Do Individuals "Strategically Divorce" To Maximize Marital Settlements?

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Using data taken from the Alameda County district, I test the hypothesis that individuals plan their divorce filings around the 10-year mark where economically payments can last a lifetime. I first observe graphic evidence within distributions for this theory of "strategic divorce", then use Kolmogorov-Smirnov Tests to verify their distributional differences. I then conduct time series regressions to check for the statistical significance at the 10-year mark, lastly constructing hazard rates after each year up until 20. I conclude that there is significance at the 10-year mark but neither gender exhibits a particular behavior nor as a whole that would indicate the existence of "strategic divorce".

1 Introduction

As the knowledge surrounding divorce and its process becomes clearer, the economics surrounding divorce law plays a larger role also. California marital law counts a marriage lasting 10 years or longer as a long-term marriage. In these cases the spouse earning less income has the right to alimony payments and support to maintain their standard of living for as long as they need or for as long as the paying spouse is capable of paying. The theory of "strategic divorce", or individuals filing unilaterally for divorce to either extract or avoid a large settlement, becomes an important economic threat.

There is no literature currently published exploring the incidence of this theory, however the concepts surrounding the economics of divorce have been covered in particular by Stevenson (2007). Betsey Stevenson has covered divorce law as well as the economics surrounding marriage extensively, and in her 2007 work "The Impact of Divorce Laws on Marriage-Specific Capital" she tracks the course of divorce law changes in the 1970s and 1980s as a major influence on household behavior. Stevenson finds a significant decrease in investment married couples spend towards marriage specific capital such as spousal education, children, and household specialization, while investment in home ownership itself varies based on local property laws. Her paper focuses on the household's decision making pertaining to securing individuals against a dissolution though, and not the actual motivations towards using unilateral divorce as a means of financial gain.

This paper examines the statistics surrounding divorce rates in varying windows centered at the 10-year mark, where following that milestone, marriage dissolution settlements may result in lifetime support. In this paper, varying questions will be considered to find evidence of or against the theory of "strategic divorce". The paper first examines graphical representations of the raw data across demographics as well as within varying time segments. The paper then applies statistical inference tests to compare the distributions across groups and check for statistically significant variations. Using any evidence of "strategic divorce" present here I use time series tests to test the data for other evidence of significant changes in the cumulative divorce filing observations around 10 years. Finally, I estimate hazard rates and the likelihoods of divorce over time and as a product of the number of kids from the current marriage.

The paper is structured as follows: the second section will present pertinent literature on the topic and other academic insight. The third section will describe the statistical and econometric methodology used, as well as hypothesizing what should be expected from the data collected. The fourth section will analyze the empirical results. A final section will conclude the paper and discuss extensions and applications.

2 Literature Review

As aforementioned, literature on the actual 10-year mark as an event of interest does not exist in economic writing. In Stevenson's 2007 work, "Divorce-Law Changes, Household Bargaining, and Married Women's Labor Supply Revisited" she observes varying household capital values as decisions taken to have different

implications for the marriage as one unit and the value the spouse puts in were the marriage to be dissolved. The development of unilateral divorce as the key event Stevenson uses in this paper allows her to examine how married couples will actually invest less in capital such as children or the other spouse's market-based skills, as those consumption gains are non-rival when the marriage stands but where the household to dissolve the returns on the investment may fall significantly. As a valuable historical reference point for my research Stevenson's findings that as investment levels fell for joint capital, reasoning for this becomes more significant when examining an even more extreme concept such as "strategic divorce". Stevenson posits that the knowledge that each spouse is less likely to reap the benefits of marriage-specific capital reduced the incentive to invest jointly.

Stevenson continues to explore the effects of divorce law changes on female labor force in another 2007 work, "Divorce-Law Changes, Household Bargaining, and Married Women's Labor Supply Revisited". Building on her previous work Stevenson finds that while investment in joint capital largely decreased as a result of 70-80s law changes, the incidence of unilateral divorce led to a rise in married and unmarried women's labor force participation. A number of Stevenson's papers become relevant in my work as well, particularly her examination of the marital shift towards less joint investment, and a female movement towards honing more individual skills as well. Where stereotypically men have in the past been the breadwinners for households, Stevenson's findings offer interesting insights into whether this idea still holds around the 10-year mark based on gender composition.

Friedberg (1998) examines the actual change in divorce rates following the introduction of unilateral divorce as an option. Synthesizing work done by H. Elizabeth Peters (1992) and Douglas W. Allen (1992) which covered a cross section of women observed in 1979, Friedberg finds that divorce rate would have been about 6% lower in 1988 if no type of unilateral divorce had been adopted in states that switched to it after 1968. Friedberg suggests that the move towards unilateral divorce accounted for 17% of the increase in divorce rates between 1968 and 1988 with effects on divorce behavior not being a shock but rather permanent.

Wolfers (2003) also examines the effect of unilateral divorce laws on divorce rates, finding that while the divorce law changes caused a noticeable rise in divorce rates for about a decade, that change was substantially reversed over the next decade. Wolfers (2003) notes that these radical changes offer little explanation for the rise in the general divorce rate over the past half century. The paper finally concludes that the results are likely suggestive of spouses bargaining within marriages as each partner's divorce threat is now a possibility.

Rasul (2005) presents an interesting question to explore with my data set as well, examining the effects of unilateral divorce laws on divorce rates pertaining to those already married at the time of their introduction. While Rasul (2005) confirms most existing literature that the larger divorce rates have been raised as a result of unilateral divorce, the findings of his paper also suggest that the change to unilateral divorce can cause those married to be better matched than those married previously under mutual consent divorce laws. I apply the concepts presented by Wolfers (2003), Friedberg (1998), and Rasul (2005) regarding overall divorce rates

to check for changes in divorce rates between the overall sample and the time frames of interest around the 10-year mark.

The directly pertinent legal history forming the basis for this paper's question can be found as far back as *Marvin v. Marvin* in 1976. The case established the framework by which marriage lawyers would have to understand the rights of unmarried cohabitants, stating that in the case of no marital contract existing, the common law rule applied meaning each individual would take back from the relationship what they had brought to it. *Marvin v. Marvin's* precedent led eventually to the 1986 case, *Marriage of Bukaty* which established that prior cohabitation and even a prior marriage may not be factored in the awarding of spousal support. Similarly, the even more significant case *Marriage of Prietsch and Calhoun* in 1986 produced a ruling that if a supported spouse's income and needs had not changed since the prior order than it would not be appropriate to terminate the order.

The first code directly relevant to this paper is California Family Code Section 4336. The code states that post January 1, 1988 long-term marriages are subject to the court retaining jurisdiction indefinitely in cases of dissolution and any changes in the spousal support structure, including termination. The section then continues to state that a marriage of 10 years or longer will be termed a long-term marriage unless proven otherwise based on factors such as the separation date, etc. This key law established the definition for a long-term marriage in California as well as how the judges can make their rulings regarding dissolution. The second law follows, as California Family Code Section 4337. Continuing on long-term marriages, the code states that unless otherwise agreed upon by the parties in question, the obligation of

one party to pay support to the other only terminates upon death of either party or the other party's remarriage.

3 Statistical/Econometric Methodology

The paper's primary focus is to analyze significant statistical questions surrounding distributions of the large dissolution filings collection as well as the 10-year mark of interest. In particular, this paper focuses on the incidence of divorce rates around 10-years and the demographics surrounding the probability of divorce as a hazard rate.

Extensively mentioned by Stevenson (2007, 2007), Wolfers (2003), Rasul (2005), and Friedberg (1998) is the use of the economic principle of the Coase Theorem when looking at divorce rates. The concept suggested by large amounts of empirical literature that focused on the changes in divorce rates take the Coase Theorem to be a null hypothesis, that a change in the allocation of the right to divorce should have no effect on rates of both marriage and divorce. In the context of this paper, I consider the concept that any statistical change in divorce rate may not be significant. By using Kolmogorov-Smirnov tests on varying slices of the data, I look for statistically significant variations in distributions.

Initially, I present the statistics in histogram and kernel density plot form as well as various tables to offer graphical representations and a look at what shapes the distribution takes over time as well as in short time frames. After examining the statistics in raw form, I use Kolmogorov-Smirnov tests as the comparisons of the distributions once scaled should account for the non-parametric nature of my data. The ability of the Kolmogorov-Smirnov test to take distribution free observations

and best estimate the differences in empirical distributions between the adjusted bands of time offers the convenience of testing any two distributions within the overall sample.

Following this, I use collapse the data set to a time series set composed of divorce filings observed every 146 days. The time frame selected here made for an even measure upon the 10-year mark as well as per every 2 years. A basic time series regression is then run to check for the statistical significance of the 10-year mark itself in the number of observations either side of 10 years per 146-day period.

Lastly, I estimate hazard rates and the rates of change from one year to the next for divorce. The hazard rates are calculated using probability density functions using my observational pool, and a hypothesized, fixed distribution function or survival function. The hazard rates offer insights into what time periods individuals are at greatest risk to file for divorce with special interest surrounding the 10-year mark.

This paper uses marriage dissolutions filed with the Rene C. Davidson Courthouse located in Oakland, California in the Alameda District. The data available was from a register of actions computer system within the Courthouse's electronic files, meaning they could only be accessed on-site. The paper takes dissolution filings from all four seasonal periods in the year of 2007 with observations from January, February, June, July, and October. The year 2007 was selected as it is an approximately even distance 20 years away from a number of the pivotal late 1980's

events discussed in section 2, particularly the passing of the of Family Code 4336 as well as the 1987 cases that preceded the need for such a code.

The data collected includes the petitioner gender, whether the final judgment of divorce was passed (although the 10-year stipulation applies the date of filling for dissolution as valid for 10-years), whether the couple had children from the current relationship, the number of children from the current relationship, and the time from marriage to filling, and separation length if any.

3.1 Hypothesis

The "strategic divorce" hypothesis posited by this paper specifically suggests that there are statistically significant bimodal clusters around the 10-year mark of marriages where dissolutions have been filed. With the family codes aforementioned in section 2 and the knowledge within divorce law of spousal support payments that can last a lifetime once a marriage becomes "long-term" I hypothesize that there should be evidence supporting "strategic divorce". Based on gender split income data taken from the United States census, where income gaps have been significant and consistent since the inception of the census by this parameter, I anticipate a statistically significant difference in the two distributions by gender around the 10-year mark and in general.

The difficulty of predicting when individuals begin the process of considering divorce before they become aware of the 10-year mark is a variable beyond the scope of testable control. Essentially, the "strategic divorce" theory attempts to capture the notion that people will either divorce as a premeditated protection against their spouse collecting long lasting payments or vice versa, but if the

sentiment this theory attempts to capture has no opportunity to present itself the data may not reflect accurately the count of dissolutions that actually were or should have been influenced by "strategic divorce". If a primary earning spouse finds out just past the 10-year mark about the existence of family codes that there was the opportunity to file for divorce before long lasting spousal support may be awarded, he or she may simply arbitrarily file any time or even right after the 10-year mark. This would indeed support the "strategic divorce" hypothesis, but in the context of this paper's further intent to find demographic specificities of who acts when and based on what factors, any speculations may be biased.

Similarly, a key question to consider that cannot be accounted for was the income earned by the petitioners in question as well as any potential property to be divided. The Rene C. Davidson courthouse papers for marriage dissolution did not stipulate this information be provided on the dissolution filing itself. Additionally, the register of actions as turned in by the filers and petitioners themselves frequently failed to document their income or in other cases put approximations. An extra component was that unlike the dissolution records themselves, which contained the length of marriage and petitioner and respondent name, the court documents specifying the income and property settlements were in varying cases locked from view at the public access workstation.

4.1 Statistical Distributions

The data collected totaled 559 observations, but in gender split cases, only 534 observations were usable due to missing information. In gender sensitive cases, the gender referred to throughout the paper always refers to the gender of the

petitioner filing for divorce. Referring to the total data sample first, the tabulated data by gender and split between pre-10 and post-10 year divorces shows that the number of females filing for divorce from the sample of 534 observations is nearly one and a half times the number of males.

[Reference Figure 1]

Otherwise, nothing particularly descriptive about the difference between pre-10 and post-10 year marriages for the two genders is readily visible from the raw counts, however the statistical differences between the two gender distributions will still be tested as will the pre-10 and post-10 distributions.

Examining a slice of data within 2-year ranges below and above the 10-year mark indicates nearly double the amount of females versus males within the 4-year band.

[Reference Figure 2]

The subsample size of men within this 4-year range is only 37 though, making the inferences drawn for men somewhat difficult to place accurately.

From visually referencing the histogram and kernel density plots of the data within this 4-year period, while the larger weight of observations appears to be pre-10 years, there is not a bimodal distribution either side of 10 years that might verify the strongest form of the "strategic divorce" theory.

[Reference Graphs 1.1-1.2]

To test for the possibility that such a theory may be inversely related per gender, a density plot is provided split by genders.

[Reference Graph 1.3]

The distributions seem visibly different now, while the plot for women appears somewhat random with a nearly normal looking distribution, the men's plot appears significantly positively skewed. For lack of descriptiveness, histograms are not used in this section. Understanding that the kernel density plot will not capture the actual observations right at certain markers, the density plot allows for convenient, direct overlapping of two distributions and their trends.

Extending the subsample size to 3-year ranges two ways, centered at 10 years (a total of a 6 year selection) reveals a kernel density plot both far more skewed right than the overall sample from the 4-year band.

[Reference Graph 1.4]

The distribution no longer appears randomized, while the larger 6-year band range will be compared to other overlapping and adjacent distributions with the Kolmogorov-Smirnov tests in subsection 4.2. Again, graphic visuals are provided based on gender as well to check for evidence of more specified parts of the "strategic divorce" hypothesis.

[Reference Graph 1.5]

Both sets of distributions via their kernel density plots are skewed right this time, not just the males. The degree to which the male density plot is skewed however does seem more extreme than for females but again, the extent to which the two distributions are the same will be tested later. Visually, it appears both genders file mostly before the 10-year mark when looking at an 8-year band of observations centered at 10. For visual convenience the overall densities of male and female petitioners is also provided:

[Reference Graph 1.6]

In general the graphs for female petitioners indicate there are no real peaks in divorce clusters until the 6-year mark. The cluster is roughly around the 2100 days point, approximately 6 years. A high-density set of observations around this point may be statistically significant and due to some actual parameter, however within the context of the "strategic divorce" theory, would have little significance. The distribution for male petitioners sees the most significant cluster around a point just before 2100 days but another one that can be visible around the 3000 days mark, just under 8¼ years into a marriage. This observation may be of greater significance towards "strategic divorce" and will be interpreted in depth in subsection 3.2. Ultimately from a visual glance at the raw statistics, it appears the observation levels for the overall sample as well as gender splits peak around 6 years instead of closer to 10.

4.2 Kolmogorov-Smirnov Tests

Using Kolmogorov-Smirnov tests, I measure the statistical variations in distributions across sections of dissolution filing periods ranging from 4-year time frames to 8 years. The Kolmogorov-Smirnov test of the available statistical tests is the strongest option towards comparing distributional equalities. Where the Kuiper Test also uses the largest magnitude discrepancies D^+ and D^- between two cumulative distribution functions, the test statistic sums the two, making it more sensitive to the tails of the distribution. Based on the distribution of the set of observations as examined in section 3, 95% of the observations for males and females fall within an approximate 7.9-10.7 year and 7.4-9.5 year range

respectively. Additional tests considered such as the Anderson-Darling Test are more suited to testing for departures from normality. The Cramer-von Mises Test is an alternative to the Kolmogorov-Smirnov Test and strongly considered but for functional and hypothesis testing similarities to the Kolmogorov-Smirnov Test was not used.

The first segment of interest as visually presented in subsection 4.1, is the 6-year band centered at the 10-year mark. Taking the slice from 7-13 years first and comparing to the 1-7 slice, the "strategic divorce" theory would suggest that the two groups are statistically different distributions. The test results figures are presented as follows:

$$1: H_0: F(x) \leq G(x) \quad vs. \quad H_1: F(x) > G(x)$$
$$2: H_0: F(x) \geq G(x) \quad vs. \quad H_1: F(x) < G(x)$$
$$Combined\ K-S: H_0: F(x) = G(x) \quad vs. \quad H_1: F(x) \neq G(x)$$

The D value is the Kolmogorov-Smirnov test statistic, when plotted, the maximum vertical distance between the two empirical distributions being compared. The notational form for what the test statistics represent is as follows:

$$1: D_1^+ = \sup_x (S_1(x) - S_2(x))$$
$$2: D_1^- = \sup_x (S_2(x) - S_1(x))$$
$$Combined\ K-S: D_1 = \sup_x \left| S_1(x) - S_2(x) \right|$$

The first test of 7-13 and 1-7 year bands are as follows:

[Reference Figure 3]

The p-value at 0 with a maximum D magnitude of 1 (the highest possible) suggests that the two distributions are different at a 1% level. The 13-19 year range test results are as follows:

[Reference Figure 4]

The p-value is again 0 with a fairly high maximum magnitude D between the two differences of .7413. We would clearly not expect the distributions to be the same across these three time frames; in fact evidence of statistically different distributions would be anticipated. The significance at the 1% level that these distributions are different however is still strong evidence of something particularly significant about how the distributions change once the significant slice centered at 10 years is reached.

The next group of Kolmogorov-Smirnov tests are focused on 2 year adjacent slices. For the data to support the "strategic divorce" theory, the tests should return high p-values for the first slices tested, early on in the marriage term lengths with the p-values expected to decrease until a point of potentially statistical significance at the 8-10 and 10-12 comparison where the two distributions should be highly dissimilar. Beginning from the start of the sample, the comparisons for the 0-2 and 2-4 year marriage terms are as follows:

[Reference Figure 5]

The p-value is moderately high; too high for the null hypothesis of the two distributions being statistically the same to be rejected. We thus fail to reject the hypothesis that the distributions from 0-2 and 2-4 years are statistically drawn from the same empirical distribution; in essence the are statistically the same. The p-value and test statistic are both lower than an ideal level for the very first band to be tested from 0-2 and 2-4. We would have expected stronger evidence that the two distributions would be statistically the same, but with varying levels of noise to be

somewhat expected in the early bands of marriage dissolutions, the following tests may closer follow the pattern hypothesized. The results for the 2-4 and 4-6 year band comparisons are as follows:

[Reference Figure 6]

The results for the 2-4 and 4-6 year time frames are nearly exactly as anticipated, with the more significant p-value dropping very slightly. There should be increasing evidence that the two distributions are not the same, but the p-value is still too high to reject the null that the distributions were drawn from the same empirical distribution. The test statistic has fallen a bit as the number of degrees of freedom has changed. The more important value again is that the p-value has fallen as well. The following test was conducted over the 4-6 and 6-8 year bands, with the corresponding results:

[Reference Figure 7]

The p-value is incredibly and unexpectedly low for this test. We reject the null hypothesis then that these distributions have been drawn from the same empirical distribution at 5%. The p-value has dropped from the previous test of 2-4 and 4-6 year bands but again, perhaps far more than we might have expected to see. If results best supporting the "strategic divorce" are to follow, the p-value will continue to decrease, while the test statistic should rise. The evidence though at this stage is already very strong that the distribution of divorce filings in general is beginning to rapidly change in shape. While this does not support a strong case of "strategic divorce" the results from this test do follow what was visually seen in subsection 4.1, that the most significant peak before a change in shape was at the 6-

year mark instead of 10. Following this test, the results of a 6-8 and 8-10 year band comparison are:

[Reference Figure 8]

The results here are completely unexpected, with the highest observed p-value yet, as well as the lowest test statistic. With such strong evidence we fail to reject the null that these two distributions are actually drawn from the same empirical distribution.

Again, this inference is the first of the four tests conducted thus far to provide evidence against "strategic divorce", suggesting that the movement of the dissolution filings is beginning to follow an approximately markable trend as opposed to statistically significant shifts. The test for the 8-10 and 10-12 bands that may be the most critical to examine is then performed with the following results:

[Reference Figure 9]

The results are again in the opposite direction from what was hypothesized. Where the p-value was expected to steadily drop towards highly significant evidence against the null to suggest the incidence of "strategic divorce", the distributions are statistically drawn from the same empirical distribution.

The colossal p-value indicates that at the most critical test juncture of 8-10 and 10-12 year ranges for evidence of "strategic divorce" the bands either side are statistically likely to be the same. Having a colossal p-value here suggests that the two 2 key frames either side of 10 years do not have quite the bimodal clustering expected right around 10 years. The concept that the 10-year mark is a statistically significant event affecting the number of dissolutions observed is tested using a

collapsed time series regression in subsection 4.3. At this point the idea that the two distributions are statistically drawn from different distributions does not hold. The 10-12 and 12-14 year frames are tested with results as follows:

[Reference Figure 10]

The p-value is smaller but still far too large to reject the null at any important level of significance. Given that the 10-12 year band showed a general downward trend in dissolution filings observed, the "strategic divorce" hypothesis would be supported by downward movement in the 12-14 band as well. Such a similar trend would be captured by the two distributions being drawn from the same empirical distribution function. The "strategic divorce" theory is not necessarily proven or disproven by distributional similarities between these adjacent bands, however in the case of the critical point at 10 years, even for the 8-10 and 10-12 ranges showing similar distributions, if the 6-8 years and 8-10 years as well as this test showed high p-values, we might still see evidence of "strategic divorce", simply not in the bimodal shape expected. Essentially for those two tests bounded at either the upper or lower limit by the 10-year mark, may indicate statistically similar distributions that rise around the 10-year mark and fall afterwards. Kolmogorov-Smirnov tests would find that these individual tests use highly similar distributions but not necessarily the fact that there is a key trend within the 4 year pre-10 and post-10 observation rates in dissolution filings. To test this as the last Kolmogorov-Smirnov distribution comparison of the total sample, the 6-10 and 10-14 bands are tested with the following results:

[Reference Figure 11]

The p-value of 0 means at a 1% level of significance the two 4 year ranges are indeed statistically drawn from different empirical distribution functions. Aggregating the Kolmogorov-Smirnov tests done for 6 year bands with one critical one centered at 10, tests done for 2 year adjacent bands, and the last test directly comparing 4 year distributions either side of 10 years, a few observations can be made regarding what proof there appears for or against "strategic divorce" evident in the sampled observations.

The 6 year band tests provided the underlying foundation for there even being a critical point centered between 7 and 13 years. The notion behind those tests was that the incidence of any peak or cluster of high frequency dissolutions was to be found in that range. The 2-year band tests were to try and prove a somewhat ambitious linearity trend in distribution slices that should have climbed steadily until the 10-year mark where a very low p-value would have provided fairly strong evidence of some form of sharp statistical discontinuity or discontinuities within the 8-12 year frame. The fact that there was instead strong evidence that the two bands compared within the 8-12 year frame were statistically drawn from the same distribution function led to the 4-year band test. Based on the graphical representations presented throughout subsection 4.1 and even from the 8-12 year frame, the 4-year band test was performed to test a weaker "strategic divorce" hypothesis, that while there may not be strong bimodal evidence the 10-year mark is still statistically significant. The two distributions being directly split by the 10-year mark were shown indeed at a 1% level to be drawn from different empirical

distributions suggesting that the subsequent panel data test may provide more conclusive evidence supporting or refuting "strategic divorce".

The overall sample thus does not provide strong evidence of distributional differences centered at 10 years. The other distributional question of interest pertains to the gender splits with tests first run for the overall gender distributions, then 2-year splits before and after 10 years, then 4 years before and after. The results for the overall sample are as follows:

[Reference Figure 12]

The fairly large p-value at .486 suggests that the male and female distributions for the collective sample set are statistically drawn from the same empirical distribution. Being that there are 534 observations in play here that may not be unexpected. The tests surrounding the critical point at 10 years may provide more evidence of one gender's tendency to file at a certain point or another. The results for the 8-10 year frame are as follows:

[Reference Figure 13]

The distributions again show a fairly high p-value at .269 indicating that for this 2-year band before 10 years neither gender significantly files for divorces at a higher rate. This again supports what the visual evidence from subsection 4.1 suggested. The test for 10-12 years yields the following results:

[Reference Figure 14]

The p-value is incredibly high for the third straight test, at .872. The evidence is very strong again that there are no statistically significant deviations between the male and female distributions. Again, the visual representations from subsection 4.1

showed very little variation between the two genders through this 8-12 year period with the statistical similarities between the two distributions now proven. The last two tests run for the two gender distributions cover the larger range of 6-10 and then 10-14 years, where evidence from the larger sample suggested that there was a statistically significant difference between those two distributions. The results for the 6-10 year range for male and female petitioners is as follows:

[Reference Figure 15]

Again the p-value is very large at .744, with test statistic maximums that do not come close to the differences observed where the distributions would be statistically different. The final test for the 10-14 year range is run with the following results:

[Reference Figure 16]

Optimistically, this is the fifth straight test of the two genders that has suggested neither side files for divorce significantly more than the other during the time frames of interest. Compounding the visual evidence from subsection 4.1 and the large p-values for distributions observed here suggests that for the time series regression the collapsed data need not account for gender differences.

4.3 Time Series Regression

To test the even weaker hypothesis from "strategic divorce" that the 10-year mark is a statistically significant event, I use a basic time series regression. I collapse the data so it is a time-series dataset – where each observation is a time period instead of a divorce. The collapsed dataset reordered into a time series set is then bunched into 146-day clusters of observations to capture the velocity or rate at

which dissolutions are filed. The first test is run for the 6-14 year band with the following results:

[Reference Figure 17]

The way the data is bunched, the coefficient on the post-10 year event variable suggests that per 146-day group observed after the 10-year mark, there are 1.1778 less marriages observed than before that same mark. The high p-value at .718 as well as a confidence interval of the estimate that ranges from (-7.977, 5.621) suggest the coefficient is likely to be statistically zero. The additional time trend variable has a p-value of .101 meaning even at a 10% significance level, there is almost no effect on the data over time. Another test is then run for the overall sample with the following results:

[Reference Figure 18]

The regression this time without the 6-14 year time constraint returns a p-value of .001 for the coefficient on the post-10 dummy. The coefficient is significantly negative this time at -7.879, which suggests that after the 10-year mark, within 146 day groupings the average number of divorces filed has fallen by nearly 8 from what the observation levels were at before 10 years. The estimate is significant at 1% and provides some evidence that over the total sample size there is a statistically significant shift at the 10-year mark.

In terms of evidence of "strategic divorce" the time series test controls for the growth over time of divorce filings so the significance of the post-10 variable is meaningful. Proof here of that mark being statistically significant exists but suggests only the weakest form of the "strategic divorce" hypothesis.

4.4 Hazard Rate

The final application taken with the sampled observations involves calculating a hazard rate for marriages based on each passing year. Using a modified formula from the traditional hazard rate formula the hazard rate for marriages uses an assumed standard set of marriages from time 0 and observed data in place of the probability density function and the survival function. The formula is as follows:

Div_t = probability of being divorced after time t
$Marr_t$ = probability of being married after time t
N_t = instantaneous number of divorces in time t
T_t = remaining number of divorces by time t

$$\Pr(Div_1 \mid Marr_0) = \frac{N_1}{(T_1 - N_0)}$$

$$\Pr(Div_2 \mid Marr_1) = \frac{N_2}{(T_2 - N_1)(1 - D_1)}$$

$$\Pr(Div_t \mid Marr_{t-x}) = \frac{N_t}{(T_t - N_{t-x})((1 - D_{t-x}) \times (1 - D_{t-x-1}) \times \ldots (1 - D_1))}$$

Based on this formula which continually accounts for the surviving ratio of marriages, the hazard rates calculated are as follows:

[Reference Table 1]

The hazard rates climb towards 10 years, but actually peak at 7 years and not at 10. This finding is actually exactly in line with the graphical representations shown in subsection 4.1. The hazard rate reaches peaks at 7 years and 16 years, while the number of divorces observed peaks in years 6 and 7. Again, this is mostly in accordance to what was expected from the statistical distributions, where peaks in observation clusters did not surround 10 years.

The hazard rate provides an informative look at the likelihood of divorce following a certain year conditional on having survived the years prior, based on the instantaneously changing population of total marriages from time 0. As the years progress, the decreasing ratio of population of surviving marriages generally follows a decreasing quantity of divorces observed. That the band of hazard rates never exceeds a peak of 7.78% and a minimum of 2% (with the valley appearing in year 1) suggests optimistically that there may be no evidence of "strategic divorce". The hazard rates from 8-14 years in particular never vary beyond a 1% range which is again positive evidence that individuals are not more prone to divorce within those ranges. The observation levels of divorce filings generally drops during that time frame as well as falling past the 14-year time as well.

In general the low variance of the observed hazard rates and absence of any real trend within the 20-year term calculated provides no evidence whatsoever of "strategic divorce".

5. Conclusions

The central question of "strategic divorce" in the instance of marriages observed in Alameda County in the year 2007 is addressed first by taking graphical representations and statistical orderings of the data for visual evidence of any skewness or peaks in the distributions based around 10 years. The largest peak for the overall sample was actually detected around the 2100 days or approximately the 6 year mark. Upon splitting the distribution by gender there was little visual evidence that the two distributions were significantly divergent, while both subsets of observations followed the overall sample's shape with a peak around 6 years. The

overall and individual gender plots all showed precipitous drops in divorce observations just following 10 years however, as well as a continuing downward trend in observations.

Using the visual representations indicating the most evidence in favor of "strategic divorce", Kolmogorov-Smirnov tests are used to check for the distributional equalities of key segments of the data. For a strong case of "strategic divorce", it is hypothesized that observing 2 year bands beginning from 0-2 and 2-4 up through and just past the 10-year mark, the p-values should steadily fall towards 10 years and then rise again. Such findings would indicate that where the early movement of the set of observations is consistent and the incidence of divorce filings should be increasing, around 10 years there should be a significant shift in the distribution of observed divorces. The findings instead suggested that at the most critical point of 10 years, distributions 2 years above and below this mark are statistically drawn from the same empirical distribution or that they are functionally not different. The test of these two bands at 8-10 and 10-12 years showed an incredibly large p-value, confirming what was observed from the graphical representations. The strongest evidence of distributions being statistically different was the test of the 4-6 and 6-8 mark, again observed from the density plots and histograms as having a peak at 6 years.

Extending to a singular test of distributions 4 years below and above this 10-year mark, there was significant evidence that the 6-10 and 10-14 bands were distributional very different. With this strong evidence of distributional differences, a time series regression was run for this 6-14 range and the larger sample, using the

10-year mark as an event dummy. The time series regression returned a coefficient with the expected negative sign but with a p-value suggesting it was still statistically zero. A time series regression run for the entire observation set suggested that at the 1% level the post-10 mark was a statistically significant event.

The last application was in calculating hazard rates to try and determine when couples were at highest risk for divorcing as well as the conditional probability level changes from year to year. The highest hazard rates calculated followed the 6^{th}, 7^{th}, and 16^{th} years, with the highest observed divorce filings following years 6 and 7.

From the graphical representations presented in subsection 4.1 through the distributional comparisons from subsection 4.2 to the direct time series event tests from subsection 4.3 and lastly through the hazard rates calculated in subsection 4.4, at best only a weak case of "strategic divorce" can be found. The largest peak as shown in all subsections is actually at 6 years. The findings optimistically suggest that not only "strategic divorce" likely not present, in particular, there is no difference cross-gender in divorce filing times.

Crucially however, it must be acknowledged that the data set's imperfections may not lend itself to stronger inferences. The value of such data points as the number of kids within marriages did not prove useful in helping judge the incidence of divorce or suggest anything interesting around the 10-year mark. Additionally as noted earlier, data that could have proven incredibly descriptive pertaining to marital income, shared property, or what child support payments were set. The data set also as a whole did not feature a proportionally large sample of observations

particularly close to the 10-year mark, meaning most tests of interest done focused at that point used anywhere from 99-253 observations. Lastly, although over a large enough unified amount of counties there should not be significantly different findings, based on median income levels, there may still be variations limiting the ability of these findings to be extended. In areas with high median incomes say in Marin County if there is one primary earner, there may be stronger evidence of "strategic divorce", versus a lower income county.

In the case of Alameda County however, the evidence is promising that economic drivers do not play a significant role in individuals' decisions to file for divorce. In particular where it might have seemed logical for there to be gender differences as well in filing times, the findings suggest that the two distributions also do not vary.

6. Acknowledgements

I would like to thank my advisor Aaron Edlin for his helpful comments and suggestions towards the direction of my research. I am also very grateful to Matthew Botsch for his invaluable advice and insight in the process of transitioning my research into tractable hypotheses and tests.

Any views expressed are mine alone and not necessarily those of my advisor or my department.

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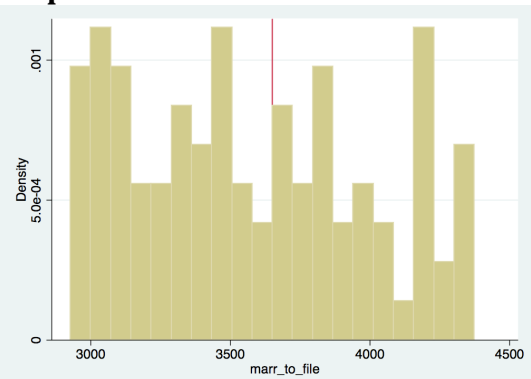
Figure 1

	Pre-10 Years	Post-10 Years	Total
Female	184	132	316
Male	118	100	218
Total	302	232	534

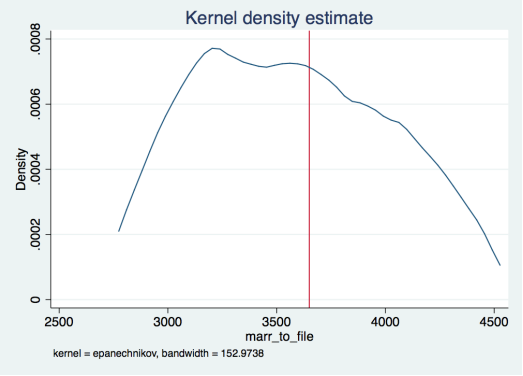
Figure 2

	Pre-10 Years	Post-10 Years	Total
Female	35	27	62
Male	21	16	37
Total	56	43	99

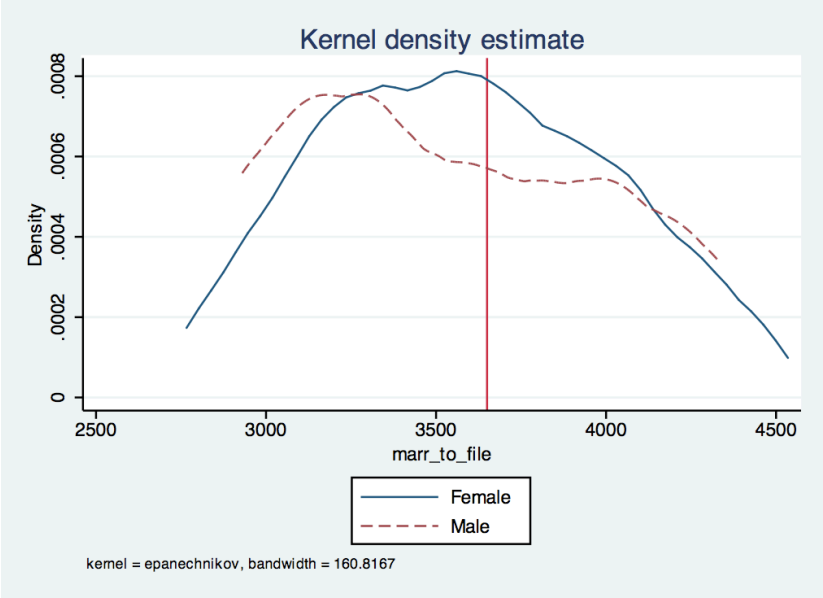
Graph 1.1



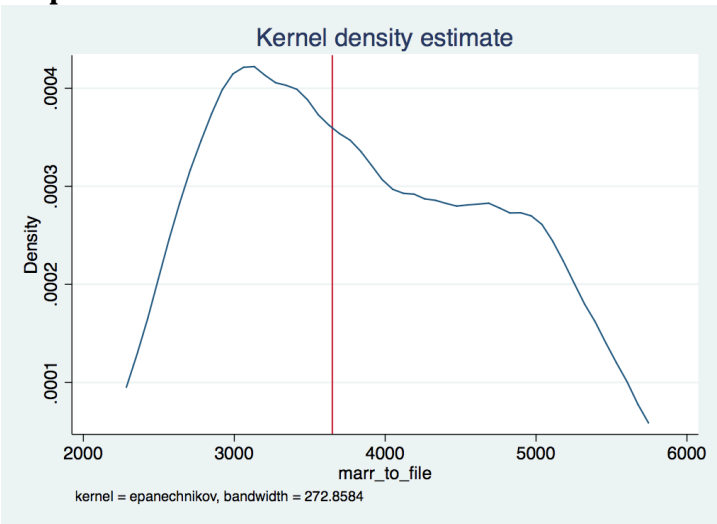
Graph 1.2



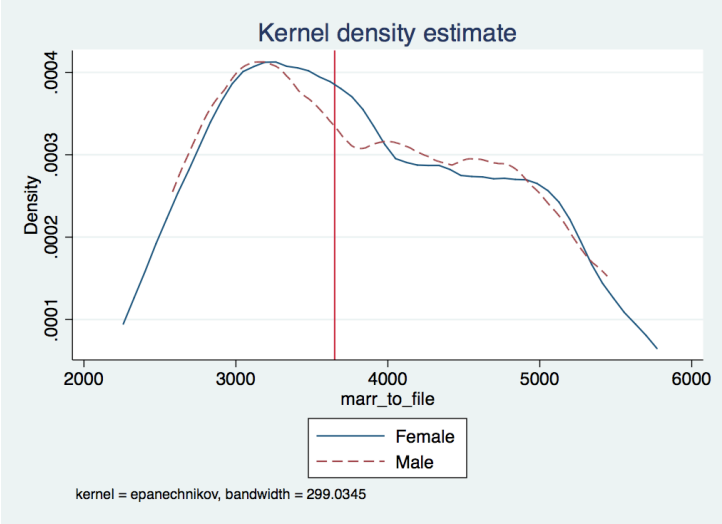
Graph 1.3



Graph 1.4



Graph 1.5



Graph 1.6

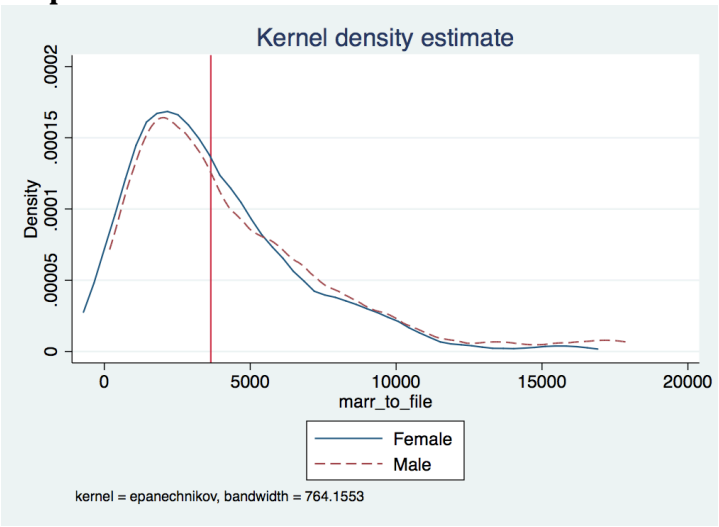


Figure 3

Smaller Group	D	P-Value	Corrected
1	0.0000	1.0000	
2	-1.0000	0.0000	
Combined K-S	1.0000	0.0000	0.0000

Figure 4

Smaller Group	D	P-Value	Corrected
1	0.7413	1.0000	
2	-1.0000	0.0000	
Combined K-S	0.7413	0.0000	0.0000

Figure 5

Smaller	D	P-Value	Corrected

Group			
1	0.0952	0.607	
2	-0.1973	0.117	
Combined K-S	0.1973	0.234	0.176

Figure 6

Smaller Group	D	P-Value	Corrected
1	0.1797	0.110	
2	-0.0025	1.000	
Combined K-S	0.1797	0.219	0.168

Figure 7

Smaller Group	D	P-Value	Corrected
1	0.0007	1.000	
2	-0.2978	0.001	
Combined K-S	0.2978	0.002	0.001

Figure 8

Smaller Group	D	P-Value	Corrected
1	0.1299	0.335	
2	-0.0503	0.849	
Combined K-S	0.1299	0.645	0.572

Figure 9

Smaller Group	D	P-Value	Corrected
1	0.0864	0.696	
2	-0.0743	0.764	
Combined K-S	0.0864	0.993	0.988

Figure 10

Smaller Group	D	P-Value	Corrected
1	0.2062	0.184	
2	-0.1018	0.662	
Combined K-S	0.2062	0.367	0.288

Figure 11

Smaller Group	D	P-Value	Corrected
1	0.6015	0.000	
2	0.000	1.000	
Combined K-S	0.6015	0.000	0.000

Figure 12

Smaller	D	P-Value	Corrected

Group			
1	0.0736	0.247	
2	-0.0081	.983	
Combined K-S	0.0736	0.486	0.444

Figure 13

Smaller Group	D	P-Value	Corrected
1	0.0667	0.890	
2	-0.2762	0.135	
Combined K-S	0.2762	0.268	0.190

Figure 14

Smaller Group	D	P-Value	Corrected
1	0.1690	0.563	
2	-0.1875	.493	
Combined K-S	0.1875	0.872	0.803

Figure 15

Smaller Group	D	P-Value	Corrected
1	0.0894	0.620	
2	-0.1245	0.396	
Combined K-S	0.1245	0.744	0.676

Figure 16

Smaller Group	D	P-Value	Corrected
1	0.1731	0.320	
2	-0.2028	0.210	
Combined K-S	0.2028	0.416	0.328

Figure 17

Source	SS	df	MS
Model	208.044444	2	104.022222
Residual	194.902924	16	12.1814327
Total	402.947368	18	22.3859649

Number of obs = 19
F(2, 16) = 8.54
Prob > F = 0.0030
R-squared = 0.5163
Adj R-squared = 0.4558
Root MSE = 3.4902

num_divorce	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
post_ten1	-1.177778	3.207264	-0.37	0.718	-7.976874	5.621318
div_gr1	-.5087719	.292376	-1.74	0.101	-1.128581	.1110375
_cons	24.28655	5.962129	4.07	0.001	11.6474	36.9257

Figure 18

Source	SS	df	MS	Number of obs =	40
				F(2, 37) =	10.99
Model	286.994519	2	143.49726	Prob > F =	0.0002
Residual	483.005481	37	13.0542022	R-squared =	0.3727
				Adj R-squared =	0.3388
Total	770	39	19.7435897	Root MSE =	3.6131

num_divorce	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
post_ten1	-7.879474	2.205515	-3.57	0.001	-12.34827	-3.410676
div_gr1	.133557	.0936013	1.43	0.162	-.0560973	.3232114
_cons	11.41387	1.383063	8.25	0.000	8.611518	14.21622

Table 1

Year	Pr(*Div*|*Marr*)	N_t	T_t
0	0	0	1000
1	.02	20	1000
2	.0302	29	980
3	.0321	34	951
4	.0462	29	917
5	.0347	27	888
6	.0658	48	861
7	.0731	47	813
8	.0534	30	766
9	.0587	30	736
10	.0564	26	706
11	.0572	24	680
12	.0498	12	656
13	.0597	21	637
14	.0500	16	616
15	.0608	18	600
16	.0778	21	582
17	.0292	7	561
18	.0479	11	554
19	.0466	10	543
20	.0598	12	533