Bankruptcy, Medical Insurance and a Law with Unintended Consequences

Thomas G. Koch *

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Abstract

The number of consumer bankruptcies has grown dramatically. Meanwhile, the proportion of workers with medical insurance has fallen, while its price has grown. This coincidence began around 1986, when Congress passed the Emergency Medical Treatment and Active Labor Act (EMTALA), guaranteeing a standard of medical care, thus limiting potential medical liability. I construct a tractable general equilibrium model of the medical insurance market, and find that repealing EMTALA would reverse these trends. Further, I find that changes in the distribution of medical risk should have led to increasing medical insurance rates after 1986. It actually fell over this period.

JEL Codes: I1, D8, H0, K35

Keywords: adverse selection, bankruptcy and default, medical insurance, EMTALA.

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1 Introduction

Public insurance has been shown to crowd out the demand for private insurance. Insurance could also be crowded out the public provision of the insured good itself. This paper understands two contemporaneous empirical trends—a rise in the consumer bankruptcy rate, and a fall in the medical insurance rate—as coming from such a crowd-out. In 1986, the Emergency Medical Treatment and Active Labor Act (EMTALA) passed into law. Also known as the "Patient Anti-Dumping Law," it guaranteed a standard of care to any person who showed up in a hospital's emergency room, independent of the person's insurance status or ability to pay for medical care.[1] Before 1986, medical insurance was one way to ensure medical treatment. After 1986, a standard of care was guaranteed by law. *Ipso facto*, private medical insurance becomes less valuable with EMTALA because bankruptcy and default became a more agreeable substitute. If an uninsured individual suffers a costly medical emergency, he or she is guaranteed a standard of care and can default on the payment of medical bills.

This paper first examines these empirical phenomena—the declining insurance rate and the increased number of consumer bankruptcies. Then, I introduce a general-equilibrium model that mixes the insurance choice with the default choice. This model is then taken to medical expenditure and insurance data, in order to estimate the quantitative effects of EMTALA. I find that repealing EMTALA would decrease the price of insurance and move the rates of medical insurance and medically-related consumer bankruptcy towards pre-EMTALA levels. Further, changes in the distribution of medical risk should

[1] If a hospital is found in violation of EMTALA, it could lose its payment agreements for Medicare and Medicaid.

have increased the insurance rate in the late 1980s and early 1990s. It actually fell over this period due to EMTALA. The final section concludes.

2 Two Empirical Phenomena

2.1 Declining Insurance

The take-up rate of those workers offered private medical insurance declined in the late 1980s and early 1990s. Cutler (2002) finds that the rise in out-of-pocket (OOP) premia can account for the entire fall in take-up rates. Cutler (2002) also notices a pattern in the insurance rates of the 1990s. Low-income workers in the 1990s were much less likely to have medical insurance, and suggests why this might be: "The alternatives that people have—enrolling in public programs, receiving free care, or paying out of pocket—are not equally attractive to everyone, particularly higher income people."

Figure 1 demonstrates that the decline in insurance rates began in the mid-1980s. In particular, there was a significant decrease around 1986. As Table 1 shows, low-income workers disproportionately shifted out of medical insurance after 1986. The coverage rate among low-income (under \$20K) workers dropped by six percent, while the coverage rate for workers with incomes above \$20K declined by a much smaller amount.

In 1986, there were several changes in federal law that could have affected demand for medical insurance. The first was the Tax Reform Act (TRA) of 1986. While TRA decreased the top marginal income tax rate, TRA increased the marginal tax rate on some low-income workers from 11% to 15%. Since compensation in the form of insurance is tax-exempt, this made medical benefits less expensive. Moreover, TRA extended tax-exempt status to

Income	1985-6	1988-9	Δ
0-5K	36.0	30.9	-5.1
5-10K	51.7	45.5	-6.2
10-20K	80.0	74.3	-6.7
20-30K	92.4	88.9	-3.5
30-50K	96.5	95.2	-1.3
50K+	97.9	97.4	-0.5
All	87.9	84.9	-3.0

Table 1: Insurance Rates Among the Employed Before and After EMTALA, by Income

the self-employed, increasing the insured portion of the self-employed. These changes mask larger decreases in insurance rates of the non-self employed in Table 1 and Figure 1.

The Consolidated Omnibus Budget Reconciliation Act (COBRA) of 1986 gave workers the right to purchase group insurance from their employers for a period of time after they left their jobs or were fired. This should *increase* a household's willingness to pay for private medical insurance. After COBRA, having private medical insurance included the option value of purchasing it in the event of job loss.

Also part of COBRA was EMTALA. EMTALA decreased the value of medical insurance by guaranteeing a standard of care in emergency rooms. Moreover, the patterns of un-insurance described above fit the EMTALA story. The cost of bankruptcy is likely to be much less for low-income households, as low-income households are less likely to hold assets and other property that could be forfeited in the bankruptcy process. As can be expected, the distortions of EMTALA around 1986 were greatest among the low-income households.

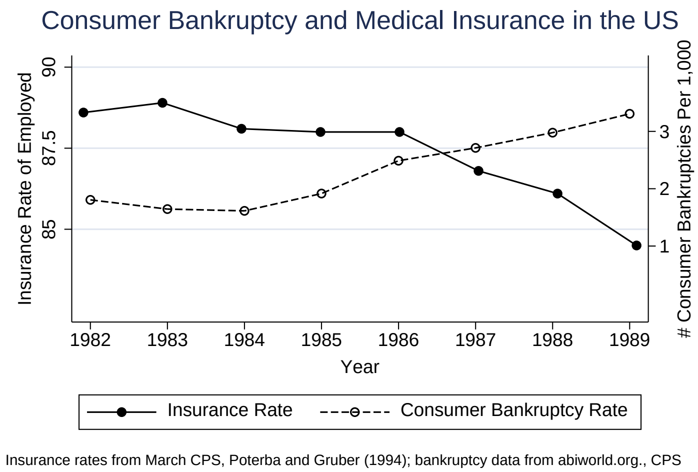

Figure 1:

2.2 The Rise in Bankruptcy

As Figure 2 shows, consumer bankruptcy has been on the rise in the US since the mid-1980s. While the the number of consumer bankruptcies reflects some business cycle variation, the trend is positive. Figure 2 also shows the number of business bankruptcy filings. The number of business bankruptcies has remained relatively constant over this period. While changes in financial frictions have been used to explain the change in the consumer bankruptcy rate, it is not clear why its effects would be asymmetric. Figure 2 suggests an asymmetric change in the bankruptcy choices faced by consumers and businesses.[2]

It has been argued that a decline in the "stigma" of bankruptcy led to the dramatic rise of consumer bankruptcy. Again, there is no *a priori* reason to

[2]The Tax Reform Act of 1986 also limited the flexibility of large banks to write off bad debt. While no model of bankruptcy includes the tax incentives for lenders, this change would likely be modeled as an increase in the transaction costs of debt.

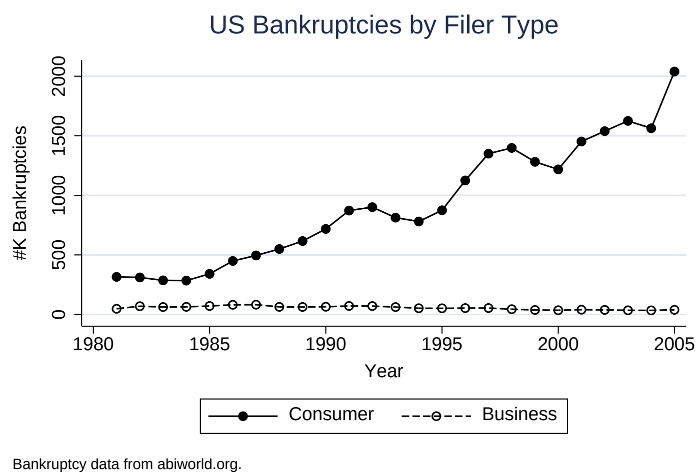

Figure 2:

think that such a decline would only affect consumer bankruptcies. Further, as Sullivan *et al.* (2000) notes, non-response remains a large problem in collecting survey data from recently bankrupted households, and does not vary in a way that suggests declining stigma. The response rate of bankrupt consumers was nearly fifty percent for their 1991 study. The response rate for Western Texas was ten percent higher than Northern California.

A more recent study, Jacoby *et al.* (2001), focused on the role of medical debt and bankruptcy. Twenty percent of the respondents from their 1991 study cited medical "causes" of their bankruptcy, rising to half of the bankrupted consumers in their 1999 study. Two percent cited medical reasons in their 1981 study. Sullivan *et al.* (2000) report that the average and median income of their bankrupt respondents decreased from 1981 to 1991. As shown above, low-income households were more likely to have switched out of coverage.

Some of the most striking evidence in favor of EMTALA's role is anecdotal.

The first is from the Government Accountability Office (2001), which studied the effects of EMTALA for Congress. Doctors reported that EMTALA led to increased use of emergency rooms, which was aggravated by the rising number of uninsured patients. Further, the study noted, "EMTALA leads to on-call physicians providing uncompensated care."[3]

Jacoby *et al.* (2001) also finds evidence of strategic behavior in decisions of debt and medicine:

> "Anecdotally, we have heard from bankruptcy lawyers that debtors may be reluctant to risk losing the services of their health care providers and thus may try to find a way to pay them even if other creditors go unpaid."

Livshits *et al.* (2006) finds that the Canadian bankruptcy rate demonstrates a similar pattern to that of the US. The Canadian bankruptcy rate serves as a control group for their research. The Canadian legal and credit market institutions are similar to those of the US. Since medical care is socialized in Canada, similar growth rates cannot be explained by increased exogenous medical risk in both countries. This similarity does not begin until the early- to mid-1990s. The bankruptcy rate in Canada experiences a shallow trough in the mid- to late-1980s, while the US rate exhibits rapid growth. Decreasing transaction costs may help explain the similar growth in consumer bankruptcy in these two countries in the 1990s. However, the data are consistent with an asymmetric change in the mid- to late-1980s.

[3] Later the study states, almost suggestively, "Hospital and physician representatives also told us that EMTALA has contributed to the increased use of emergency departments for the treatment of nonurgent conditions and a decline in physicians willingness to provide on-call services to emergency departments. However, other factors, such as the increase in the number of uninsured, also contribute to these changes and it is difficult to determine how much is due to EMTALA."

These phenomena point to a change in 1986. After 1986, insurance rates in the US begin to decline, and the number of medically-related consumer bankruptcies increased. As the insurance rate fell, the price of insurance increased. The following sections explain these patterns with an adverse selection model of insurance and default.

3 A Model of Insurance and Default

The economy described below has a unit measure of agents heterogeneous in their risk. It is assumed that agents' risk types are private information. This assumption is drawn from the many legal mechanisms designed to ensure the privacy of health information. For example, the Health Insurance Portability and Accountability Act (HIPAA) of 1996 mandated federal privacy protections for patients. Further, it is assumed that signaling is not possible.

These assumptions lead to adverse selection into the medical insurance market—the agents who choose medical insurance are those who are most likely to use it. This is consistent with a wide array of medical insurance research. For example, Cutler and Zeckhauser (1998) finds that adverse selection enabled the collapse of the most generous medical insurance plan offered by Harvard University.

3.1 The Agent's Choice

Consider an agent that faces risk $\widetilde{mx}_i$. This risk is characterized by its PDF and CDF, $h_i(mx), H_i(mx)$. *Ex ante*, before this risk is realized, the agent can purchase insurance against this risk, $\iota = 1$, at price ϖ. After the risk is realized, *ex post*, the agent without insurance can choose to default, $d = 1$, at price κ. All agents earn income w and each makes the ex-ante insurance choice according to:

$$U_I(w, \widetilde{mx}_i; \varpi, \kappa, \tau) = \max_{\iota \in \{0,1\}} \left\{ u(w - \varpi - \tau), E\left[\widetilde{U}_D\right] \right\}. \tag{1}$$

Agents are taxed a lump sum amount τ; the proceeds of this tax pay for the realized risk that is defaulted on. This is the insurance choice framework of Pratt (1964), with the additional opportunity to default on the realized risk *ex post*.

The utility of going uninsured is a random variable:

$$\widetilde{U}_D = \max_d \{u(w - \widetilde{mx}_i - \tau), u(w - \kappa - \tau)\}. \tag{2}$$

If the realized $mx_i > \kappa$, then the agent chooses to default. Otherwise, the agent will pay for realized risk out of pocket.

An agent's willingness to pay for medical insurance, π_i, depends upon its risk, $\widetilde{mx}_i$, the cost of default, κ, and the tax level τ: $\pi(\widetilde{mx}_i; \kappa, \tau)$. If agent i's willingness to pay for private medical insurance is greater than or equal to its price, i.e., $\pi(\widetilde{mx}_i; \kappa, \tau) \geq \varpi$, then the agent will choose to buy insurance, $\iota(\widetilde{mx}_i; \kappa, \tau) = 1$.

3.2 The Markets for Insurance and Medical Care; the Government

The insurance market is competitive, so that the price of insurance is equal to the average realized risk of the insured. By the informational assumptions, there is only one insurance type offered.

Medical goods and services are provided by firms with linear technology that converts consumption goods into medical goods. In order to ensure the existence of medical firms, the government collects the lump-sum tax on agents, and redistributes this revenue to the hospitals in order to cover the lost revenue due to defaults.

3.3 Equilibrium and Stability

Definition. An equilibrium is defined to be a price of insurance, ϖ, tax level, τ, default decision rule $d(mx_i; \kappa, \tau)$ and insurance decision rule $\iota(\widetilde{mx}_i; \kappa, \tau)$ such that:

- ι_i solves the agent's insurance choice, according to the discrete maximization problem of (1);
- $d(mx_i; \kappa)$ solves the agent's default choice, according to the discrete default problem of (2);
- ϖ is equal to the average realized risk of the insured; and,
- τ is set to expected amount of realized risk which is not paid for by agents due to default.

Several reasonable assumptions specify the model to make it consistent with empirical evidence and tractable:

- The unconditional distribution of realized medical uncertainty is Pareto of the second kind (a.k.a. Lomax or Pearson Type IV).
- Individual i's risk is characterized by the exponential distribution, with parameter λ_i. If the λ_i's are distributed according to the gamma distri-

bution, then the unconditional distribution of realized risk will be Pareto. This identity is derived in Harris (1968).

- Preferences display constant absolute risk aversion (CARA).

Under these assumptions, an agent's willingness to pay for medical insurance with the availability of default is:

$$\begin{aligned}\pi(\lambda_i;\kappa) &= \frac{1}{r}\log(Pr(mx_{\leq}\kappa) * E(e^{-r*\widetilde{mx}_i}) + Pr(mx_i < \kappa)e^{-r\kappa}) \\ &= \frac{1}{r}\log\left(\frac{\lambda_i - re^{-(\lambda_i - r)\kappa}}{\lambda_i - r}\right)\end{aligned}$$

Note that an agent's willingness to pay does not depend upon the tax level. The following results are important for the equilibrium results below. It is helpful to note that agents with lower λs face higher risk: the mean of an exponential random variable parameterized by λ is λ^{-1}.

- $\lim_{\lambda_i \to 0} \pi(\lambda_i;\kappa) = \kappa$, and $\lim_{\lambda_i \to 0} \pi(\lambda_i;\kappa) < 0$;
- $\lim_{\lambda_i \to \infty} \pi(\lambda_i;\kappa) = 0$, and $\lim_{\lambda_i \to \infty} \pi(\lambda_i;\kappa) = 0$
- $\lim_{\lambda_i \to r} \pi(\lambda_i;\kappa) = \frac{1}{r}\log(1+r\kappa)$, with $0 < \pi(r;\kappa) < \kappa$, and and $\lim_{\lambda_i \to r} \pi(\lambda_i;\kappa) < 0$

Theorem (Monotonicity of willingness to pay)**.** *For* $\kappa > 1$

$$\frac{\partial \pi(\lambda_i;\kappa)}{\partial \lambda} < 0.$$

Proof. The following inductive proof is structured as follows: first, establish that $\frac{\partial \pi(\lambda_i;\kappa)}{\partial \lambda}|_{\lambda=r} < 0$. Second, for any $\lambda_0 > r$, $\frac{\partial \pi(\lambda_i;\kappa)}{\partial \lambda}|_{\lambda=\lambda_0+\epsilon} < 0$

Since $\frac{\lambda_i - re^{-(\lambda_i - r)\kappa}}{\lambda_i - r} > 1$ the sign of $\frac{\partial \pi(\lambda_i;\kappa)}{\partial \lambda}$ depends upon the sign of:

$$\frac{\partial}{\partial \lambda_i} \frac{\lambda_i - re^{-(\lambda_i - r)\kappa}}{\lambda_i - r} = \frac{1 + r\kappa e^{-(\lambda_i - r)\kappa} - \frac{\lambda_i - re^{-(\lambda_i - r)\kappa}}{\lambda_i - r}}{\lambda_i - r}$$

The sign of equation 3 depends upon the two inequalities $\lambda \gtrless r$, and $f(\lambda) = 1 + r\kappa e^{-(\lambda_i - r)\kappa} \gtrless \frac{\lambda_i - re^{-(\lambda_i - r)\kappa}}{\lambda_i - r} = g(\lambda)$.

Using L'Hospital's Rule, it can be shown that if $\kappa > 1$:

$$\frac{\partial f(\lambda)}{\partial \lambda}|_{\lambda = r} = -r\kappa^2 > -\frac{r\kappa^2}{2} = \frac{\partial g(\lambda)}{\partial \lambda}|_{\lambda = r}.$$

For a small $\epsilon > 0$, $f(r + \epsilon) < u(r + \epsilon)$, implying that $u'(r + \epsilon) < 0$. This implies that for a small ε, $f(r + \epsilon + \varepsilon) < u(r + \epsilon + \varepsilon)$, implying that $u'(r + \epsilon + \varepsilon) < 0$.

Mutatis mutandis, for a sequence of small negative numbers. □

The monotonicity of $\pi(\lambda;\kappa)$, and the fact that $\lim_{\lambda \to 0} \pi(\lambda;\kappa) = \kappa$ implies that even the agent facing the highest risk would rather purchase insurance rather than default with perfect certainty.

This monotonicity allows us to draw the supply and demand curves as downward sloping. Because of this, an equilibrium can be characterized by one marginal agent, whose willingness to pay for insurance is equal to its price. For a marginal agent, λ_m, the average expenditure of the insured is:

$$\begin{aligned} \varpi(\lambda_m) &= \int_0^{\bar{\lambda}_m} t^{-1} \frac{t^\alpha e^{-t/\beta}}{\beta^{\alpha+1}\Gamma(\lambda_m/\beta, \alpha + 1)} dt \\ &= \frac{\Gamma(\lambda_m/\beta, \alpha)}{\beta\Gamma(\lambda_m/\beta, \alpha + 1)}, \end{aligned} \tag{3}$$

where $\Gamma(x, \alpha)$ is the incomplete gamma function. Three characteristics of the price schedule of insurance, $\varpi(\lambda_m)$ will be important:

- $\lim_{\lambda_m \to \infty} \varpi(\lambda_m) = \frac{1}{\alpha\beta} > 0$,
- $\lim_{\lambda_m \to 0} \varpi(\lambda_m) = \infty$, and
- $\frac{d\varpi(\lambda_i)}{d\lambda_i} < 0$.

The probability of an uninsured agent of type λ_i choosing bankruptcy is $P(mx > \kappa|\lambda_i) = e^{-\kappa\lambda_i}$. Then the mass of agents who go bankrupt are:

$$\int_{\lambda_m}^{\infty} e^{-\kappa t} t^{\alpha} \frac{e^{-t/\beta}}{\beta^{\alpha+1}\Gamma(\alpha+1)} dt = \frac{\Gamma(\alpha+1) - \Gamma(\lambda_m(1/\beta+\kappa), \alpha+1)}{\Gamma(\alpha+1)(1+\beta\kappa)^{\alpha+1}} \tag{4}$$

The average medical expenditure in the economy is

$$\overline{mx} = \frac{1}{\alpha\beta}, \tag{5}$$

while the variance is given by:

$$\text{Var}(mx) = \frac{\alpha+1}{\alpha^2\beta^2(\alpha-1)}. \tag{6}$$

The proportion of agents with medical insurance is the CDF of the gamma distribution evaluated at the marginal agent.

$$||\Lambda_1|| = \text{gammacdf}(\lambda_m; \alpha, \beta) \tag{7}$$

Because of the downward-sloping supply curve, there may be multiple equilibria. In order to resolve this, I propose an equilibrium refinement.

Definition. An equilibrium characterized by its marginal agent, λ_m, is locally stable if it can withstand a deviation from equilibrium behavior by an agent local to its marginal agent.

Theorem. *An equilibrium characterized by its marginal agent λ_m is locally stable if for all local $\varepsilon > 0$*

$$\varpi(\lambda_m + \varepsilon) \geq \pi(\lambda_m + \varepsilon; \kappa)$$

and

$$\varpi(\lambda_m - \varepsilon) \leq \pi(\lambda_m - \varepsilon; \kappa)$$

The stability refinement is similar to the trembling-hand refinement of Selten (1975), and the stability refinement of Kohlberg and Mertens (1986). This refinement is intuitive—the equilibria in this model are pooling equilibria. Because the movements in insurance rates and prices are steady, it is unlikely that the equilibria we observe is unstable. Further, stable equilibria produce better fits of the data, as described below.

For reasonable parameter values, $[\alpha, \beta, r, \kappa]$, one of the three cases below characterizes the existence of equilibria:

- no equilibrium exists;
- one instable equilibrium exists; or,
- two equilibria exist, one stable and the other not; the marginal agent of the stable equilibrium faces a lesser risk than the marginal agent of the instable equilibrium.

Figures 3, 4, and 5 plot the price, $\varpi(\lambda)$, and willingness to pay, $\pi(\lambda; \kappa)$, functions for three different parameterizations. There is an equilibrium where the price of insurance equals its value to the marginal agent in Figures 3 and 4. There is not an equilibrium in Figure 5.

The stability of the first two circumstances can be found in Figures 6 and 7. They demonstrate the previous intuition.

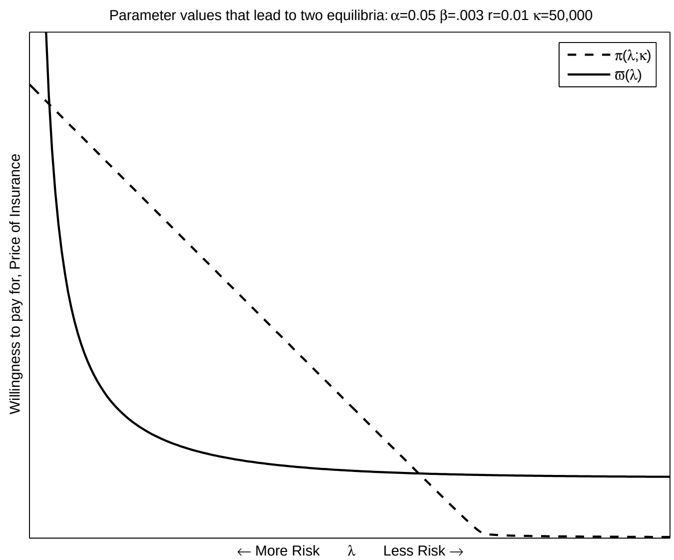

Figure 3: Two equilibria.

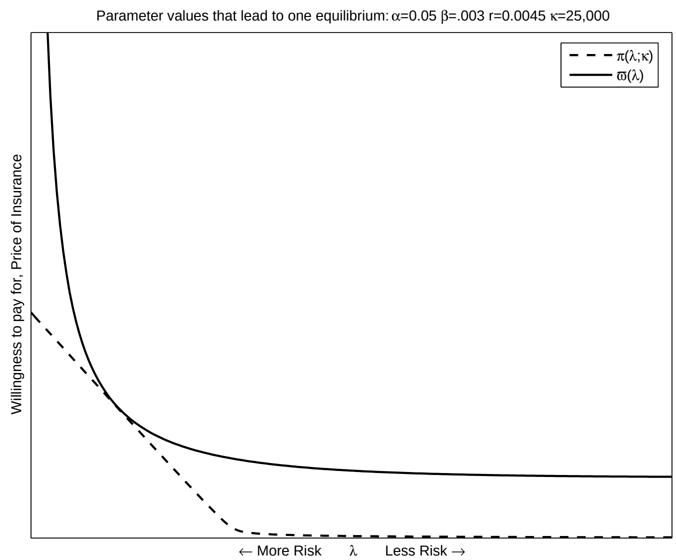

Figure 4: One equilibrium.

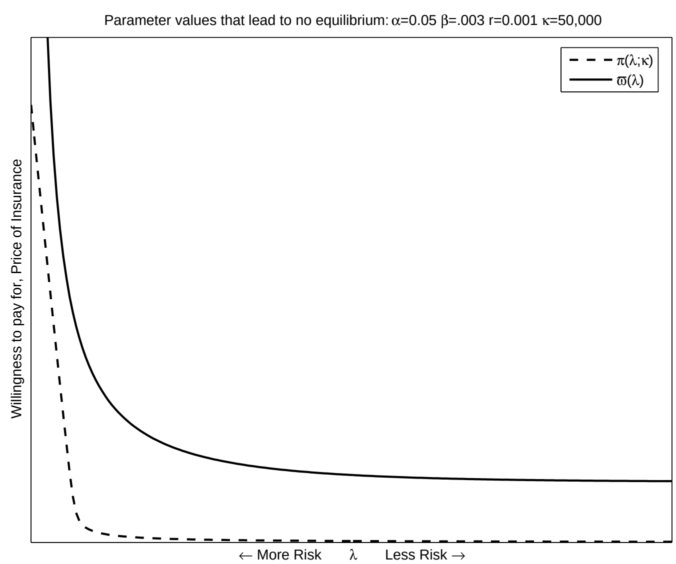

Figure 5: No equilibria.

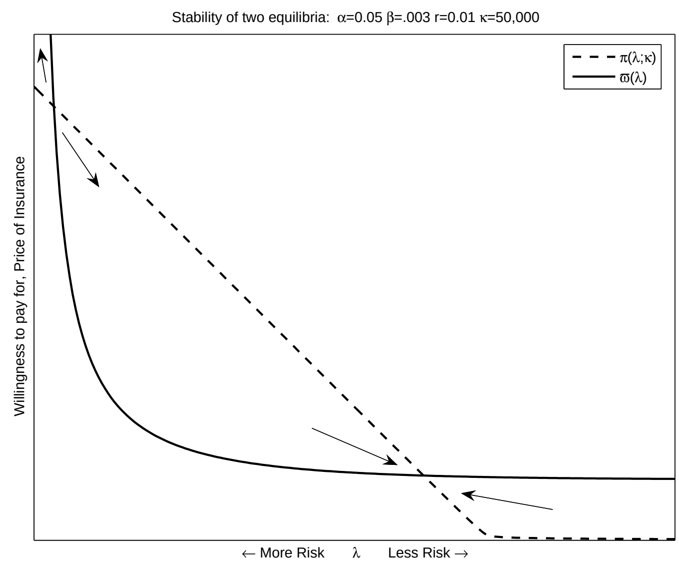

Figure 6: The equilibrium with a lower insurance rate is not stable, while the equilibrium with the higher insurance rate is stable.

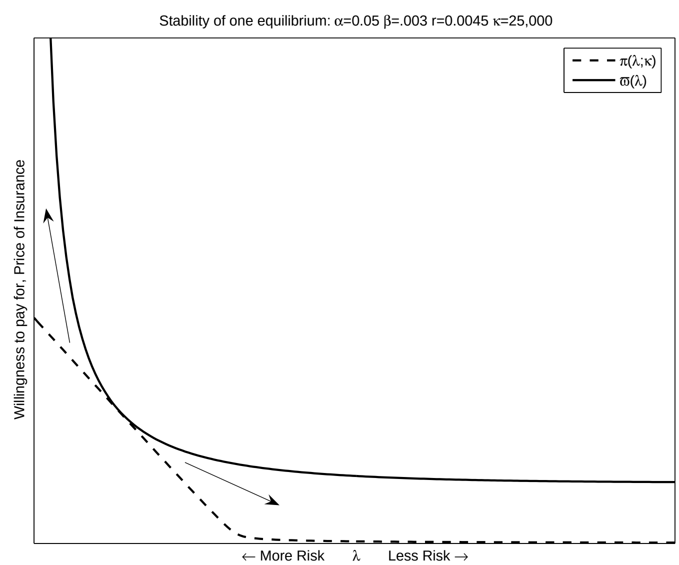

Figure 7: The single equilibrium for these parameter values is not stable—it will not withstand the marginal agent deviating from equilibrium behavior.

3.4 Specification and Identification

Figures 8 and 9 plot the empirical PDF and CDF of medical charges against the fit of a Pareto distribution. One might naively treat medical charges the same way one would treat other stochastic variables: set up an ARMA process and use the previous period's medical charges as the state variable which determines the risk faced by the agent in the next period. Since the medical expenditures are all non-negative, it would seem natural to fit the ARMA process from the log of the charge data. However, there are a large number of observations with no medical charges. Since the natural log of zero is undefined, it makes little sense to fit the expenditure data to a log-ARMA process.

Note that the empirical PDF is monotonically decreasing with a large tail. This contradicts one implication of the log-ARMA fitting: in the cross-section, log-ARMA fits lead to lognormal cross-sections, whose PDFs are not monotonic.

Preferences are chosen to match trends in insurance rates. Consider two agents facing the same absolute uncertainty. If preferences exhibited constant relative risk aversion, the worker with the higher wage would have a lesser willingness to pay for insurance than the low-wage worker. CRRA preferences exhibit negative income elasticities. This runs contrary to the strong positive association between higher wages and having medical insurance, as exhibited in Table 1. A good deal of this positive association is due to the tax-exempt status of medical insurance. Higher-income workers face higher marginal tax rates. This makes medical insurance relatively less expensive than wages. The positive association between wages and insurance can only be partially explained by differing marginal tax rates using sensible price elasticities, such

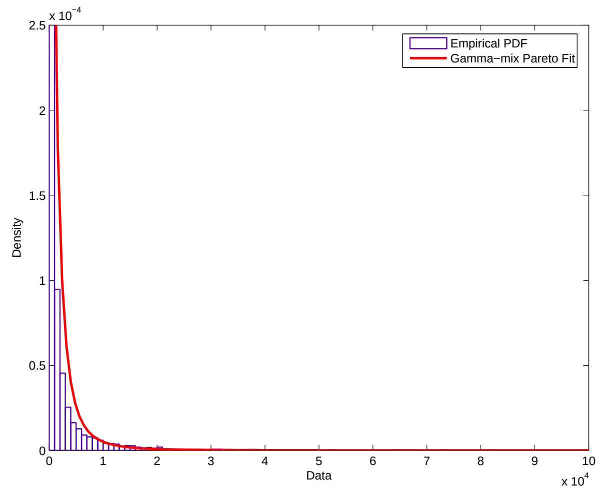

Figure 8: Empirical PDF of Charges and a Gamma-mix Pareto fit

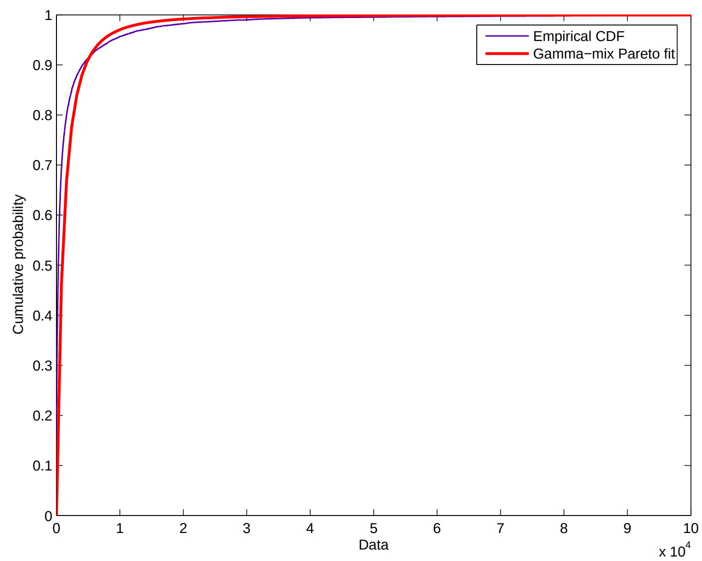

Figure 9: Empirical CDF of charges and a Gamma-mix Pareto fit

as those estimated in Gruber and Poterba (1994).

In this model, the cost of default is characterized by κ. In previous models of default, the cost of default is derived from two sources: exclusion from the credit market and some utility loss due to the "stigma" of default. The former cost is inherently dynamic and demands a dynamic model.

However, the model here is static. This is because the timing of payments to insurers, both in the model and in the real world, is also static. A previously bankrupted household would not be kept from the insurance market because payment for insurance occurs before insurance pays for medical goods and services. Likewise, there is no incentive for medical providers to deny their goods and services so long as the individual pay for them.

This static model also overlooks the potential option value of medical insurance—if an uninsured employee develops a chronic condition, the insurer may refuse to insure him or her. Starting in 2002, the Medical Expenditure Panel Survey (MEPS—described below), recorded the reason for a worker's ineligibility for medical insurance. Of over twenty-five thousand jobs recorded in the 2002 MEPS, roughly ten percent of the respondents reported that they were ineligible to receive medical insurance. Of these 2,500, only nine incidents of ineligibility were for medical reasons. Over 1,700 respondents were not offered insurance because they did not work enough hours.

Identification of the gamma-distribution parameters is guaranteed by the mean and variance of medical charges. Two parameters and three moments remain. Since the default rate is not a linear transformation of either the price of insurance or the insurance rate, identification of these two parameters is achieved.

4 Estimation and Data

The model described above has four parameters to be estimated—α and β, which characterize the distribution of risk in the economy, r, the degree of absolute risk aversion, and κ, the cost of default. These four parameters are estimated using a minimum-distance estimator on five moments from the model. These five moments are:

- cost of insurance, Equation (3);
- bankruptcy rate, Equation (4);
- average medical charge, Equation (5);
- variance of the medical charges, Equation (6); and,
- proportion of agents with insurance, Equation, (7).

The minimum distance estimator takes the usual form:

$$\phi^* = [\alpha^*, \beta^*, r^*, \kappa^*] = \arg\min(\mu^d - \mu^m(\phi))W(\mu^d - \mu^m(\phi))', \tag{8}$$

where μ^d is a vector of the moments from the data, $\mu^m(\phi)$ is a vector of the moments from the model evaluated at parameter values ϕ, and W is a weighting matrix. The inverse of the variance-covariance of the moments, W^{-1}, is used as the weighting matrix. Due to restrictions of the data below, the covariance of the price of insurance and the other moments is assumed to be zero. This is consistent with the law of one price in this model of insurance.

The estimation program determines whether the candidate parameter vector leads to zero, one or two candidate equilibria. If it is zero or one, the estimation program has taken a “bad step.” If it is two, then the estimation procedure finds the marginal agent for the stable equilibrium.

The moments are taken from the Medical Expenditure Panel Survey (MEPS) of 1999. Medical expenditure data from 1987 is available in the National Medical Expenditure Survey. However, there is no measure of medically-related bankruptcy for this year. The year 1999 is chosen because this is the only year of the 1990s where medical expenditure data and bankruptcy-survey data are available.

The MEPS provides nationally representative data on medical events such as visits to the emergency room or outpatient procedures. The data provide expenditure information for each event, including the amount and source of expenditure (e.g., private insurer, public insurer, or out-of-pocket (OOP)), and a breakdown of expenditures according to the goods or services provided. Data was collected for a nationally representative sample of households, and consists of the medical events of each member of a household.

The sample is restricted to individuals under the age of 65, to avoid Medicare distortions. Since the availability of Medicaid is also distortional, individuals in households rated as being below or very near the poverty line are also excluded. The data also contain information on the insurance status of individuals, which is used to find that approximately eighty percent of the individuals in the sample had private health insurance in 1999.

There is a difference between how much is charged for a medical event, and how much is eventually paid. These differ in part because of default. The charge variables are commonly described as being the “sticker price” of the medical event—in many instances, it is a starting point for negotiations rather than a final account of liability. Since households would face a “sticker price” after the medical services are provided, charges are used for estimation purposes.[4]

The cost of medical insurance is also provided by the MEPS. Single coverage of hospital and/or physician plan costs $2,324.76 on average.

The bankruptcy rate in the U.S. in 1999 was approximately 7.5 bankruptcies per one-thousand citizens between the age 18 and 65. As mentioned above, Jacoby *et al.* (2001) surveys bankrupt households and finds that about half of the bankrupt households in their survey cite medical reasons as the primary cause of their financial troubles. As a survey with limited response, the estimates of Jacoby *et al.* (2001) potentially suffer from response bias. For example, if wealthier bankrupt households were more likely to respond, then the causes of bankruptcy would be skewed towards those causes predominantly experienced by the wealthy. Unfortunately, the MEPS does not have any variables concerning the bankruptcy status of households. However, the MEPS reports both the expenditures and charges of each medical event, such as a visit to the doctor or emergency room.

Since the data do not report who was charged, default on the part of the individual must be inferred. EMTALA covers visits to emergency rooms and subsequent inpatient stays, so an EMTALA-related default must be associated with such an event. In order to count as a medical event where the household likely defaulted on the medical charges, a medical event must satisfy the following criteria:

- the ER visitor is uninsured; and
- the difference between expenditures and charges is at least $5000.

[4]While insurers routinely pay less than amount charged, uninsured households are in a much weaker negotiating position.

α	β	r	κ
1.126	4.58×10^{-4}	0.002	5,668.8
(0.0156)	(6.91×10^{-6})	(3.16×10^{-5})	(150.85)

Table 2: Estimated Parameters(SEs)

Moment	Data	Fit
$\bar{\iota}$	0.784	0.7839
ϖ	2,324.76	2,324
$\bar{d}$	1.803×10^{-4}	1.72×10^{-5}
$\overline{mx}$	1984.93	1,938
σ_{mx}	8392.79	7957.39
	$\chi^2 = 3.8745$	

Table 3: Model Moments from Estimated Parameters in Table 2

The MEPS asks medical service providers why charges differ from expenditures. Unfortunately, these answers are not provided in publicly available data.

Tables 2 and 3 present estimated parameters and data and model moments, respectively. The model fits the moments well. The overidentification statistic, which is distributed $\chi^2(1)$ is less than four. The standard errors were calculated by bootstrapping from the sample.

Searching for stable equilibria also found the equilibrium that best fit the data moments. This procedure was set to solve for instable equilibria, and the fit was bad (i.e., large overidentification statistics). While this is not a result of the model, it is consistent with the intuitive appeal of the stability refinement.

4.1 Policy Experiments

An obvious question arises: what if we repealed EMTALA? Or, at the very least, made it costlier for the uninsured to default on medical bills? The qualitative answer is clear: the new stable equilibrium will have more agents choosing insurance, decreasing the cost of insurance and lowering the rate of medically-related bankruptcy.[5]

One way to make it costlier to default on medical debt would be to treat it differently in bankruptcy proceedings. The first policy experiment limits the ability of households to default on medical debt: make households liable for \$1400 worth of medical goods and services above and beyond standard bankruptcy standings.[6] The price of insurance is relatively inelastic, as it falls by just over \$100. However, the insurance rate increases by over six percent, and the default rate falls by two orders of magnitude. The second column of Table 4 reports the changes in the insurance rate, default rate and the price of insurance under this policy change.

Estimating the effects of fully repealing EMTALA is more complicated. Even if EMTALA were repealed, some hospitals would still likely provide some free care for the uninsured facing large medical bills, as part of their not-for-profit mission. Because of this, the effects of repealing EMTALA as measured here are likely to be overestimates. The changes measured in this second experiment correspond to the repeal of EMTALA and the end of free care, both of which distort the demand for medical insurance. This counterfactual is calculated by setting κ to an arbitrarily large number. The third column of Table 4 presents the results of this policy experiment. The insurance rate increases to over 90%, while the cost of insurance falls to just under \$2,100. The default rate is approximately zero.

It may be unlikely that the not-for-profit mission of hospitals could be

[5]The answers are opposite for an instable equilibrium. This runs contrary to the US experience after EMTALA. This, along with the fact that stable equilibria fit the data better, reinforce this choice of refinement.

[6]This corresponds to a twenty-five percent increase in the cost of default, κ.

Moment	Fit	Experiment 1	Experiment 2	Experiment 3
$\bar{\iota}$	0.7839	0.8481	0.9178	0.9178
ϖ	2,324.8	2,199.5	2.0751	2,075.1
$\bar{d}$	1.72×10^{-5}	3.0424×10^{-7}	0	0
$\overline{mx}$	1,938	1,938	1,938	1,938
σ_{mx}	7957.39	7957.39	7957.39	7957.39

Experiment 1 gives preferential treatment to medical debtors. It corresponds to setting $\kappa = 7085$. Experiment 2 repeals EMTALA and ignores the availability of free care for the uninsured with large medical bills. The corresponds to κ equal to the largest real number Matlab can manage: 1.7977×10^{308}. The third and final experiment repeals EMTALA, but allows for some free care for the uninsured when the medical bill is greater than \$20,000.

Table 4: Model Moments of Experiments

overturned at the same time EMTALA is repealed. Because of this, I run a third experiment: set κ to \$20,000. This limits an uninsured agent's liability in the event of onerous medical expense, while mitigating the potential effects of on insurance demand. Setting $\kappa =$\$20,000 is a first-best guess at which point hospitals would provide charity care. The effects of this policy experiment are reported in the final column of Table 4. The effects are similar to those of the previous experiment.

If the cost of default decreases too much, then there may not be an equilibrium with insurance. The demand curve lies entirely below the supply curve if the cost of default falls much below \$5000. This is a strong result, though its intuition is sound. Medical insurance is expensive. As it becomes easier to opt out of medical bills, an agent's willingness to pay for insurance decreases. If the provision of reduced-billing medical care becomes too widespread, then no one will pay for medical insurance.

4.2 What if EMTALA never happened?

This paper was originally motivated by the precipitous decline of medical insurance rates in the mid- to late-1980s. This section asks: What would have happened after 1986 had EMTALA not been passed?

As Cutler (2004) finds, medical technology has made great advancements in the past fifty years. Patients with heart attacks now receive more effective and expensive care than their counterparts in the 1950s. Because of this, it is unlikely that the distribution of medical risk, as characterized by α and β, remained constant through the 1980s and 1990s. In order to isolate the effects of EMTALA, these parameters must be estimated for the mid-1980s.

There is only one publicly-available data set that provides the cross-sectional distribution of medical charges for the mid-1980s. The National Medical Expenditure Survey collected such data for 1987. These data are used to find α_{1987} and β_{1987}, using the method of moments estimation described in Harris (1968). The cost of default for 1987, κ_{1987}, is set to match the insurance rate among non-Veterans under the age of 65 in 1987, and likely reflects the availability of free care for very rare and very expensive medical events.[7] Although 1987 is after the passage of EMTALA, it is unlikely the full effects of EMTALA were incurred until later. The estimate of κ_{1987} of over \$34,000 reflects this.

As mentioned before, there is reason to believe there were changes to the credit market beyond the scope of this model in the mid- to late-1990s. In order to isolate these changes from the effects of EMTALA, the final year of the experiment is 1996. The first wave of the MEPS was collected in 1996, and provides the information required to estimate the distribution of medical risk

[7]Because the NMES does not provide a variable stating whether a household is above or below the poverty line, all individuals whose households had wage earnings of less than \$8,000 were excluded. \$8,000 was chosen as it sits between the poverty lines for a families of two and three members.

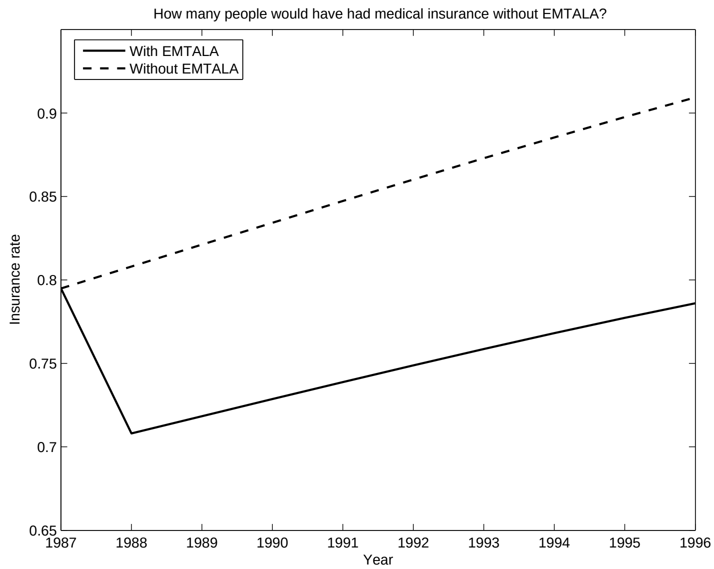

Figure 10: A plot of the insurance rate during the late 1980s and early 1990s with and without EMTALA. The estimation procedure for this graph is described in the text.

in 1996, i.e., α_{1996} and β_{1996}. The cost of default in 1996, κ_{1996}, is set to match the insurance rate among non-Veterans under the age of 65 whose household was above the poverty line. These parameters and moments can be found in Table 5. A linear trend provides the parameters of the risk distribution for the years between 1987 and 1996. Finally, the parameter of absolute risk aversion, r, is taken from the previous estimation from the 1999 data.

Two trends of insurance rates are provided in Figure 10. The first, without EMTALA, finds the equilibrium insurance rate if the cost of defaulting on medical goods and services were held constant throughout the period. The second trend keeps κ_{1987} for 1987, and sets the cost of default to κ_{1996} for each subsequent year.

Had EMTALA not passed into law, the insurance rate would have *increased*

	1987	1996
α_{year}	1.10988	1.1042
β_{year}	6.7×10^{-4}	4.8×10^{-4}
$\bar{\iota}_{year}$	.7949	.786
κ_{year}	34,843	7,085.8

κ_{year} was set to match the insurance rate of that year, $\bar{\iota}_{year}$. The NMES (1987) and MEPS (1996) were used to find α_{year} and β_{year}.

Table 5: The estimated parameters and moments for the years of interest of the final policy experiment.

from 1987 to 1996, instead of falling. The distribution of medical risk shifted in a way that would have led to less adverse selection and more risk sharing. These changes mask EMTALA's consequences as read from a simple plot of insurance rates over time, as in Figure 1.

5 Conclusion

The number of consumer bankruptcies has grown dramatically since the mid-1980s. At the same time, the proportion of workers with medical insurance has fallen, while its price has grown. This paper ties both of these empirical phenomena to the 1986 passage of EMTALA. Had EMTALA not passed, the US insurance rate would have increased significantly after 1986, instead of the decrease that has been observed.

Among other parameters, this paper estimates the coefficient of absolute risk aversion. The estimation strategy depends upon the monotonicity of the insurance price schedule, $\varpi(\cdot)$, as it restricts the number and type of equilibria. Different preferences or distortional public insurance could lead to a non-monotonic price schedule.

Consider an economy where the agents have CRRA preferences. Agents

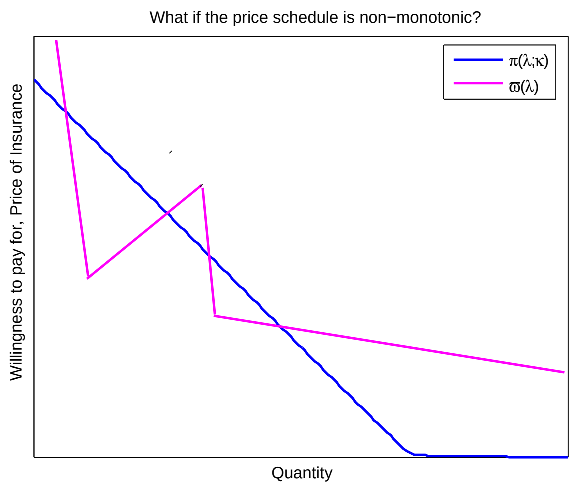

Figure 11: A non-monotonic price schedule can lead to multiple stable equilibria, which complicates estimation.

are heterogenous in their risk like before. Most agents have wealth w_1, while a smaller number have $w_2 > w_1$. Figure 11 sketches out the price schedule in this environment. The non-monotonicity is caused by the wealthier agents whose willingness to pay for insurance is less than their counterpart with the same absolute risk but less wealth.

Before, stability was invoked to choose among equilibria, and it worked well because stable equilibria were unique. Figure 11 indicates two stable equilibria exist. Adding more features to the model, such as the availability of public insurance, might also add more stable equilibria.

Estimation programs need to know which of the candidate stable equilibria to choose. The equilibria are Pareto ordered, with more insurance Pareto preferred to less. This is consistent with the literature of macroeconomic complementarities, as discussed in Cooper (1999). It provides a first-principles rationale for choosing among equilibria.

That said, it is not clear that the medical insurance market is Pareto optimal. Recent legislative action has attempted to shift away from the current equilibrium. The most well known of these initiatives was passed in Massachusetts, where taxing un-insurance was designed to increase the number of citizens with insurance and decrease its cost. Was this an attempt to make a Pareto-improving shift, or was it just the insured median voter attempting to decrease the cost of his or her insurance?

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