

An Analysis of Automobile Insurance Choice in Pennsylvania

by

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Introduction

The automobile accident compensation scheme in the United States has long been the subject of academic and public policy debate. Automobile accident compensation was historically determined under a tort system in all states. Within the tort system, the injured party has the burden of proof to show that another driver was at least partially negligent before collecting compensation from the at-fault driver. There is no guarantee that an injured party will be fully compensated for injuries under a pure tort compensation scheme. In response to criticism of the tort system and to high and rising costs for automobile insurance in the 1970s, sixteen states enacted no-fault automobile insurance compensation laws. All of the laws contained some type of limitation of the right of an injured driver to seek recovery for economic and non-economic costs from a negligent driver. If injuries exceed either a verbal or monetary threshold in the law of the state, the injured party is entitled to seek compensation for non-economic losses from the at-fault driver. The laws also mandated that no-fault drivers purchase first party coverage (Personal Injury Protection, or PIP) for economic losses regardless of fault. If economic losses arising from an injury exceed the first party benefit limit, the injured party is entitled to seek recovery from an at-fault driver for the uncompensated losses. The primary objective of no-fault systems is to increase compensation for medical and economic losses while reducing overall automobile insurance costs¹.

¹ There is a very large literature on the costs and benefits of no-fault compared to tort compensation systems. One area that has been widely studied is whether no-fault leads to an increase in accident rates due to lower incentives for care by drivers who do not bear the full wealth effects of their actions under a regime where they do not face liability. See, for example (Cummins and Weiss, 1999; , Carroll and Abrahamse, 1999; Kabler, 1999, 2001; Zador and Lund, 1986; Loughran, 2001. The current paper does not address this question.

However, no state has passed no-fault legislation since the end of the 1970s, and Georgia, Connecticut, New Jersey, and Pennsylvania have since replaced their no-fault laws. (III, 2005). Colorado allowed its no-fault law to sunset in 2003 and returned to a tort system. Pennsylvania repealed its no-fault law in 1984 and introduced a "choice" system in 1990². New Jersey introduced a choice system in 1989, changing from a no-fault regime³. Under the choice laws in both Pennsylvania and New Jersey, drivers may choose to be insured under the full tort compensation system, or under a no-fault system with limitations on lawsuits. In both states, no-fault electors are entitled to a premium reduction.

Recent proposals to reform automobile insurance compensation systems at both the state and federal levels have made choice an important public policy issue. The Colorado legislature considered and rejected a choice system before the no-fault law was allowed to sunset in 2003. A recent bipartisan report by a group of Michigan legislators recommended adopting a choice no-fault system (III, 2006). Similarly, a recent study sponsored by the National Association of Mutual Insurance Companies recommends allowing consumers a choice to limit tort recovery or maintain full tort benefits, among other proposals for reform (Kinzler, 2006).

Choice bills have been introduced at the federal level in Senate bill S2931 in the 108th Congress, 2004, House bill H.R. 1704 in the 107th Congress introduced in 2001, and in both the House and Senate in 1999⁴. Although no proposal has yet made it past the committee stage, the continued interest in choice makes it an important system for study. While the evidence to date is unclear as to whether no-fault or tort is more equitable and/or efficient, under either mandatory

² When the Pennsylvania no-fault law was repealed in 1984, it was replaced by a tort compensation rule that remained in force until the adoption of the "choice" system in 1990.

³ Kentucky adopted a choice law that allowed drivers to reject no-fault benefits in favor of a tort system. However, 99% of drivers have retained the no-fault option, making Kentucky a no-faults state in practice.

⁴H.R. 1704, 107th Cong. (1st Sess. 2001) was introduced by Representatives Armev (R-TX), Moran (D-VA), and Cox (R-CA), with Representatives Dooley (D-CA), Northrup (R-KY), and Weldon (R-PA) signing on as co-sponsors. The Senate bill in 2004 was introduced by Senator John Cornyn (R-TX), and co-sponsored by Senators John McCain (R-AZ) and Mitch McConnell (R-KY).

tort or no-fault systems, all insured drivers are compelled to participate in an automobile compensation system that is chosen for them, regardless of their individual preferences. One criticism of a mandatory no-fault regime is that it forces individuals who might otherwise prefer to retain the right to sue to give up at least some of their tort rights. However, under a mandatory tort regime, insureds who would not choose to sue for damages in any case do not receive premium reductions commensurate with their relatively lower contribution to insurer losses (Powers, 1992).

To date however, the choice automobile compensation system has received relatively little empirical attention in academic research. Schmit and Yeh (2003), examine the effect of choice on claim outcomes, including the use of attorneys, and speed and equity of payment in both Pennsylvania and New Jersey, finding little support for the argument that no-fault results in more efficient and equitable claims payment in either state. Regan (2008) examines the determinants of no-fault choice for 1997 - 2002 and finds that no-fault choice is related to driver age and risk characteristics as well as insurance prices. The current paper uses a longer time period and a richer set of variables to more completely model the no-fault choice in Pennsylvania. If a state or the federal government is to carefully consider adoption of a "choice" auto insurance system, it is important to have more accurate information about the proportion of insured drivers who are likely to choose to voluntarily restrict their tort rights, and also the factors that influence the choice of tort or no-fault insurance coverage. If no-fault does reduce insurance prices overall, then the proportion of drivers choosing no-fault in a state will directly influence insurance costs.

Pennsylvania provides a useful case. Pennsylvania is a large market for automobile insurance, accounting for over \$6.2 billion in premium revenue in 2003. Insurance prices vary widely across the 67 counties of Pennsylvania, as do demographic and other factors that might

influence insurance coverage selection. There is also wide variation in the rate of limited tort election in Pennsylvania, with an average of 49 percent of drivers choosing limited tort in 2002, but ranging from 37 to just over 66 percent. In 1991, the first full year under the new law, just 31 percent of drivers chose the limited tort option. Further, the rate of no-fault election increases in each county over time, but the increase is much faster in some counties. What factors explain the differences in the rate of increase in limited tort election? Does the choice of limited tort depend on insurance prices alone, or are there other factors that are important? These are the questions examined here. Using county level data from 1991 through 2002, I find that limited tort election is positively related to insurance prices, but that demographic and other factors are also important.

Section 2 describes the federal auto choice proposal and details the provisions of the Pennsylvania law implementing auto insurance choice. Section 3 develops the empirical models, Section 4 discusses the results, and Section 5 presents the conclusion.

Section 2: Auto Insurance Choice

The most recent federal choice proposal, "Auto Choice", (S. 2931, 108th Congress, 2004) is designed to function as an alternate to existing state compensation systems. Under the federal proposal, drivers could opt to continue to remain covered under an existing state tort system, or switch to a no-fault system⁵. If a driver switched to the federal no-fault system, the proposal calls for mandatory PIP to be purchased. All drivers must also carry bodily injury and property damage liability coverage at the state prescribed minimum limits. If a no-fault driver is injured in an accident, the first layer of recovery is from his PIP coverage. If economic losses exceed the

⁵ The proposal defines the framework for the system, but leaves specifics such as minimum limits and optional coverage requirements to the states.

PIP limits purchased, the injured party could seek recovery from an at-fault driver for uncompensated economic losses. If there is an accident between two no-fault electors, each seeks recovery from his own PIP coverage up to the policy limits. Once the PIP limits are exhausted, economic losses can be sought from the liability insurance of the other driver based on fault.

If a driver chooses to remain insured under an existing tort system, the driver would be required to purchase a new type of coverage called "Tort Maintenance Coverage" (TMC). This coverage operates like uninsured motorist coverage in that a tort driver who is injured by a no-fault driver must seek recovery for economic and non-economic damages from his own insurer under the TMC provisions. Once the TMC limits are exhausted, the injured driver may seek recovery from the no-fault driver based on fault. This coverage would be provided by the bodily injury and property damage liability limits carried by the no-fault elector. TMC coverage would only come into effect if a tort-electing driver were injured by a no-fault electing driver who was found to be at-fault in the accident. If the tort electing driver also carries underinsured motorist coverage, the UIM coverage would be attached only after coverage under the TMC policy and the coverage of the PIP insured were exhausted. If two tort-electing drivers are involved in an accident, the compensation mechanism is unchanged from the traditional tort system.

Additionally, all drivers would be free to seek both economic and non-economic damages from drivers who operate a vehicle while under the influence of alcohol or illegal drugs, or who engage in intentional misconduct.

The federal proposal allows states to opt out of offering the choice system to drivers. This can be done by the state passing a law that prohibits the option, or by the state showing that the

expected cost savings from adopting the choice model would not exceed 30 percent of bodily injury premiums on average.

2.1 Pennsylvania's Model: Because of rising costs, particularly in the Philadelphia area, Pennsylvania switched from a full-tort system to a no-fault law with a monetary threshold of \$750.00 and unlimited first party benefits in 1974. Unfortunately, the switch had little impact on rising costs, and generated heated debate about auto insurance reform. In 1984, the no-fault law was repealed and replaced with a tort system with "add-on" first party benefits⁶. However, costs continued to rise, increasing almost 25 percent more than costs for the United States as a whole between 1985 and 1990.

In 1990, Pennsylvania introduced a choice no-fault law under the Motor Vehicle Financial Responsibility Law Amendments, commonly called Act 6. Act 6 allows drivers a choice between remaining in the full tort system or electing coverage under a modified no-fault system with a verbal threshold. The latter option is called "limited tort". Under Act 6, those electing the limited tort option can recover economic losses, including medical care costs, rehabilitation, and lost income, from their PIP insurance. Once first party sources of recovery are exhausted, insureds may then seek recovery for economic losses from the at-fault driver through the tort system. This provision is similar to the federal Auto Choice model. However, in Pennsylvania, a limited tort elector does not give up the right to seek non-economic damages for serious injuries. A serious injury is defined in the statute as "a personal injury resulting in death, serious impairment of body function or permanent and serious disfigurement" (75 Pa.C.S.A., Sec 1702). This provision makes Pennsylvania's choice system a bit more liberal than that proposed

⁶ Add-on systems provide optional or mandatory first party benefits without restricting an insured's right to sue for non-economic losses or uncompensated economic losses.

under federal Auto Choice. Anecdotal evidence, however, suggests that it is difficult to breach the threshold for serious injury in Pennsylvania.

All drivers must purchase minimum medical benefits coverage in the amount of \$5,000. Drivers may purchase optional additional first party medical benefits up to at least \$100,000, and extraordinary first party medical benefits of up to \$1,000,000. Drivers may purchase optional income loss benefits up to a maximum limit of \$50,000. Under Pennsylvania's choice system, both limited tort and full tort electors are required to carry minimum liability insurance limits of \$15,000 per person, \$30,000 per accident, and \$5,000 in property damage liability coverage. If an accident involves two limited tort electors, each is compensated by her own insurer under first party benefits unless the injury is a serious injury as defined in the statute. If an accident involves two tort electors, the injured party must seek recovery from the liability limits of the at-fault driver. In the case of an accident involving a limited tort elector and a tort elector, the tort elector may seek recovery from the (at-fault) limited tort elector under the limited tort elector's liability limits. However, if the tort elector is at fault, the limited tort elector recovers from her own first party benefits unless the injury is classified as "serious" as defined above. Unlike the federal proposal, limited tort electors can be sued by tort electors from the first dollar of damages⁷. Because of this, the insurers of limited tort electors might not realize cost reductions that are commensurate with the required premium reductions under the law. Unlike New Jersey, Pennsylvania has no mechanism for reallocating these costs across insurers of tort and limited tort drivers⁸.

The 1990 law mandated a rate rollback of ten percent for those choosing full tort, and 22 percent for those choosing limited tort (75 Pa.C.S.A Sec. 1799.7). This discount applied to total

⁷ This provision weakens some of the arguments against no-fault that rely on reduced incentives for safe driving by no-fault electors because no-fault electors do not face potential liability for their actions.

⁸ See Herbers (1994) for a complete discussion of these allocation mechanisms in New Jersey.

premiums for any selection of coverages based on the rate that prevailed on December 31, 1989. In addition, to prevent insurers from preemptively raising rates before the law's effective date, an immediate rate freeze was imposed until July 1, 1990, based on rates as of December 31, 1989. Rate increases thereafter were limited to increases in the CPI and other approved indices. There was also a mandated minimum price differential between the full and limited tort policies of 15.3 percent applied to the total premium for all coverages combined⁹.

2.2 Limited Tort Election in Pennsylvania: Limited tort election rates differ significantly across Pennsylvania's 67 counties. The proportion of county drivers choosing limited tort coverage has increased steadily since the law was introduced in 1990, but the increase is not uniform across the state. The data for the analysis that follows is at the county level. I do not have observations of individual auto insurance purchases, but the Pennsylvania Department of Insurance has provided the rate of limited tort election in each county in Pennsylvania for the period 1991 through 2002¹⁰. For reference, Figure 1 shows the name and location of each county in Pennsylvania, with the counties divided into contiguous regions according to the Pennsylvania Department of Transportation Traffic Engineering Districts. [Figure 1 here]

In 1991, the statewide average limited tort election rate was 32.8 percent. This increased to 49.8 percent by 2002. However, just 25 percent of drivers chose the limited tort option in the lowest ranking county, Luzerne, in 1991, while the highest ranking county, Philadelphia, had 50 percent of insureds choose the limited tort option. By 2002, limited tort election increased to almost 66 percent in Philadelphia county, and to 36.5 percent in Luzerne county.

⁹ This differential was revised in 2003 to reflect a savings of approximately 40 percent on bodily injury, first party medical, and uninsured/underinsured motorists coverages only.

¹⁰ Thanks to Randy Rorbaugh and Chuck Romberger at the Pennsylvania Department of Insurance for providing the data and answering technical questions about limited tort election rates.

The counties in Pennsylvania vary significantly in terms of population density and income levels, and these differences might partly explain differences in limited tort election. One might expect that densely populated counties would have higher insurance prices overall, and thus greater savings might be realized by drivers choosing the limited tort option. Table 1 shows the counties with the highest and lowest rates of limited tort election in 2002, and correlates these with population density and county per capita income. Philadelphia county has the greatest population density by far of any Pennsylvania county, with over 11,000 people per square mile¹¹, and the highest rate of limited tort election. However, the remaining high ranking counties have population densities far below Pennsylvania's average of 452 people per square mile. These counties do, however, have lower per capita incomes than the state average of \$26,350, so that might be a factor influencing the rate of limited tort election. [Table 1 here]

Insurance prices are likely to be key determinants of limited tort election across counties. The Pennsylvania Insurance Department publishes a guide to insurance premiums that reports the offering prices of the top twenty insurers in each county for the year. The premiums are based on a model policy so that accurate comparisons can be made across insurers and counties¹². Each insurer reports offering prices for both full and limited tort options for each county. When an insurer reports a range of prices for the model policy in a county, the mid-point of the range is used here. To calculate average county prices, I take the average offering price for the model policy across the top twenty insurers. I use the offering prices for the full tort policy rather than the limited tort policy. However, because of the regulatory constraint discussed above that

¹¹ The next most densely populated county is Delaware, with 3,009 people per square mile. The least most densely populated county is Forest, with just over 11 people per square mile in 2002.

¹² The model premium is based on a married driver age 35 driving a one-year old Ford Taurus SE with safety features. The driver commutes to work five miles one way and 12,000 miles per year, has no claims, and is currently insured by another firm. The policy limits are 50/100/25 for the liability coverage, and there is a \$250.00 deductible for comprehensive physical damage coverage. A sample listing for the year 2005 can be accessed at <http://www.ins.state.pa.us/ins/lib/ins/consumer/brochures/CENTRAL2005%282006%29.PDF>.

governs the price differential between limited tort and full tort policies for this sample period, the correlation between the average limited tort and full tort prices is over 99 percent for the sample. Thus, although the figures shown are higher than they would be if the limited tort price had been used, the relative relation of prices across counties is unaffected by the use of the full tort model policy price.

Figure 2 maps average prices and average limited tort election across regions in Pennsylvania for 2002. The rate of limited tort election across regions ranges from 55.3 percent of insured drivers for Region 2, to a low of just over 41 percent for Region 11, which includes Pittsburgh in Allegheny county. Region 6 which includes Philadelphia county has the highest average prices by a large margin, and also the highest rate of limited tort election. However, Regions 1 and 2 also have relatively high levels of limited tort election, but are not among the highest priced regions. [Figure 2 here] Below I examine other factors that might influence limited tort election in Pennsylvania.

3. Empirical Analysis

Ordinary least squares regression analysis is undertaken to more carefully examine the relation between limited tort choice, demographic and economic factors. Two sets of analysis are undertaken. In the first set, the determinants of limited tort election are modeled as a function of the proportion of insureds in each county choosing limited tort insurance. In the second set of models, the factors that may affect the change in limited tort election across counties and time in Pennsylvania are examined. Econometric tests indicate that all models are characterized by heteroscedasticity, so all standard errors are adjusted using White's correction (White, 1980)¹³. The data span the twelve-year time period 1991 through 2002 and are based on observations over

¹³ White, Breusch-Pagan, and Goldfeldt-Quandt tests all reveal the presence of heteroscedasticity. However, the models are not characterized by autocorrelation or multicollinearity.

all 67 counties in Pennsylvania, for a total of 804 observations. Some of the variables described below are available only for the period 1997 - 2002. In those cases, separate models are estimated using the 1997 - 2002 time period. As noted above, the limited tort election data is provided by the Pennsylvania Insurance Department and is calculated by dividing the number of car years written for limited tort electors to total car years written for each county and year.

Explanatory Variables: In addition to insurance prices, several other factors may influence limited tort insurance choice¹⁴. Table 2 shows the summary statistics for the dependent and explanatory variables used in this analysis along with their definitions. [Insert Table 2 here]

The variables below appear in the regression models for the full period 1991 - 2002 in both sets of analyses.

Income is likely to be an important determinant of limited tort election for several reasons. First, drivers in lower income counties may choose full-tort insurance relatively less often than those in higher income counties simply because of the premium differential. Miller (1988) notes that the percentage of income spent on automobile insurance premiums is seven times higher for families in the lowest income quintile as for those in the highest income quintile. Further, lower income drivers might be without health insurance and might prefer the security of limited tort auto insurance medical cost recovery. Income is measured as aggregate personal income in each county and year divided by population, and is available from the Pennsylvania Department of Labor.

¹⁴ Note that the price information provided by the Pennsylvania Insurance Department for the model policy referenced earlier is not available before 1997. Therefore, price is used as an explanatory variable only for the period 1997-2002. Because the price variable used here is not determined by the proportion of drivers that choose limited tort insurance it is not likely to be endogenous. The Hausman test also rejects the hypothesis of endogeneity.

Some researchers have argued that higher risk drivers are more likely to prefer limited tort insurance coverage because they do not bear the full cost of accidents they cause (See, for example, Kabler, 1999). However, under Pennsylvania's choice system this would apply only if an at-fault driver injures a limited tort elector. As discussed above, if an insured driver injures a tort elector, the tort elector maintains full tort rights, regardless of the coverage election of the at-fault driver. This is because the at-fault driver's election of full tort or limited tort coverage only affects his own right to recover non-economic damages arising from minor injuries. In this case, a higher risk driver might prefer to be insured under the full tort option, recognizing that she is more likely to be involved in an accident, and thus might be more likely than a more careful driver to benefit from the full tort choice.

Accident statistics for Pennsylvania indicate that male drivers are involved in more accidents, and more fatal accidents, than female drivers are, and this is consistent across time and across all age groups (BHTSE, 2002). Moreover, research has shown that males are less risk averse than females, both in making financial decisions (Jianakoplos and Bernasek, 1998), and in making lifestyle choices (Hersch, 1996), and this might also influence limited tort election as compared to females. However, because males tend to have higher incomes as well as higher accident costs, the right to sue for non-economic damages might be relatively more valuable for male insureds. The proportion of the county population that is male is included to control for these effects. The data is drawn from the United States Census website.

Driver age might influence limited tort election in several ways. Younger drivers are more likely to be in an accident than older drivers, both because of lack of driving experience and because of increased risk taking (BHTSE, 2002). In addition, younger drivers are more likely to face income constraints relative to older drivers, and so might prefer limited tort

coverage because of the premium savings. Then again, younger drivers might experience lower severity per accident, because income losses might be lower, injuries less severe, autos driven are less expensive, or time to recovery shorter. Finally, the youngest drivers in this age group may be insured under the policy of their parents or legal guardians. Recognizing the high cost of carrying a young driver on the policy, the named insured parent or guardian might be inclined to choose the limited tort option. All of these factors argue for younger drivers choosing limited tort. However, the default for drivers that do not make an affirmative choice of auto insurance coverage is full-tort in Pennsylvania. If younger drivers entering the market are uneducated about auto insurance coverage, or are simply less inclined to make any coverage choices, then we might see a negative relationship between limited tort choice and younger population across counties. We include the proportion of population that is between 18 and 24 years old to control for this effect. This data is taken from the United States Census website.

Labor force participation might also influence limited tort election. Relatively lower rates of labor force participation might reflect income constraints that are not captured by the per capita income measure used above. A larger labor force participation rate might also capture differences in populations that commute to work. A typical measure of labor force participation is the employment rate in a county, measured as the number of eligible people working divided by the number of people who are members of the active labor force. The active labor force includes the population between 16 and 64 years old, but excludes full-time students, retirees under the age of 64, the population over the age of 64, and full-time caregivers. Thus, the use of the employment rate excludes drivers in these groups. To capture any difference in limited tort election that might be due to difference in labor force participation, I include the ratio of the

number of people employed in each county divided by the population aged 16 and older. The data is provided by the Bureau of Labor Statistics.

Population density is included to control for differences in accident types and insurance costs across counties. As noted above, there are significant differences in population density across counties, ranging from just under 11 people per square mile to over 11,110 people per square mile. Insurance costs are higher in more densely populated counties, both because accident frequency tends to be higher, and bodily injury costs are higher. A recent study reports that approximately 75 percent of all automobile accidents happen in urban areas (IRC, 2003). However, there are more single-car accidents in rural areas, and these generally involve more serious injuries (IIHS, 2007). Population density is measured as the county population divided by land area.

As additional measures of accident risk, both accident rates and fatalities are included in the regression models. If drivers perceive a higher risk of an accident, they might be more likely to choose full-tort insurance, since recoveries might be greater under full-tort for minor accidents. Alternately, drivers who perceive a higher risk of accident might choose limited tort insurance more often since it provides greater certainty of recovery. Of course, both accident rates and fatalities are related to insurance prices as well. Accident frequency is measured as the number of reported accidents per county divided by county population aged 16 and older¹⁵. Reported accidents include those with fatalities, physical injuries, or only property damage. Note that this measure likely under reports accident frequency since some accidents with minor losses are not reported. The fatal accident rate is measured as the ratio of the number of auto accident fatalities to the number of reported accidents in each county. Seatbelt usage is also included as a control

¹⁵ A better measure of accident frequency would be the ratio of reported accidents to registered vehicles, but vehicle registration information is not available for the period 1991-1996.

for differences in accident severity across counties. It might be the case that counties with higher seatbelt usage have lower serious injury risk, and drivers in these counties might believe that they are less likely to be injured in a car accident. In this case, limited tort election would be positively related to seatbelt usage. Information on seatbelt usage and accidents is provided by the Pennsylvania Department of Transportation's annual *Crash Facts and Statistics*.

I also control for the potential access to legal services on the limited tort choice. It can be argued that any restrictions on the right to sue would be strongly resisted by attorney groups. Lasher (1999, 2001) notes that the Pennsylvania Trial Lawyer's Association was in active opposition to the implementation of Act 6. Counties with relatively higher proportions of employees in the legal services industry might then have lower rates of limited tort election, especially if attorney groups exert influence on driver choice through advertising or other means. Previous research has found that attorney involvement in claims is associated with higher claims severity. For example, Browne and Puelz (1996) note that attorney involvement is associated with a 64 percent increase in claims severity. Accident victims might have relatively greater access to legal services in some counties, and thus might have greater certainty of recovering damages in tort suits. The measure of the availability of legal services used here is the ratio of the number of people employed in legal services times 1000 to the population aged 16 and older¹⁶. Because of significant variations across time and counties, this variable is transformed by the natural logarithm function when it appears in the analysis of the determinants of limited tort choice. Employment in legal services is reported in *County Business Patterns*.

It is also possible that political party affiliation may influence limited tort election. Democratic elected officials are more likely to oppose tort reforms such as no-fault than are

¹⁶ An ideal measure would use the number of practicing attorneys in each county over the time period, but this information is not publicly available to my knowledge.

Republicans, and this position might be supported by constituents (Meier, 1991). This would lead to a negative relationship between limited tort election and a relatively larger democratic voting base. Empirical research has found a negative link between the proportion of democratic voters and support for tort limitations (Carroll and Regan, 1999). Democratic voters might also be less trusting of insurance companies and prefer the legal system to allocate damages arising from auto accidents (Sugarman, 1998). The influence of political affiliation is captured by including a variable equal to the ratio of registered Republican to Democratic voters in each county. Voter registration data is provided by the Pennsylvania Department of State.

Several other variables are likely to influence limited tort choice across counties and time. However, the data that follow are available from 1997 onward only. Thus, the regression models using these variables are estimated for this period only.

A variable is included to control for the influence of medical costs on limited tort election. On average, 56 percent of each dollar paid by auto insurers to auto accident victims goes to medical costs (III, 2007). It might be the case that counties with higher average medical costs will have higher bodily injury losses overall, and thus higher insurance prices. Alternately, if medical costs are higher, the greater certainly provided by limited tort coverage might be preferred by a larger proportion of drivers. Medical cost is measured as the ratio of total hospital costs incurred in a county to the number of inpatient hospital days. The data is reported by the Pennsylvania Healthcare Cost Containment Council.

Another possible factor that might influence the choice of limited tort or full tort automobile insurance is whether the driver has other private health insurance to cover accident costs. As noted above, all drivers in Pennsylvania must carry a minimum of \$5000 in first party injury benefits. After this limit is exhausted, health insurance covers medical costs relating to

auto accidents, unless the injured party seeks recovery from an at-fault driver. If a driver has private health insurance she might be more likely to choose limited tort coverage since there is a greater degree of certainty that at least the medical care portion of accident costs will be paid¹⁷. The proxy for the prevalence of private health insurance in each county is the proportion of people who received medical care in a hospital or outpatient facility who were covered by private health insurance for our sample period. The data to calculate this variable is provided by the Pennsylvania Healthcare Cost Containment Council.

The size of the uninsured driving population might also influence limited tort election. If an insured driver is in an accident with an at-fault uninsured driver, then the insured driver has very few options for recovery of accident costs in the tort system. If the insured driver carries uninsured motorist coverage, then uncompensated accident costs are paid from the uninsured motorist limits. However, if uninsured motorist coverage is not purchased, recovery from the negligent uninsured driver is unlikely. Drivers in counties with higher rates of uninsurance might prefer limited tort for the greater certainty that economic costs will be paid up to the policy limits. A proxy to control for the population of uninsured drivers in each county is constructed as the ratio of registered passenger vehicles in the county to insured car years written. A larger ratio indicates a higher uninsurance rate. The data on car years written is provided by the Pennsylvania Insurance Department, while vehicle registration information is available from the Pennsylvania Department of Transportation's *Report of Registrations*.

Traffic density, as measured by the number of total daily vehicle miles traveled per population aged 16 and older, is included to capture the differences in driving intensity across

¹⁷ The incentive to choose limited tort or full tort might also be influenced by the presence of private disability insurance that would replace income lost as result of an auto accident. However, we were unable to find any information on disability income purchases across Pennsylvania counties.

counties. It is expected that this variable would be higher for more rural counties, as commutes might tend to be longer, or public transportation less widely available.

To control for other factors that might vary across time or counties that influence the election of limited tort auto insurance, the regression models include regional and time-specific dummy variables. In the first analysis of the determinant of limited tort choice, the dependent variable is formulated as the proportion of car years insured under the limited tort option for each county year. The sample period is 1991-2002 for a subset of the variables, and 1997-2002 using all of the explanatory variables. In the second analysis that examines the change in limited tort election across time, the dependent and explanatory variables are formulated as annual rates of change, $(y_t - y_{t-1}) / y_{t-1}$ ¹⁸.

4. Discussion of Results

In Table 3, Model 1 reports the OLS regression estimates for the models using the set of explanatory variables that are available for the entire period 1991-2002. For comparison, the model is also estimated for the period 1997 - 2002. Estimated coefficients and asymptotic t-statistics are shown. In each model, the estimated coefficient for per capita income is negative and statistically significant, indicating that in counties with higher per capita income, limited tort election is lower all else equal. This supports the idea that income constraints affect insurance policy choice. The estimated coefficients for both the male population and the population between 18 and 24 years old are positive and statistically significant, supporting the idea that limited tort election is more common in counties with a higher proportion of male drivers, and a higher proportion of young drivers¹⁹. Population density and the fatal accident rate are also

¹⁸ The initial year is dropped from the analysis after the change variables are calculated, so there are fewer observations for the second set of models.

¹⁹ Because young male drivers have the highest accident rate, an interaction term, (Male*Young), was also included in the models. The estimated coefficient was not significant and did not change the rest of the results, so was

significant and positively related to limited tort election, but the accident frequency rate is significant only for the period 1991-2002. The estimated coefficient on the seatbelt usage variable is positive and statistically significant, indicating that limited tort election is higher in counties with greater seatbelt usage, all else equal²⁰. [Table 3 here]

While the ratio of Republican to Democratic voters is positive and significant for the 1991-2002 period, it is not significant for the 1997-2002 period. Similarly, while the estimated coefficient on the variable that measures access to legal services is negative in both models, it is statistically significant in only the period 1997-2002. This provides mixed support for the idea that people will be less likely to give up some of their tort rights if legal services are more readily available.

Table 4 reports the estimation results for two models for the 1997 - 2002 period. The first model shows the results using the same set of variables as in Table 3, but with the addition of the model policy price variable. The second model reports the results using the full set of explanatory variables. In each model the estimated coefficient on the price variable is positive and significantly related to limited tort choice across counties. Higher priced counties have a greater rate of limited tort election all else equal. However, other variables are still important in determining limited tort election rates. Similar to the results reported in Table 3, per capita income is negatively related to limited tort choice, while the proportion of the population that is male, the proportion of the population that is between 18 and 24 years old, seatbelt usage, and the fatal accident rate are all positive and significantly related to limited tort choice in both models for the 1997-2002 period. Population density is no longer a significant predictor of

dropped from the analysis. I also tested variables (males 16- 24 / male population), and (male 16-24 / population aged 16 and older), but neither of these was significantly related to limited tort election.

²⁰ Philadelphia county has the highest rate of limited tort election across the counties but the lowest rate of seatbelt usage, with an average seatbelt usage rates of just 21%, compared to 73% for the state in the period 1991-2002.

limited tort choice once price is controlled for. This suggests that the price variable captures some of the effects of differences in population density across counties²¹.

The estimated coefficient for the traffic density variable, shown in model 2, is negatively related to limited tort election after controlling for price and the other variables in the model. This indicates that, as daily miles driven per person over age 16 increases, limited tort election declines in the county. [Table 4 here]

Model 2 in Table 4 also shows the estimated coefficients for the proxies for uninsured motorists, average hospital costs, and access to private insurance. All of these are positive and statistically related to limited tort election across Pennsylvania counties, even after controlling for differences in insurance prices. All models also include year and region indicator variables. Most of the regional dummy variables have statistically significant estimated coefficients. This means that, even after controlling for differences in economic and demographic factors there are substantial differences in limited tort election rates across regions in Pennsylvania.

Tables 5 and 6 report the results of regression models that estimate the factors that influence the change in limited tort election across time. Tables 5 reports the results of the models first using the subset of variables that are available for the sample period 1991 - 2002, and the for period 1997-2002. Table 6 reports the results for the period 1997 - 2002 using the variables that are available for that period. The variable that measures change in average insurance prices is not statistically significant in either model in Table 6, indicating that annual changes in insurance prices do not have an immediate impact on insurance policy choice²². The

²¹ The correlation coefficient between population density and average insurance premium is 0.83, so multicollinearity could affect the results. The models were re-estimated dropping the population density variable. The coefficients changed in magnitude, but signs and significance levels were unaffected.

²² This variable was also included in analysis as one-period lag and as a two-period lag. However, it was not significant in any model. A separate regression model was estimated to capture aggregate change in limited tort election and average insurance prices across the period 1997-2002 as well. The variables were formulated as $(X_{2002} - X_{1997}) / X_{1997}$. There was no significant relationship between average insurance price change and limited tort election

results for model 1 in Table 5 indicate that as county per capita income growth is lower in the period 1991-2002, limited tort election growth increases. This is consistent with insurance policy selection being influenced by income constraints. However, the estimated coefficient on income growth for the 1997-2002 periods, shown in model 2 of Table 5 and both models in Table 6 is positive and statistically significant, indicating that limited tort election is increasing in counties where income is increasing faster. This relationship also holds for the proportion of male population, proportion of population between 18 and 24 years old, labor force participation, and Republican to Democrat voter ratio variables. While the accident growth rate is positive and statistically significant for all models, the fatal accident growth rate is not significant for any model. Annual change in legal employment and population density are not statistically related to change in limited tort election across counties in any model. [Table 5 here]

Model 2 in Table 6 shows the results for the full set of explanatory variables for the period 1997-2002. While there is not significant relation between annual growth in the measures of traffic density and uninsured autos, the estimated coefficient on the change in hospital costs variable is negative and statistically significant at the one percent level. However, as the proportion of hospital days covered by private health insurance increases, limited tort election increases. [Table 6 here]

5. Conclusion

The efficient and equitable design of an auto accident compensation scheme has long been the subject of debate. Both tort and no-fault systems differ in their rules and applications across states, making comparisons of efficiency and equity across states difficult. Under either a tort or no-fault system, drivers are forced to abide by the accident cost compensation scheme of

in this model either. This may be because price increases do not vary much over the state. The mean model premium change was 29% with a standard deviation 5%.

the state regardless of their own preferences in the trade-off between cost and compensation. Choice auto systems offer a solution. As states and the federal government consider auto compensation reforms, choice systems continue to draw attention.

Pennsylvania's choice auto insurance law has now been in place for almost 20 years. The differences in demographic and economic characteristics across Pennsylvania's counties make it a useful case to study the operation of a choice system. Choice election has increased from 33 percent to over 50 percent statewide since 1991, and has increased overall in each county. However, there remain persistent differences in limited tort election and the rate of change in limited tort election across time and across counties. For example, limited tort election increased in Cumberland county by just 8 points (25 percent) over the period, but increased by over 29 points (96 percent) in Venango county. Philadelphia, the highest cost county, ranks highest in limited tort election, but other high ranking counties are not among the highest cost.

This research has investigated some of the factors that contribute to those differences, and the results may be used by policymakers to estimate potential costs and benefits arising from a choice system. However, the unique features of Pennsylvania's model must be considered in applying these results. As compared to the federal model, Pennsylvania's approach does not insulate limited tort electors from lawsuits by drivers injured by limited tort electors. Nor does it bar limited tort electors from seeking compensation for non-economic damages arising from serious injuries.

The results of the empirical analysis show a positive relation between insurance prices and limited tort election, with election rates higher in higher cost counties. However, price alone does not explain the differences across counties. We also find a greater rate of limited tort election associated with a larger male population, and a younger population. Limited tort

election is lower for counties with a higher per capita income, but higher when there is a greater proportion of the population covered by private insurance. Importantly, we do not find a significant relationship between the change in limited tort election and change in insurance prices, but this may indicate that limited tort election is a "sticky" choice, or that insurance prices change relatively slowly for the models estimated here.

Even after controlling for economic and demographic factors that differ across Pennsylvania counties, there are still significant differences in limited tort election across geographic regions of the state. For example, populations in some regions might be less litigious than in others, and therefore retaining tort rights is not as highly valued in those regions. For example, the ratio of automobile bodily injury to property damage liability claims is often used as a measure of the propensity to sue. This ratio was over 55 percent for Philadelphia in 1997, but just under 16 percent for Allegheny county, which includes Pittsburgh (IRC, 2002). From a public policy perspective, it is important to understand that regional differences are likely to influence the rate of limited tort election if a choice proposal is offered in another state or at the federal level.

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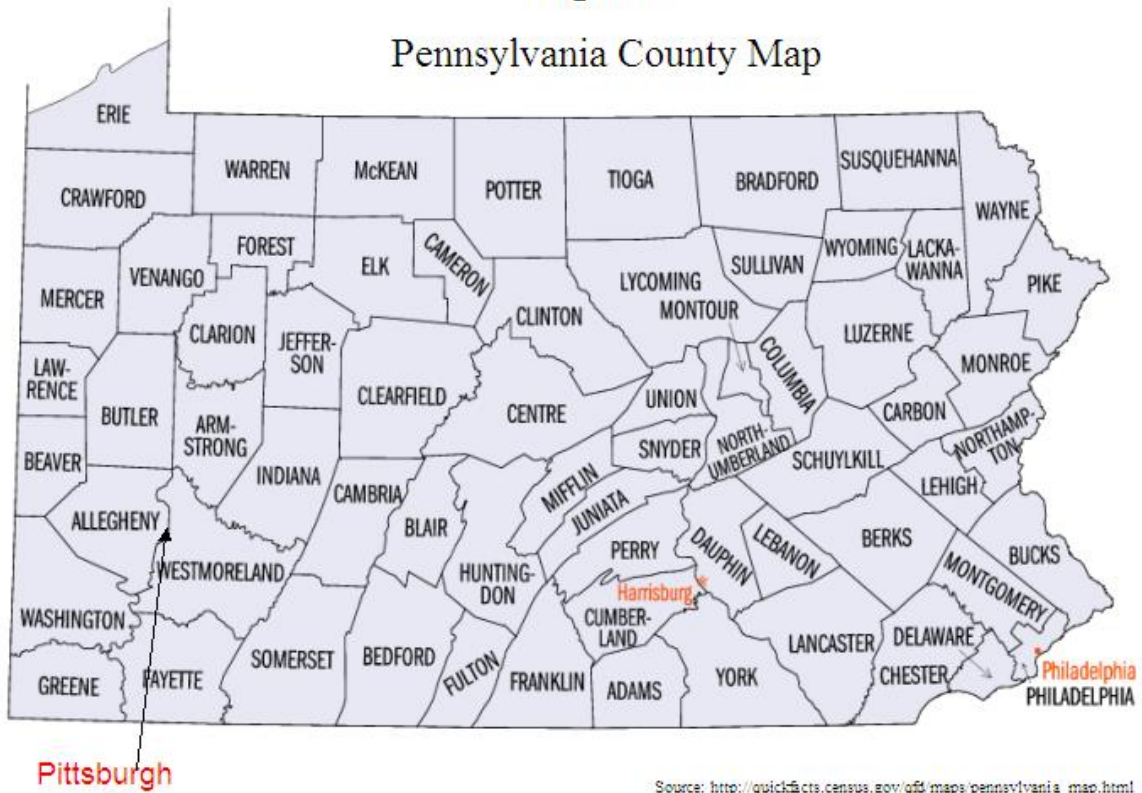
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Figure 1

Pennsylvania County Map

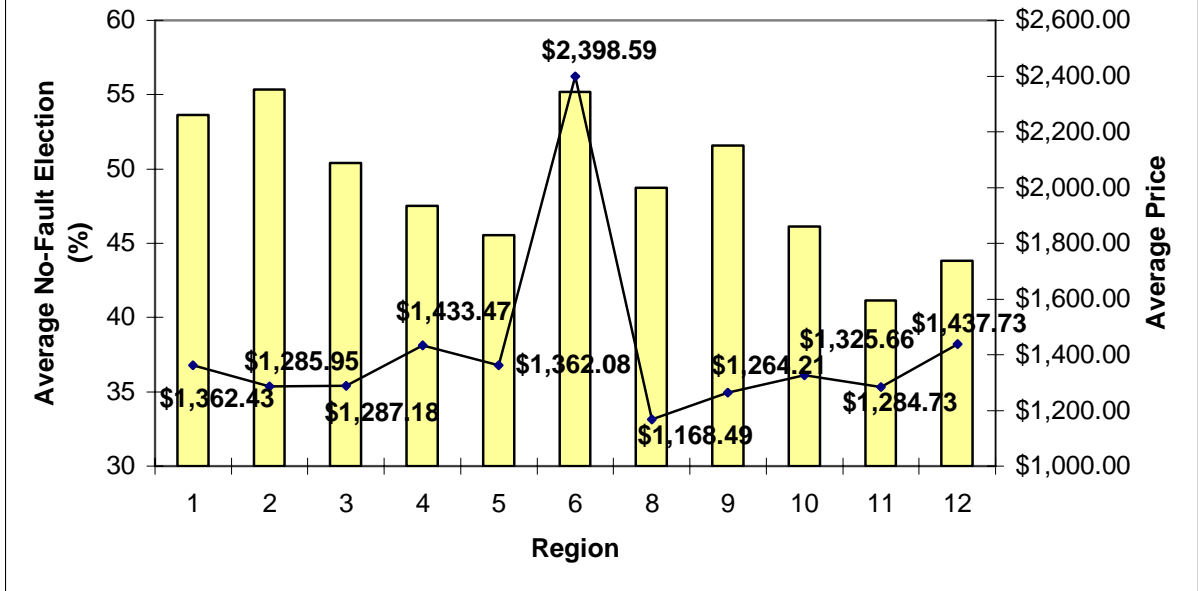


Source: http://quickfacts.census.gov/qfd/maps/pennsylvania_map.html

Pennsylvania Engineering District Regions as defined by the Pennsylvania Department of Transportation

- 1 Erie, Crawford, Mercer, Venango, Warren, Forest
- 2 McKean, Potter, Cameron, Elk, Clinton, Centre, Clearfield, Mifflin, Juniata
- 3 Tioga, Bradford, Sullivan, Lycoming, Columbia, Montour, Union, Northumberland, Snyder
- 4 Susquehanna, Wayne, Lackawanna, Wyoming, Luzerne, Pike
- 5 Berks, Schuylkill, Lehigh, Carbon, Monroe, Northampton
- 6 Philadelphia, Delaware, Montgomery, Chester, Bucks
- 8 Franklin, Cumberland, Perry, Dauphin, Lebanon, York, Lancaster, Adams
- 9 Cambria, Blair, Huntingdon, Fulton, Bedford, Somerset
- 10 Armstrong, Clarion, Jefferson, Indiana, Butler
- 11 Allegheny, Beaver, Lawrence
- 12 Westmoreland, Fayette, Washington, Greene

Figure 2
Average No-Fault Election and Price By Region
2002



The average price is based on the model policy premium for the full tort model policy, and calculated by averaging prices across each county in the region for 2002. The model premium is for a married driver age 35 driving a one-year old Ford Taurus SE with safety features. The driver commutes to work five miles one way and 12,000 miles per year, has no claims, and is currently insured by another firm. The policy limits are 50/100/25 for the liability coverage, and there is a \$250.00 deductible for comprehensive physical damage coverage. Information on the model premium is provided by the Pennsylvania Insurance Department.