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Factors Affecting Chapter 12 Bankruptcy Filings in the United States:

A Panel Data Model

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Throughout the eighties and nineties, bankruptcy was a growth industry. For the twelve months ending December 31, 2001, overall filings in the United States were 1,492,129, a record for calendar year filings. Concern about this rapid growth has been evidenced by the formation of a National Bankruptcy Review Commission to study this problem as mandated by bankruptcy reform legislation in 1994. Congress has been toiling for more than five years to fashion bankruptcy reform legislation. As of this writing, it appears the bankruptcy reform legislation will not pass in 2002. Part of the recently defeated legislation would have made Chapter 12 (farm business reorganization) a permanent part of the Bankruptcy Code. When originally enacted in 1986, Chapter 12 came with a sunset provision and has been reenacted eight times with its next scheduled sunset on December 31, 2002.

Both Chapter 7 (straight liquidation) and Chapter 13 (consumer reorganization) annual case filings increased by at least four-fold from 1980 to 2001. In contrast, Chapter 12 annual filings spiked in 1987 and then stabilized and diminished over the nineties. Although not existing until November 1986, Chapter 12 had 6064 filings in 1987 and then subsequently decreased with the next highest year being 1988 with 2025 filings. As is clear in Figure 1 and Table 1, there has been a downward trend in annual Chapter 12 filings while rates for Chapters 7 and 13 have been explosive and Chapter 11 (business reorganization) filings have fluctuated with the business cycle.

The surge in overall bankruptcy filings is a major concern and has drawn the attention of researchers to investigate the occurrence. Buckley and Brinig, and Weiss, Bhandari and Robins have attempted to explain this phenomenon with econometric models. Buckley and Brinig observe that the 1984 Bankruptcy Code revisions strengthened the Code to fend off debtor opportunism under Chapters 7 and 13, yet filing rates tripled from 1984 to 1991. In their panel data model using annual observations from 1980-1991, Buckley and Brinig conclude that economic and legal factors were not likely major determinants of filing rate variation but that changes in social norms were more likely the causes. Weiss, Bhandari and Robins conclude somewhat differently that economic factors were important in explaining variation in bankruptcy filing rates using panel data from 1980 to 1992.

While prior analysis has sought to explain what causes variation in Chapter 7 and Chapter 13 filing rates, companion research has not been forthcoming on Chapter 12 filing rates. As argued by Shepard and Collins, one of the major goals of farm policy is to keep farm operators out of financial peril. However, from a policy perspective, there is scant research on predicting or forecasting the level of Chapter 12 filings and no modeling analysis on explaining why these rates vary from state-to-state and over time.

Since Chapter 12 is likely to become a permanent part of the Bankruptcy Code, it is important to understand what factors affect its filing rate. Both creditors and debtors could then better anticipate when it is likely to be used. Also, it is important to understand the changing dynamics of Chapter 12 filing since it is apparent that usage has declined even though the late nineties have not been as financially robust as the mid-nineties. Furthermore, agricultural policy and bankruptcy policy are intertwined with an understood goal of both being preservation of farms in times of financial stress.

In what follows, prior studies of bankruptcy and farm bankruptcies are reviewed with the intent of motivating an econometric model of Chapter 12 bankruptcy filing rates. Methods for estimating the model are presented along with the parameter estimates and their implications.

Basics of Farm Bankruptcy and Relevant Studies

Since 1898 bankruptcy law has offered two alternatives for insolvent farmers. Farm operators could completely liquidate all but exempt property and pay off debtors as best they could and get the so-called financial "fresh start" where almost all debt was forgiven. This is the essence of Chapter 7 as it exists today. Alternatively, farm debtors could reorganize with the hope of keeping the business going and paying off existing debts from future income but not under the more appealing conditions of Chapter 12 until November 26, 1986.

Until 1979 all farm bankruptcies were identified in documents filed by the bankruptcy petitioner regardless of the type of bankruptcy chosen. With the adoption of Bankruptcy Reform Act of 1978 (P.L. 95-598, 92 Stat. 2549), such recording ended with the reform implementation in 1979. Thus there have been no official tabulations of total farm bankruptcies since 1979. Chapter 12 became available on November 26, 1986, as a means for farmers to reorganize and continue the business with reduced debt loads and restructured payment schedules on secured debt. Thus there are records of how many farms have filed for Chapter 12 each year since 1986 to the present.

Chapter 12 requires that 50 percent of annual income the year prior to filing be from farming and on a regular basis. Total debt must be less than $1.50 million and 80 percent of this debt from farming. Farm operators have had continued access to three other bankruptcy chapters. There is every reason to believe that farms make use of these chapters with some frequency. Dixon, Flynn and Flaccus, based partially on the study by Matthews et al., argue that roughly half of all farm bankruptcies probably use Chapter 7 even with the existence of Chapter 12. Moreover, one can easily speculate that many consumers who coincidentally qualify as farmers under the minimal definition of farmer used by the National Agricultural Statistics Service use Chapter 13.[1] The fact that these consumers also qualify as farmers may be largely irrelevant if the vast majority of their income and debts are not farm related.

Chapter 12 filings have varied over both time and region. In terms of cases filed, 1987 was the high year with 6064 filings and 2001 the low year with only 382 filings (Table 1 and Figure 1). Using the old Economic Research Service farm production regions (Figure 2), the Northern Plains had the highest number of filings and the Northeast region the fewest. While the Northern Plains and Corn Belt were the highest filers through 1995, the Southern Plains edged out the Corn Belt after 1995 for the next three years. However, the Corn Belt has many more farms than the Northern and Southern Plains regions.

Table 2 reports Chapter 12 filings tabulated on a per farm basis. The rate for 1987 was 27.4 farms per 10,000 and this surpassed the previous high rate for the twentieth century of 12.35 in fiscal 1925. The Northern Plains region had the highest filing rate for the period 1986 through 2001. The peak rate was 78.43 farms per ten thousand farms in the Northern Plains in 1987. The Northern Plains, Mountain States and Delta have the overall highest rates over the life of Chapter 12. The Northeast and Appalachian regions had the lowest filing rates. Smaller farms and nearness to large metropolitan areas that provide employment opportunities tend to predominate

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[1] Basically the definition requires that the place of operation sell or be expected to sell at least $1000 dollars of agricultural products in a year.

in these regions and thus discourage the use of Chapter 12. But even these regions show considerable variation in filing rates over the years as is the case with all of the regions. Thus the question to be answered is why both regional and time variations have persisted.

Previous empirical studies of Chapter 12 have focused on the state-by-state analyses of petitioner filing data. These include studies by Faiferlick and Harl who examined Iowa farms filing in 1986 and 1987 as well as other studies of Indiana, South Dakota, and New York. All these studies are reviewed in Harl. Not surprisingly, the typical Chapter 12 debtor has large debts compared with assets. In the Iowa study the average age of the debtor was younger than financially strong farm operators. The Chapter 12 debtors also had larger farms than the financially secure farmers in Iowa.

The primary factor leading to a bankruptcy filing is the debtor's inability to pay current liabilities. Campbell and Dietrich, Lawrence, Smith and Rhoades, and Smith and Lawrence hypothesize the likelihood of default as a function of the ability of the borrower to make loan payments and the loan-to-value ratio. The latter factor is important since if the value of the asset drops below the balance remaining, default can be justified regardless of ability to pay. In their study of mortgage loan defaults, Campbell and Dietrich show the variation of debt default rate is significantly related to current as well as original loan-to-value ratios, payment-to-income ratio and the regional rates of unemployment during the 1960s and 1970s. Lawrence, Smith and Rhoades as well as Smith and Lawrence support Campbell and Dietrich's conclusion that current loan-to-value ratio and payment-to-income ratio are significantly related to loan default.

Although there are no studies of the determinants of variations in Chapter 12 rates, two recent studies estimate models to predict Chapter 7 and Chapter 13 filing rates. The first study is by Buckley and Brinig (BB) and the second is by Weiss, Bhandari and Robins (WBR). Both use annual panel data over the eighties and first part of the nineties. While they differ in some details, both hypothesize legal, economic and social factors as relevant explanatory variables. BB use 86 federal judicial districts as the unit of observation and WBR use the fifty states and District of Columbia. Both define the dependent variable as a rate—number of filings divided by population. Both estimate their models with a fixed effects estimator to correspond to the idiosyncrasies of either federal judicial districts or states.

Both BB and WBR include various economic indicators as predictors of filing rates. Unemployment rates and percentage of population under the poverty line are used by BB. In WBR unemployment rates, two income measures and a variety of indebtedness measures are used. Both studies emphasize the variations in property exemption rules that could influence filing rates.[2] In BB the emphasis is on the role of social factors that depend on: "(1) the strength of social networks, (2) conservative and hierarchal attitudes, and (3) the social stigma of promise-breaking." (Buckley and Brinig, p. 200).   In WBR less emphasis is put on social factors and only the divorce rate is included as a social factor.

The studies' findings conflict. Buckley and Brinig conclude that economic factors were of mixed importance. They present a series of regressions under different assumptions about endogeneity and non-spherical disturbances.   In one set of regressions the sign of unemployment rates is significant and positive as expected but then negative and significant when accounting for endogeneity.   In general, BB find that the social variables were important, particularly divorce

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[2] In a Chapter 7 filing certain types of property are typically exempt from creditors not holding a security interest in the property, usually up to some dollar limit.

rate and proportion of population over age sixty-five. Buckley and Brinig conclude that the increase in filings can be attributed to changes in social norms.

The results in WBR are more perplexing. Weiss, Bhandari and Robins estimate a fixed effects model that includes three lags of the dependent variable as regressors. The model is estimated by least squares, which because of the fixed effects and lagged endogenous variables, results in an inconsistent estimator.[3]

With the caveat that the estimator employed is not consistent, WBR find economic variables to have more significance than in BB and conclude that economic factors are important. Weiss, Bhandari and Robins find unemployment level, per capita income and various measures of aggregate loan delinquency to be significant. Divorce rate is not a significant variable. The authors go to great lengths to test the importance of exemption and other state-level legal requirements such as exemption levels of pensions and cash surrender value of life insurance. None of these variables are significant.

Shepard and Collins (SC) estimated an econometric model of annual national, U.S. farm bankruptcy rates from 1910-1978. Their study is at a very aggregate (national) level and uses data from an era where all farm bankruptcies were duly recorded. The dependent variable is the natural log of bankruptcy filings as a percentage of filings in 1910. The independent variables in the estimated models are real net farm income per farm, average farm size, debt as a proportion of physical farm assets, government support payments as a proportion of revenues and a non-farm bankruptcy rate. All independent variables are in natural logs and lagged one year. Two separate models are estimated: one for the period 1910-1940 and the other for 1946-1978. In both models farm size and the overall bankruptcy rate are significant. Although significant in the early period model, ratio of debts to physical farm assets and government payments are not significant in the later sample model. Income is significant in the later sample model with the expected negative sign. Farm size has a negative sign in the early sample model and positive in the later sample model. The authors reason that efficient farming in the post-WWII era required an increased scale of production and therefore increased risk.

Model Specification

In specifying the estimated model, we adopt the views of BB and WBR that acknowledge roles for economic, legal and social factors. However, because government plays such an active role in agriculture, we also incorporate the role of government, like SC in their study of pre-Chapter 12 farm bankruptcies. We view this variable as an essential input in understanding the forces that drive farmers to seek the protection and prerogatives of Chapter 12. All of the variables in the models are defined with their acronyms in Table 3.

Two different models are estimated initially. The models differ in the definition of the dependent variable. The dependent variable in the first model is CH1210, the number of filings in the year for a given state (CH12FIL) divided by the number of farms with sales in excess of $10,000. The dependent variable in the second model is CH1225 defined as CH12FIL divided by the number of farms with sales in excess of $25,000 per year. Small farms are excluded because these farms are unlikely to generate enough farm income to satisfy the requirement for Chapter 12 filing that 50 percent of all income be from farming in the prior year.

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[3] Anderson and Hsiao discuss appropriate estimators.

In representing economic forces, it is clear that levels of income and debt are essential factors in understanding the frequency of debt reorganization and restructuring. Thus income and debt measures are of primary importance. In our model the debt-to-asset ratio (DAR) represents the impact of debt on farm finances and financial stress. It also indicates when the value of assets is getting low relative to debt and therefore a potential opportunity to restructure debt to more favorable terms. An associated variable is the real value of farms' land and buildings (FARMVAL). As farm values increase, farm operators will have a greater incentive to reorganize and not lose an appreciating asset. Ceteris paribus, as these variables rise, farm operators should find reorganizing more appealing. However, a rapid depreciation of land values could also induce farmers to seek Chapter 12 to restructure their debt to the current fair market value of the asset but this effect would also be reflected in DAR.

Profitability and liquidity are clearly important measures of long-run solvency and ability to payback loans. Real net farm income per farm (NFI) is used to measure income, similarly to SC. An additional source of income to farm households is off-farm work. Measures of farm household off-farm income are not directly available. In lieu of this measure, the proxy variables of proportion of farm operators working more than 200 days off-farm (WORK200) and unemployment rate (UNEMP) are used. WORK200 accounts for the percentage of farm operations relying heavily on off-farm work. UNEMP indicates the availability of off-farm work and the overall vigor of the national economy. A final measure of profitability and liquidity is the debt-servicing ratio (DEBTSVC), which is the ratio of current debt payments over gross cash farm income.

As specified in SC, the structure of agriculture is hypothesized to be an important determinant of Chapter 12 filings. Two measures are included in the regression models. Like SC, farm size (SIZE) is represented by average farm size. As mentioned earlier, SC found it positively related to farm failure in their later sample. Because small farms are unlikely to be able to meet the income test to file in Chapter 12, both WORK200 and SIZE are defined for farms with annual sales of $10,000 or greater.

A second structural measure is the type of agriculture practiced in a state. While all states have a combination of crop and animal agriculture, this mix varies across states. Crop agriculture is typically subject to greater revenue variation than animal agriculture since weather variations in a growing season have a more immediate impact on revenues. Thus we expect filing rates to be positively associated with a greater concentration of crop farming. Agricultural type is measured by the proportion of gross revenues from crops (CREV).

Government policy and indicators of social attitudes are included because they have shown influence in past studies. Unlike consumers filing Chapters 7 or 13, farmers may be direct recipients of government payments associated with their farming activities. To reflect this, the proportion of total farm revenues due to government payments (GOVPAY) is included in the regression models. This is government payments divided by the sum of cash receipts and government payments. It represents the impact of policy on farm financial stress. This variable can be viewed as a measure of stress since it tends to rise when financial stress in agriculture increases. Its sign expectation is ambiguous. In SC it was significant and positive in the 1910-1940 sample and negative and insignificant in the 1946-1978 sample. To the extent that it is a lagging indicator of stress, it would be expected to have a positive sign.

To model the effects of social attitudes the proportion of the population over sixty-five (OLDER) and the proportion of the population that is divorced (DIVORCED) are included as

independent variables. The theory is that older people are more prone to keep commitments and that states with fewer divorces indicate a population inclined to keeping promises made. As pointed out in WBR, divorce can be both a cause and an effect of bankruptcy. While a divorce can cause financial stress, financial stress can also cause divorce. However, with divorced proportion lagged a year, DIVORCED can be regarded as predetermined and a cause of Chapter 12 filing.[4]

A final variable is a binary called YEAR87. This variable takes on a value of one if the observation is from 1987 and zero otherwise. We justify its inclusion because farmers suspected for several years that something like Chapter 12 was going to be enacted. Thus, given the economic disaster of the early 1980s in agriculture, there was a pent-up demand for Chapter 12 as the numbers in Table 1 clearly indicate. The variable YEAR87 accounts for this effect.

The variation in the application of bankruptcy law across states is important, particularly with respect to the variation in property exemptions under Chapter 7. These variations are difficult to quantify as discussed in WBR. To capture their effect, as well as other laws that can be particular to a state, the model is estimated with fixed effects. Thus each state has its own intercept in the regression model.

Estimation Method

The model is estimated in double-log form.[5] Both BB and SC employ the double log model. In preliminary estimation, models in the natural units (rates) were estimated and had distinctly inferior fit to the double log models. In addition, all the independent variables are lagged one year as in BB, WBR and SC. This is justified on the basis that filing a bankruptcy petition is usually the result of a series of setbacks and not something entered into quickly. Finally, due to the unavailability of Chapter 12 until November 26, 1986, the rates for 1986 can hardly be regarded as annual rates. Hence the sample years go from 1987-2000 for forty-eight states for a total of 672 observations.[6]

The estimated autocorrelation coefficient for the model is .091 indicating serial correlation is of minimal importance. Homoscedasticity was clearly rejected. Estimated generalized least squares (EGLS) was used assuming that the error term variances differ across states but are constant within states. An alternative model with the dependent variable as actual number of filings in a state per year (CH12FIL) was estimated but had distinctly inferior goodness of fit compared with the rate models.

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[4] Divorce is a difficult variable to use. Indiana, Louisiana, Colorado and California have several years of data missing. A personal communication with an official in Indiana indicates that such data are not collected. Nonetheless, both WBR and BB have a divorce rate variable. It is not known exactly how such data were collected since the web site given in WBR was not functional and no source of data was cited in BB. In a personal communication BB indicated that they had several missing observations in their divorce rate variable. Our variable, DIVORCED, is not the divorce rate but number of people currently having marital status of being divorced for which more complete data are available.

[5] In the 54 observations where CH12FIL is zero, CH1210 and CH1225 were set to .0001 for the purposes of taking the logarithms.

[6] Alaska and Hawaii are omitted because their agricultural situations are so different compared with the contiguous forty-eight states.

Data and Sources

The data used in this study were primarily drawn from Economic Research Service (ERS) web sites, various years of the Census of Agriculture, and the website at the Administrative Office of the U.S. Courts. Other sources include: National Agricultural Statistics Service, United States Department of Agriculture (NASS/USDA), Bureau of Labor Statistics (BLS), Bureau of Economic Analysis (BEA), and the Bureau of Census annual Current Population Survey. The variables in this study are observed annually at the state level.

<u>Independent Variables</u>

Financial Variables

Debt-to-asset ratio (DAR), net farm income (NFI) and debt servicing ratio (DEBTSVC) were obtained from ERS.[7] The numbers of farm operations and real farmland values (FARMVAL) were obtained from NASS/USDA. Farm numbers were used to compute net real farm income per farm (NFI).[8] State unemployment rates (UNEMP) were drawn from the BLS.[9] The numbers of farm operators on farms with sales greater than $10,000 working 200 days or more per year off the farm were obtained from the 1982, 1987, 1992 and 1997 Censuses of Agriculture. These observations were divided by total number of farm operators on farms with sales greater than $10,000 in a state to get proportion of farm operators in the state working 200 days or more off-farm (WORK200) and linearly interpolated for non-census years.

Farm Structural Variables

Acres of land in farms and farm operators with annual sales greater than $10,000 ($25,000) were obtained from the 1982 (sales greater than $10,000 only), 1987, 1992 and 1997 Censuses of Agriculture. The data from these three years (1987, 1992 and 1997) were linearly interpolated[10] and extrapolated to get the observations for non-census years. Average farm size (SIZE) is calculated by land in farms with annual sales greater than $10,000 divided by number of farm operations with annual sales greater than $10,000. The farm revenues from crops and animals to compute CREV were retrieved from the BEA website.[11]

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[7]DAR was obtained from:
 http://www.ers.usda.gov/data/farmbalancesheet/50stbsht.htm accessed in August, 2002.
NFI was obtained from:
 http://www.ers.usda.gov/data/farmincome/50stmenu.htm accessed in August, 2002.
DEBTSVC was obtained from a personal communication, Preliminary Estimates, Farm Financial Ratios, USDA/ERS, October 2001.

[8] FARMVAL and NFI are deflated by the U.S. GDP index, 1996=100. Farm numbers and land values came from:
  February 2001, Report SpSy 3(01)a. Feb. 2001,
  Final Estimates 1993~97, Stat, Bul, No. 955,
  Final Estimates 1988~92, Stat, Bul, No.895,
  Final Estimates 1979~87, Stat, Bul, No.792.

[9] http://www.bls.gov/data/top20.htm Rates are not seasonally adjusted.

[10] For example, if the value of a variable in 1987 was 1 and was 2 in 1992, the intervening values for the four unobserved years would be 1.2,1.4,1.6 and 1.8, respectively.

[11] http://www.bea.doc.gov/bea/regional/spi/ Accessed August 2002.

Policy and Social Variables

Direct government payments per farm operation and cash receipts (used to construct GOVPAY) were obtained from ERS.[12] The Population Estimates Branch, U.S. Bureau of the Census, provided a source for the proportion of the population aged 65 years or older (OLDER).[13] The proportion of people fifteen years of age or older with divorced marital status (DIVORCED) was computed from data in the annual versions of the Current Population Survey, Annual Demographic File, for various years.[14] Observations for divorced persons were not available for 1999. These observations were synthesized by averaging the values for 1998 and 2000 for a given state.[15]

Dependent Variables

Dependent variables are functions of the number of Chapter 12 cases filed and the number of farms with annual sales more than $10,000 and $25,000. Chapter 12 filing numbers were obtained from the web site of the Administrative Office of the U.S. Courts and the two numbers of farms as described above.

Descriptive Statistics and Estimated Parameters

Before discussing the estimated model, it is useful to examine the descriptive statistics of the dependent and independent variables. These are presented for the variables in their natural units in Table 4. The mean number of filings in the sample is 31.68 ranging from zero to 737. The filing rates have means of .0016 and .0023 for CH1210 and CH1225, respectively. These range from zero to .029 for CH1210 and zero to .041 for CH1225. Thus there is considerable variation around the means for the dependent variables.

The income and debt variables also show considerable variation. DAR has a mean of .16 varying from .043 to .31. The mean for DEBTSVC is .16 and its values range between .06 and .45. Net farm income per capita varies from $500 to $108,000 and has a mean of $24,858. Land values reflect the inherent contrasts in land productivity across the U.S. spanning values from $125 to $7,680.1 per acre with a mean of $1,524 per acre. The mean for UMEMP is 5.5 percent with a range of 2 to 13 percent. The proportion of farmers working 200 or more days off the farm ranges from .09 to .35 with a mean of .22.

With means of .47 and 1,246 respectively, the farm structure variables CREV and SIZE also display variability reflective of U.S. agriculture. Government payments (GOVPAY) show that the impact of government payments proportion varies considerably over the sample from a

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[12] Government payments were obtained from:
http://www.ers.usda.gov/Data/FarmIncome/finfidmu.htm
and cash receipts were obtained from:
 http://www.ers.usda.gov/data/farmincome/finfidmu.htm. Both were accessed in August, 2002.
[13] Population Estimates for the U.S., Regions, Divisions, and States by 5-year Age Groups and Sex:
 Time Series Estimates, July 1980-1990, July 1, 1990 to July 1, 1999 and April 1, 1990 Census Population Counts.
[14] Current Population Survey: Annual Demographic File, 1986-1998 and 2000,
http://www.icpsr.umich.edu/. Files accessed in September, 2002.
[15] To test the sensitivity of this procedure, the model was estimated both with and without the affected year and the results were nearly the same.

minimum of .0012 to a maximum of .36. The social variables, OLDER and DIVORCED, have means of .13 and .08, respectively.

In estimating the two models with differing definitions of the dependent variable (i.e., using CH1210 or CH1225) it became clear that the models were nearly the same in terms of significant variables and signs. Because of these similarities, only the estimates for CH1210 are displayed and discussed.

Table 5 displays the results for the fixed effects model. The model fits the data well with an R^2 of .70. In panel data with fixed effects a high R^2 can sometimes be attributed mostly to the fixed effects. However, the R^2 with fixed effects only is .46 and the R^2 without the fixed effects is .42. This indicates that the explanatory variables do have explanatory power of their own.

Of the twelve independent variables, eight have p-values less than or equal to .05 indicating that eight of the variables are statistically significant at the .05 level or better. Multicollinearity was not a problem in the model with only one condition index in excess of 100, the standard suggested in Belsley, Kuh and Welch. There is no surprise that YEAR87 is significant since it is clear from the data in Table 1 that 1987 was a year with generally high rates of filing for all states.

All of the income and debt variables are significant and of the expected signs except FARMVAL which is negative as expected but only significant at .10. However, FARMVAL is collinear with SIZE which is significant so FARMVAL is likely important. As debts rise relative to assets and debt service absorbs more income, filing rates rise. Increasing land and building values decrease filing. As seen in other studies, income directly affects filing rates. As farm income declines or income from off-farm sources decreases, filing rates increase.

The positive and significant elasticity of DEBTSVC is expected. This variable is most indicative of ability to pay existing liabilities, so it is not surprising that it is significant. None of the studies by WBR, BB and SC have a similar variable that is as closely connected to debt repayment capacity.

In contrast to results in SC, the sign of SIZE is negative. However, their study referred to all farm bankruptcies, not just reorganizations. Most farm bankruptcies of that era were the end of the farming enterprise. In the case of a reorganization, farm size might indicate larger debts that make it more difficult for the financially stressed farms to fit into Chapter 12. (A petitioner can have no more than $1,500,000 in total debt. For debts in excess of this limit, petitioners must use Chapter 7 or 11.) The negative sign might also indicate increased efficiency directly related to size of the farm.

Government payments are significant. This is in contrast to SC who found no significance for farm payments in the post-World War II model. In the present model government financial intervention does play a role and apparently aids farms in lessening the need for financial reorganization. It is tempting to say that government payments decrease farm bankruptcy, but it must be remembered that farmers can and undoubtedly do file in Chapters other than Chapter 12.

Both the social variables, OLDER and DIVORCED, are not significant. This suggests that the finding of BB that social norms are important, is not supported for farm financial reorganizations. This conclusion is more in accord with WBR. However, since farmers can file in other Chapters, the conclusion cannot be made that social norms are without influence in farm

bankruptcies overall. In addition, perhaps there are better measures of social norms than those used here and in other studies.

Since all the variables are in log form, the coefficients in Table 5, except for YEAR87, can be interpreted as elasticities. Unemployment, DAR, WORK200 and SIZE are nearly elastic, and have the largest elasticities of all the variables. The fact that unemployment, debt–to-asset ratio and off-farm work ratio are the most elastic except for farm size underscores the importance of cash flows in explaining variation rates. This is consistent with the findings in WBR.

Conclusions

In estimating a panel econometric model of state level Chapter 12 filing rates from 1987-2000 we find similarities and differences between other studies of bankruptcy filing rates. Weiss, Bhandari and Robins and Buckley and Brinig estimated similar panel models for Chapter 7 and Chapter 13 over the eighties and early nineties. Like the two studies of Chapters 7 and 11, we find that economic conditions of the economy as a whole are important predictors of Chapter 12 filing rates. In particular, increases in the unemployment rate are associated with significant increases in Chapter 12 filing rates.

We also find a fairly precise measure of ability to pay current liabilities, in this case debt service payments divided by gross revenues, to be a factor in predicting filing rates. The significance of this variable indicates that similar measures for Chapter 7 and Chapter 13 studies would be useful. There is no evidence to suggest that changing social norms toward keeping commitments has affected the Chapter 12 filing rate. Farm size has a negative effect on filing levels. If the debt limit for filing Chapter 12 is raised to $3,237,000 as proposed in the pending bankruptcy legislation, more farms may avail themselves of Chapter 12.

Government payments to farms lessen Chapter 12 filing. Farm crop operations receive most government payments. Animal agriculture also benefits from payments to crop producers in the form of cheaper feed prices. Thus government payments help both types of agricultural enterprises avoid Chapter 12. It is tempting to argue that surely government payments stave off farm bankruptcies. However, as a caveat, both debtors and creditors anticipate government payments. Many loans that would have been made with anticipated payments would not be made in the absence of these payments. Hence, an absence of government payments to agriculture would probably also curtail some bankruptcies while likely causing others.

Table 1.--Chapter 12 farmer bankruptcy case filings by farm production region, 1986-2001

Year[2]	Northeast	Lake States	Corn Belt	Northern Plains	Appalachian	Southeast	Delta States	Southern Plains	Mountain	Pacific	United States
					Number						
1986[3]	9	50	103	148	92	47	44	41	42	24	600
1987	99	466	1,292	1,553	470	335	547	394	546	363	6,064
1988	39	175	447	358	102	105	170	185	256	188	2,025
1989	24	147	290	218	68	83	115	170	155	163	1,433
1990	49	130	226	224	79	118	128	141	135	106	1,336
1991	85	145	213	190	86	139	169	173	152	127	1,479
1992	69	160	259	235	116	121	154	180	178	124	1,596
1993	78	140	210	172	73	84	131	116	114	117	1,235
1994	66	105	123	124	62	66	77	102	78	88	891
1995	78	103	122	134	64	84	57	108	81	93	924
1996	84	97	114	195	65	84	112	173	74	83	1,081
1997	87	80	91	152	46	83	91	145	109	62	946
1998	58	78	94	146	58	77	64	98	89	45	807
1999	52	61	145	168	60	67	52	100	82	46	833
2000	36	33	79	48	19	22	28	43	57	40	405
2001	20	24	50	58	19	43	18	57	23	70	382
Total	933	1,993	3,858	4,123	1,479	1,558	1,957	2,226	2,171	1,739	22,037

Note: Northeast=CT, DE, ME, MD, MA, NH, NJ, NY, PA, RI, VT. Lake States=MI, MN, WI. Corn Belt=IL, IN, IA, MO, OH. Northern Plains=KS, NE, ND, SD. Appalachian=KY, NC, TN, VA, WV. Southeast=AL, FL, GA, SC. Delta States=AR, LA, MS. Southern Plains=OK, TX. Mountain=AZ, CO, ID, MT, NV, NM, UT, WY. Pacific=AK, CA, HI, OR, WA.

[1] Data exclude Guam, Puerto Rico, and the Virgin Islands. [2] Ending December 31. [3] Filings began on November 26, 1986.

Table 2.--Chapter 12 farmer bankruptcy case filings per 10,000 farms by farm production region, 1986-2001

Year[2]	Northeast	Lake States	Corn Belt	Northern Plains	Appalachian	Southeast	Delta States	Southern Plains	Mountain	Pacific	United States
					Number per 10,000 farms						
1986[3]	0.57	2.14	2.15	7.46	2.74	2.83	3.39	1.57	3.42	1.47	2.67
1987	6.38	20.22	27.73	78.43	14.24	20.55	43.24	15.21	44.79	22.23	27.40
1988	2.56	7.61	9.63	18.31	3.15	6.40	13.71	7.06	21.11	11.48	9.20
1989	1.62	6.50	6.36	11.21	2.15	5.14	9.27	6.44	12.90	9.92	6.59
1990	3.38	5.83	5.07	11.52	2.56	7.33	10.76	5.30	11.35	6.47	6.23
1991	5.86	6.56	4.87	9.85	2.86	8.88	14.57	6.48	12.88	7.83	6.99
1992	4.77	7.24	5.97	12.30	3.85	7.78	13.63	6.69	15.25	7.66	7.57
1993	5.19	6.34	4.74	9.08	2.30	5.00	10.83	3.91	8.93	7.04	5.61
1994	4.38	4.78	2.80	6.58	1.96	3.93	6.42	3.40	6.07	5.28	4.05
1995	5.16	4.73	2.80	7.15	2.04	5.00	4.71	3.56	6.28	5.52	4.21
1996	5.58	4.51	2.64	10.51	2.08	5.00	9.22	5.66	5.67	4.90	4.99
1997	5.77	3.76	2.11	8.26	1.48	4.94	7.52	4.71	8.28	3.62	4.32
1998	3.86	3.71	2.18	7.96	1.88	4.56	5.27	3.17	6.72	2.58	3.68
1999	3.46	2.88	3.37	9.18	1.94	3.99	4.28	3.22	6.19	2.62	3.80
2000	2.42	1.59	1.85	2.66	0.62	1.33	2.32	1.38	4.32	2.30	1.86
2001	1.35	1.15	1.20	3.24	0.62	2.61	1.51	1.82	1.77	4.05	1.77
Total[4]	3.89	5.68	5.46	13.63	2.95	5.91	10.10	4.83	10.78	6.49	6.32

Note: Northeast=CT, DE, ME, MD, MA, NH, NJ, NY, PA, RI, VT. Lake States=MI, MN, WI. Corn Belt=IL, IN, IA, MO, OH. Northern Plains=KS, NE, ND, SD. Appalachian=KY, NC, TN, VA, WV. Southeast=AL, FL, GA, SC. Delta States=AR, LA, MS. Southern Plains=OK, TX. Mountains=AZ, CO, ID, MT, NV, NM, UT, WY. Pacific=AK, CA, HI, OR, WA.

[1]Data exclude Guam, Puerto Rico, and the Virgin Islands. [2]Ending December 31. [3]Filings began on November 26, 1986. [4]Total Chapter 12 farmer bankruptcies for 1986-99 divided by the total number of farms for 1986-99 for each respective region.

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Table 3. Definitions of Dependent and Independent Variables

Variable Names	Definition
Dependent Variables	
CH12FIL	Number of Chapter 12 cases filed
CH1210	Ratio of the number of Chapter 12 filings to the number of farms with annual sales greater than $10,000
CH1225	Ratio of the number of Chapter 12 filings to the number of farms with annual sales greater than $25,000
Independent Variables	
Income and Debt Variables	
DAR	Debt-to-asset ratio
FARMVAL	Real value of farm land and buildings (dollars per acre)
NFI	Real net farm income per farm (1,000 dollars)
WORK200	Proportion of farm operators in the state with annual sales greater than $10,000 working 200 days or more off-farm
UNEMP	State unemployment rate (%)
DEBTSVC	Debt servicing ratio
Farm Structural Variables	
SIZE	Average farm size of farms with annual sales greater than $10,000 (acres)
FCREV	Proportion of farm revenues from crops
Policy and Social Variables	
GOVPAY	Proportion of total farm revenue from government payments
OLDER	Proportion of population 65 years old or more
DIVORCED	Proportion of population 15 years or older having a divorced marital status
Pent-up Demand Variable	
YEAR87	A binary variable having a value equal to 1 in 1987, 0 otherwise

All variables are on an annual basis and by state. To convert nominal dollar values to real values, the U.S. GDP deflator (1996 = 100) is used.

Table 4. Descriptive Statistics of Dependent and Independent Variables

Variable[1]	Mean	Standard Deviation	Minimum	Maximum
CH12FIL	31.68	50.61	0	737
CH1210	0.0016	0.0021	0	0.0292
CH1225	0.0023	0.0030	0	0.0409
DAR	0.1569	0.0457	0.043	0.3077
FARMVAL	1524	1450	124.6	7680
NFI	24.858	18.57	0.500	108.0
WORK200	0.2197	0.0567	0.089	0.3455
UNEMP	5.543	1.683	2.200	13.10
DEBTSVC	0.1566	0.0486	0.060	0.4500
SIZE	1246	1906	103.9	10260
CREV	0.4701	0.1785	0.089	0.8607
GOVPAY	0.057	0.0558	0.0012	0.3585
OLDER	0.1268	0.0177	0.080	0.1855
DIVORCED	0.0827	0.0169	0.038	0.1671

1.The variable names and units are defined in Table 3.

Table 5. Estimated Coefficients for the EGLS Fixed Effects Model[1]

Variable[2]	Coefficient	Standard Error	t ratio	p-value
DAR	0.9707*	0.2428	3.998	0.0001
FARMVAL	-0.3111	0.1834	-1.696	0.0899
NFI	-0.1235*	0.0453	-2.725	0.0064
WORK200	-0.9304*	0.3331	-2.793	0.0052
UNEMP	0.9856*	0.0903	10.915	0.0000
DEBTSVC	0.5071*	0.1871	2.711	0.0067
SIZE	-0.8696*	0.4131	-2.105	0.0353
CREV	0.2991	0.1850	1.617	0.1058
GOVPAY	-0.2661*	0.0411	-6.475	0.0000
OLDER	0.1017	0.8399	0.121	0.9037
DIVORCED	-0.2965	0.1574	-1.884	0.0596
YEAR 87	0.6844*	0.0802	8.528	0.0000

1. Filing rate is defined as Chapter 12 filings divided by number of farms with sales greater than $10,000.

2. The variable names and units are defined in Table 3. All variables except YEAR87 are in logarithms and lagged one year.

* Significantly different from zero based on a two-sided test at the 0.05 level.
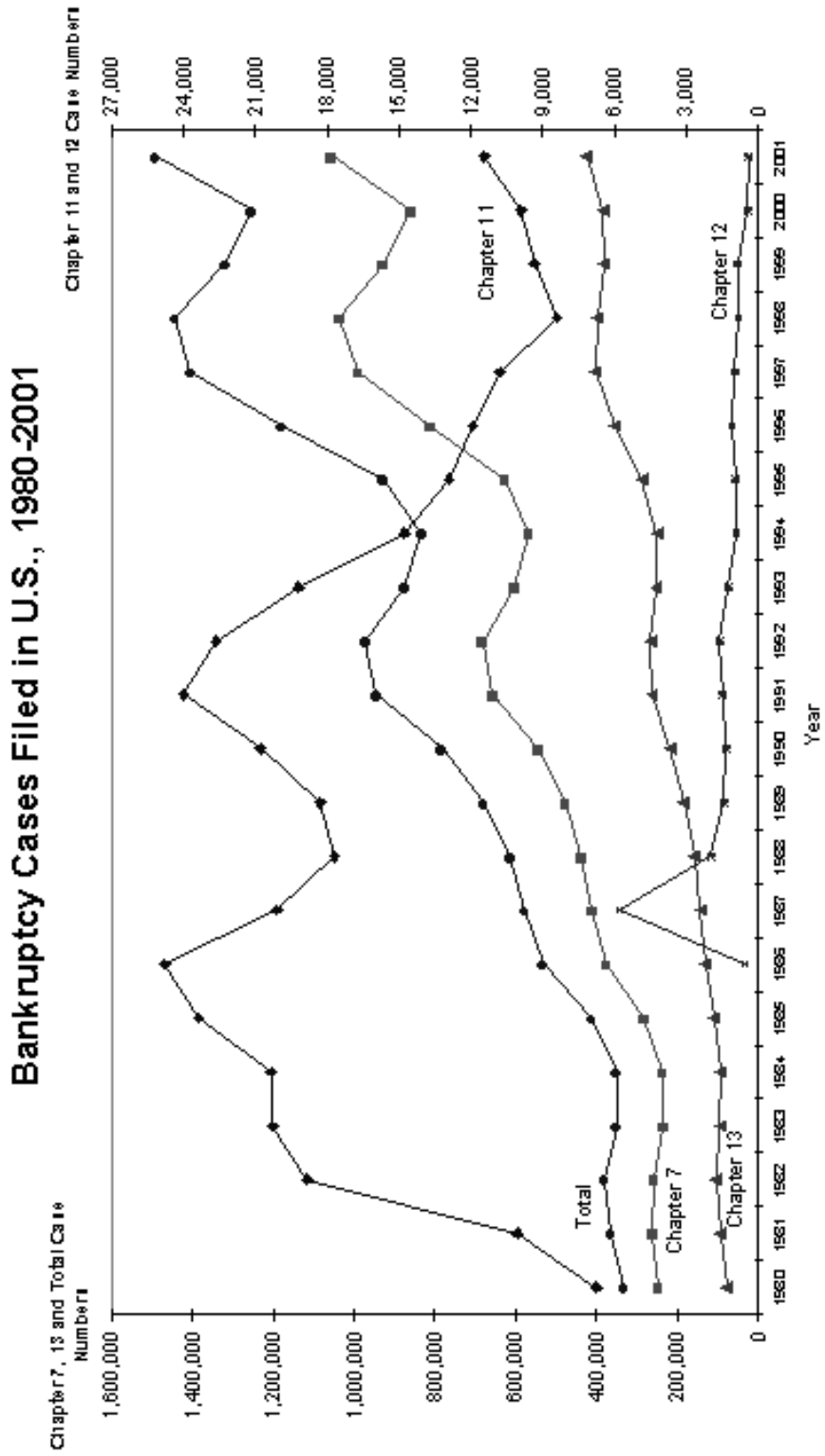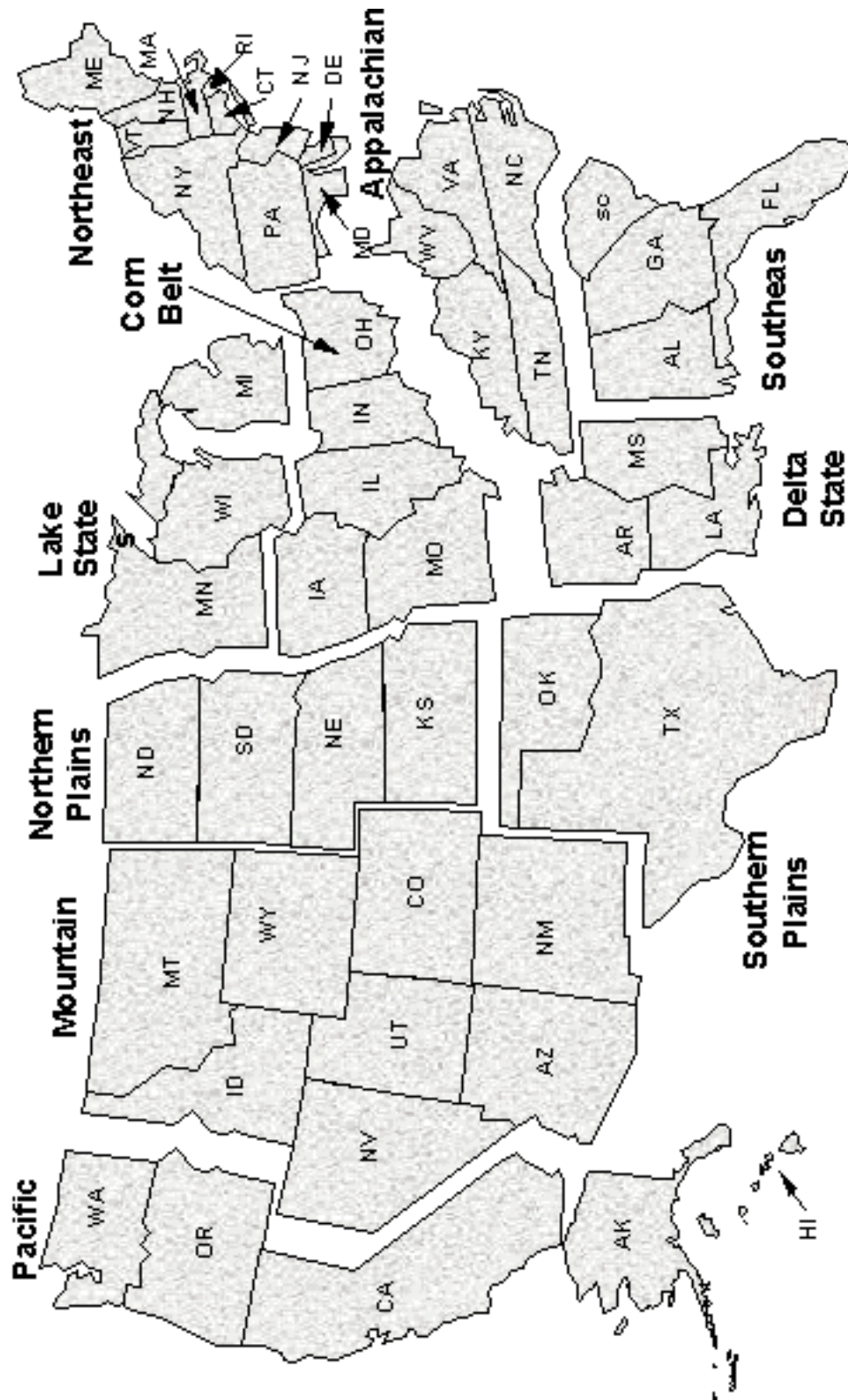
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Figure 1.

Bankruptcy Cases Filed in U.S., 1980-2001

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Figure 2: Farm Production Regions

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