Law and Macroeconomics as Aggregate Demand Externalities: An Application to Optimal Tort Law

Yair Listokin

Abstract

This paper presents one method for introducing macroeconomic concerns into the standard microeconomic models of law, using the canonical economic model of tort law as an example. When an economy suffers from inadequate aggregate demand, expenditures on precautions to avoid injuries have aggregate demand externalities. In addition to reducing damages from injury, expenditures on precautions raise incomes for the sellers of precautions (e.g., car brake mechanics). With higher incomes, the sellers, in turn, consume and invest more. This multiplier effect of the original expenditure on total spending and output can be modeled as an aggregate demand externality and incorporated into the standard economic models of law. When I introduce aggregate demand externalities into the seminal economic model of tort law, we come to very different conclusions than is standard. Specifically, the strict liability rule and the Hand Rule for negligence both produce inefficient outcomes with respect to expenditures on precaution and activity levels. Instead, negligence rules with more stringent standards of care than the Hand Rule become more efficient. If standards of care get too high, however, then an enhanced negligence rule no longer yields a better outcome than strict liability or the Hand Rule. Optimal tort law therefore looks very different when we introduce aggregate demand externalities. If efficient tort law changes when we introduce macroeconomic effects, then we can presume that our law and microeconomic conclusions regarding other areas of law will change as well.

I. Introduction

Law and economics should really be called “law and microeconomics.” Existing models aim to make law as micro-economically efficient as possible; we assume that macroeconomic effects, such as aggregate demand shortages, either do not exist or can be handled with other instruments.

These assumptions were reasonable approximations before 2008. During the “Great Moderation” of the post-World War II era, it seemed that the periodic but prolonged output declines that characterized the economic history of advanced economies in the nineteenth and early twentieth centuries were a thing of the past.\footnote{See, e.g., Ben Bernanke, The Great Moderation, (\url{http://www.federalreserve.gov/boarddocs/speeches/2004/20040220/}); Steven J. Davis & James A. Kahn, Interpreting the Great Moderation: Changes in the Volatility of Economic Activity at the Macro and Micro Levels, 22 J. Econ. Persp. 155 (2008).} Overcoming small
macroeconomic fluctuations caused by inadequate or excess “aggregate demand” (a fancy word for the desire to spend on consumption or investment) was a task for the central bank. As a result, there was no need to make law and economics more complicated by introducing macroeconomic considerations.

The Great Recession of 2008-2009 and its painful aftermath undermined these conventional wisdoms. Central banks around the world proved unable to mitigate an intense and prolonged period of inadequate aggregate demand, with worldwide costs in the tens of trillions. In addition, the textbook backup policy for promoting aggregate demand, fiscal stimulus, was hardly tried, in part because of high debt levels. In the face of these policy failures, macroeconomists are “rethinking macroeconomic policy.” In order to understand the implications of law for the making of macroeconomic policy and the implications of macroeconomic considerations for law, we need to add macroeconomic effects to our standard law and (micro)economic models.

In this paper, I develop one method for introducing macroeconomic considerations into one of the canonical models of law and economics: the microeconomic model of tort or “accident” law. I focus on tort law not because it is the area of law with the most important macroeconomic implications, but rather because economic analysis of tort law produced some of the seminal thinking about the microeconomic effects of law. Moreover, the economic model of tort law formed the basis for many other economic models of law, including regulation. If adding macroeconomic considerations changes our conclusions about tort law, then it is likely that macroeconomics will change many of our standard law and microeconomic conclusions.

In particular, I introduce macroeconomics into the model of accident law by assuming that during deep recessions, but not otherwise, market transactions cause “aggregate demand externalities.” According to Keynesian macroeconomic theory, a purchase does not just affect the buyer and seller. Instead, a purchase may have “multiplier”

---

2 This has been the title of three conferences hosted by the IMF. See Olivier Blanchard, Ten Take Aways from the “Rethinking Macro Policy: Progress or Confusion?” (https://blog-imfdirect.imf.org/2015/05/01/ten-take-aways-from-the-rethinking-macro-policy-progress-or-confusion/).


effects. The income that the seller earns from a purchase causes the seller to consume
more, helping third-party sellers. In turn, these third-party sellers, their incomes increased,
buy more from still other sellers. Thus, the original purchase entails aggregate demand
“externalities” on many third parties.

The introduction of macroeconomics via aggregate demand externalities alters
many of the canonical results of the economic analysis of tort law. My analysis demonstra-
tes that we need different tort law rules when short-term interest rates are zero and
unemployment rates are high. Tort standards should be business-cycle sensitive. In addi-
tion, precautions purchased in market transactions (which cause aggregate demand
externalities in deep recessions) should have different standards of care than non-market
precautions. And when activity levels are fixed and injurers choose only precautions, a tort
rule of strict liability yields inefficient precaution, as too does a negligence rule determined
according to the “Hand Rule.” Instead, we need a more demanding standard of care to
achieve socially efficient precautions in the presence of aggregate demand externalities.

The introduction of aggregate demand externalities also negates the canonically
optimal tort law results with respect to activity levels. The standard model predicts that
strict liability produces efficient activity levels, while negligence rules produce excessive
activity levels. With aggregate demand externalities, neither negligence rules nor strict
liability produce efficient activity levels. Indeed, the activity level with a negligence rule
may be preferred to a strict liability rule. When activity levels can vary, we also cannot de-
rive simple conclusions about the optimal negligence rule. If aggregate demand
externalities are very high, a less stringent negligence rule may yield the best outcome be-
cause it encourages the highest aggregate demand externalities. But if aggregate demand
externalities are not too large, then a negligence rule stricter than the Hand Rule yields
better outcomes.

In total, my analysis suggests that law and macroeconomics yields very different
results from the standard law and microeconomic analysis. Accordingly, we need to de-
velop a robust law and macroeconomics to complement our existing literature.

II. Aggregate Demand Externalities

Aggregate demand externalities are imposed on others through their effect on macroeco-
nomic variables rather than their effects on specific non-parties to a transaction. To
illustrate, consider a firm’s pricing decisions for its products.\(^6\) When a firm decides to
change its prices, it has a direct effect on the firm’s profits and the welfare of the firm’s
customers. If the firm’s products do not cause environmental externalities, then we would
not think that the firm’s pricing decision affects all participants in the economy.

\(^6\) For a discussion and critique of different economic definitions of the term externality, see Lisa Grow Sun
& Brigham Daniels, Externality Entrepreneurialism, 50 U.C. Davis L. Rev. 321 (2016).
With price rigidities, however, an individual firm’s pricing decision has a macroeconomic effect. The firm’s price is one of many prices that help determine the aggregate price level, $P$. If the firm lowers its price, the aggregate price level goes down slightly. In turn, the aggregate price level helps determine the “real money supply” of the economy, which is defined as the nominal value of money divided by the price level, $\frac{M}{P}$. Keynesian macroeconomics predicts that a greater real money supply increases aggregate demand by lowering interest rates and encouraging investment. Indeed, this prediction (and its empirical confirmation) justifies central bank interventions in the money supply ($M$) to stabilize aggregate demand.

When the firm lowers its price, the price decrease (very) slightly increases the real money supply, lowers the interest rate, and raises aggregate demand and output. Thus, the firm’s decision to lower its price causes an aggregate demand externality.

Firms will ignore aggregate demand externalities, as they do with other externalities. Firms choose prices to maximize their own profits, rather than cumulative economic output. As a result, private price-setting may lead to inefficient outcomes, such as inadequate aggregate demand and output. Monetary policy tries to offset these externalities. If aggregate demand is inadequate and firms aren’t cutting prices by enough to enable full employment (i.e., $P$ is too rigid), then the central bank can raise the money supply, $M$, to enable an increase in real money balances that the firms would have been unable to achieve if left to their own devices because they would not internalize the aggregate demand externalities of their pricing decisions.

In ordinary times, we rely on central banks to enact policies to offset aggregate demand externalities. As a result, the relevance of these externalities in ordinary times is limited. Law and economics can reasonably ignore aggregate demand externalities under these circumstances.

At times, however, monetary policy is constrained. For example, at the “zero lower bound” to nominal interest rates, the central bank’s ability to stimulate the economy by raising real money balances and lowering interest rates loses traction. The central bank has done all it can do without resorting to controversial “unconventional” monetary policy such as quantitative easing.

At the zero lower bound, positive aggregate demand externalities become large, as the central bank cannot offset these externalities via monetary policy. At the zero lower bound of interest rates, spending “multipliers” can exceed 1.5. This means that a dollar

---


8 In 2009, the non-partisan Congressional Budget Office estimated that the fiscal multiplier for government spending from the 2009 ARRA ranged between .5 and 2.5. The midpoint of these estimates is 1.5. Charles J. Whalen & Felix Reichling, The Fiscal Multiplier and Economic Policy Analysis in the United States (Congressional Budget Office, 2015) (https://www.cbo.gov/sites/default/files/114th-congress-2015-2016/workingpaper/49925-FiscalMultiplier_1.pdf). For theoretical accounts of why the fiscal multiplier is so high at the zero lower bound, see Lawrence Christiano et al., When Is the Government Spending Multiplier
of additional government spending increases total output by more than $1.50. A dollar of spending causes fifty cents of externalities in addition to its direct effects of one dollar of economic activity.9

The textbook response to the zero lower bound policy constraint is expansionary fiscal policy.10 With monetary policy impotent, the government should spend more during recessions characterized by the zero lower bound because such spending has a high positive aggregate demand externality. If aggregate demand externalities are high at the zero lower bound but low during ordinary times, then a government policy to spend more now but reduce spending in the future to repay the debt incurred will have a positive net effect on total output. Raising government spending and lowering tax rates provides an alternative source of aggregate demand stimulus.

Expansionary fiscal policy faces its own set of constraints. At many levels of government (such as states and municipalities), government cannot run a deficit. If government revenues decrease, then these jurisdictions must reduce rather than expand government spending. Even governments that can run deficits face other constraints, such as worries about the bond markets or legislative inertia, that prevent fiscal policy from correcting the inefficiencies associated with high aggregate demand externalities.

At present, finding alternative avenues of aggregate demand stimulus when both fiscal policy and monetary policy are constrained is an urgent public policy concern.11 I will now explore law as a solution to the problem of aggregate demand externalities.

III. An Economic Model of Tort Law with Aggregate Demand Externalities

I begin with the “textbook” model of torts as presented by Miceli.12 First, I will assume that “activity levels,” other than precautions, are constant. I relax this assumption in the

---

9 According to classical assumptions, output should not even rise one for one as government spending increases. Instead, the additional spending demand from the government should crowd out other spending so that total output remains unchanged while prices go up. See, e.g., N. Gregory Mankiw, Macroeconomics 324-25 (7th ed. 2010).


11 For example, the Brookings Institution hosted a March 21, 2016 conference entitled “Are We Ready for the Next Recession?” (http://www.brookings.edu/events/2016/03/21-are-we-ready-for-the-next-recession). The conference considered “which fiscal and monetary policy tools will be available in the event of a recession—and which won’t—and how effective additional fiscal and monetary stimulus is likely to be, along with new ideas to make fiscal policy more effective.” The conference did not consider stimulus policies, like law, that are outside of monetary and fiscal stimulus—in large part because such alternative policies have not been explored.

next section. Assume that there is an injurer, who can take precautions, denoted by $x$, to avoid causing an injury. There is also a potential victim. The victim cannot do anything to prevent injury. (This is a model of “unilateral” care.) The victim suffers damages expressed in dollar terms, $D(x)$, that are, in the relevant range, a decreasing function of the precautions taken by the injurer: $D'(x) < 0$. The marginal value of precautions in preventing injuries decreases as more precautions get taken: $D''(x) > 0$. At some extreme level of precautions, additional precautions start to become counterproductive: $D'(x^\text{extreme}) > 0$.

The precautions taken by the injurer, $x$, may or may not have an aggregate demand externality, $A(x) \geq 0$. Precautions will have aggregate demand externalities if they are market transactions that occur during a recession where monetary policy is constrained by the zero lower bound. Macroeconomic conditions at the time of a judicial decision are irrelevant: what matters legally are the macroeconomic conditions at the time an accident takes place. Non-market decisions do not produce aggregate demand externalities, even if they take place at times of inadequate aggregate demand with a high Keynesian multiplier.

Consider a car driver taking precautions to avoid harming others. Some of the driver’s precautions, call them $x_1$, are typically purchased in a market (e.g., keeping the car’s brakes in good repair and replacing them when they get worn out). Assume that the economy is in a recession and that market expenditures have positive and proportional aggregate demand externalities given by $A(x_1) = kx_1$ that equals the external multiplier effects of economic activity minus one. $(m - 1 = k \geq 0)$. Thus, a fiscal multiplier of 1.5, the midpoint of the CBO’s estimate for the multiplier during the Great Recession, corresponds to a 50% aggregate demand externality ($k = .5$). When a driver pays for brake repair during a recession, this becomes the service worker’s income. In turn, the service worker spends some of the additional money on consumption, which becomes a third party’s income, and so on.

Other precautions, termed $x_2$, such as the level of attention the driver gives to the road, are non-market decisions. There are no aggregate demand externalities associated with these transactions. Without any money changing hands, there is no external increase in consumption. As a result, $A(x_2) = 0$.

Alternatively, we can understand $x_2$ to refer to market transactions in periods without aggregate demand externalities. This means that the resources that are not spent on precautions get devoted in their entirety to something else, so that additional expenditures on $x_2$ do not raise overall output and resource utilization. This is the state of the economy that is examined in existing law and microeconomic models such as the model of torts.

13 For simplicity, I will assume that all potential injurers either purchase a good in a market or not (goods are either market or non-market goods). Thus, the model assumes that no one repairs their own brakes.

Precautions are not the only element of the economic model of tort that may produce aggregate demand externalities. The social cost of harms, as well as precautions, may be subject to aggregate demand externalities. For example, if an injurer causes property damage (e.g., a wrecked car), pays compensation in tort, and the injured party replaces the wrecked property with new property (e.g., a new car), then the purchase of the new property has aggregate demand externalities during recessions. Under these assumptions, the social costs of harms in tort may be below the costs sustained by the injured party.

Under other assumptions, however, harms may have negative aggregate demand externalities in addition to their direct costs. For example, suppose that the injured party receives damages to compensate for a wrecked car and chooses not to replace the car. Instead, the injured party puts the compensation funds in the bank. Because the injured party no longer has a car, her marginal propensity to consume on expenses like entertainment goes down as accessing these services becomes more difficult. If this is the case, then the social costs of harm caused by the tortfeasor exceed the costs to the injured party. The injury harms not only the injured party, but also the people who provided services to the injured party and now have lower incomes.

For simplicity, I will focus on aggregate demand externalities associated with precautions. It is important to remember, however, that precautions are not the only element of the economic model of tort that may be associated with aggregate demand externalities.

A. Socially Optimal Non-Market Precautions

A social planner aims to maximize social welfare, where welfare is given by the sum of precautions by injurers, damages from injuries to victims and aggregate demand externalities from precautions.

$$\min_x x + D(x) - A(x)$$

For non-market or non-recession period precautions, there are no aggregate demand externalities, $A(x) = 0$. Therefore, the social planner’s problem is identical to the standard problem. The social planner spends on precautions so long as precautions provide at least a dollar for dollar reduction in the costs of injuries. Thus, the first order condition becomes

$$1 + D'(x^*_2) = 0$$

where $x^*_2$ denotes the socially efficient level of non-market precautions.

B. Socially Optimal Market Precautions

For a market precaution with an aggregate demand externality, however, the social planner chooses precautions until the marginal costs of precaution equal the combined value of the reduction in injuries and the positive aggregate demand externality associated with more precaution expenditures. The social planner thus chooses greater precautions than without aggregate demand externalities because precautions now have an added ben-
efit—precaution expenditures increase aggregate income, aggregate consumption, and aggregate demand. The social planner’s first order condition becomes

\[ 1 + D'(x^*_1) - k = 0 \text{ or } D'(x^*_1) = k - 1 > -1. \]  (3)

As we would expect with any positive externality, the socially optimal level of precaution with positive aggregate demand externalities rises relative to the optimal level of precaution without such externalities. \( x^*_1 > x^*_2 \).  

Because expenditures on the same good can have different aggregate demand externalities depending on the state of the business cycle, tort law should depend on the business cycle. When aggregate demand externalities are high (as with \( x_1 \)), the standard of care should be stricter than when aggregate demand externalities are zero (as with \( x_2 \)).

**C. Precautions Under Strict Liability**

A strict liability rule requires the injurer to pay for all damages incurred on the victim. A strict liability rule means that the injurer chooses precautions to minimize the sum of the damages associated with injuries and the costs of precautions to avoid injuries.

\[ \min_x + D(x) \]  (4)

Under a strict liability rule, the injurer invests in precaution until the marginal value of precaution equals the marginal cost of the reduction in injuries associated with more precaution. The first order condition is

\[ 1 + D'(x^\text{SL}) = 0 \]  (5)

When precautions have no aggregate demand externalities (as with \( x_3 \)), \( A(x_3) = 0 \), and the costs of injuries and precautions are the only relevant costs and benefits for socially optimal precaution decisions. Thus, the injurer faces the same problem as the social planner when there are no aggregate demand externalities. (Equation (1) is the same as (4) when \( A(x) = 0 \).) The injurer and the social planner choose the same amount of precaution, \( (x_2^\text{SL} = x^*_2) \). This is the well-known result that strict liability produces socially optimal incentives for precaution.

Strict liability yields an inefficiently low level of precaution when precaution causes an aggregate demand externality. Under strict liability, the injurer minimizes the costs of precaution and injury. The injurer does not internalize the aggregate demand externality associated with precautions. (Equation (1) differs from equation (4) when \( A(x) > 0 \).) Because the injurer does not account for a positive benefit associated with precautions, the injurer chooses too little precaution. \( x_1^\text{SL} < x^*_1 \).  

---

14 Comparing equation (3) with equation (1), \( D'(x^*_1) = k - 1 > -1 - D'(x^*_2) \). Since \( D''(x) > 0 \), \( x^*_1 > x^*_2 \).

15 \( x_1^\text{SL} < x^*_2 \). In the previous footnote, we established that \( x^*_1 > x^*_2 \).
D. Precautions Under a Negligence Rule

Under a negligence rule, an injurer pays for harm caused to the victim if and only if the injurer’s precaution falls short of a level defined as the negligence standard. Otherwise, the injurer incurs only precaution costs, even if injuries still occur. That is, the injurer solves the problem:

$$\min x \quad x + D(x) \quad x < z$$

$$\min x \quad x \geq z$$

where $z$ is the negligence standard. Without aggregate demand externalities for precaution, a negligence rule produces efficient precaution so long as the standard for negligence is set at the efficient level. The negligence standard of care should be set at the point at which the marginal costs of precaution equal the marginal reduction of injuries associated with the additional precaution. If the negligence rule is set at this level, known as the marginal “Hand Rule” level, then a negligence rule produces efficient levels of precaution. That is, if $x^2 = x^*_2$, then $x^\text{Neg}_2 = x^*_2$.

Now consider the possibility of aggregate demand externalities for precautions purchased in the market, $A(x_1) > 0$. The injurer’s problem, given by (6), becomes very different from the social planner’s problem, given by (1). The injurer ignores aggregate demand externalities and focuses only on precautions and possible damages. If the negligence standard is set at the marginal Hand Rule level—as if there were no externalities—then the negligence rule yields too little precaution. Injurers choose inadequate precaution because they minimize the private costs of precaution and damages and ignore the aggregate demand externalities associated with purchasing precaution. That is, if $z_1 = x^*_1$ (where $x^*_2$ represents the marginal Hand Rule standard of care), then $x^\text{Neg}_1 = x^*_2 < x^*_1$.

Both conventional negligence standards and strict liability rules generate inadequate incentives for precautions when precautions cause aggregate demand externalities. The negligence standard, however, does not have to be set at the marginal Hand Rule level. Instead, the negligence standard should be set to account for the aggregate demand externality. If the court sets a higher negligence standard than the marginal Hand Rule in order to account for the positive aggregate demand externality associated with precaution, then the injurer will take additional precautions. Thus, the optimal negligence standard for precautions with aggregate demand externalities is higher than the marginal Hand Rule. If the negligence standard is set at a precaution level that fully accounts for aggregate demand externalities, $z_1 = x^*_1$, then the social optimum may be reached. If aggregate demand externalities are high enough, however, then the social optimum may not be reached.

With respect to optimal negligence standard in the presence of aggregate demand externalities, we can say with certainty that the optimal negligence standard in the presence of aggregate demand externalities should be higher than it is without externalities, that is $z_1 > z_2$. The standard should adjust upwards to account for aggregate demand externalities. We cannot say, however, that the negligence standard should be set as high as the precaution level that the social planner would ideally dictate—the best level of precau-
tions. If the social planner sets the precaution standard too high, then the injurer may decide to violate the standard.

Figure 1 demonstrates why the negligence standard should require higher precautions when there are aggregate demand externalities, $\xi^1 = x_1^{AD} > \xi^2 = x_1^{HR}$, but cannot always achieve the first best ($x_1^*$).

There are two curves and two lines in Figure 1. The upward sloping line from the origin reflects the costs of precautions ($x_1$). The downward sloping line from the origin reflects the positive aggregate demand externalities (negative social costs) associated with precautions. For illustration purposes, I assume that aggregate demand externalities are 100% ($k = 1$). The aggregate demand externalities exactly equal the private costs of precautions, so that spending on precaution is, from a social perspective, free.\(^{16}\) As a result, damages as a result of injuries, the curve given by $D(x_1)$, represents the entire social cost curve. The fourth, U-shaped curve, $x_1 + D(x_1)$, shows the private costs of precautions and damage payments to the injurer.

---

\(^{16}\) This corresponds to the Keynesian prescription of paying people to dig holes and then fill them up as a socially useful policy. In reality, aggregate demand externalities are probably smaller, but this assumption makes the exposition simpler without changing any of the intuition.
We established above that if the negligence standard is the Hand rule, \( x_1^{HR} \), then the injurer will choose a level of precaution just above the standard. This precaution level keeps the injurers from owing damage payments while minimizing the injurer’s costs of precaution. This level of precaution, however, is not the socially optimal level, given by \( (x_1^*) \). Instead, total social costs will be lower when precaution levels are higher because of the aggregate demand externalities associated with taking precaution.

The darkly shaded curves depict the injurer’s private costs with a negligence standard set to be above the Hand Rule level of precaution to reflect the aggregate demand externalities associated with precaution \( (y_1 = x_1^{AD} > x_1^{HR}) \). For precaution levels below the heightened negligence standard, the injurer pays both the costs of precaution and the costs of injury because the injurer owes damages. For higher precaution levels, the injurer pays only the costs of precaution because the injurer is not negligent. As the literature discusses, this creates a discontinuity in costs around the negligence standard, \( y_1 = x_1^{AD} \). When precautions are just below this level, the injurer owes damages for injuries. When precautions are just above this level, the injurer does not owe damages.

The injurer will choose a precaution level to minimize the total costs given in the darkly shaded regions of the two curves. Because of the discontinuity created by the negligence rule, the injurer will choose precautions at or just above the heightened negligence standard, \( x_1^{AD} \). This represents the lowest point on the darkly shaded regions of the two curves. Even though the marginal private costs of precaution exceed the marginal reduction in injury costs at this level of precautions, the injurer chooses to meet the heightened standard so as to avoid being liable for damages.

The heightened standard of care gives higher social welfare than the Hand Rule standard of care: \( D(x_1^{AD}) < D(x_1^{HR}) \). The heightened standard also brings higher welfare than a strict liability rule (in which the injurer minimizes \( x_1 + D(x_1) \) and also chooses \( x_1 = x_1^{HR} \). Social welfare is higher with a negligence rule with the heightened standard of care because higher precautions are extremely (socially) valuable due to the aggregate demand externalities associated with precautions. And the heightened negligence rule creates incentives for the injurer to comply with the heightened standard. As a result, a heightened negligence standard improves social welfare in the presence of aggregate demand externalities from precautions.

If social welfare increases with precaution expenditures, then why not make the negligence standard exceedingly high and improve social welfare even more? If the negligence standard is too strict, then the injurer will not choose to meet the standard. Instead, the injurer will prefer to accept liability for injury and choose a precaution level that minimizes total costs. In Figure 1, this occurs when the negligence standard is higher than \( y_1 = x_1^{MAX} \). At any standard higher than this, the injurer will choose to fail the standard and pay damages. This will result in precautions of \( x_1^{HR} \). At this level of precaution, social welfare is lower than the social welfare with a moderately heightened negligence standard of, for example, \( x_1^{AD} \). Because of this constraint, a stricter negligence does not always achieve the social optimum, \( x_1^* \). Indeed, in Figure 1 the social optimum is unattainable.
with a negligence rule. Social welfare is maximized in Figure 1 with a negligence rule of 
\( z_1 = x_1^{\text{MAX}} \).

Thus, in the presence of aggregate demand externalities from precaution, a negligence rule allows for higher social welfare than a strict liability rule. The negligence rule should be set at a higher precaution level than the standard, Hand Rule level. But the standard of care should not be so high as to make injurers decide that compliance with the stricter standard is not worth the cost.

**IV. Aggregate Demand Externalities and Activity Levels**

In Section III, I assumed that activity levels were constant. The injurer chose the precaution level, conditional on the activity taking place. With respect to driving, this meant that the injurer was driving no matter what and only chose the level of care with which to drive.

This was a simplification, albeit a standard one in the optimal tort literature. In reality, drivers choose whether or not to drive as well as how much precaution to take while driving. Optimal tort papers therefore consider “activity levels” as well as precautions. In this section, I explore optimal tort law in the presence of aggregate demand externalities when we allow activity levels to vary.

**A. Activity Levels Without Aggregate Demand Externalities**

First, let’s review the optimal tort literature on activity levels without aggregate demand externalities. Let \( n \) be the amount of activity (e.g., how many driving trips) and redefine \( x \) to mean the amount of precaution, in dollars, per activity (per trip) and \( D(x) \) to mean the amount, in dollars, of injury per activity (trip). Let \( w(n,x) \) be the injurer’s profit or personal benefit (in dollar terms) from taking \( n \) trips at a precaution level of \( x \) per trip. Assume that \( w_x < 0, w_{xx} \leq 0 \)— precautions reduce profits and become increasingly unprofitable. \( w_x > 0 \) at first, meaning that the injurer wants to do some of the activity, and ultimately becomes negative, so that \( w_{xx} < 0 \)— there are decreasing marginal profits from undertaking more activities. Therefore, there is a positive but not infinite activity level associated with each level of precaution where the injurer’s profit is maximized. Finally, \( w_{xx} < 0 \), as the level of precautions go up, the marginal benefit of additional activity goes down.

With no aggregate demand externalities, the social welfare function is

\[
\max_n w(n, x) - nD(z_2) \tag{7a}
\]

Solving for the optimal precaution level gives the analogue to equation (2) above.

\[
w_x - nD'(z_2) = 0 \tag{7b}
\]
The injurer should choose precaution until the marginal profit loss associated with precaution equals the marginal reduction in total damages.\textsuperscript{17} Call this precaution level $x^\ast$.

Choosing the optimal activity level yields:

$$w_n = D(x_2) \quad (8)$$

At the socially optimal activity level, the injurer’s marginal profits associated with more activity should be equal to the amount of damages caused by the activity. Call this activity level $n^\ast$.

Under a strict liability tort regime, the injurer’s problem is the same as the social welfare function. Thus, strict liability yields efficient outcomes, $(x_2^\ast, n^\ast)$ with respect to both precaution levels and activity levels when there are no aggregate demand externalities.

Under a negligence regime, the injurer’s problem becomes:

$$\max_{n, x_2} w(n, x_2) - nD(x_2) \text{ if } x_2 < x_2^{\text{Neg}} \quad \text{and} \quad \max_{n, x_2} w(n, x_2) \text{ if } x_2 \geq x_2^{\text{Neg}} \quad (9a)$$

Assume that the negligence standard is set at the Hand Rule level (where the marginal costs of additional precautions equal the marginal reduction in damages): $x_2^{\text{Neg}} = x_2^{\text{HR}} = x_2^\ast$. As established in Section III, when the negligence standard of care is equal to the Hand Rule, the injurer takes efficient precautions.

The injurer chooses activity level under a negligence to rule to maximize:

$$\max_n w(n)$$

Yielding the first order condition,

$$w_n = 0 \quad (9b)$$

The injurer chooses to undertake additional activities until the marginal benefit from the activities is zero. Call this level of activity $n^p$.

As is well known, the injurer takes too much precaution under a negligence regime ($n^p > n^\ast$).\textsuperscript{18} So long as the injurer meets the negligence standard, the injurer does not have to pay for damages caused. As a result, the injurer ignores the costs of the damages associated with additional activity because the injurer does not have to pay for them. Instead, the injurer keeps doing additional activities until they have no private benefit. The injurer therefore chooses too much activity because the injurer does not internalize the injury costs associated with additional activities.

Thus, the optimal torts literature concludes that a strict liability regime is superior to a negligence regime with respect to activity levels. Strict liability produces the socially efficient level of activity while negligence produces too much activity.

\textsuperscript{17} The marginal reduction in damages equals the reduction in damages per trip associated with higher precautions times the number of trips.

\textsuperscript{18} Under negligence, $w_n = 0$. At the social optimum, $w_n = D(x)$. Because $w_n \leq 0$, $n^p > n^\ast$. 

B. Activity Levels with Aggregate Demand Externalities

Now assume that activity levels, as well as precaution expenditures, have aggregate demand externalities. In the driving accident context, if an injurer does more driving, then they spend more. For example, many driving trips involve going to stores to purchase goods. In a recession at the zero lower bound, these extra trips cause aggregate demand externalities as described in Section II.

When activity levels as well as precaution expenditures can vary, the social welfare problem with aggregate demand externalities becomes

\[ \max_{n,x_1} w(n,x_1) - nD'(x_1) + knx_1 \]

The first order condition with respect to precaution becomes

\[ w_x(n,x_1) - nD'(x_1) + kn = 0 \]  \hspace{1cm} (10)

The injurer should choose precautions until the marginal costs of these precautions in terms of lost profits equal the benefits associated with more precaution, which are both reduction in damages and aggregate demand externalities. Call this level \( x_1^* \). Because there are greater benefits associated with precautions with aggregate demand externalities, the injurer should take more precautions at the social optimum than without such externalities, \( x_1^* > x_2^* \).

This result is the analogue of our results with respect to precaution in the previous section.

With respect to activity levels, the first order condition with aggregate demand externalities becomes

\[ w_x(n,x_1) - D'(x_1) + kx_1 = 0 \]  \hspace{1cm} (11)

Call this activity level \( n_{AD} \). Because more activity produces aggregate demand externalities in addition to private benefits to the injurer, the socially optimal level of activity is higher in the presence of aggregate demand externalities that it would otherwise be. That is, \( n_{AD} > n^* \).

I now examine the efficacy of strict liability and negligence regimes in the presence of aggregate demand externalities. As with the existing literature, I will assume that negligence rules can be applied to levels of precaution, but cannot be applied to activity levels (i.e., there is no such thing as a negligent amount of driving).

When there are aggregate demand externalities, a strict liability regime (see equations (7a) and (7b)) yields too little activity. As shown above, the strict liability regime produces activity level \( n^* \) which we have already shown is less than \( n_{AD} \), the optimal activity level with aggregate demand externalities. Intuitively, the injurer does not internalize

\[ 19 \text{ Compare the first order condition with aggregate demand externalities, equation (7), with the first order condition with aggregate demand externalities, equation (10). Because } w_x < 0, \ x_1^* > x_2^* . \]

\[ 20 \text{ Compare the first order condition with aggregate demand externalities, equation (8) with the first order condition with aggregate demand externalities, equation (11). Because } w_n < 0, n_{AD} > n^* . \]
aggregate demand externalities associated with more activity under a strict liability regime. As a result, the injurer chooses too little activity.

Now consider a negligence regime with the rule set to the Hand Rule standard, $x^{HR}$, as in equations (9a) and (9b) above. We already showed that this regime produces a high activity level, $n^*$, where the injurer’s private marginal benefit from more activity is equal to zero: $n^p > n^*$.

Without aggregate demand externalities, negligence produces too much activity relative to strict liability. But in the presence of aggregate demand externalities, the incentives negligence creates for additional activity may be a good thing. Activity has positive aggregate demand externalities that are not internalized by the injurer. From a social perspective, we want more activity, but we can’t use a negligence rule to set activity levels. Therefore, the “excess” activity level associated with a negligence rule may be what is needed to prompt more activity. If $n^{AD} \geq n^p$, then the “excess” incentives created by the negligence rule for activity improve social welfare relative to the incentives provided by a strict liability rule.

We cannot be sure that a negligence rule is superior to a strict liability rule with respect to activity levels when there are aggregate demand externalities. The excess activity incentives associated with the negligence rule may be so great that the negligence rule produces activity levels that are too high even after we account for the aggregate demand externalities ($n^* < n^{AD} < n^p$). In these cases, either a negligence rule or a strict liability rule can be superior. The greater the aggregate demand externality, the more likely it is that the negligence rule is superior to the strict liability rule.21

With respect to the negligence standard of care, we cannot say generically that a stricter standard of care is always better than a more lenient one in the presence of aggregate demand externalities. If the aggregate demand externalities are very large, so that $n^{AD} > n^p$, and the activity level is very sensitive to the standard of care, then we might want to lower the standard of care. Even though more precautions have aggregate demand externalities and reduce injuries, more precautions may hurt activity levels so much that enhancing the standard of care does not increase social welfare overall.

Suppose, however, that the negligence rule yields too much activity, even after considering aggregate demand externalities. That is, $n^* < n^{AD} < n^p$, when the negligence standard is set at the Hand Rule level, $x^{HR}$. In this case, the negligence standard should be stricter than the ordinary hand rule level. To see this, start with the Hand Rule negligence level, $x^{HR}$. By the envelope theorem, a small increase in the required precaution level produces minimal costs with respect to the combined value of precautions and damages (we are near the social optimum with no aggregate demand externalities). Additional precautions yield an aggregate demand externality benefit (for a direct welfare gain). This small increase in $x$ also induces the injurer to reduce activity levels below their current excessive

21 Equation (11) shows that $n^{AD}$ is increasing in $k$. As $n^{AD}$ increases, it gets closer to (or may even exceed) $n^*$. This makes $n^*$ more attractive relative to $n^p$. 
level of \( n^b > n^{HR} \). Because activity levels are too high by assumption, this indirect effect of raising the standard of care also raises welfare. Thus, an increase in the negligence standard above the Hand Rule is welfare enhancing. The toughened standard of care raises aggregate demand and lowers excessive activity levels, while only slightly distorting the level of precaution per activity. The optimal negligence standard should therefore demand more care than the Hand Rule standard.

This does not mean, however, that the standard of care should be raised until the activity level reaches its social optimum. If an excessively high standard of care induced the injurer to violate the standard rather than comply (as discussed in Section III), then we cannot attain the optimal activity level.

To sum up, with aggregate demand externalities, we can no longer claim that a strict liability rule creates better activity level incentives than a negligence rule. Instead, the negligence rule’s “excess” activity incentives may enhance efficiency, as it produces more activity with aggregate demand externalities. And if the aggregate demand externalities from activity levels are moderate, then a negligence rule with a heightened standard of care yields a better outcome than a negligence rule with the Hand rule standard.

The optimal negligence level can be characterized as follows: raise the standard of care above the Hand Rule level until the private inefficiencies associated with the additional care and the loss of aggregate demand externalities associated with lower activity levels exceed the social benefits of reducing the excess activity level and the aggregate demand externalities that come with higher levels of care.

V. Conclusion

When we introduce macroeconomic aggregate demand externalities from precaution expenditures and activity levels, our economic model of tort law changes dramatically. Specifically, both the Hand Rule for negligence and a strict liability tort regime yield inefficient outcomes with respect to both precaution levels and activity levels. Instead, negligence rules with more stringent standards than the Hand Rule become more attractive. Optimal tort law therefore looks very different when we introduce aggregate demand externalities. If efficient tort law changes when we introduce macroeconomic considerations, we can presume that our law and microeconomic conclusions regarding other areas of law change as well.

We should thus develop a law and macroeconomic analysis of law to complement our robust law and microeconomic literature. Macroeconomic considerations need to be introduced into law for several reasons. First, aggregate demand externalities can be very large. Second, alternative policies to address aggregate demand shortages (such as mone-

\[ wn < 0, \text{ equation (9) is no longer satisfied. Because } w'_{mx} < 0, \text{ } n \text{ must go down in order for equation (9) to be satisfied. Thus, an increase in } x \text{ above the Hand Rule level yields less activity, lower } n. \]

\[ \text{We know that this condition is satisfied at } n^b, x^1_{HR}. \]
tary and fiscal policy) are not always up to the task. Third, law cumulatively affects almost every economic decision—if law makes a sustained effort to stimulate aggregate demand, it can plausibly make a difference. Fourth, the stakes are enormous—the Great Recession was associated with tens of trillions of dollars of lost output and threatened and continues to threaten longstanding political orders. Finally, the optimal legal policy when aggregate demand externalities are high is very different from the optimal legal policy when there are no externalities.

Indeed, the model of tort law presented here has applications for other areas of law, such as regulation. Suppose that, instead of accidents, the damages under consideration are harms to the environment. For example, suppose that the Environmental Protection Agency is setting standards or rules for pollution from power plants. The EPA can choose to impose strict liability for environmental harm on the power plant or require the power plant to comply with rules (or standards) that are analogous to negligence rules. The results derived here suggest that, in deep recessions, the EPA should favor incrementally stricter environmental rules so long as the stricter rules do not cause the power plant to shut down. Indeed, introducing macroeconomic considerations into law may best be achieved through regulation rather than tort law—I focus on tort law here because of its role in the development of the economic analysis of law rather than its suitability for law and macroeconomics. I leave such determinations to future work in law and macroeconomics.

Introducing macroeconomic effects makes law and law and economics more complicated. After further analysis, we may decide that the complications are not worth the gains. But, before we can reject law and macroeconomics, we need to know where it leads us. I hope that this paper helps facilitate this conversation.