Personal Insolvency in England and Wales: a Spatial Analysis.

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Abstract

Personal insolvency rates vary considerably across local areas of England and Wales but the reasons for this have barely been explored. This paper presents an empirical study of the factors determining variations in personal insolvency rates in 2006 utilising newly available data. The results suggest that a number of economic and demographic factors are important including income, social benefits, age, occupation, public sector and armed forces employment and level of local entrepreneurship. Significant spatial autocorrelation is evident in the dataset and three sub-regional clusters of local authorities are identified; one in the South West characterised by adjacent areas with high insolvency rate and two others in Wales and the North West characterised by low insolvency rates.
Introduction

Recent years have seen a significant rise in personal insolvencies in many major economies. In the USA, for example, rates of filing for non-business bankruptcy rose from 15 to 54 persons per 10,000 population from 1980 to 2004 (Edmiston, 2005) whilst, in Canada, personal bankruptcies grew by 87% over the period 1990-2007 (Bankruptcy Canada, 2008). Similarly, there was a staggering 350% increase in bankruptcy in Australia over the ten years from 1988-89 (Ralston et al., 2001) and, in England and Wales, individual insolvencies rose from an average of 7,000 per annum in the 1980s to 27,500 in the 1990s and then to more than 100,000 in 2006 and 2007 (The Insolvency Service, 2007). Traditional explanations of insolvency, which regard it as something “forced” on individuals by unforeseen events that impact on an individual’s financial position, have only been partially successful in explaining these changes (Zywicki, 2005). Consequently, a wide range of explanatory factors have been examined including changes in bankruptcy law, social and demographic factors, easier access to credit, a reduced stigma involved in declaring for bankruptcy and the impact of the wider macroeconomic environment (e.g. Fay et al., 2002; Hussein, 2002; Hudson and Cuthbertson, 1993).

In addition to seeking explanations for the widespread rise in insolvencies, researchers have increasingly recognised that individual insolvencies do not only vary over time; they also seem to vary significantly over space (Edmiston, 2005, 2006; Fabling and Grimes, 2005). Brown (1998), for example, notes that there have been large and persistent differences across US states over the period 1970-96, and a number of studies have sought to explain US regional patterns (e.g. Edmiston, 2006; Agwal
and Liu, 2003; Barron et al., 2002b). Recent data for England and Wales show similarly wide spatial differences with Harlow, the local authority with the highest insolvency rate in 2006, having a rate of insolvency 3.7 times that of Ceredigion, the area with the lowest rate (The Insolvency Service, 2007). However, despite such variations, no detailed research has been conducted to investigate explanatory factors. This no doubt reflects the fact that details concerning insolvencies at the local level have only been available for England and Wales since 2000, and the most reliable data is the most recent as mapping insolvencies to addresses has become more sophisticated.

The analysis that follows focuses on the spatial dimension by examining the causes of local variations in personal insolvency rates across Unitary and District Local Authorities in England and Wales in 2006, the latest year for which data were available at the time of the study. The data were kindly provided to the authors by The Insolvency Service. A cross-section approach is taken due to the lack of long, reliable time series data at the local level. Such a study is timely, given the huge rise in individual bankruptcies in the UK. The analysis begins with an overview of the theoretical factors that might determine rates of insolvency and a brief discussion of the available empirical evidence. This is followed by the estimation of a model of insolvency for England and Wales using both OLS and Maximum Likelihood approaches. The latter method allows for possible spatial autocorrelation. The final section considers implications and conclusions.
The Determinants of Insolvency

In simple terms, an individual is insolvent if he or she cannot pay their debts as they fall due. A more precise definition arises from the traditional economic approach to personal insolvency, which is typically based on an underlying life-cycle model (Zywicki, 2005). In this approach, insolvency arises if current income plus the discounted value of future income net of future consumption is less than the value of outstanding debt (Hussain, 2002). Consequently, an individual may become insolvent if, for example, unanticipated shocks to income, the value of assets held and interest rates violate the lifetime budget constraint. Of course, if capital markets are perfect, individuals should be able to borrow against future income to meet some current debts. However, if imperfections limit the ability of the individual to borrow against future income, insolvency may arise if current debt payments cannot be financed by current income.

The above discussion suggests that the fundamental economic factors influencing insolvency rates are interest rates, current disposable income, expected future income, asset values, debt levels and credit availability. Some of these factors, such as interest rates, may be largely determined at the national level and impact on overall insolvency rates rather than their spatial distribution. However, other factors vary across space and might provide a basis for explaining regional differences. There are, for example, typically significant differences in income levels across local areas in most countries and this may impact on the ability of individual’s within a locality to withstand economic shocks. In addition, given that housing is typically the major asset held by most individuals, differences in the value of this asset may have
particularly important implications for insolvency rates. On the one hand, high asset values allow individuals to better withstand unanticipated shocks to current income by selling or borrowing against the asset (Sullivan et al., 2005). However, if house prices rise relative to current earnings, this may increase the proportion of income required to service mortgages and make households vulnerable to shocks in interest rates. Thus the direction of influence of asset values on insolvency rates is not clear cut.

Whilst the life cycle approach suggests that bankruptcy arises from economic shocks, it says little per se about the underlying source of the shocks. An alternative approach, often referred to as the adverse events model (Fay et al., 2000), focuses attention on the particular unanticipated events that lead to bankruptcy including unemployment, marital break-ups and health problems. If the incidence of these factors differs across space, then this may also help to explain some of the root causes of regional variations in insolvency rates. However, it is important to note that it is the impact of adverse events on income and wealth that ultimately causes bankruptcy and hence this approach is not incompatible with the basic life cycle view but involves a different level of analysis.

The adverse events and life cycle approaches regard insolvency as an event that is “forced” on individuals by unavoidable shocks. An alternative perspective is to regard the decision to declare formal bankruptcy as a strategic decision taken by individuals after weighing up the relevant benefits and costs (Fay et al, 2000). According to this approach, individuals are more likely to file for bankruptcy the greater the financial benefit they derive from doing so compared to their net financial position if they do not. Alternatives to formal bankruptcy might include measures to improve income,
perhaps by changing occupation, informal arrangements with creditors or legal
alternatives to formal bankruptcy embedded within insolvency law. In England and
Wales, for example, approximately 60% of recent insolvencies involve bankruptcy
orders whilst 40% are dealt with by Individual Voluntary Agreements (IVAs)
between debtors and creditors. Under the latter arrangements, which were introduced
in the Insolvency Act of 1986, debtors and creditors agree to a legally binding
arrangement to pay off a percentage of debts over 5 years without the need for formal
bankruptcy. A similar type of system operates in the US in which debtors may file for
bankruptcy under either Chapter 7, (non-exempt assets are surrendered and distributed
to creditors; most debts are then discharged and the debtor keeps future income) or
Chapter 13, (debtors retain their assets but a plan for payment of a proportion of debt
out of future income is made and the rest of debt is then written off).

The existence of legal alternatives to formal bankruptcy creates a strategic choice for
insolvent individuals (and their creditors) which will be influenced by the specific
financial incentives embodied within a country’s legal system. The legal system may
also impact on insolvency rates across space if there are local laws that impact on
financial incentives. For example, in the USA, laws on wage garnishment (the extent
to which future earnings can be deducted to pay off debts) and homestead exemptions
(the amount of home equity that can be used to pay unsecured debt when an
individual becomes bankrupt) vary across states (Gropp et al, 1997). Such differences
will affect the net financial benefits of Chapter 7 compared to Chapter 13 and
alternative informal methods of dealing with insolvency. Of course, whilst such local
variations in laws are important for countries with federal political systems, they are
not of importance for the spatial distribution of insolvencies across local economies with a uniform legal system governing insolvency such as England and Wales.

If the decision as to whether or not to declare for bankruptcy is a strategic one, it may be influenced by individual attitudes towards bankruptcy. A considerable literature has developed in recent years arguing that one of the main factors behind the rise in bankruptcies is the reduced social stigma associated with declaring oneself bankrupt (CBO, 2000). Sullivan et al (2005) define stigma as “…a cost associated with filing for bankruptcy based on injury to reputation or violation of moral standards.” If stigma falls, the disutility associated with being known as a bankrupt falls and individuals may borrow more and file for bankruptcy more readily. A decline in stigma in recent years might be associated with a greater social acceptability of debt due to the rise of credit cards and other methods of borrowing, or a more general change in moral attitudes (CBO, 2000). If this reflects a general cultural trend, then declining stigma may be an influence that acts across many localities, regions and countries. However, it is also plausible that there is a local dimension that reflects local culture and demographic effects. Edmiston (2005, 2006), for example, argues that US regions have different moral attitudes to debt and credit reflecting local culture, religious attitudes and the age distribution of the population.

Whilst social and demographic factors might impact on attitudes to stigma, they might also have a more direct influence on insolvency (Fay et al., 2002). A range of personal characteristics have been examined in this regard including age, ethnicity, home ownership, business ownership, employment status and type of occupation. The theoretical rationale for these characteristics is rarely full elaborated although it is
plausible that they may have an impact through affecting the risk of insolvency. For example, differences in insolvency across age groups might reflect underlying differences in terms of income, access to credit, debt levels and health problems; occupational skill levels might impact on the risk of unemployment and ease of access to new employment opportunities when unemployed; business ownership may increase the risk of personal insolvency due to the high failure rate for new businesses, a less risk averse attitude to risk than non-owners and use of homes for collateral for business borrowing (Fay et al., 2002); finally, government employees might have a lower insolvency risk as public sector occupations are generally less affected by the business cycle than the private sector (Chakravarty and Rhee, 1999). Once again, if these factors vary across space they may influence the distribution of bankruptcies across localities.

Thus, theoretical considerations suggest that insolvency rates may be affected by a variety of economic, social, occupational and demographic factors. Many of these factors such as such as income and asset values; the likelihood of adverse events; industry and occupational structure and demographic characteristics, vary significantly across space and may impact on local insolvency rates. However, some factors are likely to be less important across space than time. These might include variations in interest rates, bankruptcy laws and attitudes to stigma although the latter may have an indirect influence through different ethnic and demographic characteristics. In addition, variations in local bankruptcy laws may be important across a federal country with local legal systems.
**Empirical Studies**

There are relatively few empirical studies concerning personal insolvency in the UK. The two most directly relevant are those of Hudson and Cuthbertson (1993), who analysed the determinants of personal bankruptcy over the period 1971-1988, and Hussain (2002) who examined the causes of the large increase in personal bankruptcies in the 1990s. Both studies concentrate upon examining national macroeconomic factors such as income, interest rates, unemployment and credit availability and neither study examines variations across space. However, whilst the UK evidence is limited, there are a growing number of US studies utilising both national and regional data. More limited research has also been undertaken in other countries experiencing increases in insolvency, such as Australia and Canada. Unfortunately, the empirical results have not been entirely consistent (CBO, 2000). In part, this reflects different data sources. For example, some researchers utilise microeconomic data on individual bankrupts, whilst others examine more aggregative data. There are also wide variations in the range of variables incorporated in studies, the particular measures used to represent factors such as income, the time period studied and the methods utilised. In the latter regard, for example, few studies examine the existence of spatial autocorrelation across areas and this might impact significantly on the results. As a consequence of these factors, it is scarcely surprising that there are different interpretations of the validity of the different theories underlying these studies (e.g. see the debate between Zywicki (2005) and Sullivan et al (2005)).
Most empirical work incorporates financial variables that reflect the traditional life-cycle approach to insolvency. In the case of income, many studies find the expected negative impact on bankruptcy (e.g. Fisher, 2005; Fay et al., 2002; Agwaral et al., 2003 and, for the UK, Hussain, 2002). However, the empirical results are not entirely consistent, with some studies, including Gross and Souleles (2002) and Elul and Subramanian (2002) finding no significant impact, although Fisher (2005) suggests that the latter result is attributable to the quadratic formulation of the income term. At the regional level, Baron et al (2002) examine US county level data for 1993-99 and conclude that bankruptcy rates are negatively related to average income. However, in a cross-section study of US counties in 2000, Edmiston (2005) finds that effect of income is complex, with bankruptcy rates rising with incomes initially (from low incomes) then falling before reaching a peak in the mid income range and then falling again.

Labour income is, of course, not the sole source of an individual’s income and a number of studies have examined various components of non-labour income. Fisher (2005), for example, examines the impact of unemployment and welfare benefits and notes that such payments have two effects: *ex post* they may encourage risk taking by providing insurance against risk and hence increase bankruptcy rates; *ex ante*, they make negative shocks easier to bear by bolstering incomes and make bankruptcy less likely. The study concludes that the net impact of such benefits is to decrease the probability of bankruptcy, implying that the second effect dominates. Conversely, Edmiston (2005) finds that bankruptcy levels are positively related to the proportion of the population receiving public assistance at the US county level possibly suggesting the first effect dominates. These conflicting results might imply that the
impact of the two effects varies over time and space and the combined impact is an empirical rather than theoretical issue.

In a recent review of the literature, the CBO (2000) argues that a major factor in the recent rise of bankruptcy has been the increased supply of credit to individuals who previously found it difficult to access it. Whilst this has made many individuals better off in the short term, it has increased indebtedness and the risk of personal bankruptcy. A wide range of studies support the view that there is a positive association between indebtedness and bankruptcy including Visa (1996), Bishop (1998) and Domowitz and Saretain (1999). These conclusions are also supported by Hudson and Cuthbertson (1993) and Hussain (2000) using UK data. At the regional level, Edmiston (2005) finds debt related to insolvency across US counties and Baron et al (2002) show that county bankruptcy rates were positively influenced by higher rates of non-mortgage debt.

The influence of asset values has primarily been examined through variables related to home ownership and housing values. Domowitz and Saretain (1999) find that home ownership discourages bankruptcy and a similar result is obtained at the county level by Edmiston (2005). Visa (1996) find that median home prices have a negative impact on bankruptcy at the national level. However, Hussain’s (2002) UK study finds no significant effect of house prices or the house price to wage ratio. From a spatial perspective, Baron et al (2002) show that bankruptcy rates across US counties are negatively related to housing values. Similarly, Fabling and Grimes (2004), using data for 6 New Zealand regions, find that increases in property values reduce combined insolvencies and involuntary company liquidations. Thus, with the notable exception
of the UK study, empirical studies generally support the view that housing is an asset that assists individuals in avoiding bankruptcy, presumably by allowing borrowing against the asset or selling the asset to cover debts.

A number of variables reflecting adverse events have been examined in the literature but the evidence is mixed. For example, unemployment has been found to have a positive impact on bankruptcy in national studies of Australia (Ralston et al., 2001) and the UK (Hudson and Cuthbertson, 1993; Hussein, 2002), across US states (Visa, 1996) and across US counties (Baron et al., 2002) Similarly, there is US evidence to suggest that divorce rates, lack of medical insurance and health problems have the expected positive impact on bankruptcy at both the national and regional level (see e.g. Edmiston, 2005, 2006; Baron et al., 2002, Domowitz and Saretain, 1999, Visa 1996). However, in contrast, Buckley and Brinig (1998) find little support for the view that job loss impacts on bankruptcy, Gross and Souleles (2002) find that lack of health insurance has no impact on bankruptcy, whilst Fay et al. (2000) find little support for a range of variables reflecting the adverse events approach. Indeed, even Baron et al. (2002) who find positive results, note that these factors cannot fully account for rise in bankruptcies when the US economy was performing well in the 1990s.

The inconsistent evidence regarding some aspects of traditional approaches that relate insolvency to financial variables and/or adverse events, has led some to question the whole basis of the view that financial distress is a plausible explanation for the recent boom in insolvencies. The argument has been made most forcibly by Zywicki (2005), who notes that insolvency rates have risen in recent decades despite growing incomes
and static or declining adverse event variables. However, Sullivan et al (2005), take a contrary view, noting that the household income of US bankrupts has deteriorated from an average of 82% of US median income in 1981 to 58% in 2001 implying a serious worsening of the relative position of bankrupts. These sharply differing views are indicative of how the mixed evidence allows for very different interpretations of the weight of the empirical research.

The strategic approach to insolvency has been the subject of considerable recent research (e.g. Fay et al., 2002). Typically, the focus has been to examine whether varying asset exemption levels in different US states create financial incentives that influence bankruptcy rates (e.g. Edmiston, 2006). Another strand of research has examined the choice between filing under chapter 7 or 13 (Domowitz and Sartain, 1998). The CBO (2000) concludes that the results of these studies are mixed and often conflicting. Edmiston (2006) concurs, noting that most studies examining regional homestead exemptions find no impact, which is contrary to what might be expected. In part, this probably reflects the difficulty of deriving a summary measure of the complex system of exemptions and variation in variables used to control for economic and other factors. However, Edmiston (2006) also argues that a major issue is a failure to take into account an endogeneity problem. The general assumption is that high exemption levels will create an incentive for filing for bankruptcy. However, states with high bankruptcy rates may respond by lowering exemption levels, creating a two-way effect between exemption levels and bankruptcy rates. After correcting for this factor, Edmiston (2006) concludes that exemptions had a positive impact on bankruptcies and thus the weak results of previous studies arise from estimation issues rather than substantive ones.
One aspect of the strategic approach that has attracted particular attention is the impact of changes in the stigma associated with bankruptcy. A number of studies claim to have detected important stigma effects including those by Visa (1996), Fay et al 1998, Buckley and Brinig (1998), Gross and Souleles (1998) for countries and by Baron et al (2002) and Edmiston (2005, 2006) for regions. However, there is a considerable doubt concerning the validity of these results, given the elusive nature of the stigma concept and the consequent difficulty of measurement. The CBO (2000) conclude that the evidence for the impact of stigma is at best suggestive and Sullivan et al (2005) argue that the claim of declining stigma in the US has little supporting evidence. Interestingly, recent survey evidence for England and Wales gathered by The Insolvency Service (2007) shows that, whilst there has been some fall in the proportion of those attaching stigma to bankruptcy in the general population, 80% of bankrupts still thought that a stigma was attached to the condition.

An important weakness of the stigma literature is that many of the variables that have been used to represent it might have economic effects of their own (e.g. age) or bear a very tenuous relationship to stigma. Visa (1996), for example infer stigma effects from the significance of a trend variable, whilst Edmiston (2005, 2006) utilises regional dummies as one of his measures. However, such trend and dummy variables might capture a whole range of factors which operate across time and space and there is no obvious reason to infer stigma effects alone from their significance. Other studies (e.g. Gross and Souleles, 1998) effectively infer stigma effects from the presence of unexplained variations in bankruptcies not accounted for when other factors are controlled for. Once again, a variety of factors could potentially account
for the unexplained variation. Thus, at best, current research is suggestive of the possible presence of stigma effects but the genuine difficulty of measuring such a concept precludes any confidence in drawing firm conclusions.

Many studies incorporate variables representing a range of demographic and industrial factors. The most commonly used is age and the evidence is generally supportive of its importance. Visa (1996), for example, find that the share of population aged 25-44 has a positive influence on US bankruptcy filings whilst Baron et al (2002) show that US counties with more over 50s had lower rates of bankruptcy. Fay et al (2002) and Fisher (2005) find that the age of the household head has a positive impact on bankruptcy and age squared negative, indicating a non-linear relationship. Edmiston (2005) argues that such patterns may reflect the fact that access to credit and debt levels rises in middle-aged groups increasing bankruptcy risk but tails off in later life. In addition to age effects, there is also some evidence of differing rates of bankruptcy across different ethnic and religious groups (see e.g. Edmiston, 2006). Results on other variables are less conclusive and often conflicting. For example, Fay et al. (2002) and Fisher (2005) find no impact of business ownership on bankruptcy rates but Edmiston (2005) finds net business births (indicative of greater business success) to have the expected negative impact; the results on self-employment are mixed with Edmiston (2005) finding a negative relationship to bankruptcy rates, whilst for UK data, Hussain (2002) finds no impact but Hudson and Cuthbertson (1993) find a positive impact; Chakravarty and Rhee (1999) find no impact of a dummy variable reflecting public sector employment. Finally, there is significant evidence that the propensity to take risk in the form of gambling influences bankruptcy rates. Ralston et al. (2001), for example, find that
gambling expenditure has a positive impact on Australian bankruptcy rates whilst Baron *et al* (2002) use US county level data to show that the volume of gambling at local casinos has some impact on bankruptcy rates in the US 1993-99.

In general, there is support for the view that local regional effects are important for bankruptcy rates and that these effects persist over time. Brown’s (1998) study of personal bankruptcy rates across US over the period 1970-96 is interesting in this regard. He notes that the ranking of US states has been remarkably stable over time implying the existence of relatively static local institutional or demographic factors. In addition, the study estimates that half of the variation in bankruptcies across states over time is attributable to a general national trend, 35% to fixed effects specific to individual states (that explain persistent differences over time) and 13% by state level trends unrelated to the US trend. Taken together with the results of other research, there is a clear case for the further investigation of spatial effects, particularly in the case of non-US countries where regional studies are very sparse.

**Empirical Model**

The remainder of this paper focuses upon analysing the economic approach to insolvency by testing an empirical model that relates regional insolvency rates to financial factors and, in addition, a number of characteristics of a region’s population. The impact of spatial spillovers is also examined by estimating maximum likelihood models incorporating spatial effects. Due to the difficulty of measurement, no attempt is made to include stigma effects. In addition, local legal effects affecting financial incentives can be safely ignored due to the homogeneity of the legal system in the
study area. The adverse events approach is not directly examined although a detailed investigation of these underlying factors might, of course, be the subject of further research. It should also be noted that the focus of the research is on total insolvencies (bankruptcies plus IVAs) rather than the strategic choice between these alternatives.

The model is tested for the 376 Local Authority Districts and Unitary Authorities in England and Wales. Data are for 2006 or 2005-6 and are obtained from NOMIS (demographic, occupational, employment and wage data), The Insolvency Service (insolvency data) and Land Registry (house prices). A small number of observations were missing for some variables (for example, due to unreliable sample sizes). In these cases, the latest available data were utilised or estimates were made from alternative information sources. It should also be recognised that the data available at this level of aggregation is limited (e.g. in terms of a lack of data on access to credit and debt levels) and this inevitably restricts the variables that can be incorporated within the model.

The dependent variable is the log of the number of insolvencies (bankruptcies and IVAs) per 1000 population of those aged over 19 in the region. Ideally, the denominator would include those aged 18-19, as this age group may be declared insolvent. However, population estimates for the local areas used in this paper are only available for groupings of ages 15-19 and 20 and over. Discussions with The Insolvency Service indicated that insolvency is low amongst 18-19 year olds and, consequently, it is unlikely that this approach results in any significant bias.
As far as the explanatory variables are concerned, the economic approach to insolvency implies that current income is a major determinant of insolvency. The main income measure utilised is average weekly pay (PAY), which is expected to be negatively related to insolvency as high incomes make debt payments more sustainable. In addition, the percentage of the working age population on any form of benefit (BEN) was included. A high value of this variable might be an indication of a weak local economy and impact positively on insolvency rates, although such benefits also act as a form of insurance against bankruptcy. Given that housing is typically the major asset held by individuals, house prices (HP) were incorporated as a measure of the value of these assets, although due to issues of multi-collinearity the variable was dropped from the final model. The ratio of house prices to earnings (HPE) was incorporated as a measure of the individual’s ability to service mortgage debt and afford housing rentals. It might be expected that high house prices relative to earnings would have a positive impact on bankruptcies.

A variety of variables reflecting demographic factors might arguably be included as explanatory variables. The models incorporated variables representing four of the main types of factors suggested by previous theoretical and empirical research: age structure, occupational structure, public sector employment and business ownership. On the basis of the evidence discussed in the literature review, age appears to be potentially of major significance. Recent data for England and Wales shows that the risk of bankruptcy varies considerably across age groups with peak levels occurring in the 30 to 39 age group and much lower levels in the over 60s (The Insolvency Service, 2006). Consequently, measures of the proportion of a region’s population
(aged over 19) in the 30-39 (AGE30) and over 60 age groups (AGE60) were included as explanatory variables.

A second potentially important factor is occupational structure. This might impact on insolvency due to, for example, variations in the risk of unemployment or the competence of individuals in dealing with financial matters across occupational groups. Thus, variables reflecting the proportion of those in employment in professional occupations (PROF) and elementary occupations (ELEM) were included as independent variables. The former might be expected to have a negative impact on insolvency, whilst the latter would be expected to be positively associated with insolvency rates. It has also been suggested (Chakravarty and Rhee, 1999) that public sector employment might be important for insolvency rates as the public sector is not as directly responsive to the business cycle as the private sector. To examine this, two variables were utilised. First, the proportion of those in employment working in sectors dominated by the public sector (health, education, public administration and social services) (PUB); second, a variable reflecting the presence of the armed forces, as this type of public sector employment is not included in the annual employment census from which PUB is derived. Given that many local areas have zero or very small levels of employment in the armed forces, a dummy variable was utilised with an area coded as 1 if the armed forces represented over 1% of the working age population and 0 otherwise (ARMDUM).

Finally, risk taking activity might affect levels of insolvency. A variety of measures including rates of self-employment, business stocks and new firm formation might plausibly reflect this type of activity. Various alternatives were utilised but tended to
perform in a relatively similar manner. In the reported equations, the variable utilised is the stock of VAT registered businesses per head of working age population (VATH), which proxies for the level of entrepreneurial activity in a local area.

**Empirical Results and Analysis**

Basic descriptive statistics of the variables incorporated in the model are presented in Table 1 (the dependent variable is not logged for ease of interpretation). A more detailed examination of the insolvency variable shows considerable variations across space, as can be seen from Table 2, which itemises the twenty highest and lowest ranking local authority Unitary and District authorities in 2006 in England and Wales. The lowest rate was for Ceredigion whilst three other Welsh localities were also in the lowest twenty as were a large number of London boroughs. The highest rate of insolvency was for Harlow at 0.61% followed by the South West Unitary authorities of Torbay and Plymouth. In general, there is a particularly high rate of insolvency across much of the South West. This can be seen most clearly from Figure 1 which classifies areas into four quartiles according to their level of insolvency. The clustering of areas with high levels of insolvency is suggestive of the possible existence of spatial autocorrelation in the data.

An examination of the correlation matrix indicated that correlations between explanatory variables were generally small and never greater than 0.65 apart from the case of HP andPAY (correlation of over 0.8). This particular correlation led to traditional problems of multicollinearity (high standard errors and low significance levels) when both variables were incorporated into the equation. Both variables were
highly significant when included in isolation but HP was dropped from the final
equation as it performed less well than PAY. Consequently, PAY should be thought
of at least partly reflecting the impact of housing assets. Further diagnostics (such as
tolerances) indicated no obvious evidence of serious multicollinearity amongst other
variables. Diagnostic statistics showed slight evidence of heteroscedasticity and hence
the standard errors are heteroscedastic-consistent using the jack-knife method of
PcGive.

Table 3 provides the results of the empirical estimates for the OLS and Maximum
Likelihood versions of the model. Only four variables were significant in the OLS
model – PAY, ARMDUM, ELEM and PROF. However, the Moran test for the
presence of ignored spatial independence suggested that spatial autocorrelation might
be present. Spatial autocorrelation may arise from measurement error problems (error
dependence) reflecting the fact that spatial units are artificial constructs and do not
coincide with the real spatial extent of the variables under consideration, or, from the
true spatial interaction of variables across areas (lag dependence) arising, for example,
from spillover effects. Robust LM tests indicated the strongest support for an error
model of autocorrelation. Consequently, a maximum likelihood error version of the
model was estimated incorporating spatial dependence in the form of contiguity based
binary weight matrix (adjacent areas were coded as 1 and non-adjacent areas 0 within
the matrix). A likelihood ratio test confirmed error dependence in the weight matrix of
the second model and the spatial coefficient was highly significant. The pseudo-$R^2$
of the new equation was 0.48 suggesting a fairly good level of fit for a cross-section
model.
In contrast to the OLS model, seven of the ten variables were significant in the new equation, highlighting the importance of taking into account spatial autocorrelation. As far as the economic variables are concerned, PAY had the expected negative impact implying that high income levels (and possibly assets levels) have a negative impact on insolvency and providing some support for the economic approach to insolvency. BEN had a positive impact suggesting that high levels of benefit take up may be a useful measure of a weak local economy which increases insolvency rates. However, the third financial variable, HPE, was insignificant in both the Maximum Likelihood and OLS models. This confirms the results of Hussain’s (2002) national study of the UK for a similar variable, although it is worth stressing, as previously noted, that house prices are significant when incorporated within the model as an alternative to PAY.

The evidence on the demographic and occupational variables was mixed. AGE30 had the expected positive impact on insolvency but AGE60 was insignificant. This latter result might imply that the low rate of insolvency in this age group reflects factors such as low income which are taken into account by other variables in the model. The results on the occupational variables were also mixed, with ELEM having the expected positive impact on insolvency but PROF proving to be insignificant (in contrast to the OLS model). PUB had the expected negative impact, lending support to the view that public sector employees are less likely to become insolvent than others. However, ARMDUM had a positive impact, suggesting that the presence of armed forces personnel pushes insolvency rates upwards. This might suggest either that current servicemen find it difficult to cope with financial matters or that many demobilised service personnel who stay in areas in which they have served struggle to
adapt to civilian life. Finally, VATH had a positive impact on insolvency suggesting that the level of risk taking has the expected impact.

Given the importance of spatial autocorrelation to the results of the model, the issue was investigated in more detail by calculating LISA (Local Indices of Spatial Autocorrelation) statistics for the dependent variable. Whilst the global Moran statistic captures average levels of autocorrelation across all observations, LISA statistics, which are essentially local Moran statistics, facilitate the identification of local spatial autocorrelation. Figure 2 presents a LISA significance map of two types of areas – areas with high insolvency rates located adjacent to other areas with high insolvency rates (high-high), and, areas with low insolvency rates located adjacent to other areas with low insolvency rates (low-low). It is clear that a large band of high-high locations are clustered across much of South-West England. Similarly, there are two clusters of low-low areas – one in Wales and the other in North-West England.

Thus, underlying the existence of global spatial autocorrelation in the dataset are three specific sub-regional clusters characterised by similar insolvency rates. An examination of the means of the significant independent variables of the three clusters compared to the rest of the sample revealed some interesting differences. The South West cluster’s high level of insolvency appears to be primarily associated with significantly lower levels of pay and the greater presence of the armed forces across the area; the Welsh cluster’s low level of insolvency is most strongly associated with high levels of public sector employment, a low level of presence of the armed forces and a relatively low proportion of the population in the 30-39 year age group and, finally, the North West cluster’s low rate of insolvency is most strongly associated
with a low level of presence of the armed forces and a relatively low proportion of the population in the 30-39 year age group. Of course, the areas contained within these clusters are far from economically or demographically homogenous and the factors accounting for the high or low rates of insolvency may differ within the clusters. Thus, these results should only be taken to be indicative of broad trends across these sub-regions.

Conclusions and Implications

Insolvency is an issue that has attracted considerable debate amongst academics, politicians and the media in recent years. In part, this has reflected a desire to understand the factors behind the dramatic rise in personal insolvency in many advanced nations. However, there is also a growing recognition that insolvency rates vary considerably across localities and are an important aspect of spatial inequality. This article has sought to present a contribution by examining spatial variations in insolvency across England and Wales in 2006. The study utilises recently available data on insolvencies at the Unitary and District Local authority level and, to our knowledge, is the first study to examine this data source in detail. An important feature of the study is the estimation of a Maximum Likelihood model to take into account spatial autocorrelation in insolvency rates.

The model presented relates insolvency rates to a range of economic and demographic variables. The empirical results suggest that economic factors have an important influence on spatial variations in insolvencies and the analysis offers some support for the traditional economic approach to insolvency. However, a range of demographic
factors are also of some significance including age, occupation and risk-taking activity. The pattern of significant variables differs considerably between the OLS and ML variants. This suggests that omitting this spatial autocorrelation from empirical studies may lead to misleading results. Indeed, this might be one issue in explaining the inconsistent results obtained in studies of other countries.

The importance of economic and demographic factors implies that insolvency rates are partly a by-product of the economic health of a region and partly associated with the make-up of a region’s population and its occupational structure. Thus, changes in the performance of a regional economy and the composition of its populace through migration will inevitably impact on insolvency rates. In addition, a number of factors not examined in this study may potentially be of some importance including debt levels, cultural effects and, possibly, differences in attitudes to stigma. However, many of these factors are intrinsically difficult to quantify, or, suffer from a lack of available data at the local level.

Finally, the identification of three sub-regions characterised by adjacent districts with similar rates of insolvency suggests that future research might be directed towards detailed case studies to examine the factors underlying these regional clusters. This would also facilitate a more qualitative approach that might be able to assess those factors for which data or adequate quantitative measures are unavailable. Such a research program might also focus on an examination of the major adverse events underpinning regional variations in insolvency. This approach would complement existing national, regional and local studies, such as the present one, that primarily rely upon econometric estimation techniques.
References


Table 1: Descriptive statistics

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<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>St. Deviation</th>
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<tr>
<td>INS (per 1000)</td>
<td>2.59</td>
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<tr>
<td>PAY</td>
<td>538.84</td>
<td>110.89</td>
</tr>
<tr>
<td>BEN</td>
<td>13.23</td>
<td>5.00</td>
</tr>
<tr>
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<tr>
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<tr>
<td>AGE30</td>
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<tr>
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<td>4.53</td>
</tr>
<tr>
<td>ELEM</td>
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<tr>
<td>PUB</td>
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<tr>
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<tr>
<td>VATH</td>
<td>0.06</td>
<td>0.13</td>
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</table>

Note: n = 376 in all cases
Table 2: Highest and Lowest Insolvency rates (2006, per 1000 population aged 19+)

<table>
<thead>
<tr>
<th></th>
<th>Insolvency Rate</th>
<th>Location</th>
<th>Insolvency Rate</th>
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<tbody>
<tr>
<td>Ceredigion</td>
<td>1.215</td>
<td>Taunton Deane</td>
<td>3.649</td>
</tr>
<tr>
<td>Wandsworth</td>
<td>1.405</td>
<td>Ipswich</td>
<td>3.669</td>
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<td>Merton</td>
<td>1.484</td>
<td>Norwich</td>
<td>3.670</td>
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<tr>
<td>Eden</td>
<td>1.506</td>
<td>Gosport</td>
<td>3.672</td>
</tr>
<tr>
<td>Gwynedd</td>
<td>1.511</td>
<td>Restormel</td>
<td>3.718</td>
</tr>
<tr>
<td>Lancaster</td>
<td>1.513</td>
<td>Salisbury</td>
<td>3.739</td>
</tr>
<tr>
<td>Ribble Valley</td>
<td>1.537</td>
<td>Swindon UA</td>
<td>3.750</td>
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<tr>
<td>Ealing</td>
<td>1.552</td>
<td>Crawley</td>
<td>3.753</td>
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<tr>
<td>Westminster</td>
<td>1.560</td>
<td>Lincoln</td>
<td>3.782</td>
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<td>Harrow</td>
<td>1.579</td>
<td>Caradon</td>
<td>3.793</td>
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<td>South Lakeland</td>
<td>1.618</td>
<td>Hastings</td>
<td>3.808</td>
</tr>
<tr>
<td>Isle of Anglesey</td>
<td>1.635</td>
<td>Kennet</td>
<td>3.857</td>
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<td>Powys</td>
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</tr>
<tr>
<td>St. Albans</td>
<td>1.641</td>
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<td>4.008</td>
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<td>Hammersmith and Fulham</td>
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<td>Stevenage</td>
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<tr>
<td>Redbridge</td>
<td>1.676</td>
<td>Kingston upon Hull</td>
<td>4.088</td>
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<tr>
<td>Richmond</td>
<td>1.681</td>
<td>Eastbourne</td>
<td>4.111</td>
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<tr>
<td>Kensington and Chelsea</td>
<td>1.692</td>
<td>Basildon</td>
<td>4.281</td>
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<tr>
<td>Copeland</td>
<td>1.725</td>
<td>Torbay UA</td>
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<tr>
<td>Enfield</td>
<td>1.732</td>
<td>Plymouth UA</td>
<td>4.331</td>
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<tr>
<td>Epsom and Ewell</td>
<td>1.733</td>
<td>Harlow</td>
<td>4.431</td>
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### Table 3: OLS and ML insolvency rate models

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<tr>
<td></td>
<td>Coefficient</td>
<td>Standard Error</td>
<td>Coefficient</td>
<td>Standard Error</td>
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<td>AGE60</td>
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<td>0.0003</td>
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<td>ARMDUM</td>
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<td>AGE30</td>
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<tr>
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<td>Spatial coefficient</td>
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<table>
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<tr>
<td>R²</td>
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<td>F</td>
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<td>Moran</td>
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<td>Robust LM (lag)</td>
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<td>(sig =0.0359)</td>
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<td>Robust LM (error)</td>
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<td>(sig =0.0000)</td>
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Note: the standard errors for the OLS model are heteroscedastic-consistent; n = 376.
Captions for figures

Figure 1: Insolvency quartiles – The darkest shaded areas indicate the top quartile of insolvency rates through to the lightest areas indicating the lowest quartile.

Figure 2: LISA clusters - The light shaded areas are areas with high rates of insolvency adjacent to other areas with high rates; the dark shaded areas are areas with low insolvency rates located adjacent to other areas with low insolvency rates.
Figure 1
Figure 2