

THE IMPACT OF CASINO GAMBLING ON PERSONAL BANKRUPTCY FILING RATES

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Personal bankruptcies soared in the United States between 1994 and 1998. One activity that can precipitate personal financial crises and that has also experienced dramatic growth is commercial gambling, especially casino gambling. This article builds a simple model of bankruptcy choice and empirically tests the model using unique county-level data on debt, income, household age, population density, and casino gambling as well as state measures of employment and marital stability, health insurance coverage, and garnishment restrictions. The authors find that the proximity of casino gambling appears to be associated with higher bankruptcy rates, but that the local impact is far more pronounced than the influence of casino gambling on the national filing rate. To quantify the magnitude of the impact, the analysis predicts over a 5% decline in 1998 filing rates for counties surrounding a casino, and a 1% decline in the nationwide filing rate if one were to eliminate casino gambling. Consequently, although casino gambling exerts important local effects, nationwide the incidence and growth of casino gambling does not explain much of the rise in bankruptcies during the past decade. (JEL D12, L83)

I. INTRODUCTION

Personal bankruptcies soared in the United States between 1994 and 1998. Nearly 1.4 million U.S. households filed for bankruptcy protection in 1998, about a half million more than in 1995. Bankruptcy filings declined about 8% in 1999 to 1.28 million, but the level was still dramatically higher than at the beginning of the decade (see Figure 1). Why this occurred against the backdrop of

the most favorable economic conditions in a half-century has challenged researchers and even spurred Congress to introduce legislative remedies.

Gropp et al. (1997) illustrated the standard explanation for personal bankruptcy: Each period households gain new information on current and projected future income as well as current and projected future expenses and update their wealth and implied projected future path of consumption with and

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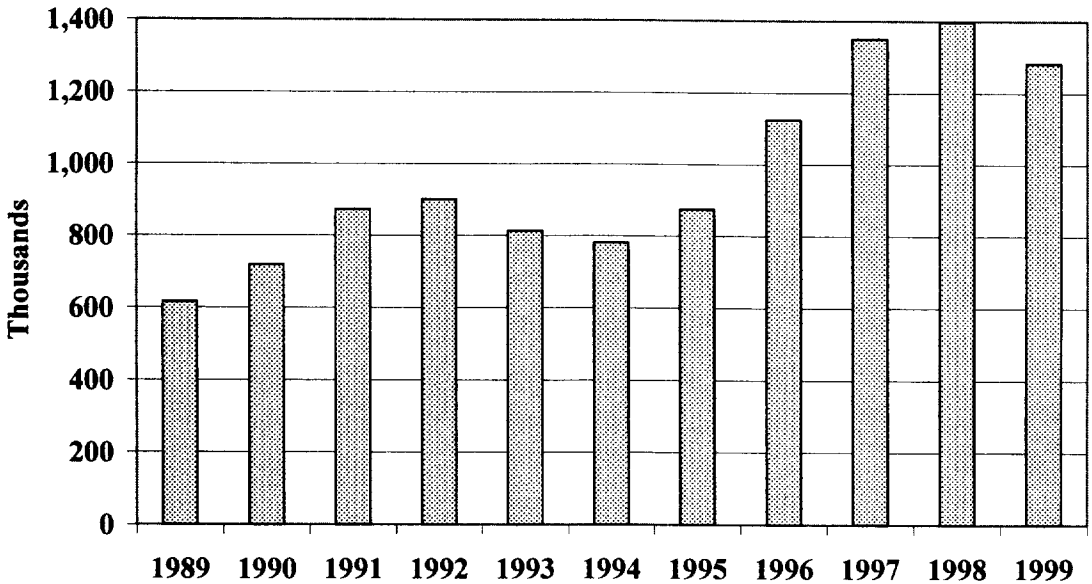
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ABBREVIATIONS

AGA: American Gaming Association
AGR: Adjusted Gross Revenue
BEA: Bureau of Economic Analysis
BLS: Bureau of Labor Statistics
CCA: Christiansen Capital Advisors, LLC
CPI: Consumer Price Index
CPS: Current Population Survey
DOC: Department of Commerce
IGWB: *International Gaming & Wagering Business*
NGISC: National Gambling Impact Study Commission
NORC: National Opinion Research Center
TU: Trans Union, LLC

FIGURE 1
Nonbusiness Bankruptcy Filings



Source: Administrative Office of the U.S. Courts.

without bankruptcy.¹ In such a setting, the bankruptcy choice can be triggered by “insolvency events” that reduce wealth, such as the realization of reduced income arising from a layoff, or high expenses arising from a divorce or an uninsured illness or accident. These changes can create a financial crisis for which bankruptcy becomes the borrower’s best alternative.

Debtor surveys consistently find that the majority of bankruptcies are triggered by insolvency events, although an explanation for the rise in personal bankruptcies during the mid-1990s that is built around a comparable rise in insolvency events seems inconsistent with the marked improvement in the economic climate.² However, one activity that can precipitate personal financial crises—and that has also experienced growth

as dramatic as personal bankruptcies over the past decade—is commercial gambling, especially casino gambling. This article empirically examines whether casino gambling is associated with higher bankruptcy filing rates in counties hosting or near casinos.

Section II describes the growth in casino gambling in the United States and its geographic spread, especially over the past two decades. The section also reviews prior research on the linkage between the opening of casinos and the incidence of personal bankruptcies. Section III develops a simple model of the bankruptcy filing choice to help identify key factors that affect the likelihood that a household will file for bankruptcy. Based on this theory, section IV describes various variables constructed to estimate an empirical model of bankruptcy filing rates at the county level for over 3000 U.S. counties for the period 1993 through 1999. The model includes a variable that measures the extent of casino gambling activity for those counties hosting and adjacent to casino facilities. Section V discusses the estimation results, and section VI provides concluding remarks.

1. Other articles that have examined the choice to file for bankruptcy include Domowitz and Eovaldi (1993) and Buckley and Brinig (1998). Domowitz and Sartain (1999a; 1999b) and Nelson (1999) examine the choice between a Chapter 7 and Chapter 13 bankruptcy filing.

2. For example, see Visa U.S.A., Inc. (1998), pp. 18–20.

TABLE 1
Trends in Adjusted Gross Revenues (Consumer Spending)

Type of Gambling Outlet	Percent Change Year-over-Year			
	1998	1997	1996	1995
Casinos				
Nevada/New Jersey slot machines	6.3	4.4	2.8	7.4
Nevada/New Jersey table games	-2.0	3.7	-2.1	8.1
Deepwater cruise ships	7.4	4.3	2.3	-5.0
Cruises-to-nowhere	25.6	9.8	11.1	50.0
Riverboats	18.2	11.3	19.2	42.7
Other land-based casinos	10.9	3.6	4.1	18.6
Other commercial gambling	3.3	-0.6	-0.4	30.1
Noncasino devices	5.4	17.2	5.5	29.7
Subtotal	8.5	7.2	6.3	17.2
Indian reservations				
Class II (e.g., high-stakes bingo)	4.5	4.5	80.8	7.6
Class III (e.g., casino games)	21.8	25.1	33.1	19.8
Subtotal	19.5	21.9	38.8	18.2
Lotteries				
Video lotteries	16.2	23.6	44.4	34.1
Other games	0.0	0.6	4.7	7.0
Subtotal	1.1	1.8	6.3	7.9
Parimutuels				
Horse total	1.9	2.0	3.5	4.5
Greyhound total	-2.4	-6.1	-11.4	-4.2
Jai alai total	-6.6	-21.2	-4.4	-8.5
Subtotal	1.2	0.5	0.9	2.8
Charitable games	2.3	6.2	-2.3	8.2
Charitable bingo	1.6	-0.2	-2.2	-0.8
Card rooms	5.6	2.3	-10.3	5.0
Legal bookmaking				
Sports books	-13.7	17.4	-3.8	-35.2
Horse books	-187.9	-34.7	-54.5	-39.7
Subtotal	-25.6	11.3	-14.9	-36.2
Internet gambling ^a	117.1			
Total	6.6	6.3	8.0	11.5

Source: Calculated from data in *International Gaming & Wagering Business*, various August issues.

^aBecause Internet gambling operates internationally, its revenues are not included in U.S. totals.

II. PRIOR RESEARCH ON THE IMPACT OF CASINO GROWTH ON PERSONAL FINANCES³

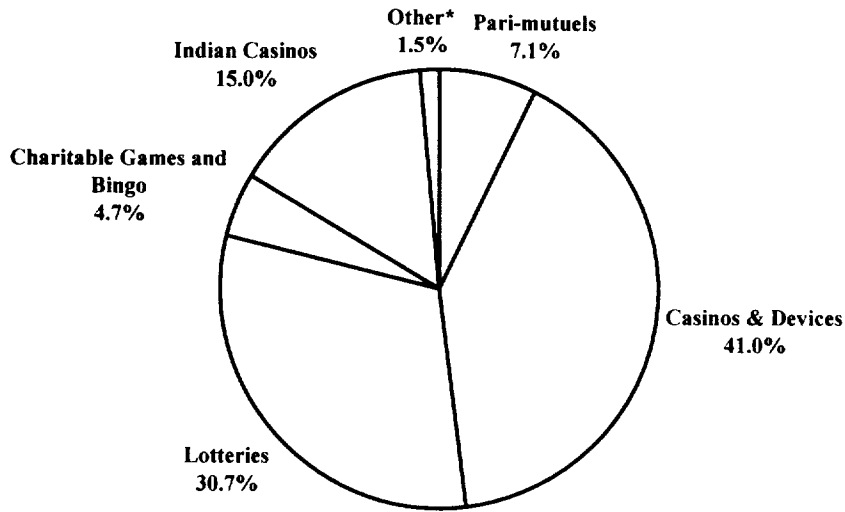
Consumer spending on all forms of commercial gambling in the U.S. reached a then record \$54.3 billion in 1998, up from \$39.8 billion as recently as 1994. Gaming industry analysts refer to consumer spending on gambling more precisely as adjusted gross revenue (AGR), defined as gross dollars wagered minus the dollars casinos pay out in

the form of winnings. Table 1 displays recent growth trends in AGR by gaming category and highlights the importance of casino gambling as the primary driver underlying the growth in gross gambling revenue. Casino gambling accounted for 56% of AGR in 1998. Figure 2 provides more detail on the breakdown of revenue by gambling category.

These statistics are striking considering that prior to 1989 the only casinos in the United States were located in Nevada and in New Jersey. National, and especially state legislative activity propelled the expansion of casino gambling across the

3. Discussion in this section draws heavily on Christiansen (1998) and Eadington (1998; 1999).

FIGURE 2
1998 U.S. Adjusted Gross Gambling Revenues



U.S. Total Adjusted Gross Gambling Revenues: \$54.3 Billion

U.S. Total Gross Wagering: \$677 Billion

Source: *International Gaming & Wagering Business*, August 1999.

*Includes Legal Bookmaking and Card Rooms.

country in the late 1980s and early 1990s. In October 1988, Congress passed the Indian Gaming Regulatory Act, permitting casino gambling on Native American land. Voters in South Dakota and Colorado approved limited/small-stakes casinos in 1988 and 1990, respectively. Recognizing a revenue enhancement opportunity, other states also began authorizing casino gambling. The first riverboat casino license was issued by the Iowa legislature in March 1989, with operation beginning in 1991. Competition among states for gambling tax revenue and economic development dollars prompted Illinois, Mississippi, Louisiana, and Missouri to legalize riverboat casinos between 1990 and 1993. Revenue from riverboat casino gambling was collected in Indiana starting in 1996.

By 1998, AGR from riverboat casinos was 13.4% of all spending on commercial gambling, second only to slot machines in Nevada and New Jersey in contribution to non-Native American casino gambling share. Despite being located largely in sparsely populated areas, reservation casinos also enjoyed rapid growth during the decade. By 1998, it is estimated that gambling at reservation

casinos represented 15% of total consumer spending on casino gambling nationwide.

Casinos can have a positive economic impact on their host communities. Several studies indicated aggregate economic benefits associated with the introduction of a casino into a community, such as Growth in employment, business investment, and tax revenue.⁴ However, few studies have addressed the direct impact on personal finances for households in such communities. In their examination of the impact of casino gambling on personal bankruptcy filing rates, these studies employed a variety of methods that produced results that ranged from no relationship to statistically significant effects. A brief summary of such studies follows.

The rapid growth in the number of casino gambling outlets during the 1990s simultaneous with the rise in personal bankruptcies prompted a credit industry consulting firm, SMR Research (1997), to declare gambling as the "single fastest-growing driver of bankruptcy," a claim repeated often in credit industry publications devoted to

4. For example, see Arthur Andersen & Co. (1997), Christiansen (1998), and Walker and Jackson (1998).

risk management. To reach its conclusion, SMR compared the aggregated personal bankruptcy filing rate of the 298 counties identified as having at least one major legal gambling facility (i.e., a casino: Indian, land-based, or boat; or parimutuel outlet) with the aggregated bankruptcy rate of counties without gambling. They found that counties with gambling had a bankruptcy filing rate 18% higher than those without. Counties with more casinos had higher filing rates: Counties with one to four gambling facilities (275) had a bankruptcy filing rate 14% higher than in counties without casinos. The rate for counties with five or more gambling outlets (23) was 35% higher than counties without gambling. SMR also noted that of the 24 counties with the highest bankruptcy filing rates per 1000 in the United States in 1996, 9 were located "very close" to three casinos.⁵

Noting the speed with which legalized casino gambling proliferated across the United States after 1989, the U.S. Congress created the National Gambling Impact Study Commission (NGISC) in 1996.⁶ The NGISC's creation represented the culmination of policy concerns about the growth in casino gambling and the social and economic externalities associated with gambling, such as pathological behavior, crime, and corruption. The NGISC was charged with quantifying the effects of these externalities on the communities that were in or near casino counties.

The National Opinion Research Center (NORC) at the University of Chicago was commissioned by the NGISC to examine the impact of new casinos on communities by comparing counties in which casinos had and had not opened over the past decade. In particular, NORC investigated the effects of casino openings on county-

level bankruptcy filings. Using a random sample of 100 counties (excluding counties with Native American casinos), NORC estimated the impact on a county's bankruptcy rate of being located within a 50-mile radius of one or more operating casinos. The analysis spanned the period from 1980–1997. In NORC's 100-county sample, 5 counties had casinos within or nearby in 1980. That number grew to 45 at the end of the sample period in 1997, with approximately 90% of these casino openings occurring after 1988. NORC found no significant change in per capita bankruptcy rates in communities where casinos were introduced. However, based on follow-up telephone surveys, a substantially higher incidence of bankruptcy was found among pathological gamblers versus low-risk gamblers and nongamblers. The study also concluded that "the availability of a casino within 50 miles [versus greater distances] was associated with about double the prevalence of problem and pathological gambling."

Nichols et al. (2000) also examined whether the introduction of casino gambling had an impact on local bankruptcy filing rates. They utilized county-level bankruptcy filing data from 1989 through the first quarter of 1998. Using eight cities in counties that introduced casino gambling between 1991 and 1994, their analysis determined whether the precasino filing rate was significantly different from the postcasino filing rate. To control for the possible influence of other factors, they created a control group by using a matching algorithm to select, for each casino community, five other communities nationwide that were located 50 miles or more away from a casino but had very similar community profiles based on a number of demographic and economic characteristics.⁷ The empirical test examined whether the change in bankruptcy filing rates in each casino community was statistically different from the change in each community's control group.

5. The American Gaming Association (AGA), the trade association for commercial gambling in the United States, criticized SMR's conclusions by demonstrating an inverse relationship between the national bankruptcy filing rate and gambling revenue between 1991–1996. The AGA contended that SMR's evidence was anecdotal at best and claimed it could demonstrate as many instances of counties in close proximity to a casino that had a bankruptcy filing rate that was below the national average as SMR had found counties near casinos with rates higher than the national average.

6. President Clinton signed Public Law 104-169 authorizing the creation of the NGISC on August 3, 1996. The final report of the NGISC was issued on June 18, 1999, and can be accessed online at <http://govinfo.library.unt.edu/ngisc/index.html>.

7. The variables used were percent of population aged 15–34; percent Indian, Aleut, or Eskimo; unemployment rate; percent black; percent Hispanic; total population; median household income; percent below poverty; percent not graduating from high school; percent of housing that is renter-occupied; percent of housing units in structures with three or more units; net migration; percent urban; average population per square mile; and a Gini coefficient of income inequality.

They concluded that bankruptcy filings did increase, relative to the control group, following the introduction of casinos in seven of the eight cities. The increase was statistically significant in five of the seven cities. They also noted that the largest increase occurred in the community that had casinos the longest and the effect was more pronounced for Chapter 13 than Chapter 7. For the one community in which bankruptcy rates declined, its casinos could be classified as "destination resort casinos," with a higher proportion of casino patrons being tourists or visitors, relative to the other seven communities. Eadington (1999) noted the possibility that the positive economic development effects of gambling (job creation, tax revenue, support of peripheral businesses and services, etc.) may be greater in destination communities due to the net positive infusion of outside dollars, than if a casino is built in an urban setting with a higher percentage of local patrons.

The studies reviewed used a variety of methodologies to investigate whether the growth in legalized casino gambling contributed to higher bankruptcy rates in counties that hosted or were near casinos. The results were mixed. However, regardless of the methodology, each study was hampered by the lack of full data on the bankruptcy experience across all counties and/or sufficient controls to isolate the impact of gambling on bankruptcy filings. The following sections attempt to address these shortcomings, beginning with a theoretical framework to help isolate the factors that determine the choice to file for bankruptcy.

III. A SIMPLE THEORY OF THE BANKRUPTCY FILING DECISION

Consider the following simple model of the bankruptcy filing decision. In period t , a household has level of debt net of assets D_t , realizes income y_t , consumes c_t , and obtains a realization of random expenses g_t arising from such sources as divorce, uninsured illness, and gambling losses. At the end of period t , the household considers the action to take with regard to the repayment of debt, in particular whether to file for bankruptcy or not to file.

If the household decides not to file for bankruptcy, then the level of debt in the subsequent period is given by

$$(1) \quad D_{t+1} = (1 + r(R_o))[D_t - y_t + c_t + g_t]$$

where R_o is the inherited creditworthiness reputation of a household that has not declared bankruptcy in the past and r is the real interest rate on debt. The real interest rate is assumed to depend directly on the creditworthiness reputation of a household. If the household decides to file for bankruptcy at the end of period t , then the level of debt at the outset of period $t + 1$ is given by

$$(2) \quad D_{t+1}^b = (1 + r(R_o))(1 - \delta) \times [D_t - y_t + c_t + g_t],$$

where δ denotes the proportion of debt obligations eliminated by the filing of bankruptcy, with $1 > \delta > 0$.

For simplicity, assume that filing for bankruptcy can be done only once over the household's time horizon. If the household does file for bankruptcy at the end of period t , then the household's anticipated value of future consumption over the remaining $T - 1$ time horizon, given per-period utility from consumption $u(c_i)$ for period $i = t + 1, \dots, T$, is given by

$$(3) \quad V(D_{t+1}^b, R_b) = \max_{c_{t+1}} u(c_{t+1}) - s(R_o - R_b) + \beta E_t V(D_{t+2}^{pb}, R_b),$$

subject to the debt evolution postbankruptcy condition,

$$(4) \quad D_{t+2}^{pb} = (1 + r(R_b))[D_{t+1}^b - y_{t+1} + c_{t+1} + g_{t+1}],$$

and a nonpositive terminal net debt condition, $D_T \leq 0$. The creditworthiness reputation for a household that has filed for bankruptcy is denoted by R_b , with $R_b < R_o$. In (3) the expectation is taken with respect to uncertain future income and expenses and the utility function has the standard increasing, concave form, such that $u' > 0$ and $u'' < 0$.

We assume that $r(R_b) > r(R_o)$, indicating that one of the costs of bankruptcy is damage to creditworthiness and a resulting higher cost of credit. In addition, the stigma

cost parameter $s > 0$ in equation (3) indicates the stigma or "embarrassment" cost felt by a household that has filed for bankruptcy arising from the resulting decline in its reputation for creditworthiness.

If the household does not file for bankruptcy at the end of period t , then the anticipated value of future consumption over the remaining $T - 1$ periods, assuming the household acts optimally, is given by

$$(5) \quad V(D_{t+1}, R_o) = \max_{c_{t+1}} u(c_{t+1}) + \beta E_t \\ \times \max(V(D_{t+2}^b, R_b), \\ V(D_{t+2}, R_o))$$

subject to

$$(6) \quad D_{t+2}^b = (1 + r(R_o))(1 - \delta) \\ \times [D_{t+1} - y_{t+1} + c_{t+1} + g_{t+1}],$$

$$(7) \quad D_{t+2} = (1 + r(R_o))[D_{t+1} - y_{t+1} \\ + c_{t+1} + g_{t+1}],$$

and $D_T \leq 0$. In this setting, the optimal bankruptcy decision at the end of period t can be expressed in terms of choosing the maximum of expressions (3) and (5). In comparing (3) and (5), note that there is an option value to not filing for bankruptcy in period t in terms of maintaining the bankruptcy option for the household in subsequent periods.

Assuming that no bankruptcy occurs if the household is indifferent, then the household will file for bankruptcy if and only if

$$(8) \quad V(D_{t+1}^b, R_b) > V(D_{t+1}, R_o).$$

This condition suggests several key factors that will make bankruptcy filing more likely by increasing $V(D_{t+1}^b, R_b)$ relative to $V(D_{t+1}, R_o)$. The larger is the reduction in debt via bankruptcy, $(D_{t+1} - D_{t+1}^b)$, the larger will be the gain from filing, *ceteris paribus*. From equations (1) and (2), this difference will increase with an increase in existing net debt D_t , a lower realization of income y_t , and a higher realization of expenses due to gambling losses, divorce, or uninsured illness g_t , which leads to the following hypothesis.

HYPOTHESIS 1: *A higher level of debt net of assets or a lower realization of income*

net of expenses (such as may arise from a spell of unemployment, divorce, uninsured illness, or gambling losses) will increase the likelihood of a bankruptcy filing.

It follows that an increase in the proportion of existing debt that is unsecured, such as revolving debt associated with credit cards, will also tend to increase the gain from filing. This is simply because there is no collateral to be forfeited when such debts are eliminated through bankruptcy. In the model, δ rises with the proportion of unsecured debt. This leads to the following hypothesis.

HYPOTHESIS 2: *A higher proportion of debt that is revolving debt will increase the likelihood of a bankruptcy filing.*

The theory also suggests that the anticipated growth rate in income will affect the likelihood of a bankruptcy filing. For any given level of realized income, a higher anticipated rate of growth in income over future periods will support a higher sustained level of consumption. Of course, the gain from filing for bankruptcy derives from the increase in future consumption made possible by wiping out previous debt. But given a concave utility function, the gain from the extra consumption triggered by bankruptcy diminishes as the anticipated growth in income rises, leading to the following hypothesis.

HYPOTHESIS 3: *A higher anticipated rate of growth in income will reduce the likelihood of a bankruptcy filing.*

The model suggests that there are reputational costs that will affect the likelihood of filing for bankruptcy. In particular, a higher stigma cost (s) or a greater increase in the costs of acquiring credit ($r(R_b) - r(R_o)$) will reduce the likelihood of a bankruptcy filing. We thus have the following hypothesis.

HYPOTHESIS 4: *A decrease in bankruptcy stigma costs or reduction in the cost of postbankruptcy credit will increase the likelihood of a bankruptcy filing.*

States vary in the treatment of delinquent borrowers by lenders. For example, some states prohibit lenders from garnishing wages. Immunity from wage garnishment lowers a borrower's costs of debt reduction, without resorting to bankruptcy (e.g., outright default). By lowering the cost of

nonbankruptcy debt reduction, it raises the relative stigma cost of using bankruptcy to reduce debt. We thus have the following hypothesis.

HYPOTHESIS 5: A limit on wage garnishment will reduce the likelihood of a bankruptcy filing.

IV. THE DATA

To test the theory of bankruptcy choice and to identify the impact of casino gambling on filing rates, we utilize annual data on county-level bankruptcy filing rates for over 3000 U.S. counties during the period 1993–99 (21,189 observations). Because this period was one of rapid expansion of casino gambling, we can explore the effect of gambling on bankruptcy filing rates not only by comparing counties that differ in the proximity to and volume of local casino gambling but also by comparing those that experienced different timing in the introduction and growth of local casino gambling during the period. Below we discuss the construction of variables identified in the set of hypotheses as determinants of the likelihood a household will file for bankruptcy. These variables should influence the level of bankruptcy filing rates across counties and over time.⁸

A. Measures of Net Debt and Proportion of Debt that Is Revolving

A key variable predicted to affect bankruptcy filing rates is the level of debt. Unlike earlier studies, the data set we employ contains county-level measures of the amount and type of consumer debt per borrower. These credit variables derive from a database assembled by Trans Union, one of the three major U.S. credit bureaus. This database is based on a series of large random samples of U.S. consumer credit histories drawn quarterly since 1992. Each quarterly sample contains approximately 30 million depersonalized credit reports. From this underlying sample we can determine the total amount of debt held by consumers per period, aggregated to the county level.

8. Construction of the empirical model draws on prior work that demonstrated the value of aggregated credit bureau data for tracking household borrowing and spending behavior. See Barron et al. (2000).

Estimation of the bankruptcy filing rate model includes the average consumer (non-mortgage) debt per household for each county each year. These dollar values of debt are transformed into real terms (1999 dollars) using the overall consumer price index (CPI). From Hypothesis 1, we expect county bankruptcy filing rates to be directly related to this overall measure of household debt, other things equal. In addition to the overall measure of consumer debt, we include in our estimation a measure of the proportion of consumer debt in a county that is revolving debt. Hypothesis 2 specifies that the bankruptcy filing rate will increase with the proportion of consumer debt that is revolving.

In Hypothesis 1, the household debt measure is net of the value of assets. Home equity provides an available measure of the value of assets and enters the estimated equation in the form of the county's average value of housing as reported by the 1990 census. The 1990 values are transformed into 1999 dollars using the CPI for housing and the overall CPI. Age of household members is another proxy for the value of household assets. A variable is constructed from the 1990 census to indicate the proportion of borrowers over the age of 50 in each county. Given the presumption that asset holdings tends to rise with age and thus net debt tends to fall, Hypothesis 1 suggests that counties with higher home values or a larger proportion of older borrowers will have lower bankruptcy filing rates.

B. Measures of Income and Anticipated Growth in Income

Household income enters the model in two ways. First, income provides another proxy for household assets and thus net debt. To measure household income, we start with the Bureau of Economic Analysis (BEA) measure of the total annual level of income for a county and the total population of the county. Total county population is converted to number of households using 1990 census data on the average number of members of a household for each county. Dividing this into the total county income yields a measure of average household income. As with the debt variables, this annual income measure for each county is converted to real terms

(1999 dollars) using the CPI. From Hypothesis 1, we expect bankruptcy filing rates to rise with a reduction in average measured household income.

To obtain a measure of the anticipated future growth in income for a county, the trend in the log of real income over 1993 to 1999 is estimated for each county and is used as a proxy for the income growth anticipated by households in making their bankruptcy decision. Hypothesis 3 suggests that bankruptcy filing rates will be inversely related to this measure of county income growth, other things equal.

C. Measures of the Prevalence of Shocks to Income, Divorce, and Uninsured Illness

Hypothesis 1 indicates that income shocks that can arise from loss of employment and expenditure shocks that can accompany uninsured illness or divorce make it more likely for a household to file for bankruptcy. We introduce two measures of the likelihood that a household experiences an income shock. First, from the Bureau of Labor Statistics (BLS) supplement to the Census 1996 Current Population Survey (CPS), *Displaced Workers, Job Tenure, and Occupational Mobility Survey*, we calculate state-level average lengths of continuous employment for workers currently employed as of 1996. States with shorter average employment durations should have more households experiencing income shocks each period, and thus counties in these states should have higher bankruptcy filing rates.

A second measure of the prevalence of household income shocks is the prior period's change in the state unemployment rate as reported by the BLS. A rise in unemployment is likely to reflect an increase in the frequency of negative income shocks among households and thus an increase in bankruptcy filings.

For expenditure shocks arising from the breakup of a marriage, we use the Census March CPS to construct measures of the proportion of adults in a state in a given year that are divorced or separated. The Census March CPS surveys are also used to construct a measure of the proportion of households with at least some health insurance. Bankruptcy filing rates are hypothesized to rise with the divorce rate and to fall with increases in the proportion of households that are covered by health insurance.

D. Measures of Stigma and the Ability to Garnish Wages

Identifying variables that reflect differences in the social stigma costs of bankruptcy is difficult. County-level population density may capture differences in stigma costs across counties. In more densely populated counties, the resulting increase in anonymity should reduce the social stigma costs to filing for bankruptcy. Consequently, from Hypothesis 3, counties with higher population density should experience higher filing rates. In addition, it is possible that older borrowers, whose attitudes were formed decades earlier during a period when bankruptcies were far less common, may also perceive higher stigma costs to bankruptcy, so we expect counties with a higher proportion of older borrowers should have lower bankruptcy filing rates. Time dummies are also included to detect any effects from an across-the-board decline in stigma over time, independent of local effects related to age or density of the population.⁹

Wage garnishment is a creditor collection tool that a delinquent debtor can escape by filing for bankruptcy. Hypothesis 5 indicates that a debtor's advantage to filing for bankruptcy is likely to be lower in states that place limits on garnishment that exceed the federal levels. Federal law exempts from garnishment 75% of disposable earnings per work week or an amount equal to 30 times the federal minimum hourly wage, whichever is greater. A minority of states had laws that provide a greater exemption. The estimation includes a variable that indicates the percent of a delinquent debtor's wages that state laws exempt from wage garnishment. We expect lower bankruptcy filing rates for counties in states where the percent of wages exempt from garnishment exceeds the federal exemption level, other things equal. Table 2 summarizes the sources for selected variables used in empirically estimating our bankruptcy filing model.

9. We also considered potential differences in stigma costs as captured by regional variables. These results are available on request. Adding regional control variables in the random-effects model does not qualitatively alter any of our other findings. Interestingly, other things equal, bankruptcy filing rates are significantly higher in the South and significantly lower in the East and the Central regions of the United States as compared to the West.

TABLE 2
Variables and Data Sources

Variable	Source
Annual county-level rate of bankruptcy filings per household	SMR Research. County bankruptcy filing totals derived from the Administrative Office of the U.S. Courts, 1993-99, Department of Commerce (DOC), BEA annual county population, and 1990 census information on county average individuals per household.
Annual county-levels of total consumer debt and proportion of consumer debt that is revolving debt	Trans Union, LLC (TU) <i>TrenData</i> TM database, 1992-99.
Annual county-level income	DOC, BEA, 1992-99. The BLS CPI-U series was used to covert to real values.
Annual number of households in the county	DOC, BEA 1992-99. County population and 1990 census average number of individuals per household in each county.
Annual state-level unemployment rates	BLS, local area unemployment statistics, 1992-99.
Annual state-level data on proportion of households with some health insurance coverage	U.S. Bureau of the Census. Annual CPS of persons and households, March surveys, 1992-99.
Annual state-level data on the proportion of adults divorced or separated	U.S. Bureau of the Census. Annual CPS of persons and households, March surveys, 1992-99.
County-level proportion of adults above age 50 for 1990	U.S. Bureau of the Census. 1990 U.S. county census data.
County-level average value of housing based on 1990 census values	U.S. Bureau of the Census. 1990 U.S. county census data converted to real values using BLS CPI housing index.
County-level population density, number of households in 1996 divided by county area	U.S. Bureau of the Census. 1990 U.S. county census data on size of county (square miles) and number of individuals per household and 1996 population figures.
State-level average length of continuous employment for currently employed workers in 1996	U.S. Bureau of the Census and BLS. 1996 CPS supplement: <i>Displaced Workers, Job Tenure, and Occupational Mobility Survey</i> .
Adjusted casino gambling revenue (wager minus payout) for counties with at least one casino, by year. Also, for counties without a casino but adjacent to or within 50 miles of a casino county, total adjusted gambling revenue of the casino counties nearby	Various state agencies with oversight responsibility for gaming activities.

E. Measure of Gambling Activity

Our measure of gambling activity focuses only on casino gambling. States with licensed casino gambling were identified through an authoritative industry publication, *International Gaming & Wagering Business (IGWB)*.¹⁰ The casino gambling category includes both land-based and riverboat facilities that provide electronic gaming activity (e.g., slot machines and table games). Our gambling database includes facilities in 59 counties located in 11 states (see Table 3 for details).

Annual data on adjusted gross revenue (gross amount wagered, minus winnings paid

to wagerers) by casino were collected from a variety of sources, which varied by state. All states regulate gambling activity and require detailed reporting. State agencies contacted for data included state gaming commissions, gaming control boards, departments of revenue, and (in the case of Louisiana for data prior to 1996) the state police. With the exception of two very large casinos in Connecticut (Foxwoods and Mohegan Sun), our database does not include casino gambling activity on Native American reservations. Such data are difficult to obtain. Because of tribal sovereignty, the various state gaming regulatory authorities do not have jurisdiction over reservation casinos. Table 3 displays the aggregate adjusted gross revenue by year for the casino counties in our database.

10. August issues of *IGWB* contain an annual supplement entitled "U.S. Gross Annual Wager" that provides statistics on gambling activity across the country.

TABLE 3
Casino Gambling Sample Characteristics

Year	Adjusted Gross Gambling Revenue (\$billion, Current)	Number of Casino Counties
1992	9.7	25
1993	11.3	31
1994	13.9	44
1995	16.6	50
1996	17.9	55
1997	19.5	57
1998	21.1	57

Note: Counties with casinos sometime during the period: 59.

Colorado: Gilpin; Teller.
 Connecticut: New London.
 Iowa: Clayton; Clinton; Des Moines; Dubuque; Lee; Polk; Pottawattamie; Scott; Woodbury.
 Illinois: Jo Daviess; Kane; Madison; Massac; Rock Island; St. Clair; Tazewell; Will.
 Indiana: Dearborn; Harrison; Lake; La Porte; Ohio: Vanderburgh.
 Louisiana: Bossier; Caddo; Calcasieu; East Baton Rouge; Jefferson; Orleans.
 Missouri: Buchanan; Clay; Jackson; Pemiscot; Platte; St. Charles; St. Louis; St. Louis City.
 Mississippi: Adams; Coahoma; Hancock; Harrison; Tunica; Warren; Washington.
 New Jersey: Atlantic.
 Nevada: Churchill; Clark; Douglas; Elko; Humboldt; Lyon; Nye; Storey; Washoe; White Pine.
 South Dakota: Deadwood.

Excluding the Connecticut reservation casinos, the database captures approximately 90% of non-Indian casino gambling activity in the United States in 1998.

The NORC study identified a significantly higher incidence of pathological gambling behavior in areas within 50 miles of casinos. Consequently, there is reason to expect that the presence of a casino may affect the financial stability of households within a 50-mile radius. Because this "impact area" often extends well into counties adjacent to or near the county hosting the casino, a set of adjacent or nearby counties for each of the 57 casino counties that remain in our sample is also identified. Nearby counties were identified if their borders fell within 50 miles of the casino location. Exceptions to this definition occurred in Nevada, which has large counties that are several hundred miles wide and widely dispersed towns. In cases where the casino was located in the center of such large counties, some adjacent counties were

well outside the impact area and were not designated as a nearby county. A total of 434 counties (out of over 3000 nationwide) were classified as either hosting or adjacent to casino gambling facilities.

From the casino database, we capture the impact of casino gambling on county-level bankruptcy rates by dividing the AGR generated in each casino county by the number of households in the immediate local and surrounding area (the casino county and nearby counties as defined). This provides a measure of the net casino revenue per household for households located in counties hosting or close to casinos. In cases where households in a given county may be near more than one casino county, we assign such households the sum of the per household net casino revenue attributed to each of the nearby casino counties. Because the database includes annual observations for each county over time, this variable captures both the presence of casinos as well as the growth in net wagering activity over time.

V. RESULTS

Table 4 displays the results of the model's estimation for the period 1993 to 1999. The results are largely consistent with the hypothesized relationships. The second column of Table 4 provides means and standard deviations for the independent variables. The third column lists the predicted signs for the coefficients as discussed in the two previous sections. The fourth column provides estimates for a random-effects model specification.¹¹ Finally, the last column reports estimation results for a fixed-effects model specification that explores the correlation between deviations in a county's bankruptcy filing rate from the county average and deviations in the independent variables from their county averages over the seven-year time period. The discussion begins with the results of the random-effects model estimation.

Household decisions to take on higher debt loads clearly contributed to the rise in bankruptcies. Holding household income and other, noncredit factors constant, higher nonmortgage debt levels per household were

11. For this estimation, we adopt the Huber/White/sandwich estimator of variance; this estimator produces valid (robust) standard errors even if the correlations within group (county) are not as hypothesized.

TABLE 4
Determinants of County Bankruptcy Filing Rates: 1993–1999

Independent variables	Means – Not Log (SD)	Predicted Sign for Effect on Bankruptcy Filing Rate	Random-Effects Model for Log of Household Bankruptcy Filing Rate, Coefficient (z-Statistic)	Fixed-Effects Model for Log of Household Bankruptcy Filing Rate, Coefficient (t-Statistic)
Log of county average real nonmortgage debt per household (lagged one year)	11,106 (4,421)	+	0.1828 (9.62)***	0.0846 (5.79)***
Proportion of county nonmortgage debt that is revolving debt (lagged one year)	0.285 0.083	+	0.1706 (2.20)**	0.1816 (2.82)***
Log of county average real house value	78,757 (47,498)	–	–0.2340 (8.08)***	–
Log of average county real household income (lagged one year)	50,766 (12,202)	–	–0.2336 (4.82)***	–0.3021 (6.71)***
Trend growth rate of county's average real household income	0.042 (0.012)	–	–3.6345 (6.37)***	–
Log of state average employment tenure (years)	7.24 (0.80)	–	–1.0184 (13.92)***	–
Change in state unemployment rate (lagged one year)	–.30 (0.64)	+	0.0078 (2.50)**	0.0069 (2.24)**
State proportion of adults who are divorced/separated (lagged one year)	0.09 (0.01)	+	1.4680 (5.43)***	0.9210 (3.56)***
State proportion of households with some health insurance (lagged one year)	0.77 (0.05)	–	–0.6498 (7.08)***	–0.1881 (1.92)*
Log of county density (households per square mile) (lagged one year)	0.08 (0.62)	+	0.1845 (27.81)***	–0.8772 (15.36)***
County proportion of adults over 50 years of age	0.39 (0.07)	–	–0.7433 (5.21)***	–
Percent of wages exempt from garnishment	81.5 (9.43)	–	–0.0249 (31.75)***	–
Log of casinos' net revenue (in thousands) per household for areas with legalized gambling (lagged one year)	0.13 (1.01)	+	0.0984 (4.97)***	0.0613 (3.13)***
Year 1994 dummy	0.14 (0.35)		–0.0539 (6.86)***	–0.0203 (2.70)***
Year 1995 dummy	0.14 (0.35)		0.0810 (7.95)***	0.1480 (15.31)***
Year 1996 dummy	0.14 (0.35)		0.3710 (29.87)***	0.4525 (40.83)***
Year 1997 dummy	0.14 (0.35)		0.5498 (37.47)***	0.6567 (49.14)***
Year 1998 dummy	0.14 (0.35)		0.5865 (34.22)***	0.7128 (44.98)***
Year 1999 dummy	0.14 (0.35)		0.5349 (29.55)***	0.6728 (39.34)***
Constant			10.7519 (21.37)***	0.4575 (0.84)

continued

TABLE 4 continued

Independent variables	Means – Not Log (SD)	Predicted Sign for Effect on Bankruptcy Filing Rate	Random-Effects Model for Log of Household Bankruptcy Filing Rate, Coefficient (z-Statistic)	Fixed-Effects Model for Log of Household Bankruptcy Filing Rate, Coefficient (t-Statistic)
Number of observations			21,189	21,189
Number of areas (counties)			3,027	3,027
Dependent variable is the log of county bankruptcy filing rate per 1000 households Mean before log	8.82			
Wald chi-squared (19) for random effects; F(14, 18,148) for fixed effects			18,899.18	2277.03

Note: The displayed means are means of the nonlog version of the variable. The sample is restricted to counties for which we have complete data for the 1993 to 1999 period on bankruptcy filing rates and debt data. Such a restriction dropped 30 counties from our analysis. In addition nine counties with population under 1000 in any year during the period 1993–1999 are excluded. For the random-effects model, the Huber/White/sandwich estimator of variance is used to calculate robust z-statistics.

*Significant at 10%.

**Significant at 5%.

***Significant at 1%.

associated with higher bankruptcy filing rates at the county level. In addition, the type of debt mattered as well. Bankruptcy filing rates rose along with the proportion of debt that was revolving, presumably due to the greater gain in net assets that can be achieved by filing for bankruptcy when less collateral is at risk of forfeiture.

As for local economic and demographic factors, counties with higher average household income and higher income growth rates had lower bankruptcy rates. Similarly, higher housing values reduced the likelihood of a bankruptcy filing. On the other hand, higher bankruptcy rates were observed in areas with rising unemployment, lower employment tenure, higher divorce/separation rates, and less health insurance coverage, all of which are proxies for the prevalence of either income or expense shocks.

Counties with a higher proportion of residents over the age of 50 (who tend to have relatively more assets and may feel greater stigma associated with filing) tend to have lower bankruptcy filing rates. Another proxy for local-level social stigma, population density, was positively associated with filing rates. Counties that exempted a higher proportion of wages from garnishment had significantly lower bankruptcy rates, holding other things constant, suggesting that debtors do take a

calculating approach to handling financial problems and opt for bankruptcy when other, informal methods for avoiding repayment are limited by court-ordered garnishment.

Finally, our measure of casino gambling losses is positive and significant in determining the level of bankruptcy filings. That is, controlling for other factors, the volume of casino gambling is directly related to the bankruptcy filing rate in areas that have casinos within or nearby. To quantify the effect, suppose there had been no growth in casino gambling activity during the years in which bankruptcy filings escalated (i.e., casino revenues were held at 1994 levels). The model suggests that bankruptcy filing rates in 1998 would have been 2.6% lower in counties that hosted or were adjacent to casinos, which translates into slightly less than a one-half of 1% lower filing rate nationwide (see Table 5). If we impose a more extreme assumption of no casino gambling at all, then the model predicts a 5.4% reduction in 1998 filing rates for casino and adjacent counties and close to a 1% decline in the nationwide filing rate.

To provide some perspective to the above results, Table 5 also displays the effect on bankruptcy filing rates if (1) income had remained at 1994 levels with no income growth and no fall in unemployment, and (2) both the level of consumer debt and

TABLE 5
 Changes (%) in the Predicted 1998 Bankruptcy Filing Rates For Alternative Values of Gambling Net Revenues, Income and Unemployment Changes, Debt, and Health Insurance Coverage

	The Level of Net Gambling Revenues Had Remained at the 1994 Level	The Level of Net Gambling Revenues Equaled Zero	Income Had Remained at the 1994 Level, the Trend in Income Was Zero, and Unemployment Had Not Fallen	Debt Levels and the Proportion of Debt that Is Revolving Had Remained at the 1994 Level	Health Insurance Coverage Existed for All Households
For all counties	-0.46	-0.97	23.3	-5.7	-13.7
For counties that either have casino gambling or are close to a county with casino gambling	-2.6	-5.4	24.7	-6.2	-12.5

the percent that was revolving had remained constant at 1994 levels. Although elimination of gambling would have reduced 1998 bankruptcy filing rates by slightly less than 1%, a stagnant economy over the 1994–98 period (coupled with the actual growth in consumer debt) would have increased bankruptcy filings nationwide by 23.3%. On the other hand, if there had been no growth in either consumer debt or the proportion of consumer debt that was revolving during this period (coupled with observed growth in income and employment), bankruptcy filing rates would have fallen by 5.7%. Last, note from Table 4 that the coefficients on the time dummy variables indicate that a significant, unexplained increase in bankruptcy filing rates occurred after 1995, even controlling for debt growth and composition, a variety of insolvency events, and local-level stigma effects. Gross and Souleles (2002) found a similar effect.¹²

The results of an estimation of bankruptcy filing rates using a fixed-effects model, reported in Table 4, largely mirror those of the random-effects model. In particular, an increase in debt, a reduction in income,

higher unemployment or divorce rates, lower medical insurance coverage, and larger gambling losses all led to an increase in the rate of bankruptcy filing. The notable exception to our earlier results is the negative effect of county household density on bankruptcy filing rates in the fixed-effects model.

The random-effects model provides strong evidence that more densely populated counties have higher bankruptcy filing rates. We have attributed this finding to lower stigma costs in higher density population areas due to increased anonymity. The fixed-effects model indicates that a larger deviation in the population density of a county from its average during the period from 1993 to 1999 is associated with a smaller decrease in the bankruptcy filing rate from the county's average. Given the assumptions underlying the two estimation methods, these results are not necessarily inconsistent. The inverse relationship in the fixed-effects model indicates that changes in density over time for a given county capture something other than changes in stigma costs. For instance, a rapid increase in density indicates a county with a high population growth rate; what we may have captured by this is a rapid growth of employment opportunities, and thus households' anticipated levels of future income. Strong local economies with rapid growth rates may elevate expectations for a household's own income prospects and thus lead to a fall in bankruptcy filing rates.

One final point regarding the fit of the models: The random-effects model for

12. Based on a detailed econometric study of the performance of several hundred thousand credit card accounts between 1995 and 1997, Gross and Souleles (2002) concluded that even after controlling for risk composition and other economic fundamentals, the propensity to default increased significantly over the period. Increases in credit limits on the cards explained only a small part of the change in default rates. Consequently, they found the results consistent with the "declining stigma" argument.

explaining the variation in bankruptcy filing rates across counties and over time can be decomposed into two components. One part considers variation in each county's filing rate from its average rate; the second part considers variation in the average filing rates across counties. The first component of the random-effects model is our fixed-effects estimator, also known as the within estimator. In terms of explaining variation in county filing rates from their averages, this model has an R^2 of 0.637. However, for explaining the overall variation in filing rates, the fixed-effects model has an R^2 of only 0.063. This low fit is not surprising given that a number of key determinants of bankruptcy filing rates vary across counties but not over time.

The second component of the random-effects model, referred to as the between estimator, focuses on explaining differences in average filing rates across counties. The R^2 for the between estimator is 0.548 in terms of explaining the variation in average bankruptcy filing rates across counties, but the between estimator had an R^2 for the overall fit of only 0.28. As expected, the random-effects estimator overall fit improves on both the within-estimator and between-estimator results, with an R^2 of approximately 0.53.¹³

VI. CONCLUDING REMARKS

Using multivariate techniques that control for the influence of factors such as debt usage, income interruptions, expense shocks, and filing stigma (social and economic), we find increases at the county level in the number of personal bankruptcy filings due to the introduction of casino gambling. However, although the proximity of casino gambling appears to be associated with higher bankruptcy rates, the local impact is far more pronounced than the influence of casino gambling on national filing rates. Nationwide, the incidence and growth of casino gambling over the past decade did not explain much of the rise in bankruptcies during the period.

Several caveats and additional comments are warranted regarding these results. First, by design, the model measures the *direct*

effect of gambling on the county-level bankruptcy filing rate. The potential boost to personal finances associated with the economic development that accompanies the introduction of a casino into a county is captured in part by the income and unemployment variables and should hold down the bankruptcy filing rate. On the other hand, gambling can lead to higher debt levels, and the inclusion of such debt variables can result in underestimating the full effect of casinos. Consequently, the direct influence of gambling on bankruptcy filing rates identified by the model omits additional positive and negative indirect influences of gambling on household finances.

With regard to the positive indirect influence of gambling, Eadington (1999) noted that the type of casino determines its repercussions on a community. Facilities that invite relatively more of their patrons from outside of their jurisdiction (tourist traffic) will see fewer adverse effects and attract relatively greater marginal local economic benefits. Consequently, a "destination resort casino," found in places such as Las Vegas or Atlantic City, is effectively a "net exporter" of gambling negatives. Its patrons are generally tourists and take any financial difficulties back home with them after depositing their welcome tourist dollars. In contrast, an urban casino attracts most of its patrons from the community, and therefore the good effects are smaller and the bad effects remain in the community.

Our gambling activity variables were designed to test the *local-level* influence of gambling activity on bankruptcy incidence. As noted, given the volume of tourist trips to gambling destinations, such as Las Vegas, Atlantic City, and, more recently, developed casino complexes along the Gulf Coast and in places such as Tunica, Mississippi, it is certainly possible and perhaps likely that some of the ill effects of casino gambling are exported back to the counties where tourists reside. Our gambling variables do not capture this effect if the tourist lives far away from a casino. Consequently, our model is silent on how much the growth in casino gambling during the 1990s may have influenced the national bankruptcy filing rate, other than the influence on the national filing rate exerted by filings in the 434 casino and nearby counties themselves.

13. Note that this R^2 figure corresponded to a weighted generalized least squares estimator. The estimations reported in Table 4 are only asymptotically equivalent to this. See Liang and Zeger (1986).

The measurement of local effects associated with gambling activity is likely to become more difficult over time. Technological advances are rapidly changing the delivery of gambling services. The rise in Internet gambling activity has been dramatic and promises to continue. Christiansen Capital Advisors (CCA), a widely cited industry specialist, estimated that adjusted gross revenue from Internet gambling increased from \$300 million in 1997 to over \$1.1 billion in 1999. CCA predicted that Internet gambling will increase by 55% per year until 2003. As Internet gambling expands, it will become more difficult to measure the local effects of gambling because there will be few (if any) local areas without it: All households with Internet service will have access to virtual casinos.¹⁴

Finally, our bankruptcy analysis provided important information for public policy issues beyond the insights regarding the effects of the introduction of gambling on household bankruptcy filing rates. For instance, Table 5 indicates that the expansion of health insurance coverage to all households would lower the overall bankruptcy filing rate in the United States by 13.7%.

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14. Bear Stearns reported that over 2 million U.S. residents regularly gamble online. See Kornblum (2002).