Desperate vs. Deadbeat: Can We Quantify the Effect of the Bankruptcy Abuse Prevention and Consumer Protection Act of 2005?

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Desperate vs. Deadbeat: Can We Quantify the Effect of the Bankruptcy Abuse Prevention and Consumer Protection Act of 2005?

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I. Introduction

For decades, personal bankruptcies increased in the U.S., either reflecting growing economic distress of families or a declining stigma associated with filing for bankruptcy. In a nod to the latter argument, the U.S. Congress passed the Bankruptcy Abuse Prevention and Consumer Prevention Act of 2005 (BAPCPA), after bankruptcies had grown to record high rates.

The assumption was that with the new law many if not most bankruptcies would eventually disappear since they supposedly were the result of a "bankruptcy of convenience". Hence, the U.S. bankruptcy rate – number of cases to the number of households – could be expected to fall to levels that were evident before bankruptcy presumably lost its stigma, in particular the 1980s.

The new law introduced two changes to shrink supposedly unnecessary filings. Bankruptcy filings became more costly and more filers fell under Chapter 13 than before, which meant that fewer debts were cancelled for debtors than was the case prior to BAPCPA. Higher costs of and fewer economic benefits from filing bankruptcy should have reduced the total number of filings.

The U.S. bankruptcy rate fell indeed sharply after the law went into effect in late 2005. It increased quickly again afterwards, though. By the end of 2007, the U.S. bankruptcy rate exceeded all levels recorded during the 1980s, approached the levels prevalent during the early 1990s, and exceeded more than half of the level before passage of the new law.

However, how much of these changes resulted from BAPCPA and what was attributable to other factors? The economy deteriorated after 2005, which could have contributed to an increase in the U.S. bankruptcy rate. The gap between the actual rate and where it would have been without the new law in 2007 could thus be relatively large. Alternatively, it is possible that absent the law, the bankruptcy rate would have leveled off or even declined, due to, for instance, improved economic conditions in 2004 and 2005 and a lagged impact of the economy on the U.S. bankruptcy rate. In this scenario, the actual rate could have been fairly close to the level of the U.S. bankruptcy rate that would have prevailed in 2007 if the bankruptcy code had not changed.

Our goal is thus to establish a benchmark level of the U.S. bankruptcy rates after 2005 that likely would have been observed, if the law had not changed. We then compare the actual U.S. bankruptcy rate to the benchmark for 2007 to provide a sense of the effectiveness of BAPCPA.

We proceed in three steps. We first analyze if there was a structural break in the U.S. bankruptcy rate in 2005 or 2006. Second, we analyze if the level of the U.S. bankruptcy rate shifted, the trend growth rate changed, or both level and trend changed after the break. Third, we forecast the U.S. bankruptcy rates for 2007 based on a forecasting model derived from data observed before the break and compare the actual U.S. bankruptcy rates to the predicted U.S. bankruptcy rates.

Our research adds to the existing literature in a number of important ways. This is the first study, to our knowledge, that provides a benchmark U.S. bankruptcy rate, to which the actual rate after the passage of the law can be compared, offering a first glimpse of the impact of BAPCPA. In this vein, this is also the first study, to our knowledge, that systematically studies, if there was indeed a structural break in the data associated with BAPCPA. And, we study bankruptcy trends

after the passage of BAPCPA to see if the break constituted a break just in the level of the bankruptcy rate or if it also constituted a shift in the trend of the U.S. bankruptcy rate.

The rest of the paper proceeds as follows. Section II provides an overview of the relevant literature, including the legal changes in 2005. A few summary figures are provided as background for our subsequent discussion in section III. Section IV presents the empirical model design, section V the results of our empirical analysis, and section VI a few concluding remarks.

II. Literature Survey

Proponents of changing the bankruptcy code in 2005 wanted to reduce what they perceived as abuse of the bankruptcy system in the U.S. (Grassley, 2005; Zywicki, 2005; NACBA, 2006). It was specifically expected that higher costs and fewer benefits would lead fewer people to file for bankruptcy and that the share of Chapter 13 filings would increase.

The new law was meant to provide debtors less relief from their debts. The U.S. law distinguishes between two Chapter 7 and Chapter 13 bankruptcy filings. Under a Chapter 7 filing, most debts are cancelled, except for child support, taxes and student loans, after all of a debtor's assets, except those that his or her state exempts, are liquidated and distributed among his or her creditors. In addition, if someone wants to keep a home or a car, any outstanding mortgage or loan must be paid. Also, many people who file under Chapter 7 tend to have assets that are exempt from liquidation, such as the equity in a vehicle and home within limits and public benefits accumulated in a bank account (Sahadi, 2005; Mann, 2005). In a Chapter 13 filing, debtors are instead put on a repayment plan that lasts up to five years. Not until the end of the repayment plan are any remaining unpaid debts canceled, again except for child support, taxes, and student loans. Keeping a home or a car in Chapter 13 requires the loan to be paid.

The new law made bankruptcy filings more costly. Prior to BAPCPA, a debtor had to pay $209 when filing for a Chapter 7 bankruptcy and $194 for a Chapter 13 bankruptcy. In 2006, a debtor must pay $299 at the time of filing for a Chapter 7 bankruptcy and $274 for a Chapter 13 bankruptcy (AOUSC, 2006). Several additional changes almost doubled the attorney and staff time needed for a case (Weiss, 2007) – costs that are passed on to clients as higher filing fees.

The legal changes included several additional hurdles for filers (GAO, 2007; Lawless and Warren, 2006; Mann, 2005; NACBA, 2006). Debtors had to pass a new means test that made it harder to qualify for a Chapter 7 filing (Gerdano, 2005). Filers also must complete a credit counseling course during the six months before filing, a credit education course or money management classes at their expenses and produce more documents in support of their case (Gerdano, 2005). Furthermore, BAPCPA changed the homestead exemption. Before October 2005, the state in which a petitioner filed for bankruptcy determined the amount of home equity that was protected. Now, a federal standard puts more limits on the amount of home equity that a state can protect (Gerdano, 2005).

Opponents of the law, however, contended that the changes would have little impact on separating debtors who were filing because of circumstances like a medical catastrophe from the few who were filing because they spent irresponsibly (Warren, 2005; Sommer, 2007). In fact, the

evidence suggested that the economic circumstances of filers had deteriorated over time (Sullivan, Warren and Westbrook, 2006). Also, the National Association of Consumer Bankruptcy Attorneys (NACBA, 2006a) concluded that only 8.1% of attorneys found that discretionary spending was one of the top two reasons their clients were forced to file for bankruptcy and that that credit counseling firms reported that on average 79% of their clients were filing for bankruptcy because of circumstances beyond their control (NACBA, 2006b).

Other analyses find that macroeconomic trends and a filer's ability to pay are more likely determinants of bankruptcy than legal regulation.[1] Personal bankruptcies generally seem to be a function of unemployment, income growth, debt levels, especially credit card debt, and medical expenditures, particularly those due to a lack of health insurance coverage (Himmelstein et al., 2006; Mann, 2005; Sullivan, Warren, and Westbrook, 2006).

There has not been much research on the effect of the new law. One of the first academic studies on this subject (Lawless, 2007) concluded that BAPCPA may actually result in more consumer credit, especially credit card debt, which could delay the onset of bankruptcy filings. Indeed, roughly coincident with the enactment of the new law, credit card debt started to expand faster in early 2006 after its growth had been remarkably slow for several years (Westrich and Weller, 2008). Thus, the decline in U.S. bankruptcy rates after 2005 may be explained by more credit card borrowing at the same time.

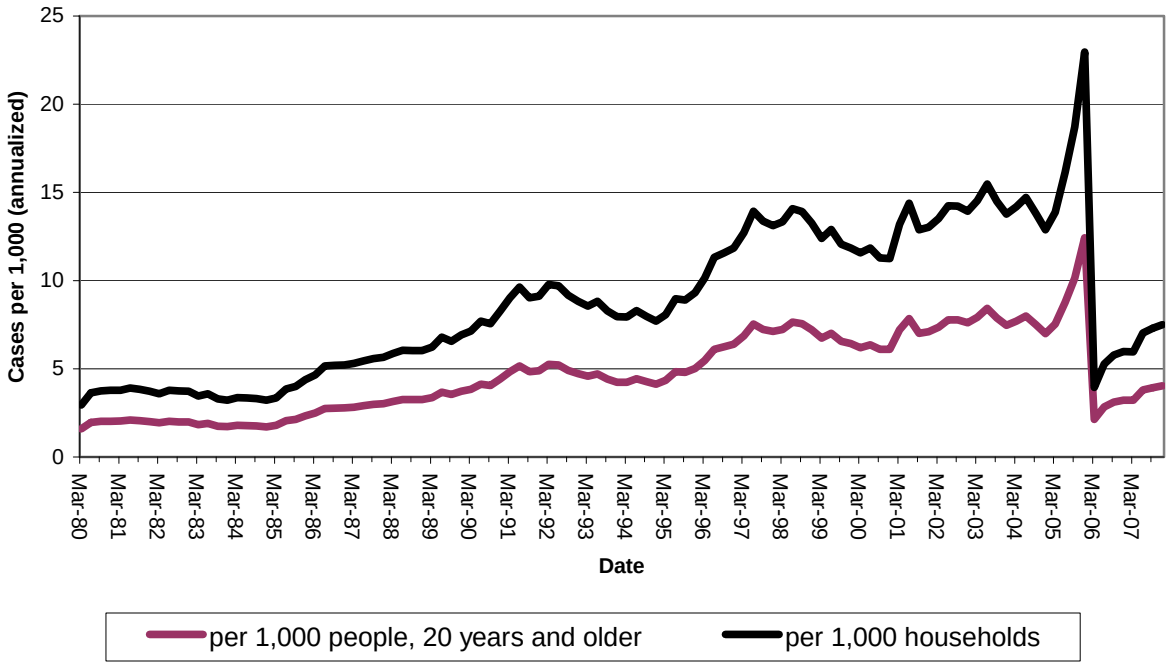
III. Background

The U.S. bankruptcy rate is the sum of all Chapter 7 and Chapter 13 filings in all 50 states, the District of Columbia, Guam, the Northern Mariana Islands, Puerto Rico, and the Virgin Islands in a given quarter to the number of households (Census, 2008a). This ratio is then annualized. We have data on bankruptcy filings on a quarterly basis, but observations for the number of households in the U.S. exist only on an annual basis. We thus interpolate the number of households in the U.S. for the missing quarters. Missing observations for 2007 are extrapolated. Alternatively, we divide the number of total filings to the adult population, defined as the population 20 years and older for the U.S., to test for the robustness of our results.

By the fourth quarter of 2007, the rate of total filings per 1,000 households had risen to an annualized 7.5 filings, up from 3.9 Chapter 7 and Chapter 13 filings per 1,000 households in the first quarter of 2006, immediately after implementation of the new law (Figure 1). The U.S. bankruptcy rate in the fourth quarter of 2007 was at 58.2% of the rate in the fourth quarter of 2004, which is the last quarter that was undoubtedly unaffected by the impending legal changes.

[1] For a review of the relevant literature see Lawless (2007).

Figure 1: U.S. Bankruptcy Rates Relative to Different Population Measures, March 1980 to December 2007



Notes: Aggregated data of state-by-state filings. Sources are the AOUSC (2008) and Census (2008a, 2008b).

We want to compare the actual bankruptcy rate with the rate that would have occurred if the law had not changed. We conduct a simple calculation to see how these two might compare. We first assume that, absent the legal changes, bankruptcy rates in 2005 had stayed at the level of December 2004, the last quarter that was unaffected by BAPCPA. We then assume that the additions to the bankruptcy rate in 2005 above the level of the fourth quarter of 2004 would not have occurred in 2005 without BAPCPA, but that they instead would have happened in 2006 and 2007. We add those bankruptcy filings to the ones that actually occurred in 2006 and 2007 and spread them out, so that the U.S. bankruptcy rate in 2006 and 2007 would have been constant. Following this procedure, Figure 2 shows that by the end of 2007 the bankruptcy rate would have been at about 60% of the bankruptcy rate in 2004.

Figure 2: Actual and Hypothetical U.S. Bankruptcy Rates Relative to Different Population Measures, March 1980 to December 2007

Notes: Authors' calculations. See text for details.

We also consider if there had been a shift from Chapter 7 filings to Chapter 13 filings. To simplify our discussion, we only consider Chapter 13 filings. If we find that the gap between actual and expected Chapter 13 filings was smaller than the difference between actual and expected total filings in 2007, it would indicate that there was a shift from Chapter 7 to Chapter 13 filings. Our calculations, not shown here, indicate that by the end of 2007, the Chapter 13 rate stood at 76.6% of its level at the end of 2004[2] – a much smaller gap than for the total U.S. bankruptcy rate, thus there may have been a shift towards Chapter 13 filings after 2005.

We want to make sure that our conclusions are not overly influenced by the trends in a few states and thus perform similar analyses for all 50 states and the District of Columbia as we do for the national bankruptcy rate. This requires two adjustments, though. First, we have fewer complete observations for the number of households for each state than for the entire U.S. since a number of years are missing. Missing household observations are interpolated, if less than two years of observations are missing. If household data are missing for more than two years, the number of households is calculated by dividing the total population in each state by the national ratio of people per household for the respective quarter. Second, the adult population is defined as the population 18 and older for each state instead of the population 20 and older.

[2] Authors' calculations based on U.S. Courts (2008) and Census (2007).

We present summary statistics on the bankruptcy rates for each state after 2005 in Table 1. The bankruptcy rate in the fourth quarter of 2007 to the rate in the fourth quarter of 2004 averaged 59% across all states -- close to the 58.2% for the aggregate U.S. ratios. The ratios of the new rate to the old rate are also not widely dispersed, indicating that our calculations reflect trends across a wide swath of states.

Bankruptcy rates, though, increasingly vary over states (Table 1). At the end of 2004, the highest bankruptcy rate, for instance, was 24.8 filings per 1,000 households in Iowa, while the lowest rate was less than one-fourth of that with 5.7 filings per 1,000 households in Vermont. The relative dispersion increased after BAPCPA went into effect as the highest bankruptcy rate was more than six times larger than the lowest rate in the fourth quarter of 2007.

Finally, there is a shift towards Chapter 13 filings (Table 1). Specifically, the rate of Chapter 13 filings at the end of 2007 typically amounted to between 79% and 95% of the ratio at the end of 2004. This is a larger overlap and smaller gap with the previous levels than was the case for the total bankruptcy rate, which indicates a move towards Chapter 13 filings after 2005.

Table 1
Summary Statistics of State Level Bankruptcy Rates in 2004 and 2007

	Fourth quarter, 2004		Fourth quarter, 2007		Ratio of 4th quarter 2007 to 4th quarter, 2004	
	Filings per 1,000 households (annualized)	Filings per 1,000 people 18 years and older (annualized)	Filings per 1,000 households (annualized)	Filings per 1,000 people 18 years and older (annualized)	Filings per 1,000 households (annualized)	Filings per 1,000 people 18 years and older (annualized)
Total filings						
Average	13.2	6.7	7.7	3.6	59	54
Median	12.4	6.3	6.9	3.1	59	55
Maximum	24.8	12.2	19.4	8.9	95	86
Minimum	5.7	2.8	2.6	1.2	26	25
Chapter 13						
Average	3.5	1.8	2.9	1.3	94.5	87.8
Median	2.9	1.5	2.1	1.0	85.5	79.1
Maximum	13.3	6.6	12.3	5.6	369.8	350.8
Minimum	0.5	0.2	0.4	0.2	15.9	15.2

Notes: Authors' calculations based U.S. Courts (2008) and Census (2008a, 2008b). Bankruptcy rates are annualized filings per 1,000. Ratios are in percent. Average and median are unweighted.

IV. Modeling U.S. Bankruptcy Rates

We construct both univariate and multivariate models for U.S. bankruptcy rates using the time period from the first quarter of 1980 to the fourth quarter of 2007. We use these models for two

purposes. First, we test if the U.S. bankruptcy rates had a break point in 2005 or 2006. If so, we investigate when exactly this break occurred and how the U.S. bankruptcy rates behaved after the structural break. In particular, we want to know if the level of U.S. bankruptcy rates shifted, if their trend changed, or if both level and trend changes occurred simultaneously.

Second, we build univariate and multivariate models to forecast the U.S. bankruptcy rates after the implementation of BAPCPA. Consequently, we do not include the period after 2005 in our modeling exercise. Observations that occurred in 2006 and 2007 are therefore used to evaluate post-sample forecasts. This post-sample evaluation is one goal of this research.

IV.1 Univariate Tests for Structural Breaks

We first use a univariate procedure to test for potential structural breaks. Our univariate analysis is an augmented unit root test (Perron, 1989; Zivot and Andrews, 1992). This test allows for a break in the level, in the trend or changes in the level and the trend after the suspected break point, while simultaneously testing for the stationarity of the U.S. bankruptcy rate.[3] In each instance, this test compares the fit of our model before and after the suspected break point, which allows us to identify the structural break point. In this investigation, we not only consider when there was a break point, but also how the bankruptcy rate behaved after the break point. Specifically, we consider if the trend changed, the level differed or both trend and level changed after the break point.

Subsequently, we also use a multivariate model to test for a potential structural break. We develop a regression model that accounts for the relevant aggregate factors that typically determine U.S. bankruptcy rates – unemployment, income, credit card debt, and health insurance coverage. We again compare the fit of the model before the suspected break with the fit of the model after the suspected break to identify the exact point of the structural break.

In all of our analyses, we consider only if there was a structural break in the bankruptcy rate during 2005 or 2006. Theoretically, it was possible that the series had a break in the first quarter of 2005, when the changes to the bankruptcy code were first debated, in the second quarter of 2005, when the law was enacted, in the fourth quarter of 2005, when the law went into effect, or in 2006, the first full quarter, after the law went into effect.

The unit root test with structural break was developed by Perron (1989). It is a test to confirm an exogenously given structural break point. The basic design uses three different regression analyses, depending on whether a researcher wants to confirm a shift in the level of the data series (model A, equation (1)), a change in the trend (model B, equation (2)), or both (model C, equation (3)):

$$y_t = \hat{\mu}^A + \hat{\theta}^A DU_t + \hat{\beta}^A t + \hat{d}^A D(T_B)_t + \hat{\alpha}^A y_{t-1} + \sum_{j=1}^{k} \hat{c}_j^A \Delta y_{t-j} + \hat{\varepsilon}_t \qquad (1)$$

[3] Both an augmented Dickey-Fuller test and the expanded method suggested by Perron (1989) confirm that the two bankruptcy series are not stationary.

$$y_t = \hat{\mu}^B + \hat{\beta}^B t + \hat{\gamma}^B DT_t^* + \hat{\alpha}^B y_{t-1} + \sum_{j=1}^{k} \hat{c}_j^B \Delta y_{t-j} + \hat{\varepsilon}_t \quad (2)$$

$$y_t = \hat{\mu}^C + \hat{\theta}^C DU_t + \hat{\beta}^C t + \hat{\gamma}^C DT_t^* + \hat{d}^C D(T_B)_t + \hat{\alpha}^C y_{t-1} + \sum_{j=1}^{k} \hat{c}_j^C \Delta y_{t-j} + \hat{\varepsilon}_t \quad (3)$$

The superscripts and subscripts "A", "B", and "C" refer to the respective models A, B, and C. All Greek letters represent parameters to be estimated, and ε_t is an error with spherical properties. The "hats" over the parameters are in keeping with the notation of Perron (1989) and Zivot and Andrews (1992) and denote the difference between the parameter's of the original theoretical models A, B, and C, and the implemented parameters of the augmented test for stationarity in equations (1), (2), and (3).

In these specifications, $D(T_B)_t$ is equal to 1 if $t=T_B+1$ and 0 otherwise, i.e. this is an indicator variable for the exogenously determined structural break or a "crash" (Perron, 1989). In addition, $DU_t=1$ if $t>T_B$ and 0 otherwise, making this an indicator variable for a change in the trend of the series after the exogenous structural break. And finally, $DT_t^*=t-T_B$ if $t>T_B$ and 0 otherwise. This is therefore the indicator variable for the entire period after the exogenous structural break.

The *k* lagged differenced terms are added in this model to reduce serial correlation in the error term. The number of *k* lagged values is determined, such that all lags are included before subsequent lags become statistically insignificant based on a standard t-test.

Based on these three models, Perron (1989) tests for a unit root. The following t-statistic is calculated in the standard fashion:

$$t_{\hat{\alpha}^i}(\lambda) \qquad i=A, B, C \qquad (4)$$

where $\lambda=T_B/T$

or the share of time when the structural break occurs. This test statistic has $k_\alpha(\lambda)$ as the critical value for the distribution of the test statistic in (4) for a fixed λ. Furthermore α_i refers to the estimate for the coefficient on the lagged value of the dependent variable in models A, B, and C.

The null hypothesis of a unit root is rejected, when

$$t_{\hat{\alpha}^i}(\lambda) < k_\alpha(\lambda)$$

If the null hypothesis of a unit root is not rejected, the series is not stationary. In turn, the additional variables allow the researcher to investigate if there is a structural break in the data and if the structural break is associated with a shift in the level, a change in the trend or both.

Since it is unclear a priori when exactly in 2005 or 2006 the structural break should have occurred, the testing method for an endogenous structural break, rather than an exogenously

determined one is more appropriate. Specifically, we use the extension of Perron's (1989) model by Zivot and Andrews (1992) to test for endogenous structural breaks:

$$y_t = \hat{\mu}^A + \hat{\theta}^A DU_t(\hat{\lambda}) + \hat{\beta}^A t + \hat{\alpha}^A y_{t-1} + \sum_{j=1}^{k} \hat{c}_j^A \Delta y_{t-j} + \hat{e}_t \qquad (1')$$

$$y_t = \hat{\mu}^B + \hat{\beta}^B t + \hat{\gamma}^B DT_t^*(\hat{\lambda}) + \hat{\alpha}^B y_{t-1} + \sum_{j=1}^{k} \hat{c}_j^B \Delta y_{t-j} + \hat{e}_t \qquad (2')$$

$$y_t = \hat{\mu}^C + \hat{\theta}^C DU_t(\hat{\lambda}) + \hat{\beta}^C t + \hat{\gamma}^C DT_t^* + \hat{\alpha}^C y_{t-1} + \sum_{j=1}^{k} \hat{c}_j^C \Delta y_{t-j} + \hat{e}_t \qquad (3')$$

Equations (1'), (2') and (3') use the same notations as equations (1), (2), and (3) to refer to models A, B, and C.

The primary difference is that the "crash" indicator is no longer valid since the focus is on a range of periods and not on an exogenously given date. Also, the changes in the intercept and in the trend of the series are now dependent on the endogenous break point. Specifically, $DU_t(\lambda)=1$ if $t>T\lambda$ and 0 otherwise and $DT_t^*=t-T\lambda$ if $t>T\lambda$ and 0 otherwise. The endogenous break point is chosen by minimizing the one-sided test statistic, assuming that small values of the test statistic lead to rejection of the null hypothesis. If the indicator variables for changes in the intercept, the trend or both are statistically significant in a regression that minimizes this test statistic, the series has a structural break point.

We first test if there is an endogenous break point in 2005 or 2006 and then test for the robustness of our results by treating the structural break point as exogenous using Perron's (1989) original methodology.

The test results for endogenous breaks reported in Table 2 identify the second and the fourth quarter of 2005 as possible break points, depending on the model specification. The fourth quarter of 2005 shows up as structural break if we include an indicator for a possible shift in the intercept or for a shift in the intercept combined with a change in the slope. The second quarter of 2005, though, becomes the break point, when we allow only for a trend change (Table 2).

We also conclude that there may have been a shift towards Chapter 13 filings (Tables 2 and 3). Models 1' and 3' suggest a structural break in the third quarter of 2005, while model 2' shows no break. If there was no break in the series, it would, combined with a falling U.S. bankruptcy rate, suggest a shift towards Chapter 13 filings.

Table 2
Coefficients for Endogenous Structural Breaks Based on Unit Root Tests of U.S. Bankruptcy Rates

Coefficients	Model A (Shift in intercept)	Model B (Change in trend)	Model C (Shift in intercept and change in trend)
Bankruptcy cases to population, 20 and over			
Break point	4th quarter 2005	2nd quarter 2005	4th quarter 2005
Post-break level dummy	-4.679***		-6.257***
($DU_t(\lambda)$)	(0.383)		(0.521)
Post-break slope change		-0.452***	0.491***
(DT_t^*)		(0.086)	(0.118)
Bankruptcy cases to households			
Break point	4th quarter 2005	2nd quarter 2005[a]	4th quarter 2005
Post-break level dummy	-8.635***		-11.535***
($DU_t(\lambda)$)	(0.704)		(0.958)
Post-break slope change		-0.836***	0.902***
(DT_t^*)		(0.158)	(0.218)
Chapter 13 filings to population, 20 years and older			
Break point	3rd quarter 2005	1st quarter 2005[c]	3rd quarter 2005
Post-break level dummy	-0.399***		-0.581***
($DU_t(\lambda)$)	(0.077)		(0.091)
Post-break slope change		-0.018	0.051***
(DT_t^*)		(0.012)	(0.015)
Chapter 13 filings to number of households			
Break point	3rd quarter 2005	1st quarter 2005[c]	3rd quarter 2005
Post-break level dummy	-0.733***		-1.075***
($DU_t(\lambda)$)	(0.143)		(0.169)
Post-break slope change		-0.032	0.094***
(DT_t^*)		(0.022)	(0.028)

Notes: Analyses based on quarterly data from 1980-II to 2007-IV. Lag structure – one lag – is selected using methodology described in Perron (1989). *** indicates significance at the 1%-level, ** indicates significance at the 5%-level and * indicates significance at the 10%-level. [a] indicates that model is inferior to both alternative specifications at 1%-level and [c] indicates that model is superior to specification with level and slope post-break dummies at the 5%-level.

Further, we treat the identified possible breaks as exogenously given and use Perron's (1989) methodology to confirm that the previously identified periods constitute structural breaks (Table 3). The tests confirm the structural breaks. This is true for the total U.S. bankruptcy rate as well as for the rate of Chapter 13 filings.

Table 3
Coefficients for Exogenous Structural Breaks Based on Unit Root Tests of U.S. Bankruptcy Rates

Variables	Model A (Shift in intercept)	Model B (Change in trend)	Model C (Shift in intercept and change in trend)
Bankruptcy cases to population, 20 and over			
Exogenous break point	4th quarter 2005	2nd quarter 2005	4th quarter 2005[b]
Post-break level dummy	-10.210***		-10.712***
(DU_t)	(0.737)		(0.871)
Post-break slope change		-0.452***	-0.096
(DT_t*)		(0.086)	(0.089)
Bankruptcy cases to households			
Exogenous break point	4th quarter 2005	2nd quarter 2005	4th quarter 2005[b]
Post-break level dummy	-18.912***		-19.841***
(DU_t)	(1.366)		(1.615)
Post-break slope change		-0.836***	-0.177
(DT_t*)		(0.158)	(0.165)
Chapter 13 filings to population, 20 years and older			
Exogenous break point	3rd quarter 2005	1st quarter 2005[c]	3rd quarter 2005
Post-break level dummy	-0.319***		-0.722***
(DU_t)	(0.078)		(0.124)
Post-break slope change		-0.018	0.068***
(DT_t*)		(0.012)	0.018)
Chapter 13 filings to number of households			
Exogenous break point	3rd quarter 2005	1st quarter 2005[c]	3rd quarter 2005
Post-break level dummy	-0.587***		-1.343***
(DU_t)	(0.145)		(0.229)
Post-break slope change		-0.032	0.127***
(DT_t*)		(0.022)	(0.033)

Notes: Analyses based on quarterly data from 1980-II to 2007-IV. Lag structure selected using methodology described in Perron (1989). *** indicates significance at the 1%-level, ** indicates significance at the 5%-level and * indicates significance at the 10%-level. [b] indicates that specification is superior at the 1%-level to both alternative specifications and [c] indicates that model is superior to specification with level and slope post-break dummies at the 5%-level.

An analysis of state level data, as summarized in Table 4, similarly shows two possible break points.[4] The summary information shows that models A and C, both of which include a shift in the level of the bankruptcy rates, have a structural break in the fourth quarter of 2005. In comparison, our summary results for model 2', which includes only a change in the trend of the bankruptcy rates, again shows a break point in the first quarter of 2005.

[4] We do not report results on Chapter 13 rates by state separately. Our unreported results on Chapter 13 rates show that the results for the national Chapter 13 rate are robust. Additional information is available from the authors.

Table 4
Tests for Unit Root of Bankruptcy Rate with Endogenous Structural Breaks, by State

State	Model 1' (Shift in intercept)	Model 2' (Change in trend)	Model 3' (Shift in intercept and change in trend)
Bankruptcy filings to number of households			
Most frequent break point	4th quarter 2005 (46)	1st quarter 2005 (23)	4th quarter 2005 (35)
Model comparison			
Model A vs. Model B (A/B)	33/1		
Model B vs. Model C (B/C)		0/39	
Model A vs. Model C (A/C)			6/4
Bankruptcy filings to population 18 years and older			
Most frequent break point	4th quarter 2005 (49)	1st quarter 2005 (24)	4th quarter 2005 (39)
Model comparison			
Model A vs. Model B (A/B)	35/4		
Model B vs. Model C (B/C)		0/36	
Model A vs. Model C (A/C)			2/2

Notes: Figures in parentheses are the number of instances, when the break point was statistically significant. For the summary of the model comparison, the number of instances, where the specified model is superior, is listed.

Our results indicate two possible structural breaks in 2005, depending on the model. Economic theory does not provide guidance on which model is preferable. We consequently compare each model's fit with the fit of the other two models by comparing the residual variances of each model. The ratio of the residual variances – with the larger variance in the numerator and the smaller one in the denominator -- has a F-distribution. The degrees of freedom are equal to the number of observations minus the number of estimated parameters.

Comparing the models' fits with each other for the Zivot and Andrews (1992) methodology, as we do in Tables 2 and 4, we find that model B, which only includes a possible change in the trend, is an inferior model to the two models that allow for a shift in the intercept. Our tests, though, show no differences between models A and C. This leaves us to conclude that the structural break occurred with the fourth quarter of 2005, that there was a downward shift in the U.S. bankruptcy rate after the implementation of BAPCPA, but that there may have been an acceleration in the growth rate of the bankruptcy rate as well. These conclusions are supported by our tests for endogenous breaks in each state (Table 4).

When we use Perron's (1989) test for exogenous breaks for the national bankruptcy rate (Table 3), we find that model 2 is again inferior to models 1 and 3, but we also find that model 3 is superior to model 1 in determining the structural break. The coefficient for the change in the slope in model 3, though, is not statistically significant. These results indicate a shift in the level of the bankruptcy rate, but no change in the growth rate after BAPCPA was implemented.

We also compare the fit of the three possible models for the rate of Chapter 13 filings. Here, we find that model 2' is statistically superior to model 1' and that models 1' and 3' are indistinguishable to each other. With model 2' offering the best fit for the trends in the chapter 13 filing rate, we conclude that there was no structural break for the ratio of Chapter 13 filings to the number of households and to the adult population (Tables 2 and 3). Combined with the result that there was a downward shift in the total bankruptcy rate at the same time, we can also conclude that there was a substantial shift towards Chapter 13 filings after BAPCPA.

IV.2 Multivariate Tests for Structural Breaks

We also take a multivariate approach to model a potential break in 2005 or 2006. We specify the bankruptcy rate as a function of the unemployment rate, the outstanding amount of credit card debt relative to personal disposable income, and the real per capita personal income. Since there is no a priori way to determine, at the aggregate level, if a petitioner will enter Chapter 7 or Chapter 13, we apply the multivariate model only to the total bankruptcy rate. Furthermore, the data availability is more limited at the state level than at the national level for a range of the variables, so we restrict our analysis to the national bankruptcy rate.

The unemployment rate is taken from BLS (2008), the ratio of credit card debt to personal disposable income is calculated from BOG (2008a, 2008b), and real per capita personal income is taken from BEA (2008). All series are integrated of order one, but all series are cointegrated, so that we proceed with estimating the regression using ordinary least squares (OLS). In all instances, we include six lags for the explanatory variables, determined by the Akaike Information Criterion. In an extension of our model, we include the share of the population without health insurance to show the robustness of our results, although this will limit our observations, since data on the share of the population without health insurance are only available from 1987 forward. The full regression model is thus defined as follows:

$$\left(\frac{BRF}{HH}\right)_t = \sum_{j=1}^{6}\left(\beta_{1j} UR_{t-j} + \beta_{2j}\left(\frac{CC}{PDI}\right)_{t-j} + \beta_{3j}\left(\frac{rPI}{Pop}\right)_{t-j} + \beta_{4j}\left(\frac{NoHI}{Pop}\right)_{t-j} + \beta_{5j}\left(\frac{BRF}{HH}\right)_{t-j}\right) + e_t \quad (5)$$

where *BRF* represents total Chapter 7 and Chapter 13 filings, *HH* is the number of households in the U.S., *UR* is the unemployment rate, *CC* is the total amount of outstanding credit card balances, *PDI* represents the personal disposable income, *rPI* is the real personal income, *Pop* is the total U.S. population, *NoHI* refers to the number of people without health insurance, and *e* is a randomly distributed error term, which is assumed to have the standard properties.

To identify a possible structural break, we separate the sample into two subsamples starting from the last observation and then gradually move the potential break one observation back in time. That is, our first break is the third quarter of 2006, our second break is the second quarter of 2006, our third break is the first quarter of 2006, and so on. We then calculate the F-statistic under the null hypothesis that the entire sample has the same structure. Since there are insufficient degrees of freedom to estimate the model after the break, the residual sum of squares of the unrestricted model is equal to the residual sum of squares of the model estimated before the break (Fisher, 1970). We identify the break as the period that has the lowest marginal significance in this test.

There was a robust structural break in the fourth quarter of 2005 (Table 5). This is true for bankruptcy filings relative to the number of households and filings to the adult population. It is also robust when we include the share of people without out health insurance in our regression.

Table 5
Multivariate Tests for Structural Break Points

	Without health insurance variable included		With health insurance variable included	
Break point	Bankruptcy cases to population 20 years and older	Bankruptcy cases to households	Bankruptcy cases to population 20 years and older	Bankruptcy cases to households
4th quarter 2006	6.498	6.426	2.484	2.468
	(0.00016)	(0.00017)	(0.07489)	(0.07666)
3rd quarter 2006	10.113	10.016	3.359	3.342
	(0.00000)	(0.00000)	(0.01491)	(0.01525)
2nd quarter 2006	15.344	15.212	5.891	5.871
	(0.00000)	(0.00000)	(0.00020)	(0.00021)
1st quarter 2006	24.143	23.951	11.131	11.108
	(0.00000)	(0.00000)	(0.00000)	(0.00000)
4th quarter 2005	**50.722**	**50.339**	**36.835**	**36.835**
	(0.00000)	**(0.00000)**	**(0.00000)**	**(0.00000)**
3rd quarter 2005	31.505	31.342	24.053	24.091
	(0.00000)	(0.00000)	(0.00000)	(0.00000)
2nd quarter 2005	22.528	22.450	27.855	27.978
	(0.00000)	(0.00000)	(0.00000)	(0.00000)
1st quarter 2005	21.903	21.873	27.163	27.285
	(0.00000)	(0.00000)	(0.00000)	(0.00000)

Notes: Table reports calculated F-statistic. Figures in parentheses are marginal significance levels.

IV.2 Developing a Forecasting Model

Our results confirm that there was a structural break in the bankruptcy rates that coincided with the implementation of BAPCPA. We now develop a forecasting model based on the data before the break. We reserve sufficient observations to conduct in-sample tests for the fit of our model. In particular, we use the data from the first quarter of 1980 to the last quarter of 2003 and of 2004 to develop the forecasting model. Observations through the end of 2005, when the structural break occurred, are used to conduct in-sample forecast tests.

As in the previous section, we use univariate and multivariate models for our forecasting exercise to ensure the robustness of our conclusions. Our univariate approach is Holt's non-seasonal smoothing model.[5] The seed value for the intercept is 0.7 and the seed value for the slope is 0.3. In addition, we use a multivariate forecasting model, based on a vector autoregression (VAR). The endogenous variables of this model are the bankruptcy rate, the unemployment rate, real per-capita GDP, credit card debt to disposable personal income, and, in

[5] We explored several different univariate forecasting methods. Holt's method addresses level and trend, which seemed to perform best of all the competitors.

an extension, the share of the population without health insurance. We already presented the data, sources, and variable definitions in our discussion of equation (5).

In Table 6 we summarize the test statistics for the comparison between the fit of the naïve, one-step forecast and that of our respective forecasting models. The first conclusion is that our forecast models are at least as good as a naïve forecasting model, especially the univariate model, as long as we do not include data for the second half of 2005 in our in-sample forecast. The second conclusion is that our forecast model performs better, when it is based on data through 2003 and does not include data for 2004. The third conclusion is that our multivariate model tends to be more appropriate for the rate of bankruptcy filings relative to the adult population than for the rate of bankruptcy filings relative to the number of households.

Table 6
Summary Statistics for In-Sample Forecasts

	Bankruptcy cases to number of households			Bankruptcy cases to population, 20 years of age and older		
Univariate forecast	Theil's U	RMSE (naïve)	RMSE (forecast)	Theil's U	RMSE (naïve)	RMSE (forecast)
Forecast model based on data through 2003, forecast for						
…4 quarters ahead	0.79	0.72	0.57	0.78	0.40	0.31
…6 quarters ahead	1.01	1.17	1.19	1.05	0.64	0.67
…8 quarters ahead	2.00	2.02	4.04	2.03	1.09	2.22
Forecast model based on data through 2004, forecast for						
…2 quarters ahead	1.50	1.75	2.64	1.51	0.95	1.43
…4 quarters ahead	2.41	2.77	6.66	2.42	1.49	3.61
Multivariate forecast						
Forecast model based on data through 2003, forecast for						
…4 quarters ahead	1.11	0.27	0.31	0.67	0.27	0.18
…6 quarters ahead	2.06	0.45	0.92	1.13	0.45	0.51
…8 quarters ahead	3.32	0.77	2.56	1.80	1.39	0.77
Forecast model based on data through 2004, forecast for						
…2 quarters ahead	2.16	0.67	1.46	1.17	0.67	0.79
…4 quarters ahead	3.36	1.06	3.55	1.81	1.06	1.92
	Chapter 13 to number of households			Chapter 13 filings to population, 20 years of age and older		
Univariate forecast						
Forecast model based on data through 2003, forecast for						
…4 quarters ahead	1.22	0.14	0.18	1.14	0.08	0.09
…6 quarters ahead	2.03	0.15	0.26	1.90	0.08	0.15
…8 quarters ahead	1.47	0.26	0.38	1.39	0.14	0.19
Forecast model based on data through 2004, forecast for						
…2 quarters ahead	1.38	0.15	0.21	1.37	0.08	0.11
…4 quarters ahead	0.81	0.33	0.27	0.81	0.18	0.15

Notes: See text for detailed description of data, data sources, and variable definitions. RMSE stands for root mean square error. The naïve model is a random walk forecast.

The multivariate models present an additional challenge because they include six lags of the U.S. bankruptcy rate. The forecasts for 2007 will hence be influenced by observations after the break occurred in 2005. This contradicts, however, our stated goal to estimate U.S. bankruptcy rates that would have occurred in 2007 without BAPCPA. One way to address this issue is to replace the actual U.S. bankruptcy rates with forecasted values.

We can use the decision rule laid out by Ashley (1983, 1985) to test if the inclusion of forecasted values for the explanatory variables improves the fit of the forecasting model.[6] Specifically, if the mean square error of the forecasted values, $MSE(X_{hat})$, is smaller than the variance of the actual values, VAR(X), the multivariate model with the forecasted explanatory variable is superior to the naïve one-step ahead forecasting model for the predicted U.S. bankruptcy rates.

The model we test compares the full multivariate model that includes forecasted values for the bankruptcy rate after 2003 or after 2004 as explanatory variables. We forecast the values for the bankruptcy rate for the in-sample forecast period by again using Holt's non-seasonal smoothing method with a seed value for the intercept of 0.7 and a seed value for the slope of 0.3. We have already shown in Table 6 that this forecasting model is especially appropriate for the quarters prior to the first half of 2005, especially if the forecasting model is based on data through 2003.

In Table 7, we present the mean square error of the forecasted variables and the variance of the actual variable. We indicate in each instance, whether the one-step ahead or the multivariate approach with a forecasted explanatory variable is preferable. The forecast for the bankruptcy rate provides the best fit, when the model is based on data through 2003 and the in-sample period ends before 2005. In this case, the multivariate approach, which includes forecasted values as explanatory variable, provides a better fit than the one-step ahead forecast model. When data for 2005 are included, the one-step ahead forecast offers a better fit than the multivariate method.

Table 7
Comparing Naïve and Non-Naïve Forecasts, Based on Forecasts as Inputs

	Without health insurance			With health insurance		
	Var(X)	$MSE(X_{hat})$	Preferred forecast	Var(X)	$MSE(X_{hat})$	Preferred forecast
Forecast model through the end of 2003						
4 quarters ahead	0.353	0.271	Non-naïve	0.353	0.240	Non-naïve
6 quarters ahead	1.204	1.470	Naïve	1.204	1.258	Naïve
Forecast model through the end of 2004						
4 quarters ahead	9.080	35.377	Naïve	9.080	34.451	Naïve

[6] Only results for the number of bankruptcy filings relative to households are shown. The results for bankruptcy filings relative to the population 20 years old and over are generally robust.

V. Comparing Forecast and Actual Bankruptcy Rates in 2007

In this section, we use the forecasting models that we developed in the previous section to estimate the level of the bankruptcy rate that would have prevailed if BAPCPA had not been passed in 2005 (Table 8). Our model selection indicated that, for the univariate case for the total U.S. bankruptcy rate, a model based on data through 2003 was more appropriate than a model based on data through 2004. Based on this model, we find that the actual bankruptcy rate was equal to 60.5% of the predicted number of filings to the number of households at the end of 2007. Moreover, our earlier results in Table 6 suggested that this model is an even better fit for forecasts of the bankruptcy cases to the adult population. In this instance, the actual bankruptcy rate in the fourth quarter of 2007 amounted to 61.5% of the rate that would have occurred without the introduction of BAPCPA.

We perform the same analysis based on a model derived from data through the end of 2004 (Table 8). This model provides a worse fit for our in-sample forecasts than the model based on data through 2003. In this case, we find that the actual bankruptcy rates equaled 80.2% to 80.3% of the predicted rate in the fourth quarter of 2007. A legitimate interpretation of our results is that the national U.S. bankruptcy rate in the fourth quarter of 2007 was no more than 40% below the rate that would have prevailed if the U.S. bankruptcy code had not been changed.

Our previous results in Table 6 indicate that, if anything, the forecast model based on data through 2004 provides a better fit than the model based on data through 2003 for predictions about the rate of Chapter 13 filings to the number of households and the adult population. Based on this model, we find that the actual rate of Chapter 13 filings was between 87.4% and 87.5% of the predicted rate at the end of 2007 (Table 8). In comparison, the model based on data through 2003 shows that the actual Chapter 13 rate equaled between 74.8% and 75.9% of the forecasted rate. Thus, the actual Chapter 13 rate was at least 13% below the level that would have been observed without the legal changes. Because this difference is substantially smaller than the gap for the total U.S. bankruptcy rate, our results support the hypothesis that there has been a shift from Chapter 7 to Chapter 13 filings after 2005.

Table 8
Comparison between Univariate Forecast and Actual Bankruptcy Rates

	1st quarter 2007	2nd quarter 2007	3rd quarter 2007	4th quarter 2007
Model based on data through 2003				
Actual				
Bankruptcy cases to households	5.96	7.04	7.30	7.50
Bankruptcy cases to population 20 years and older	3.22	3.80	3.94	4.04
Chapter 13 cases to households	2.53	2.64	2.91	2.96
Chapter 13 cases to population 20 years and older	1.37	1.42	1.57	1.59
Forecast				
Bankruptcy cases to households	12.73	12.63	12.52	12.41
Bankruptcy cases to population 20 years and older	6.79	6.72	6.65	6.59
Chapter 13 cases to households	3.99	3.98	3.96	3.95
Chapter 13 cases to population 20 years and older	2.13	2.12	2.11	2.10
Actual as percent of forecast				
Bankruptcy cases to households	46.8	55.8	58.3	60.5
Bankruptcy cases to population 20 years and older	47.4	56.5	59.2	61.4
Chapter 13 cases to households	63.4	66.4	73.3	74.8
Chapter 13 cases to population 20 years and older	64.2	67.2	74.3	75.9
Model based on data through 2004				
Forecast				
Bankruptcy cases to households	10.31	9.98	9.66	9.34
Bankruptcy cases to population 20 years and older	5.57	5.39	5.22	5.04
Chapter 13 cases to households	3.51	3.47	3.42	3.38
Chapter 13 cases to population 20 years and older	1.90	1.87	1.85	1.83
Actual as percent of forecast				
Bankruptcy cases to households	57.8	70.5	75.5	80.3
Bankruptcy cases to population 20 years and older	57.7	70.4	75.4	80.2
Chapter 13 cases to households	72.1	76.2	84.9	87.5
Chapter 13 cases to population 20 years and older	71.9	76.0	84.8	87.3

Notes: Bankruptcy rates are annualized number per 1,000. The ratio of actual to predicted rates are in percent.

We supplement our univariate forecasts with multivariate forecasts. Our earlier results in Table 6 showed that the model based on data through 2003 is appropriate for the rate of total filings to the number of households and the adult population and that the model based on data through 2004 is acceptable for the rate of filings to the adult population.

Table 9 summarizes our comparison between the actual and the predicted rates. Specifically, based on the model derived from data through 2003, we find that ratios of actual to predicted rates between 58.5% and 59.2%. Alternatively, the figures generated from the model through 2004 show ratios of actual to predicted rates between 67.2% and 71.8%.[7] Given that neither

[7] Only results for the number of bankruptcy filings relative to households are shown. The results for bankruptcy filings relative to the population 20 years old and over are robust but show a slightly larger difference between the actual and predicted bankruptcy rates in 2007. Details are available from the authors.

model is necessarily superior, we conclude that the actual bankruptcy rate was between 41% and 28% below the rate, where it would have been without the introduction of BAPCPA.

Table 9
Comparison between Multivariate Forecast and Actual Bankruptcy Rates

	1st quarter 2007	2nd quarter 2007	3rd quarter 2007	4th quarter 2007
Bankruptcy cases to households, actual	5.96	7.04	7.30	7.50
Model without health insurance				
Forecast, based on model through 2003	13.04	13.17	11.94	12.67
Forecast, based on model through 2004	11.21	11.23	9.92	10.44
Actual as percent of forecast, model through 2003	45.7	53.5	61.1	59.2
Actual as percent of forecast, model through 2004	53.1	62.7	73.6	71.8
Model with health insurance				
Forecast, based on model through 2003	12.88	13.16	12.08	12.83
Forecast, based on model through 2004	11.45	11.70	10.59	11.16
Actual as percent of forecast, model through 2003	46.3	53.5	60.4	58.5
Actual as percent of forecast, model through 2004	52.0	60.1	68.9	67.2

Notes: Bankruptcy rates are annualized number per 1,000. The ratio of actual to predicted rates are in percent.

We conduct our earlier univariate tests for all bankruptcy rates on a state-by-state basis. Table 10 summarizes our results. Based on a forecasting model formed from data through 2003, the average ratio of actual to predicted values across all states in 2007 is 50.7%, whereas the average ratio for a model based on data through 2004 is 59.6%. Furthermore, between four and 12 states had actual bankruptcy rates that were more than 75% above the predicted values in 2007, while only one state had a bankruptcy rate that was below 25% of the predicted value in 2007. Thus, the ratios are skewed towards higher values. These summary data suggest – in very general terms – that the bankruptcy rates in 2007 were approximately 40% and possibly a little more below the bankruptcy rates that would have occurred in 2007, if BAPCPA had not been passed.

The average Chapter 13 rate again comes much closer to the predicted values. Depending on the forecasting model, the average ratio of actual to predicted values of the Chapter 13 rate in 2007 was 83.5% or 83.9% (Table 10). Considering that the difference of the U.S. bankruptcy rate to the predicted rate may be at or even above 40%, this indicates a substantial shift from Chapter 7 to Chapter 13 filings after 2005.

Table 10
Ratio of Actual Bankruptcy Rate to Forecasted Rate, Average for 2007, By State

	Bankruptcy cases to number of households		Chapter 13 filings to number of households	
	Forecast model through 2003	Forecast model through 2004	Forecast model through 2003	Forecast model through 2004
Average (percent)	52.4	64.8	83.9	86.8
Standard deviation	0.28	0.30	0.49	0.52
Relative standard	0.54	0.46	0.58	0.60
Instances greater than 75%	4	12	18	21
Instances less than 25%	1	1	1	2

Notes: Outliers with values greater than 400% and less than zero are excluded from the analysis.

VI. Conclusion

In this paper, we study U.S. bankruptcy data to gain a sense of the effectiveness of the Bankruptcy Abuse Prevention and Consumer Protection Act of 2005.

Bankruptcy filings have been reduced by a significant number of cases. By the end of 2007, the total bankruptcy rate was about 40% below where it would have been without the law. The gap could likely persist but gradually shrink. In particular, our results indicate that the trend growth rate remained unchanged after the break. This suggests that it would take about 11 years for a gap of this magnitude to be closed – assuming that the expected level of bankruptcies stayed constant after 2007. Personal bankruptcy rates could rise further, especially since credit card debt, a significant leading indicator of U.S. personal bankruptcies, also increased after 2005.

This suggests several conclusions on the effectiveness of the new bankruptcy code. First, the hurdles for bankruptcy filings – higher costs and lower benefits – reduced the number of filings significantly and forced more filers to fall under more onerous rules. Second, the drop in the total U.S. bankruptcy rate still left the vast majority of U.S. bankruptcy cases intact. Our estimate of a drop of 40% in the U.S. bankruptcy rate two years after the law had passed is likely an upper bound. Other, less robust estimates show a gap of only 20%. Third, the U.S. bankruptcy rate continued to grow at least at the same rate after the law had been implemented as before. This may indicate that the new bankruptcy code will slowly shrink the gap to the old bankruptcy rate, especially if the new law had the impact of delaying the onset of bankruptcy filings. Future research will have to determine if that has been the case, when more observations post-BAPCPA have become available.

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