aged 20-39 years old. Table B2, Column 2, shows the results of the main specification, now defining both PACS intensity and births per woman dividing the total number of PACS and the births in each year by the total number of women aged 20-39 in each department. Column 1 in the same table shows the results with the original definition of these variables. As can be seen, the coefficients do not change considerably in magnitude or significance level when we redefine our variables this way.

Second, as stated, there can be an unobservable variable, causing both PACS to be popular and fertility to increase, confounding our results. While, again, we do not feel confident to argue that what is shown in this paper is a causal link between PACS and fertility, we can explore to what extent other variables (possibly correlated with PACS and fertility), can be biasing our estimates. We suggest three additional control variables: two of them indicating the political affiliation of individuals in each department, and another one measuring the percentage of immigrants in each

department. Columns 3, 4, 5 and 6 of Table B2 shows the regression results for an extended version of our main specification, adding each of these control variables (interacted with year dummies).

Political affiliation can very well be related to fertility decisions and the support/acceptance of a contract like PACS. Indeed, this seems to be the case, (the correlation between the percentage of voters voting for Chirac or Le Pen in the 2002 presidential election and our measure of PACS intensity is -0.42). Table B2, Column 3, includes as controls the interaction of the percentage of votes obtained by Jean Marie Le Pen in the 2002 presidential election and year dummies (using the original definition of fertility and PACS intensity). As can be seen, the coefficients, although slightly smaller, still show an apparent increase in fertility in departments with higher PACS intensity after 1999. Column 4 includes the interaction of the percentage of votes obtained by Jean Marie Le Pen or Jacques Chirac in the same election and year dummies. Again, while the coefficients have lower significance level, the trends observed in our main specification are still present.

Also (and, again, impossible to test given the unavailability of data), immigration status can be correlated both with the willingness to sign a PACS (possibly due to legal reasons) and fertility (immigrants can face different incentives to have children, and are likely to have very different observable characteristics than natives (like income or schooling levels), which can also be correlated with fertility. Column 5 includes then the percentage of the population designated foreign born in the 1999 census (excluding Europeans and the descendants of French citizens) interacted with year dummies as controls¹⁹. As shown, the estimated coefficients do not change

¹⁹ For the purpose of this study we only consider non European Union migrants. In that sense we count all individuals born outside France, who were not French nationals at birth, who were not born within the European Union and who were not European Union nationals at the time of the census. The European Union (EU-15) at the

considerably in magnitude or significance level with respect to our main specification (Column 1).

Finally, Column 6 includes both political affiliation and percentage of immigrants interacted with year dummies as controls. As can be seen, while the estimated coefficients lose significance, the observed trends shown in Column 1 are still evident. However, we still believe that our results should be taken with caution.

Our estimation strategy uses as a regressor the total number of PACS signed between 1999 and 2005 divided by the total number of women as the explanatory variable. As the popularity of PACS increased over time (and our measure of PACS intensity remains constant), we expect (and observe) higher coefficients for the interaction of PACS intensity with later years, if PACS is having a positive effect on fertility. However, it is indeed then hard to interpret the magnitude of our reported estimates, since the number of PACS signed in later years should not have any effect on fertility for earlier dates. Moreover, the popularity of PACS can be a result of the increase in fertility.

In this section, we suggest two alternative estimation strategies that could potentially make our results easier to interpret.

Our measure of PACS intensity is, from our point of view, a measure of how popular PACS was in different departments. In order to avoid the difficulty interpreting the coefficients when we add PACS signed in later dates than the one at which fertility is measured, we suggest a new measure of PACS intensity, defined as the total number of PACS signed in 1999 and 2000 (only) as our main regressor, which will measure the popularity of PACS at a date closer to its

time included: Spain, Italy, Portugal, Germany, Belgium, Denmark, Greece, Ireland, Luxembourg, Netherlands, United Kingdom, Austria, Finland, France and Sweden.

introduction. Results are shown in Table B3. As can be seen, while the magnitude of the estimated coefficients increases with respect to those in the main paper's regression (as our measure of PACS intensity is now a smaller number), their sign and the changes in the magnitudes over time remain qualitatively similar to those presented in our main specification.

Second, we estimate an alternative specification, following a reviewer's recommendation. For this specification, we define our measure of PACS intensity in year t as the total number of PACS signed up to that year. PACS intensity would then be changing within departments across time. Specifically, we can define this alternative measure of PACS intensity as:

$$PI_{it} = \sum_{\tau \leq t} \frac{p_{i\tau}}{W_i}$$

Where PI_{it} is our alternative measure of PACS intensity in department i , at time t . And $p_{i\tau}$ measures the number of PACS signed in year τ , and W_i is the total number of women aged 20 to 35 in 1998.

And run the following specification:

$$F_{it} = \alpha_i + \sum_t \partial_t + \sum_t \beta PI_{it} + \sum_k \sum_t \gamma_{k,t} (X_{ki} * \partial_t) + \varepsilon_{it}$$

We present the results for this specification in Table B4.

Table B1

	Regression Results					
	Change in births per 1000 Women 1999-2004			Change in births per 1000 Women 1993-1999		
	With Paris	Without Paris	Without Paris and outliers	With Paris	Without Paris	Without Paris and outliers
PACS Intensity	0.06174	0.16636	0.33178	0.05623	0.04554	-0.05473
	[0.09935]	[0.09489]*	[0.14996]**	[0.07840]	[0.07704]	[0.10230]
Fertility in 1998	0.08101	0.0988	0.09132	0.15729	0.1897	0.19664
	[0.03528]**	[0.03722]***	[0.04207]**	[0.03475]***	[0.03609]***	[0.03726]***
Unemployment in 1998	-0.00052	-0.00055	-0.00058	-0.00043	-0.00039	-0.00038
	[0.00023]**	[0.00024]**	[0.00026]**	[0.00020]**	[0.00021]*	[0.00024]
Pop Density 1999	0	-0.00001	-0.00001	0	-0.00002	-0.00002
	[0.00000]	[0.00001]	[0.00001]*	[0.00000]*	[0.00001]***	[0.00001]***
Constant	0.00096	-0.00349	-0.00684	-0.00259	-0.00434	-0.00246
	[0.00526]	[0.00576]	[0.00637]	[0.00505]	[0.00505]	[0.00536]
Observations	96	88	75	96	88	75
R-squared	0.07	0.12	0.16	0.18	0.26	0.27

Robust standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Table B2

Regression Results						
Births per woman						
Coefficient of the Interaction between PACS intensity and year dummies						
Excluding Paris and its Suburbs						
	1	2****	3	4	5	6
Pacs Intensity*Year 1994	-81.342 [85.915]	-80.926 [82.394]	-32.545 [85.634]	-18.065 [96.221]	-84.643 [79.113]	-65.429 [85.092]
Pacs Intensity*Year 1995	-58.341 [80.984]	-71.475 [77.330]	-11.107 [83.119]	-17.205 [85.137]	-61.19 [75.667]	-34.747 [88.377]
Pacs Intensity*Year 1996	57.827 [75.146]	44.881 [71.821]	98.614 [71.502]	115.316 [79.595]	56.052 [74.028]	94.442 [73.294]
Pacs Intensity*Year 1997	10.667 [65.676]	4.452 [61.711]	45.342 [64.071]	62.406 [67.356]	9.267 [64.351]	44.386 [66.455]
Pacs Intensity*Year 1998	8.262 [65.901]	2.006 [62.840]	19.099 [66.797]	30.135 [65.886]	7.63 [64.811]	14.19 [77.403]
Pacs Intensity*Year 2000	-78.569 [73.404]	-72.089 [68.023]	-100.326 [71.707]	-77.749 [75.274]	-78.383 [72.309]	-116.154 [73.772]
Pacs Intensity*Year 2001	91.538 [67.528]	89.627 [65.339]	80.584 [69.014]	75.598 [68.299]	92.252 [62.766]	87.343 [64.752]
Pacs Intensity*Year 2002	120.35 [63.510]*	102.694 [59.444]*	107.186 [64.582]*	113.397 [66.194]*	119.802 [61.934]*	81.94 [67.098]
Pacs Intensity*Year 2003	156.5 [77.783]**	125.579 [73.171]*	144.841 [76.114]*	87.63 [74.413]	155.706 [76.477]**	115.196 [83.932]
Pacs Intensity*Year 2004	166.359 [86.048]*	152.851 [80.300]*	152.893 [85.865]*	140.136 [85.877]	165.823 [84.627]*	127.657 [92.415]
Pacs Intensity*Year 2005	92.31 [100.873]	92.918 [92.362]	62.879 [96.049]	70.051 [111.356]	91.207 [100.150]	9.379 [104.195]
Constant	118.902 [5.663]***	85.874 [3.848]***	113.578 [5.369]***	109.094 [9.939]***	117.81 [5.182]***	116.033 [5.698]***
Year Fixed Effects						
Department Fixed Effects						
Fertility in 1998 interacted with year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Density in 1999 and unemployment interacted with year dummies	Yes	Yes	Yes	Yes	Yes	Yes
% Vote for Jean Marie le Pen in 2002 interacted with year dummies			Yes			
% Vote for Jean Marie le Pen or Jacques Chirac in 2002 interacted with year dummies				Yes		Yes
% immigrants interacted with year dummies					Yes	Yes
Observations	1056	1056	1056	1056	1056	1056
R-squared	0.96	0.96	0.96	0.96	0.96	0.96

Robust standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

**** This column defines PACS intensity and births per woman dividing PACS and births by women aged 20-39

Table B3

Regression Results				
Coefficient of the Interaction between PACS intensity (first two years) and year dummies				
	Without Paris		With Paris	
	(1)	(2)	(3)	(4)
PACS intensity*year 1994	-280.999	-521.414	-510.379	-568.115
	[587.583]	[651.876]	[621.115]	[566.091]
PACS intensity*year 1995	-127.929	-312.56	-305.793	-332.037
	[496.018]	[551.541]	[549.555]	[522.518]
PACS intensity*year 1996	268.267	247.234	254.675	211.11
	[424.080]	[486.553]	[474.381]	[473.524]
PACS intensity*year 1997	58.418	-16.013	-10.903	-51.813
	[394.781]	[434.111]	[433.341]	[443.322]
PACS intensity*year 1998	151.956	136.845	137.662	147.793
	[399.577]	[442.350]	[445.116]	[439.582]
PACS intensity*year 2000	-809.684	-461.142	-463.714	-458.32
	[407.317]**	[505.908]	[502.013]	[501.515]
PACS intensity*year 2001	104.018	640.758	638.959	709.697
	[406.520]	[433.355]	[430.691]	[446.258]
PACS intensity*year 2002	287.838	779.795	778.257	780.962
	[356.782]	[401.402]*	[401.155]*	[406.153]*
PACS intensity*year 2003	299.146	1,060.81	1,056.11	1,049.19
	[510.304]	[514.645]**	[522.628]**	[508.203]**
PACS intensity*year 2004	474.925	1,136.88	1,131.40	1,156.45
	[529.221]	[588.692]*	[582.117]*	[561.095]**
PACS intensity*year 2005	-22.579	599.744	592.097	620.732
	[564.200]	[661.545]	[651.403]	[636.572]
Constant	106.108	106.436	119.917	118.975
	[2.725]***	[3.012]***	[5.149]***	[5.506]***
Year Fixed Effects	Yes	Yes	Yes	Yes
Department Fixed Effects	Yes	Yes	Yes	Yes
Fertility in 1998 interacted with year dummies			Yes	Yes
Density in 1999 and unemployment in 1998 interacted with year dummies			No	Yes
Observations	1152	1056	1056	1056
R-squared	0.95	0.95	0.96	0.96

Robust standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Table B4**Regression Results****PACS intensity (alternative measure) and births per woman**

	With Paris		Without Paris	
	(1)	(2)	(3)	(4)
PACS intensity	-9.212	137.103	145.592	192.181
	[62.082]	[65.934]**	[65.802]**	[64.220]***
Constant	104.893	104.186	117.684	116.337
	[0.595]***	[0.610]***	[4.009]***	[4.421]***
Year Fixed Effects	Yes	Yes	Yes	Yes
Department Fixed Effects	Yes	Yes	Yes	Yes
Fertility in 1998 interacted with year dummies	No	No	Yes	Yes
Density in 1999 and unemployment in 1998	No	No	No	Yes
Observations	1152	1056	1056	1056
R-squared	0.95	0.95	0.95	0.96

Robust standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Figure B1

Figure B2