The Volume of Federal Litigation and the Macroeconomy*

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Abstract

In this paper we examine the extent to which fluctuations in a number of macroeconomic variables impact on the volume of federal litigation cases. In particular, the impact of aggregate U.S. GDP, consumption, inflation, unemployment, and interest rates on the volume of antitrust, bankruptcy, contract, personal injury, and product liability cases between the years 1960 and 2000 is examined using Granger causal analysis and vector autoregression models (see e.g. Granger (1988)). Our empirical findings suggest that there are several linkages between macroeconomic variables and the volume of litigation cases, in broad agreement with the findings of Siegelman and Donohue (1995), who find that unemployment is an important determinant of the (number and) quality of employment cases filed. Most noteworthy, we find that there is a causal linkage from output, consumption and inflation to the total volume of federal litigation, so that predictions of future litigation volume can be improved by using information contained in current macroeconomic aggregates. Causation in the other direction (i.e. from the volume of litigation to macroeconomic activity) is not found in the data, however. Based on impulse response analysis, it is seen that shocks to income, consumption and inflation immediately lead to an increase in the volume of litigation, with shocks to inflation having the largest impact, and shocks to consumption having a rather moderate impact. In addition, the long run impact that shocks to each of these variables has on the volume of litigation is positive, regardless of whether the VAR or VEC model is used. Here, again, the impact of consumption is quite moderate, though. Additionally, similar results arise when examining the relation between various individual measures of federal litigation volume and the macroeconomy. Thus, the volume of federal litigation does not appear to be immune to the business cycle, a finding which is in broad agreement with the findings of Siegelman and Donohue.

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1 Introduction

Some attorneys are of the belief that their market is relatively immune from the volatility of business cycles. The recent front page headline from the New Jersey Law Journal summarizes this view:

"However Hard the Market Falls, Soft Landing Seen for IP Lawyers
Also likely to thrive in sluggish times: employment, bankruptcy, and practice areas relatively immune to the business cycle"[1]

The litigation business consists primarily of attorneys who, in turn, generate a demand for the services of a range of other professionals. These range from real estate companies who lease space to attorneys, to professionals such as support staff, outside experts, and other "litigation support professionals and their employees, as well as other workers who provide services directly to the court system." National Economic Research Associates, for instance, conducts a "legal leading indicators" survey to forecast spending by corporations on outside legal counsel over the coming year. One of the purposes of this survey is to determine whether current economic conditions are expected to affect the litigation business. Given that firms are willing to pay for this information, forecasts of the volume of litigation must play an important role when decisions are made.[2]

For some types of lawsuits, such as bankruptcy litigation, one would expect there to be a significant relationship between slowdowns in the economy and the volume of bankruptcy lawsuits. However, for other types of lawsuits considered in this study, such as contract cases, antitrust lawsuits and various types of tort litigation, there is no obvious relationship. For example, are individuals more likely to pursue a personal injury lawsuit in better or poorer economic times? Litigation is a costly endeavor, and individual plaintiffs and their attorneys, who may be financing the expenses of the lawsuit and are paid through contingency arrangements, would presumably be influenced by economic conditions. Contingency fee arrangements further cloud the picture. Attorneys may be funding current and future lawsuits from the proceeds of prior lawsuits. However, cases may not conclude in a manner that relates to the economy. There is a significant lag between when a lawsuit is filed and when it reaches an end in the form of one of several potential outcomes: settlement, plaintiff dropping the case, dismissal, or trial.

[1] *Henry Gottlieb (2001, pp. 1-16).*

[2] Detailed information on this survey can be found at the website *http:\\www.nera.com.*

In the case of commercial litigation, will declining demand and cash flows make companies more reluctant to engage in this expensive activity? Are the reasons for commercial lawsuits somehow linked to the performance of the economy? For example, will intellectual property lawsuits more likely occur in an up or down economy? Will a rising economy create more innovations and more opportunities for parties to file lawsuits? On the other hand, does a weak economy force firms to seek opportunities within the legal system to replace diminished opportunities in the marketplace? Clearly, there are numerous questions one may ask with regard to the impact of macroeconomic and business conditions on the volume of litigation. Interestingly, with the exception of Donohue and Siegelman (1993) and Siegelman and Donohue (1995), little empirical research into the above questions has been undertaken. In their empirical study, Siegelman and Donohue (1995) focus on a variety of questions, including testing the Priest-Klein model of litigation. Specifically, they test the relationship between economic fluctuations and the number of employment lawsuits filed. Their results show an inverse relationship between economic performance and the number of employment cases filed. They additionally show that recessions tend to generate lower quality cases, which the Priest and Klein (1984) model suggests would settle more quickly.

Our study differs from the Siegelman and Donohue (1995) study in several respects. Most fundamentally, we focus on a broad variety of cases, including different types of personal and corporate litigation. In addition, our data set covers four decades while the Siegelman and Donohue analysis uses quarterly data for the time period 1977:2-1988:3. In a sense, our work can we viewed as an extension and update of the analysis conducted by Siegelman and Donohue, as we consider a longer historical period, include other economic variables, and apply a number of different econometric tools. (However, as noted earlier, Siegelman and Donohue consider other questions such as factors that determine settlement.) In summary, our study focuses exclusively on modeling the incidence of lawsuits across different types of litigation as a function of changing macroeconomic conditions; as reflected in fluctuations in GDP, consumption, unemployment, inflation, and the term structure of interest rates.

While the primary focus of our study is the impact of macroeconomic variables on the volume of litigation, we also study the impact of the volume of litigation on the macroeconomy. One argument is that litigation is costly, causing higher production costs and therefore higher prices and lower output. On the other hand, litigation may be viewed as a tool for eliminating distortions, and as such will not have negative effects on the economy (see e.g. Shapiro (1991)). Successful

antitrust suits will reduce monopoly power, leading to higher output and lower prices. Further, with imperfect information, there may be economic benefits to firms that produce unsafe products, and changes in the legal system may allow individuals to recover the damages resulting from use of these products. From this perspective, there is no reason why changes in the volume of litigation should have a systematic effect on macroeconomic variables.

Based on the application of a number of empirical time series tools, including Granger causality tests and impulse response function analysis (constructed from fitted vector autoregression models), we find evidence that economic fluctuations do indeed appear to have an impact on the volume of litigation. Most noteworthy, we find that there is a causal linkage from output, consumption and inflation to the total volume of litigation, suggesting that predictions of the future volume of litigation can be improved by using information contained in these variables. Causation from the volume of litigation to macroeconomic activity is not found in the data, however. Based on impulse response analysis, it is seen that shocks to income, consumption and inflation immediately lead to an increase in the volume of litigation, with shocks to inflation having the largest impact, and shocks to consumption having a rather moderate impact. In addition, the long run impact that shocks to each of these variables has on the volume of litigation is positive, regardless of whether the VAR or VEC model is used. Here, again, the impact of consumption is quite moderate, though. Additionally, similar results arise when examining the relation between various individual measures of litigation volume and the macroeconomy. Thus, litigation volume does not appear to be immune to the business cycle, a finding which is in broad agreement with the findings of Siegelman and Donohue.

The rest of the paper is organized as follows. In Section 2, the data used in our study are discussed. Section 3 contains a summary of the results based on our empirical investigation of the data. Finally, Section 4 concludes.

2 Data

A. Dependent Variables: Measures of Litigation Volume

The various dependent variables measuring the volume of different types of federal lawsuits were derived from the Administration Office of United States Courts. These data, shown in Table

1 and Figure 1, feature the volumes of two very different categories of lawsuits: commercial and personal litigation. The data cover the time period 1960-2000. These four decades feature highly variable economic conditions that include three significant economic expansions: the 106-month expansion of the 1960s, the 97-month expansion of the 1980s, and the longest post-war expansion that occurred during the years 1991-2001, which as of the date of this writing is 125 months long. In addition, the analysis period includes several economic contractions, including two 16-month recessions that occurred in the mid-1970s and the early 1980s. This variability allows us to better test how litigation volume moves as economic conditions change.

A number of changes in the litigation market have taken place over the period 1960-2000. In the bankruptcy sector, the Bankruptcy Reform Act of 1978 became the governing law for bankruptcy cases that were filed on or before October 1, 1979.[3] This law was later amended in 1984 and 1994 but these changes were not as dramatic as those of 1978. The 1978 Act provided for greater flexibility and other incentives for companies to file for bankruptcy protection. In addition, corporations could now utilize the bankruptcy laws for other non-traditional applications such as to avoid burdensome contracts such as labor agreements. This was the case with Continental and Eastern Airlines. Other companies, such as Texaco, Johns Manville and A.H. Robins, used the bankruptcy laws to deal with pressing litigation-related liabilities. Due to the legal changes that relate to the 1978 law, it is not surprising that the data show that bankruptcy volume increased substantially in the 1980s.

The other obvious relationship between bankruptcy case filings and the economy is that bankruptcy, whether corporate or personal, is usually a symptom of financial distress that is more likely to occur in poorer economic conditions. With bankruptcy case filings, one would expect case volumes to be countercyclical subject to variation that can be explained by institutional factors such a changes in the law. That is, when the economy turns down some companies and individuals will undergo financial distress and will have to resort to filing bankruptcy.

The antitrust data include both government and private antitrust actions. Most antitrust cases are based upon allegations of violations of the Sherman Antitrust Act of 1890 or the Clayton Act of 1914. The case law interpreting this legislation has varied after their passage. Over the analysis period 1960-2000, the 1960s was a period of more intense antitrust action compared

[3]For a summary of the highlights of these bankruptcy laws, see Weston and Copeland (1992, pp. 1150-1174) and Gaughan (2002, pp. 436-444).

with the years that followed. Indeed, the 1980s and 1990s were marked by more relaxed antitrust enforcement. It is not surprising, therefore, to note that the volume of antitrust cases generally declines throughout the period 1980-2000. It should, also be noted that there was a spike in the number of antitrust cases in 1962. These were mainly electrical equipment cases (1,741) coming from an unusually high volume of cases that were brought against the larger electrical equipment manufacturers in the U.S. The initial criminal prosecution in these cases was successful and established the culpability of the defendants. This allowed private litigants to piggyback on the federal prosecution, causing a spike in antitrust cases.[4] While this is an unusual occurrence, there really is not a compelling reason why this data point should be excluded from the data set.

There was also an increase in antimonopolization cases in the 1970s which is apparent in the significant number of cases that occurred in that decade (see e.g. Scherer and Ross (1990, pp. 458-471). Chief among these was the Justice Department's case against IBM which was filed on the last day of the Johnson Administration in 1969. This case volume, however, declined during the 1980s with the advent of more pro-business administrations that changed the leadership of the Justice Department.

One possible theory is that there would be a greater number of antitrust cases when there are more business activities as this would increase instances where companies may engage in anti-competitive behavior. On the other hand, one could make a theoretical argument that in poorer economic times firms tend to resort to anticompetitive behavior to try to maintain slipping sales volume. These alternative hypotheses are tested subject to the institutional variations that come in the form of varying levels of enforcement occurring during specific time periods.

A similar argument as was applied to antitrust actions can be applied to contract cases. With higher business volumes that occur in economic expansions there are more opportunities for businesses to engage in actions which a firm considers a violation of a contractual agreement. The cost of commercial litigation may also support a pro-cyclical variation as firms in weaker economic conditions may not be as able to pursue costly commercial litigation. If this is the case, contract case volumes would be pro-cyclical. On the other hand, perhaps the opposite is true. Perhaps firms resort to the courts to replace sales that they may be losing due to a declining economy. This would imply a counter-cyclical relationship.

[4]We thank a referee for pointing this out.

It should be noted that the case volume data are federal court statistics and do not reflect the trends in cases occurring in the state court data. This is not an issue for bankruptcy data as bankruptcy laws are federal. While a plaintiff can file an antitrust action in state court, it is the federal level that is the most important. However, plaintiffs' attorneys have displayed a preference to file personal injury and other related actions, such as product liability cases, in state court. Certain states like Texas and Mississippi have become known as states that have been very generous to plaintiffs, as discussed in Koenig (1998) and Pear (2001). Defendants, on the other hand, may work to have a case transferred to federal court where they may believe that they may achieve better results.

Moral hazard issues aside, auto accidents and other injuries are presumably random. Are plaintiffs more likely to pursue such actions in better or worse economic times? The availability of contingency fee arrangements may somewhat offset a plaintiff's inability to pursue an action because he has lower income due to an injury (see e.g. Galanter (1998) and Kritzer (1998)). Law firms are subject to the same economic conditions, but the income of plaintiff firms that practice in this area typically comes from settlements or verdicts which may or may not have an obvious relationship with the business cycle.

B. Independent Variables

The macroeconomic explanatory variables include the broadest domestic economic aggregate, gross domestic product (GDP), as well as personal consumption expenditures and the civilian unemployment rate as a gauge of labor market performance. An inflation measure, the urban CPI, and the 3-month T-Bill are also included. The latter has a priori theoretical relevance due to the fact that plaintiffs' attorneys often access capital markets to help finance litigation. Therefore, it is useful to see if variations in the costs of capital influence the volume of specific types of lawsuits. These economic variables were all gathered from the Federal Reserve Economic Database (FRED – see Table 1 and Figures 1 and 2).

3 Analysis and Empirical Findings

The empirical analysis proceeds as follows. We begin by computing simple correlations among the total number of cases and each of the macroeconomic variables. We then perform Granger causality

tests and ordinary least squares regressions, which are designed to determine which macroeconomic variables contain information useful for forecasting the volume of litigation. We conclude by estimating vector autoregressive (VAR) and vector error correction (VEC) models, and computing impulse response functions, which describe the dynamic response of the volume of litigation following shocks to real income, real consumption expenditures, and the CPI. As a preliminary step, it is necessary to specify which, if any, of the variables are nonstationary, and if so whether any of the variables are cointegrated, as failing to do so may lead to incorrect inference and model specification.[5]

Table 2 presents the results of augmented Dickey-Fuller unit root tests, where the tests allow for a time trend in each series.[6] We conclude that only the interest rate series is I(0), using the terminology of Engle and Granger (1987), while all of the other series are I(1). (For a detailed discussion of the unit root tests used in this section, see Said and Dickey (1984) and Hamilton (1994)). Panel I of Table 3 presents the results of bivariate cointegration tests based on the Engle-Granger two step method, with no cointegrating relationships being found among total cases, real GDP, consumption, and the CPI.[7] It is possible to have a cointegrating relationship which includes more than two variables, and if so there may be multiple cointegrating relationships among those variables. Panel II of Table 3 presents the results of full information maximum likelihood cointegration tests, using the trace type cointegration test of Johansen (1988, 1991) and the lag selection approach of Ng and Perron (1995). The results of these tests depend on the trend properties of the data, but when simple regression based tests were carried out, we found the preferred specification to include a linear trend in the data, and an intercept but no time trend in the cointegration vector, corresponding with the results given in column 3. For this specification, a Johansen trace test could not reject a cointegrating rank of zero (indicating no cointegration), and the Schwarz (1978) Information Criterion selected the model with no cointegration, but the Akaike (1973,1974)

[5]See Hamilton (1994, pp. 557-562) for further discussion.

[6]All tests are based on regressions of the form $x_t = \alpha + \beta x_{t-1} + \sum_{i=1}^{l} \gamma_i \Delta x_{t-i} + \varepsilon_t$, where the number of lags, l, is chosen using the methodology of Ng and Perron (1995), and the reported test statistics are the t-statistics associated with $H_0 : \beta = 0$, corresponding to the null hypothesis of a unit root. "Levels" results set $x_t = y_t$ and "Differences" results set $x_t = \Delta y_t$, (so that when $x_t = \Delta y_t$, the null hypothesis is that the series is I(2), while when $x_t = y_t$ the null is I(1)) where y_t is given in the first column of the table. Starred entries denote rejection of the unit root null hypothesis at a 10% level, so that the interest rate is found to be stationary (or I(0)).

[7]See Engle and Granger (1987) for a detailed introduction to cointegration in economics.

Information Criterion did select the model with one cointegrating relationship. Based on these findings, we analyze both vector autoregressive (VAR) and vector error correction (VEC) models when the cointegration status of the variables needs to be specified.

Sample correlations among total cases and each of the macroeconomic variables over the period 1961-2000 are shown in panel I of Table 4. In order to assess the statistical significance of these correlations, we employ Fisher's z test, with an asterisk denoting a correlation which is significantly different from zero at the 10% level. Inflation, unemployment, and the 3-month treasury bill rate are all significantly positively correlated with the total number of cases, indicating that the volume of litigation has tended to rise in the face of deteriorating economic conditions over the last forty years. Panel II, however, shows that there was little correlation among the different types of litigation for the period 1981-2000.

The natural first step in testing whether litigation is affected by the business cycle is to test for Granger causality from the macroeconomic variables to the volume of litigation. Table 5 presents the results of pairwise Granger causality tests between the individual macroeconomic factors and the total number of cases over the period 1961-2000, and Figure 3 presents a graphical representation of these findings. The idea behind Granger causality tests is to determine whether the past of a particular macroeconomic variable contains information useful for forecasting total case volume (tc_t) beyond that contained in lagged values of tc_t, and vice versa. Specifically, we conclude that the variable x fails to Granger cause tc if $\gamma_1 = \gamma_2 = \cdots = \gamma_k = 0$ in the OLS regression

$$tc_t = \alpha + \sum_{i=1}^{k} \beta_i tc_{t-i} + \sum_{i=1}^{k} \gamma_i x_{t-i} + \eta_t,$$

where the lag length, k, is chosen using the SIC, and η_t is an error term. In Granger causality tests involving stationary variables, the test reduces to a standard Wald test of $H_0 : \gamma_1 = \gamma_2 = \cdots = \gamma_k = 0$.

Table 5 presents the p-values for tests of causality between total cases and each of the macroeconomic variables. At a 10% significance level, we see that income, consumption, and inflation are useful for forecasting total case volume, while total case volume is not useful for forecasting any of the macroeconomic variables, so that causality runs from the macroeconomic variables to the volume of litigation, but not vice versa. This analysis was also done for several different types of litigation, including antitrust cases, bankruptcy cases, contract actions, personal injury cases, and product liability cases. There is evidence, at a 10% significance level, that the number of antitrust,

bankruptcy, and contract action cases can be predicted by the macroeconomic variables, but as for total case volume, there is no evidence of Granger causality running from the individual types of litigation to the macroeconomic variables. These estimates indicate that our findings for the total volume of litigation extend to the individual types of litigation. Our findings for the individual case types indicate that bankruptcy is affected by the previous year's unemployment rate, which makes sense. Contract actions are affected by the previous year's inflation rate and interest rate, and it is well-accepted in macroeconomics that it is difficult for firms and households to index contracts perfectly to account for changes in inflation or interest rates. Unexpected movements in inflation or interest rates will increase the incentive for one of the parties to not comply with the contract.

Granger causality tests are useful as a means of uncovering a forecasting relationship between two variables, but it is also important to look at the underlying regressions and determine the sign and magnitude of the relationship. Table 6 presents the results of OLS regressions of the change in total case volume on different variables, where an asterisk denotes an estimated coefficient which is significant at the 10% level. Panel I shows that real income, real consumption expenditures, inflation, unemployment, and the 3-month treasury bill rate all have significant explanatory power for total cases in at least one of the equations. Moreover, the signs of the significant coefficients are consistent with the notion that the volume of litigation increases in difficult economic times. Income and consumption have negative coefficients when they are significant, while inflation, unemployment and the interest rate all have positive coefficients when significant.

As for the magnitudes of the significant coefficients, we see that a one percentage point increase in real income or real consumption will be followed by a 0.75 percentage point decrease in the total number of cases the next year.[8] It is not surprising that the coefficients on income and consumption

[8]Looking at the change in total case volume and real GDP growth in Figure 1 reveals several examples prior to 1985 where total case volume did not move in a countercyclical fashion, raising the possibility that litigation volume was countercyclical only in the post-1985 period. A simple calculation revealed that litigation volume and real GDP moved in opposite direction 61% of the time for the whole sample, and 58% of the time through 1985. Additional work on developing a satisfactory theory for trends in the data, especially the development of post-1985 cyclical responsiveness needs to be developed. One area perhaps worth exploring is the great strides the plaintiff's bar, partially through its industry group - The Trial Lawyers, has made. The plaintiff's bar has become more organized and has overcome some of the advantages that corporate defendants have had over them. In addition, in the mid-1980s and the early 1990s we started to see the growth of various financing sources which enabled the plaintiff's bar to gain greater access to capital markets and help offset the financial disadvantage that plaintiff's attorneys had relative

are similar, given the high correlation between the two series (Table 2 shows a correlation coefficient of 0.82). One percentage point increases in the price level and interest rate are followed by 0.75 and 0.007 percentage point increase in total cases, respectively. Interestingly, changes in the unemployment rate have a significant contemporaneous effect on the volume of litigation, but no lagged effect, consistent with the Granger causality tests (Table 5 indicates that there is causality running from each of the other macroeconomic variables to the unemployment rate). The finding of a positive coefficient on the unemployment rate is just what we should expect based on the findings of Siegelman and Donohue (1995). Overall, the bivariate regressions indicate that there is both a statistically and economically significant relationship between the macroeconomic variables and the volume of litigation.

The Granger causality tests and regression results discussed above provide strong evidence that the volume of federal litigation is countercyclical. The final step in our analysis is to estimate multivariate regressions of the volume of litigation on all of the macroeconomic variables. For this, we estimate VAR and VEC models, which are probably the most widely applied multivariate time series models (see e.g. Hamilton (1994)). One advantage of these models is that they allow us to calculate the impulse response functions for the volume of litigation following shocks to the macroeconomic variables. The impulse response functions predict the change in total cases after s periods following shocks to macroeconomic variables, i.e., $\partial tc_{t+s}/\partial \varepsilon_t$, where ε_t is an unpredictable change in one of the macroeconomic variables.[9]

Panel II of Table 6 shows the results of estimating VEC models for total cases and the macroeconomic variables.[10] It is standard to estimate VEC models by including lags of all variables, and these results are presented in the first column of panel II. The cointegrating vector, which represents the "long run equilibrium" relationship among litigation and the macroeconomic variables, is significant, as well as the lagged interest rate. As is often the case in such reduced form exercises, multicollinearity among the explanatory variables prevents many of the variables from appearing

to large corporate defendants. It is possible, for example, that these phenomena have set in place forces which have more pro-cyclical relationships with the economy.

[9]See Hamilton (1994, chapter 11) for a discussion of impulse response functions.

[10]We do not present estimation results for the VAR models because the error correction term was strongly significant in each of the VEC models, indicating that failure to account for the long-run linkages among the levels of the variables will lead to incorrect inference (see Engle and Granger (1987)). In addition, the estimated coefficients in our VAR models were qualitatively similar to those based on a VEC model. VAR model results are available upon request.

to be significant, and Table 2, discussed above, shows that the macroeconomic variables are highly correlated with one another.[11] The bivariate regressions indicated that contemporaneous (as opposed to lagged) unemployment affects the volume of litigation, so we also estimate a VEC model where lagged unemployment is replaced with contemporaneous unemployment. The second column of panel II reports results for this model, and we do see some changes in the results. The error correction term is again significant, but the unemployment rate is now significant and the interest rate is no longer significant. These results provide strong evidence that the volume of litigation is countercyclical, because several of the estimated coefficients are significant, in spite of the existence of substantial multicollinearity between the regressors.

The multivariate regression models also allow us to compute impulse response functions for total cases. In Figure 4, we present estimated impulse responses from a VAR model estimated both in differences (the VAR model) and in levels and differences (the VEC model). The reader is referred to Hamilton (1994) for further details. From these figures, it is clear that shocks to income, consumption and inflation immediately lead to an increase in the volume of litigation, with shocks to inflation having the largest impact, and shocks to consumption having a rather moderate impact. In addition, the long run impact that shocks to each of these variables has on the volume of litigation is positive, regardless of whether the VAR or VEC model is used. Here, again, the impact of consumption is quite moderate, though.

4 Concluding Remarks

We have carried out an empirical analysis of the impact of macroeconomic activity on the volume of federal litigation in the U.S. economy. Our findings suggest a variety of strong linkages among the variables. Most noteworthy, we find that there is a causal linkage from output, consumption and inflation to the total volume of litigation, so that predictions of future litigation volume can be improved by making use of information contained in macroeconomic aggregates. Causation from

[11] Additionally, note that VAR and VEC models are reduced form models, in the sense that they are not designed to yield direct estimates of underlying structural coefficients linking the variables in the model. Instead they can be viewed as models that yield the 'best' predictions of the dependent variable, given all information. In this sense, the impulse repsonses reported on the the final figure of the paper do have standard interpretation, and in the literature are generally used as an alternative to calculating elasticities, for example, which require knowledge of structural coefficients.

the volume of litigation to macroeconomic activity is not found in the data, however.

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Table 1: Variable Definitions, Sources, and Mnemonics

I. Volume of Litigation Data, 1960-2000 (annual)	Source:
TC_t = total cases	Admin. Office of US Courts
AN_t = antitrust cases	Admin. Office of US Courts
BA_t = bankruptcy cases	Admin. Office of US Courts
CA_t = contract actions	Admin. Office of US Courts
PI_t = personal injury	Admin. Office of US Courts
PL_t = product liability	Admin. Office of US Courts

II. Macroeconomic Variables, 1960-2000 (annual)	Source:
RY_t = GDP, billions of chained 1996 dollars, SA	FRED database
RC_t = Personal Consumption Expenditures, billions of chained 1996 dollars, SA	FRED database
P_t = CPI-U_t, U.S. City averages	FRED database
U_t = LHUR, civilian unemployment rate, SA	FRED database
R_t = 3-month T-bill rate, secondary market	FRED database

Notes: All variables other than U_t and R_t are modelled in logs, denoted by the use of lowercase letters. U_t, R_t, P_t are averaged from monthly, and RY_t, RC_t are "last quarter" of the year.

Table 2: Unit Root Test Results

Variable	Unit Root in Levels		Unit Root in Differences		Sample Period
	lags	test statistic	lags	test statistic	
Total Cases	1	-1.377	0	-4.255*	1961-2000
Antitrust	0	-2.122	0	-9.815*	1963-2000
Bankruptcy	0	-1.722	0	-7.898*	1977-2000
Contract Actions	0	-1.497	0	-4.228*	1979-2000
Personal Injury	0	-1.250	0	-9.053*	1961-2000
Product Liability	0	-2.166	0	-6.755*	1980-2000
Real GDP	0	-0.880	0	-4.816*	1961-2000
Consumption	1	-0.770	1	-5.319*	1961-2000
CPI	2	-1.181	1	-3.020*	1961-2000
Unemployment	1	-2.444	1	-4.917*	1961-2000
Interest Rate	1	-2.848*	1	-5.322*	1961-2000

Notes: Entries are Dickey-Fuller tests statistics and lags used in the Dickey-Fuller regressions (see above for further discussion). In the empirical macroeconomics literature, both unemployment and interest rates are sometimes modeled as stationary (so that differences are not taken prior to estimation of regression models), and are sometimes modeled as nonstationary (so that differences are taken). The reason for this is that unit root test results to date have provided mixed evidence concerning how to model these variables. Given this fact, given our evidence presented above that the interest rate is stationary and unemployment is only borderline nonstationary, and given that in theory a variable that is bounded above and/or below cannot be I(1), we model both unemployment and the interest rate as stationary in the sequel.

Table 3: Cointegration Test Results

I. Bivariate Tests				
	Total Cases	Real GDP	Consumption	CPI
Total Cases	–	–	–	–
Real GDP	0, -4.133 (0)	–	–	–
Consumption	0, -4.022 (0)	0, -5.739 (0)	–	–
CPI	0, -4.404 (0)	0, -5.356 (0)	0, -4.664 (0)	–

II. Multivariate Tests (Johansen Trace Test Including All Four Variables)					
Data Trend:	None	None	Linear	Linear	Quadratic
Rank or	No Intercept	Intercept	Intercept	Intercept	Intercept
No. of CEs	No Trend	No Trend	No Trend	Trend	Trend
	Akaike Information Criterion by Model and Rank				
0	-19.39280	-19.39280	-19.79628	-19.79628	-19.67530
1	-19.62798*	-19.59435*	-19.84913*	-20.03001*	-19.96050*
2	-19.55138	-19.57381	-19.77368	-19.93845	-19.92149
3	-19.28462	-19.44412	-19.49780	-19.79361	-19.81897
4	-18.86543	-19.11544	-19.11544	-19.46334	-19.46334
	Schwarz Information Criterion by Model and Rank				
0	-18.70329*	-18.70329*	-18.93439*	-18.93439*	-18.64104*
1	-18.59371	-18.51699	-18.64249	-18.78027	-18.58148
2	-18.17236	-18.10860	-18.22229	-18.30086	-18.19772
3	-17.56085	-17.59107	-17.60165	-17.76818	-17.75044
4	-16.79690	-16.87453	-16.87453	-17.05006	-17.05006
Trace Test:	Rank=1	Rank=2	Rank=0	Rank=0	Rank=1

Notes: All estimations are based on annual data for the period 1961-2000. In Panel I, the first entry in each cell is the estimated cointegrating rank based on application of the Johansen trace test at a 10% level (all tests also find no cointegration at the 10% and also at the 1% level). The second entry is the Engle-Granger cointegration test statistic (see Engle and Granger (1987)), with lags selected as in Table 2. In this test, the alternative is cointegration among the two variables, and the 10% and 1% critical value are -3.37 and -4.40, respectively (see e.g. Hamilton (1994)). In Panel II, Akaike and Schwarz information criteria are given for vector error correction models with 0-4 included cointegrating restrictions. Starred entries correspond to the preferred model and cointegration rank. The final row of entries denotes the estimated cointegration rank based on application of the Johansen trace test. The third combination of "trend" properties (i.e. linear trend in data, intercept in cointegrating relation) is the "preferred" combination (see above for further discussion).

Table 4: Bivariate Correlation Structure

I. Correlations Among Macroeconomic Variables and Total Cases						
Data from 1961-2000						
	Total Cases	Real GDP	Consumption	Inflation	Unemployment	Interest Rate
Total Cases	1.000000					
Real GDP	-0.085933	1.000000				
Consumption	0.060234	0.819835*	1.000000			
Inflation	0.299716*	-0.455788*	-0.598635*	1.000000		
Unemployment	0.405531*	-0.137269	-0.042924	0.143191	1.000000	
Interest Rate	0.278357*	-0.460247*	-0.513446*	0.670074*	0.407521*	1.000000

II. Correlations Among Litigation Case Count Components					
Data from 1981-2000					
	Antitrust	Bankruptcy	Contract Actions	Personal Injury	Product Liability
Antitrust	1.000000				
Bankruptcy	0.054400	1.000000			
Contract Actions	0.080109	0.131781	1.000000		
Personal Injury	-0.092101	0.163185	-0.168653	1.000000	
Product Liability	0.087908	0.573574*	0.477523*	0.505952*	1.000000

Notes: Entries are bivariate correlation coefficients. Starred entries denote rejection of $H_0 : \rho_0 = 0$ based on the Fisher's z test (see e.g. Anderson (1984)), where ρ is the true correlation coefficient, and r is the sample analog. In this test, a region of rejection at the 10% significance level is $\sqrt{T-3}\,|z - \xi_0| > 1.67$, where $z = \frac{1}{2} log\left(\frac{1+r}{1-r}\right)$ and $\xi_0 = \frac{1}{2} log\left(\frac{1+\rho_0}{1-\rho_0}\right)$.

Table 5: Pairwise Granger Causality Tests

Data from 1961-2000

Causality To	Causality From				
	ΔTotal Cases	ΔReal GDP	ΔConsumption	Inflation	Unemployment
ΔReal GDP	0.527				
ΔConsumption	0.414	0.045			
Inflation	0.250	0.000	0.001		
Unemployment	0.458	0.000	0.000	0.000	
Interest Rate	0.886	0.006	0.065	0.022	0.626

Causality From	Causality To				
	ΔTotal Cases	ΔReal GDP	ΔConsumption	Inflation	Unemployment
ΔReal GDP	0.068				
ΔConsumption	0.080	0.000			
Inflation	0.022	0.000	0.011		
Unemployment	0.761	0.100	0.325	0.369	
Interest Rate	0.756	0.008	0.201	0.079	0.000

Causality To	Causality From				
	ΔReal GDP	ΔConsumption	Inflation	Unemployment	Interest Rate
ΔAntitrust	0.422	0.665	0.790	0.070	0.725
ΔBankruptcy	0.494	0.150	0.940	0.002	0.635
ΔContract Actions	0.448	0.702	0.055	0.886	0.027
ΔPersonal Injury	0.395	0.405	0.293	0.313	0.117
ΔProduct Liability	0.789	0.809	0.994	0.148	0.952

Causality From	Causality To				
	ΔReal GDP	ΔConsumption	Inflation	Unemployment	Interest Rate
ΔAntitrust	0.848	0.749	0.989	0.927	0.849
ΔBankruptcy	0.569	0.669	0.152	0.206	0.143
ΔContract Actions	0.955	0.575	0.855	0.614	0.974
ΔPersonal Injury	0.927	0.775	0.148	0.639	0.696
ΔProduct Liability	0.623	0.740	0.179	0.979	0.603

Notes: Entries in both matrices are rejection probabilities based on the bivariate null hypothesis of non Granger causality from the "From" variable to the "To" variable. Probabilities are based on F-tests constructed with regressions involving one lag, which is the preferred lag structure based on application of the SIC. See Figure 3 for a pictorial representation of these results.

Table 6: Regression Results

Data from 1961-2000

I: Bivariate Regressions								
Regressor/	Regression Model							
Statistics	1	2	3	4	5	6	7	8
ΔTotal Cases$_{t-1}$	0.353*	0.354*	0.380*	0.346*	0.370*	0.386*	0.341*	0.260*
ΔTotal Cases$_{t-2}$	0.046							
ΔReal GDP$_t$			-2.319					
ΔReal GDP$_{t-1}$				-0.743*				
ΔConsumption$_t$					0.003			
ΔConsumption$_{t-1}$						-0.799*		
ΔCPI$_t$							0.586*	
ΔCPI$_{t-1}$								0.750*
Unemployment$_t$								
Unemployment$_{t-1}$								
Interest Rate$_t$								
Interest Rate$_{t-1}$								
Intercept	0.023*	0.026*	0.034	0.050*	0.024	0.052	-0.002	-0.006
$\overline{R}^2$	0.090	0.104	0.103	0.172	0.088	0.165	0.171	0.216
DW	1.978	1.976	2.110	2.039	2.001	2.098	2.099	2.131
F	2.073	0.025	0.056	0.014	0.076	0.016	0.014	0.005

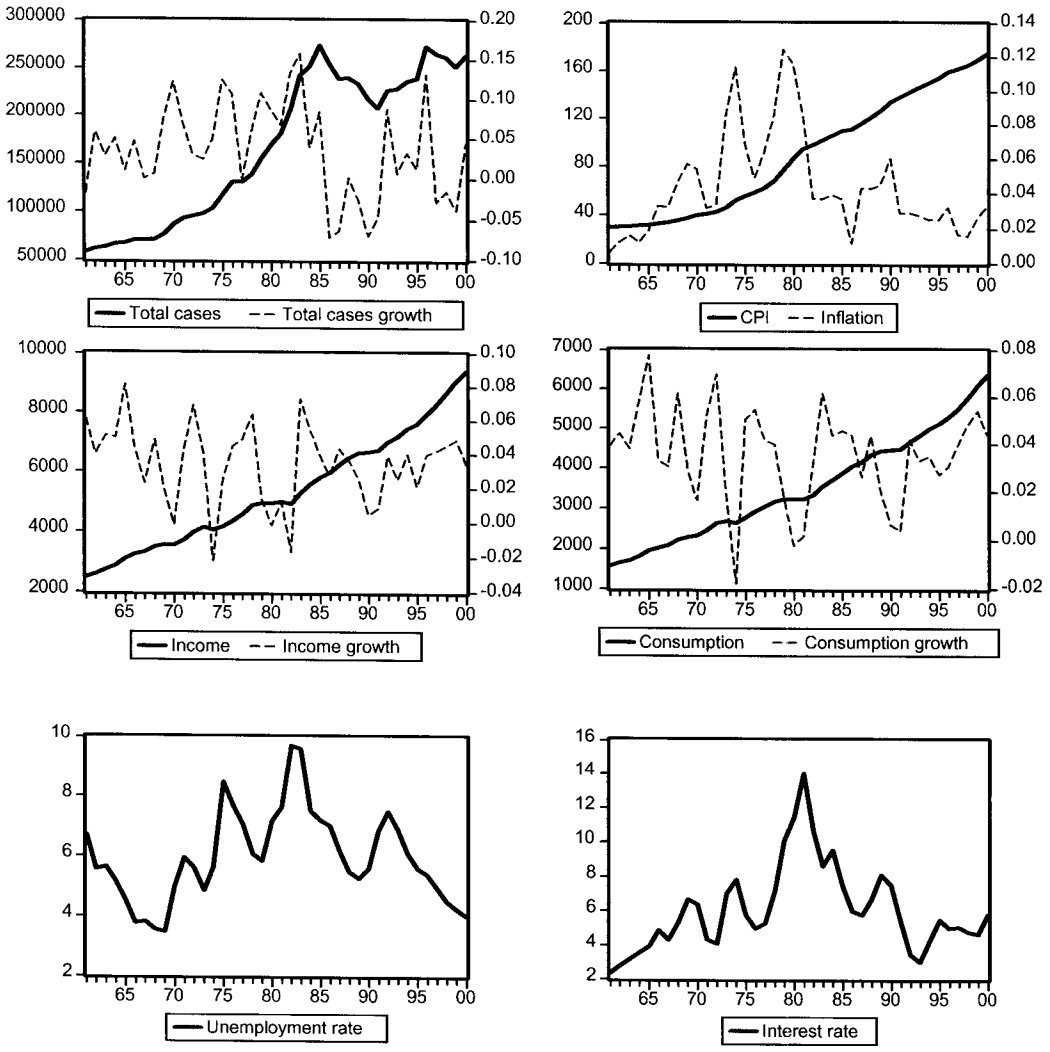
I: Bivariate Regressions (cont.)					
Regressor/	Regression Model				
Statistics	9	10	11	12	13
ΔTotal Cases$_{t-1}$	0.244	0.348*	0.316*	0.290*	0.181
ΔTotal Cases$_{t-2}$					
ΔReal GDP$_t$					
ΔReal GDP$_{t-1}$					-0.606
ΔConsumption$_t$					
ΔConsumption$_{t-1}$					0.582
ΔCPI$_t$					
ΔCPI$_{t-1}$					0.699
Unemployment$_t$	0.012*				0.006
Unemployment$_{t-1}$		0.002			
Interest Rate$_t$			0.006		
Interest Rate$_{t-1}$				0.007*	0.001
Intercept	-0.043	0.012	-0.008	-0.016	-0.032
$\overline{R}^2$	0.172	0.090	0.137	0.168	0.159
DW	1.851	1.982	2.046	1.919	2.002
F	0.014	0.072	0.029	0.015	0.0739

Notes: All regressions are estimated using least squares. Variable definitions are given in Table 1. In all regressions, the change in total cases is the dependent variable. Starred coefficients denote rejections of the null hypothesis that the coefficient is zero based on t-tests with a significance level of 10%.

Table 6 (cont.)

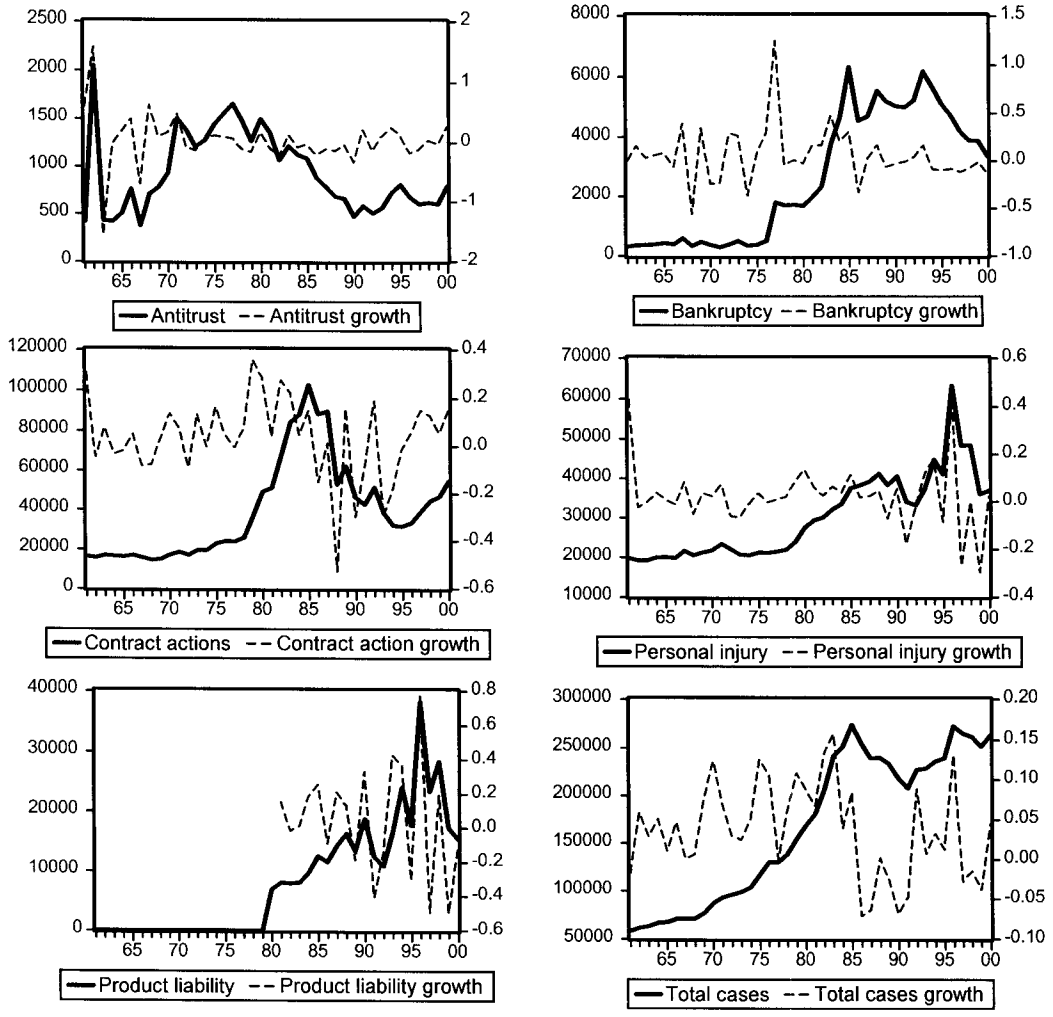
II: Multivariate Regressions		
Regressor/	VEC Model	
Statistics	1	2
z_{t-1}	-1.152*	2.090*
ΔTotal Cases$_{t-1}$	0.162	0.104
ΔReal GDP$_{t-1}$	0.202	-0.937
ΔConsumption$_{t-1}$	0.509	1.319
Inflation$_{t-1}$	0.281	0.242
Unemployment$_t$		0.033*
Unemployment$_{t-1}$	0.007	
Interest Rate$_{t-1}$	0.016*	-0.000
Intercept	-0.149*	-0.185*
$\overline{R}^2$	0.441	0.249
F	5.172	2.749

Figure 1: Levels and Growth Rates of Macroeconomic Variables 1961-2000



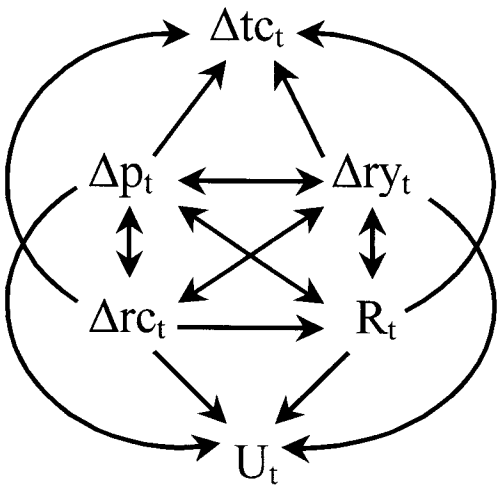
Notes: Plots of the levels (solid lines) and growth rates (dashed lines) of the macroeconomic variables over the period 1961-2000. See Table 1 for variable definitions and data sources.

Figure 2: Levels and Growth Rates of Litigation by Category 1961-2000



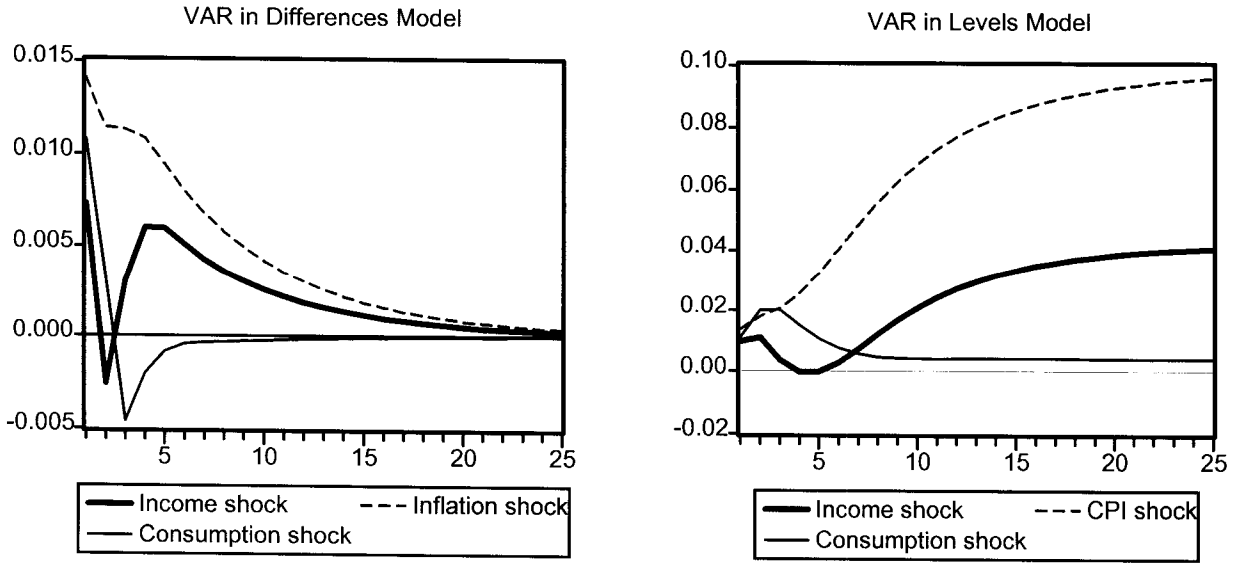
Notes: Plots of the levels (solid lines) and growth rates (dashed lines) of the cases filed in each year for different categories of litigation over the period 1961-2000. See Table 1 for variable definitions and data sources.

Figure 3: Granger Causal Relations 1961-2000



Notes: This is a graphical representation of the results reported in Table 5. The direction of the arrows denotes the direction of bivariate causality, with bi-directional causality denoted by arrows pointing in both directions.

Figure 4: Impulse Response Functions



Notes: Plots show impulse responses for each of the variables based on estimated VAR models, for horizons of up to 25 years.
Impulse responses are for a difference VAR model and the VEC model shown in Table 6 part II model 1.