# A Theoretical Framework for Law and Macroeconomics

Yair Listokin, *Yale Law School*

Send correspondence to: Yair Listokin, Yale Law School, Yale University, New Haven, CT, USA; Email: yair.listokin@yale.edu

This article considers the effects of law within a Keynesian macroeconomic model. Using the investment-savings and liquidity-money (IS/LM) model at the heart of "short-run" macroeconomics, I argue that law affects spending ("aggregate demand") and that the changes in spending induced by law can affect output. I contrast the law and macroeconomic perspective with the law and microeconomic approach that has dominated law and economics. I demonstrate that law's effects on aggregate demand, invariably ignored in law and economics, become particularly important when monetary policy is constrained by the "zero lower bound" (ZLB) on nominal interest rates. At the ZLB, interest rates cannot adjust to bring aggregate demand into balance with the economy's supply potential. Economic output falls short of its potential due to inadequate demand. At the ZLB, I argue that some microeconomically disfavored legal instruments, such as command and control regulation crafted to increase spending, become appealing relative to seemingly superior alternative instruments such as Pigovian taxation. I conclude by arguing that law offers a potentially important but unexplored instrument of macroeconomic policy. (*JEL*: K00, K10, E00, E02)

## 1. Introduction

Law and economics should really be called "law and microeconomics." Law and economics models aim to make law as microeconomically efficient

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as possible. Law and economics assumes 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 (Bernanke, 2004; Davis and Kahn, 2008). Mitigating small macroeconomic fluctuations caused by inadequate or excess "aggregate demand" (desired spending 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 2008–9 and its painful and long-lasting aftermath (now being called "secular stagnation") undermined these conventional wisdoms. Central banks around the world, constrained by the zero lower bound (ZLB) on interest rates, have proven unable to mitigate a 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, deficit restrictions, and legislative inertia. In the face of these policy failures, macroeconomists are "rethinking macroeconomic policy" (Blanchard, 2015).[1] New instruments for macroeconomic stabilization are desperately needed.

With an omniscient social planner, recessions caused by inadequate demand, like the Great Recession, would never occur. The social planner would raise spending to guarantee that output always equals capacity. A recession therefore represents a coordination failure (Mankiw). If all private actors would agree to spend more, then they would all be better off. But they cannot agree (privately) to spend more. In a recession, spending thus has a public good quality. In response, macroeconomic stabilization policy offers

Aviv University, Haifa University, and Bar-Ilan University Law Schools for their lively feedback and discussion. All errors are my own.

1. This has been the title of three conferences hosted by the International Monetary Fund.

alternative coordination mechanisms to increase spending. These mechanisms include increasing the money supply, raising government spending and lowering taxes. But during the Great Recession, the coordination mechanisms offered to resolve the problem of inadequate aggregate demand have not included law. This is odd, because in many other areas we rely on law to solve coordination failures.

Our neglect of the role of law in macroeconomic policy is also historically unusual. Law and regulation (e.g., the National Industrial Recovery Act or NIRA) formed the heart of the "New Deal" response to the Great Depression, which worked spectacularly well at first before losing efficacy. Similarly, the Nixon administration turned first to price controls authorized by the Economic Stabilization Act of 1971 rather than changes in fiscal and monetary policy to control the inflation of the 1970s.

I am not arguing that we should adopt price controls. But our exclusive emphasis on the microeconomic effects of law ignores past practice. And if macroeconomic circumstances are bad enough, even the most microeconomically inefficient rules may be macroeconomically justified. In a recent *American Economic Review* article, for example, Eggerstsson (2012a) sets forth conditions under which suspension of antitrust laws become justified as a mechanism for raising inflation expectations and stimulating present day spending. Eggertsson argues that these conditions may have been satisfied in 1933, when the NIRA relaxed antitrust rules.

Thus, law (aside from government spending and taxation) offers one hitherto unexamined tool for stabilizing aggregate demand. Like government spending and monetary policy, laws and regulations can stimulate or inhibit spending. Indeed, law plays a role in almost every spending decision. With the failure of traditional macroeconomic policy, the time has come to consider adding law to the macroeconomic policy toolkit.

In this article, I introduce law into the investment-savings and liquidity-money (IS/LM) model of short-run macroeconomic fluctuations. This static general equilibrium model is the workhorse of macroeconomics textbooks as well as many discussions of macroeconomic policy (Krugman, 2000).[2] IS/LM assumes that prices do not adjust freely—meaning that output

2. See, e.g., Young and Zilberfarb (2000) ("Dornbusch and Fischer termed [Hicksian IS-LM] as 'core of modern macroeconomics."').

responds to changes in aggregate demand. This distinguishes the IS/LM model from other workhorse models of economics (such as "supply and demand" curves), which assume that prices adjust freely to attain equilibrium. Because the IS/LM model is likely to be unfamiliar to many in law and economics, I spend more time explaining it than I would with a supply and demand curve in a law and microeconomics article.

I find that law affects short-run macroeconomic fluctuations in the IS/LM models because law affects aggregate demand and, with fixed prices, changes in aggregate demand induced by law affect output. Taking a macroeconomic perspective, I find that some disfavored legal policies, such as command and control regulation as compared to Pigovian taxation, can become desirable if they stimulate aggregate demand sufficiently. Law's effects on output and unemployment are particularly important when monetary policy is constrained by the "ZLB" on nominal interest rates. At the ZLB, law's effects on aggregate demand are more likely to translate into changes in output rather than changes in interest rates.

Finally, I offer a framework to compare a law's microeconomic and macroeconomic effects, providing a more general framework for "law and economics" than has traditionally been presented. I argue that, at the ZLB, law should take into account short-run macroeconomic considerations and attempt to promote aggregate demand even at the cost of long-run inefficiencies. I offer a list of variables that make macroeconomic concerns more or less important. When the economy is not constrained by the ZLB, however, law and microeconomics as usual should continue, with monetary policy being used to stabilize aggregate demand.

The article is organized as follows. Section 2 reviews the nascent law and macroeconomics literature. Section 3 illustrates the relevance of a macroeconomic approach by introducing macroeconomic considerations to the choice between Pigovian taxation and command and control regulation. Section 4 introduces the IS/LM curve and explains why laws can shift both curves. Section IV then combines the IS/LM curves into a general equilibrium theory that predicts how legal changes effect output and interest rates. Section IV also explains why the effects of law are much greater when interest rates are constrained by the ZLB than at other times. In Section 5, I contrast the traditional law and economics effects on "long-run potential output" with the short-run macroeconomic effects I examine here. Section

6 briefly compares the efficacy of law as instrument of aggregate demand management with other instruments, such as monetary policy and fiscal policy. Section 7 concludes with law and macroeconomic implications for lawmaking.

## 2. Law and Macroeconomics: A Literature Review

This is not the first article to recognize the possibility that macroeconomic effects matter for law. For example, Shleifer and Vishny (1992) pointed to macroeconomic effects to demonstrate that auctions may not always yield efficient results in bankruptcy because of cyclically dependent liquidity constraints. Kelman (1993), in one of the few articles that considered law and macroeconomics before the Great Recession, primarily asked why there was no such thing as "law and macroeconomics" rather than attempting to develop the field. Tax law has been slightly more cognizant of macroeconomic concerns than other fields, although even in tax law microeconomic efficiency has been the dominant consideration. For example, from 2009 to the present, I wrote a number of papers discussing the macroeconomic effects of tax expenditures (Listokin, 2009a,b, 2012, 2016). I also argued that all tax policies should be examined for their stabilizing or destabilizing effects on the business cycle as well as their effects on microeconomic efficiency and equity (Listokin, 2009a,b, 2012, 2016).[3] More recently, Masur and Posner (2012) have argued that Cost–Benefit Analysis should account for unemployment effects as well as direct costs. And Liscow (2016) has argued that bankruptcy law should pay more attention to job losses in recessions than in booms.

All of these papers make important contributions to the nascent field of "law and macroeconomics." But they are all very incomplete. Each focuses on a particular area of law, rather than asking if law has macroeconomic effects more generally. Even more importantly, the articles, with the exception of Shleifer and Vishny (1992), do not embed their contributions within a theoretical account for their macroeconomic effects. For example, Liscow (2016) asserts that job loss causes more harm in recessions due to

3. See also Galle and Klick (2010) (assessing the cyclical effects of the Alternative Minimum Tax); Strnad (2003) (examining the macroeconomic implications of a cash flow tax).

"reallocation problems" of uncertain origin.[4] In this article, by contrast, I put law and macroeconomic statements such as this one on a robust theoretical footing. This article compliments my companion article, "Law and Macroeconomics: The Law and Economics of Recessions," which examines the interaction between law and macroeconomics in a more discursive setting (Listokin, 2017). This article, by contrast, firmly grounds law and macroeconomics in standard macroeconomic models.

Writing outside the law and economics perspective, economists Mian and Sufi (2014) have demonstrated that foreclosure laws have important effects on consumption and employment in severe recessions. And in other work, Mian et al. (2013, 2015) describe an aggregate demand/aggregate supply mechanism with nominal rigidities as the transmission mechanism between aggregate demand shifts and effects on output.

Eggertsson's work also relates closely to this article. Eggertsson (2012) asks

> Can government policies that reduce the natural level of output increase actual output? In other words, can policies that are contractionary according to the neoclassical model, be expansionary once the model is extended to include [macroeconomic considerations]? For example, can facilitating monopoly pricing of firms and/or increasing the bargaining power of workers' unions increase output? Most economists would find the mere question absurd. This article, however, shows that the answer is yes under the special "emergency" conditions that apply when the short-term nominal interest rate is zero and there is excessive deflation. Furthermore, it argues that these special "emergency" conditions were satisfied during the Great Depression in the United States.

This article attempts to bring these insights to bear on law more generally.

## 3. An Example in Which Macroeconomic Factors Influence the Optimal Choice of Instrument to Control Externalities

Consider a regulator choosing between two instruments to control externalities, a Pigovian tax versus command and control regulation. Traditionally, law and economics favors the Pigovian tax because it requires

4. For instance, Liscow (2016) notes, "Whether due to sticky information, sticky wages, or some other cause, reallocation works less well during recessions." (footnotes omitted).

the regulator to know less information (Kaplow and Shavell, 2002; Masur and Posner, 2015).[5] If the regulator calls for command and control regulation, then the regulator needs to know the best way to mitigate the externality. By contrast, a Pigovian tax allows market participants to determine the optimal mitigation strategy.

To be even more concrete, suppose that a regulator is choosing between a carbon tax or mandating that all utilities install solar panels equal to 50% of their generating capacity. Conventional wisdom in law and economics holds that the carbon tax works better. If the cheapest way to achieve a given reduction in emissions is to install solar panels, then the tax, which raises the price of energy produced with carbon intensive methods, will encourage solar panel installation. If the cheapest way to reduce emissions is some other mechanism (e.g., energy conservation measures), then the carbon tax will provide the proper incentives while the solar panel mandate requires unnecessarily expensive emissions reduction via solar panels.

I am deliberately choosing a command and control regulation that is inflexible and likely to be inefficient under traditional criteria. I am also choosing a command and control regulation that plausibly stimulates spending. Other command and control regulations that inhibit aggregate demand, such as a blanket prohibition on emissions, have negative effects on aggregate demand as well as the negative microeconomic effects just described.

The argument in favor of a Pigovian carbon tax rather than command and control solar power mandates is compelling. Instead of wasting resources on solar panels, the carbon tax achieves the same emissions reduction and frees up resources for other socially valuable purposes. This conclusion, however, ignores the effects of the choice of instrument on aggregate demand. The traditional analysis thus implicitly assumes, not unreasonably, that output levels are determined by the supply capacity of the economy. Reduced spending on solar panels as a result of a carbon tax relative to a solar mandate will be replaced by increased spending in other areas of the economy, so that the economy always produces at its "potential." The assertion that output will always equal capacity is known as Say's Law.

5. But see Fleischer (2015) (arguing against Pigovian taxation); Weitzman (1974) (advocating quantity regulation under some circumstances).

Keynesian macroeconomics disputes Say's Law. Instead of output being determined by supply capacity, Keynesian theories predict that output is partially predicated on demand—that is, spending. More demand yields more output.[6] In Keynesian theories, an economy's supply capacity either has no meaning or supply capacity determines whether a given level of output is inflationary over the long run or not. Inflation rises in the long run if output exceeds capacity. Inflation falls in the long run if output falls short of capacity. In the short run, however, increases in spending translate only into higher output and/or higher interest rates—prices are fixed.

Assume now that the economy is demand constrained. Demand falls far short of capacity and thus output falls far short of capacity, with inflation falling in the long run (perhaps below some target level). Unemployment rises. In addition, assume that the solar panel mandate raises spending compared to a carbon tax. (For example, suppose that companies only invest if required to and otherwise hold cash—the solar power mandate raises overall investment spending because companies are forced to use cash to install solar panels.) Under these assumptions, which are empirically plausible, the solar panel mandate may be more "efficient" than the Carbon tax. While the solar panels may not be the most microeconomically efficient means of mitigating emissions, the construction of solar panels during a recession raises demand and thus uses capacity that would otherwise have been idle. This "efficiency" can outweigh the seeming inefficiency of choosing a particular means of mitigating emissions rather than leaving the choice to the market.

Thus, macroeconomic concerns can change our conclusions about the efficiency of different choices of legal instrument. In a recession, a demand-increasing command and control regulation may be more efficient than a Pigovian tax.

This conclusion assumes that we know what regulations increase aggregate demand. But how do we know what increases aggregate demand (spending)? For example, the introduction of the solar power mandate might

6. More sophisticated demand side theories (see below) consider the possibility of asymmetries with respect to the influence of demand on output. Inadequate demand can restrict output (imagine a restaurant with no customers), but excess aggregate demand cannot lead to any level of output (a restaurant can only serve so many meals before it hits a capacity constraint, even with lines out the door).

destroy confidence and cause investment to plummet. Companies may spend more on solar panels, but less on everything else. Under these alternative assumptions, a command and control regulation lowers, rather than raises, aggregate demand and should not be favored in recessions.

The effects of a law on aggregate demand are thus an empirical question. But this is a well-posed empirical question that has not previously been focused on. Indeed, for many important regulatory interventions there are empirical estimates of job creation effects. For example, the Mercury and Air Toxics regulation issued in 2010 estimated that compliance would be associated with the creation of 46,000 jobs in the short run, a figure that includes the effects of power plants shutting down rather than complying with the regulation. Thus, we can often estimate what policies will raise or lower aggregate demand. For example, macroeconomics typically assumes that additional government spending and/or lower taxation raises aggregate demand. These are also ultimately empirical claims. If people react to lower taxes and higher spending by dramatically lowering their consumption and investment, then fiscal stimulus may not increase aggregate demand. But, over time, empirical observation has shown us that fiscal stimulus typically boosts spending.

By introducing macroeconomics into the analysis of law, I do not pretend that we know for certain how each law raises or lowers total spending. But if we focus exclusively on law and microeconomics, we never even ask the question of how a law affects spending. Thus, a law and macroeconomics approach reframes the empirical questions we should ask about a law in order to determine what are efficient laws.

For regulations that already estimate the impact of the regulation on jobs and spending, we should incorporate these estimates. And for regulations without such estimates, we can egange in armchair empiricism with regards to the aggregate demand effects of laws that we have not studied empirically. In this respect, law and macroeconomics would be no different than law and microeconomics, which also rely frequently on armchair empiricism—about microeconomic efficiency rather than about what "increases spending."

Finally, the choice between a carbon tax and a solar power mandate is an artificial one. In an ideal world, our response to a deep recession would be

to increase spending and direct that spending toward the projects with the highest marginal value. But the world of macroeconomics is not an ideal world—there would be no recessions caused by inadequate demand with an ominiscient social planner. (Due to the Coase Theorem, there would not be much need for law and microeconomics either.) While a choice between two options is a simplification, it is a useful one for framing my analysis.

## 4. Law in Theories of Short-Run Macroeconomic Fluctuations

The IS/LM model developed by Hicks and Samuelson offers a synthesis of the Keynesian and Classical Visions of macroeconomic behavior. In the Classical model, prices adjust to accommodate changes in demand. In the Keynesian model, output adjusts to accommodate changes in demand.

Although the IS/LM model has been superseded in academic economics by "New Keynesian" dynamic stochastic general equilibrium (DSGE) models, the IS/LM model provides an excellent starting point for understanding short-run macroeconomics.[7] IS/LM is the primary model used by macroeconomic policymakers and continues to be taught as the foundation of short-run macroeconomics to undergraduates (Mankiw, 2006). Even DSGE academic research in macroeconomics can often be explained within the simpler IS/LM framework (Blanchard, 2016). As N. Gregory Mankiw, chair of the Council of Economic Advisors in the George W. Bush administration, has written,

> The heart of [modern macroeconomics]—a dynamic general equilibrium system with nominal rigidities— is precisely what one finds in the early Keynesian models. Hicks proposed the IS-LM model, for example, in an attempt at putting the ideas of Keynes into a general equilibrium setting. …To a large extent, the new [Keynesian] synthesis picks up the research agenda that the profession abandoned, at the behest of the new classicals, in the 1970s. (Mankiw, 2006)

7. See, e.g., Krugman (2014) (concluding that "the experience of the past six years has actually been a great vindication for those who relied on a simple but explicit model, Hicksian IS-LM, which made predictions very much at odds with what a lot of people who didn't use explicit models were sure would happen").

The IS/LM model is a three-market static general equilibrium model of the economy.[8] The three markets are goods, money, and bonds. Bonds are illiquid investments that pay interest, enabling bond issuers to make additional purchases of goods in the present. Money is a store of value that facilitates the purchase of goods. In the IS/LM model, we assume that prices are fixed but interest rates can adjust.

## 4.1. The IS Curve

Short-run macroeconomic theories begin by observing that, in equilibrium, output must equal spending. If spending on private consumption, investment, and government provided public goods falls short of output, then inventories will accumulate. Firms will cut back their output until their production equals spending. Formally, this means that output, $Y$, should equal spending on investment, $I$, government spending, $G$, and consumption, $C$, Spending on consumption, $C(Y - T)$, is an (increasing) function of disposable income, which equals total income minus taxes, $T$.[9] Spending on investment is a (decreasing) function of the interest rate, $I(r)$. The IS curve is often depicted to reflect this negative relationship between the interest rate and output, as in Figure 1.

$$Y = C(Y - T) + I(r) + G^{10} \qquad \text{(IS)}$$

4.1.1. *Shifting the IS curve and the Keynesian multiplier.* The IS curve shown in Figure 1 depicts the relation between output and the interest rate for given levels of taxes and government spending. Shifts in government taxation or spending shift the IS curve. Thus, an increase in government spending from $G$ to $G + \Delta G$ shifts the IS curve to the right as shown by equation IS and Figure 1. Intuitively, more government spending means

8. The model presented here is of a "closed economy"—there are no goods or capital flows from other economies. For an open economy version of the IS/LM model, see Mankiw (2015, pp. 339, 373).

9. In the standard Keynesian model, this relationship between output and consumption is asserted rather than derived from consumer behavior. In the subsequent decades, an enormous amount of research effort has been devoted to developing a more theoretically and empirically grounded understanding of consumption patterns (see, e.g., Deaton, 1993).

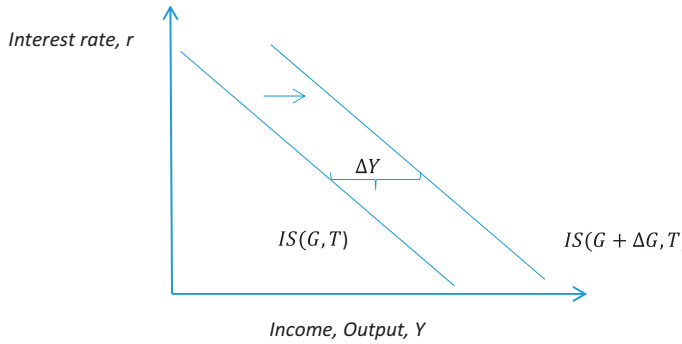


**Figure 1.** IS Curve.

more demand. The increase in demand shrinks inventories and causes firms to increase production to meet the increase in demand. Similarly, a decrease in taxes will raise disposable income, consumption spending, and finally output.

Because the consumption function itself depends on output, increasing in government spending can have multiplier effects. An increase in government spending (from $G$ to $G + \Delta G$) increases output directly. This increase in output, in turn, leaves more disposable income for consumers. They raise their consumption. (Their consumption increases less than one for one because some of the increased income is taxed or retained as savings.) This increase in consumption increases Y still further. An initial increase in government spending, $\Delta G$ thus gets "multiplied" into a more than one for one increase in output ($\Delta Y > \Delta G$).

4.1.2. *Law and the IS curve.* Taxes and government spending are not the only policy instruments that affect spending on consumption, income, or government spending and thereby shift the IS curve. Law can also shift the curve by increasing or decreasing expenditures on any of the three areas. Above, I examined how the instrument choice of a carbon tax versus a solar power mandate effects aggregate demand.

To demonstrate the range of law and macroeconomics, I will provide several examples of how the law can increase spending on each of con-

sumption, investment, and government spending. In each case, I rely on armchair empiricism for my claims.[10]

Consumption depends not only on total disposable income, but also on law. For example, a law that mandated a certain savings rate for all individuals would raise savings rates for all individuals who had previously been saving less than the mandatory amount. The increase in savings will also mean a decrease in consumption. (I will consider the effects on the interest rate and investment in the next section.) The IS curve shifts to the left—for any given interest rate, output is lower.

Contract and consumer bankruptcy law also helps determine consumption. Debtors consume more than creditors out of a given amount of wealth—that is why they are debtors. Thus, a shift in contract and bankruptcy law that favors debtors over creditors shifts wealth to debtors and raises overall consumption in the short run (Mian and Sufi, 2014). The IS curve shifts to the right. For a given amount of disposable income, laws that distribute wealth to debtors from creditors will raise consumption because debtors have higher marginal propensities to consume than creditors.

Investment is also a function of law as well as the interest rate. Suppose, for example, that residential zoning restrictions eased in all jurisdictions. This easing would make investment in housing more attractive at any interest rate and lead to more investment spending on construction of houses and apartments. Or consider the celebrated contracts case of *Peevyhouse v. Garland*, 382 P.2d 109 (Okla. 1962). In this case, the plaintiffs, whose land was ruined by the defendant's mining activities, asked for specific performance of a provision to remedy the plaintiff's land to its original condition, even though the cost of the remediation greatly exceeded the enhancement

10. The "New Keynesian" IS curve, in which output today is a declining function of the interest rate (as well as expected output in the next period), can be derived from a maximizing representative household as follows. Begin with a household attempting to choose consumption and savings to maximize lifetime utility. Savings yields an interest rate. The first-order condition of the utility function for this household is called an "Euler equation" which sets the marginal utility of consumption today equal to the discount rate multiplied by the interest rate multiplied the marginal utility of consumption tomorrow. This implies that a higher interest rate today means less consumption and output today, as the household prefers to save, receive the high interest rate, and consume in the next period (see, e.g., Romer, 2012, pp. 240–2).

to the property's value.[11] Whatever the microeconomic merits of the court's decision to award minimal damages, the court's decision likely reduced investment and aggregate demand. If the court had awarded specific performance, investment spending (in improving the plaintiff's property) would have gone up at any interest rate. Without specific performance, some of the funds that would have been devoted to this investment were likely to be saved.

Government spending is obviously a function of the appropriations laws that enact the spending. But government spending is also affected by other laws. In the Great Recession, for example, spending on infrastructure was delayed by a thicket of state and local regulations that prevented projects from being "shovel ready" (Shear, 2010).

Government spending is also determined by the institutional environment within which the spending occurs. If a bureaucracy makes qualifying for a government benefit program difficult, then government spending is likely to be less than it would be if qualification was easier—regardless of the content of the law establishing the government benefit program.

In total, these six examples are illustrations of the myriad ways in which laws, regulations, and legal environments can promote or inhibit spending.

4.1.3. *Law as a variable in the IS curve.* Formally, I add $\boldsymbol{l}$ to the standard downward sloping IS equation. $\boldsymbol{l}$ is an $n$ dimensional vector that measures law on $n$ dimensions. Different elements of law will affect different components of the IS equation. Debtor and creditor law ($l_1$) for example, affects the consumption function. For a given amount of disposable income, laws that distribute wealth to debtors from creditors will raise consumption in the short run because debtors have higher marginal propensities to consume than creditors. Thus, $\frac{\partial C}{\partial l_1} < 0$ where a higher $l_1$ indicates that the law is more favorable to creditors.

$$Y = C(Y - T, \boldsymbol{l}) + I(r, \boldsymbol{l}) + G(\boldsymbol{l}) \qquad \text{(IS)}$$

11. In fact, the plaintiff asked for a very high damage amount that would enable the plaintiff to remedy the land. The opinion is written, however, as if the choice is between specific performance and low damages.

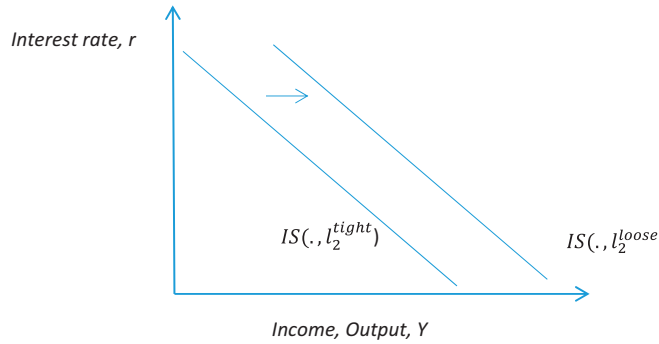


**Figure 2.** Law in the IS Curve.

Investment is also a function of law. an investment in housing construction that was marginally profitable with permissive zoning and a given interest rate will become unprofitable with more restrictive, and less profitable, zoning requirements. If $l_2$ measures zoning restraints, with higher $l_2$ meaning tougher zoning, then for investments on the margin, $\frac{\partial I}{\partial t_2} < 0$. For investments not on the margin, however, $\frac{\partial I}{\partial l_2}$ has an ambiguous sign. For example, a developer of an inframarginal housing project may choose to comply with costly historic preservation requirements, raising spending on investment.

The graph above demonstrates the shift in the IS curve when zoning requirements, $l_2$, get looser for marginal investments. Because $\frac{\partial I}{\partial l_2} < 0$, a move toward looser zoning requirements shifts the IS curve given above to the right.

Lawyers should not be surprised by the assertion that law can shift the IS curve. As lawyers have often observed, law can be a substitute for the taxes and government spending that are the paradigmatic examples of interventions that shift the IS curve (Kelman, 1999, pp. 1–5, 77–8; Posner, 1971). If taxes and government shift the IS curve, then law can too.

4.1.4. *The size of the shift in the IS curve induced by law.* Even if law shifts the IS curve, we may be skeptical about the size of the shift. For example, if one town loosens its zoning law, then investment spending

should increase, but not by much relative to the size of the economy. Is it even worth mentioning?

I offer two responses. First, while any one legal decision may not have enormous effects on aggregate demand, the cumulative effects of legal decisions on aggregate demand could be enormous. If every municipality (or even one state) considered the effects of zoning law on aggregate demand and loosened zoning laws in recessions, the effects would be macroeconomically significant. And if all legislators, regulators, judges, and others attempted to stimulate the economy during the appropriate times, the stimulus could be massive (I will talk below about legal actor's capacity to make such decisions.) Secondly, some individual legal decisions are macroeconomically significant. For example, the instrumental choice between a carbon tax or a solar panel mandate on the entire United States is itself likely to have measurable effects on total spending.

4.1.5. *The inadequacy of the IS curve alone as a model of the economy.* Operating alone, the IS curve provides an incomplete model for an economy's equilibrium. First, it predicts that more demand always means more output. This is clearly unrealistic at extreme levels. Suppose, for example, that the government goes on a crazy spending spree, with a fiscal deficit equal to more than 100% of the previous year's output. We do not think that the economy will just work harder indefinitely to meet the government's demand and double output. Yet that is what the IS curve alone predicts.

In general, the IS curve ignores opportunity costs. If government spending goes down because the government spends less and borrows less money, then there should be more opportunity for consumption and investment by the private sector. This should offset some or all of the decrease in output attributed to the fall in government spending. The LM curve introduces the possibility of such effects by allowing the interest rate, as well as the output level, to become a function of demand. Movements in the interest rate allow the economy to adjust in more realistic ways to changes in demand.

## 4.2. The LM curve

While the IS curve describes equilibrium in the goods market, the LM curve describes equilibrium in the money market. Savings can be held in

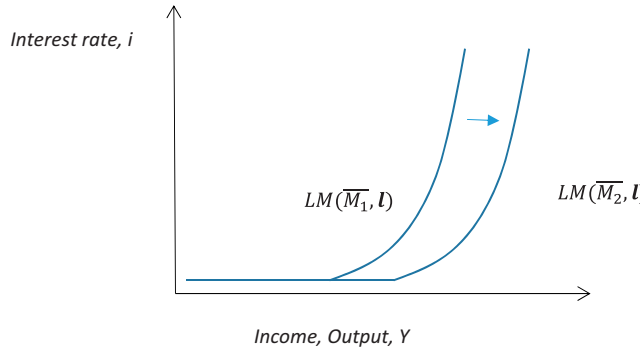


**Figure 3.** The LM Curve and the ZLB

two forms—bonds or money. Money facilitates transactions, while bonds do not. In order to induce people to hold bonds rather than money, bonds pay an interest rate. At higher income levels, people want to hold more money to facilitate the additional transactions that are occurring. In response, bonds must offer a higher interest rate. Thus, the LM curve (describing equilibrium in the money market) depicts an upward sloping relation between the output level and the interest rate, as depicted in Figure 3.

Formally,

$$\left(\frac{M}{P}\right) = L(r, y) \qquad \text{(LM)}$$

At equilibrium in the money market, the real money supply, given by $\left(\frac{M}{P}\right)$, must equal the demand for money, $L(r, y)$.[12] The demand for money is increasing in $Y$, $\frac{\partial L}{\partial Y} > 0$. When output is high (meaning that there are more total transactions), people want to hold more money to facilitate transactions. The demand for money is decreasing in $r$, $\frac{\partial L}{\partial r} < 0$. Higher interest rates raise the cost of holding money (which yields no return) as an asset, as opposed to bonds. For a given real money supply, $\left(\frac{M}{P}\right)^S$ we can draw an LM curve in $(r, Y)$ space (see Figure 3). Increases in base money, $\overline{M}$,

12. We can conflate the real interest rate, $r$, and the nominal interest rate, $i$, because we have assumed prices are fixed.

(from $\overline{M_1}$ to $\overline{M_2}$) shift the LM curve outward, as shown in Figure 3.[13] Base money is the element of the money supply that determines the very short-term interest rate targeted by central banks (e.g., the Federal Funds rate). By increasing the base money supply, the central bank lowers the short-term interest rate.[14]

4.2.1. *Law and the LM curve.* Law plays a role in the formation of the LM curve. Most directly, law governs the operation of the central bank, which determines the level of the "monetary base." Law—specifically financial regulation—also governs the process by which base money, $\overline{M}$, is converted into the money supply, $M$, a process known as the "money multiplier."

To illustrate the money multiplier, suppose that the Central Bank prints \$100 and gives it to me, $\overline{M} = 100$. I then deposit the money with a bank. The bank does not simply hold on to the cash. Instead, the bank lends some of my deposit to someone else. The amount of lending the bank does is determined by capital and reserve requirements set by financial regulators. Suppose that the bank lends \$80 of the \$100 I have deposited because the bank is required to hold 20% reserves. The bank transfers a credit of \$80 to the borrower's account (along with a debt obligation of \$80). The money supply is now \$180 rather than the original \$100. In turn, the borrower may keep the \$80 in the bank for a time. The bank now lends \$64 (80% of \$80) to still another borrower. The money supply is now \$244=\$100+\$80+\$64. The process continues until the series reaches its limit, with the money supply, $M = \$500$ (Mankiw, 2015, p. 550).[15]

With looser reserve and capital requirements,[16] the money multiplier will be higher than with tighter requirements, thus shifting the LM curve for a

13. The monetary base includes currency and private banks' reserves held by the central bank (see Goodhart, 1989). Whenever the central bank buys bonds, it increases base money. Thus, conventional expansionary monetary policy (involving very short-term government bonds) and unconventional monetary policy (involving longer term bonds) both increase the monetary base.

14. We can derive a micro-founded LM curve by assuming that the household gets a direct utility benefit by holding money because it facilitates transactions. See Romer (2012, pp. 240–2) and the citations therein.

15. See discussion at note 8.

16. This type of "law and macroeconomics", which examines the role of financial regulation in the macroeconomy, is much more well developed. For recent examples, see Romano (2014). Unfortunately, most of the literature on financial regulation also does not attempt to link itself explicitly with macroeconomic models of the economy. In this

given amount of base money. Thus, the rightward shift of the LM curve depicted in Figure 3 can be triggered by a loosening of a bank capital or reserve requirements as well as an increase in base money. (The LM curve is a function of .) Moreover, the central bank is not in complete control of the money supply. If the money multiplier changes, for example, because banks become nervous and tighten lending requirements, then the money supply may shrink even if the central bank increases the supply of base money.

4.2.2. *The ZLB* The LM curve in Figure 3 reflects the existence of a "ZLB" on nominal interest rates.[17] Because cash can always be held for no return, interest rates, which represent the price of money (relative to bonds), cannot go below zero, even if a simple extrapolation of the normal relationship between interest rate and output implies that interest rates should be negative. (If the interest rate on bonds becomes negative, money dominates bonds as an asset as it facilitates transactions and yields a higher return.) As a result, the LM curve is horizontal when the interest rate is approximately zero. A horizontal LM curve at an interest rate near zero can also be derived from the assumption of infinite demand for money once the return of money equals or exceeds the return of other assets. That is, $\lim_{i \to 0}(L(i, Y)) \to \infty$. This liquidity trap means that, once interest rates are zero, injecting more money into the economy does not change interest rates because the additional money gets held as an asset rather than leading savers to switch to bonds. Policy is trapped by overwhelming demand for the liquid asset.[18]

4.2.3. *Shifting the LM curve.*

article, I will not develop the connection between the LM curve and law further. This is a promising avenue for future research.

17. Recent experience demonstrates that short-run interest rates can become negative. While cash has a ZLB on return, other forms of money, such as checking, are not formally constrained by the zero lower bound. Because cash is not a perfect substitute for these other forms of money (e.g., its expensive and dangerous to store), interest rates on non-cash money can go slightly negative. If short-term interest rates on other forms of money become too far negative, however, then we would expect widespread substitution from these other forms of money too cash, with considerable disruption to the economy. Thus, the ZLB is more accurately characterized as a "just slightly negative interest rate" lower bound. For expositional purposes, however, the ZLB is a good approximation. For a discussion of negative short term interest rates. See Rognlie (2016).

18. While I use the term liquidity trap in the text, I think the term as unfortunate. The phrase does not evoke the problems as well as the "ZLB."

As can be seen from the LM equation, an increase in the money supply (which can stem from an increase in the supply of base money or from a loosening of reserve or capital requirements) shifts the LM curve to the right, as shown in Figure 3. At a given price level, more money supply increases the supply of real money balances, $\frac{M}{P}$. Money is more abundant, so its price (the interest rate) goes down. Once the ZLB, $(i = 0)$, is triggered, however, interest rates are constrained to be zero. Thus, expansionary money policy (increases in base money, or lessening of lending requirements) when output is below the output associated with a zero interest rate does not shift the LM curve to the right.

## 4.3. Potential Output and Inflation

To this point, I have described the conventional IS and LM curves and discussed how law can affect these curves. As noted, however, the IS/LM model is a static model that assumes stable prices. Both of these assumptions are questionable at best—especially in the long run. To make the model more realistic, I will add the following assumption that implicitly introduce some of modern dynamic macroeconomics to the IS/LM framework.

First, assume that the economy has a "natural" rate of output at which inflation remains steady. Economists often call this level of output "potential output." This level of output is denoted by $Y_{\text{POT}}$. This potential output reflects "real" factors of production, such as the level of technology, the size of the labor force, the capital stock, and law (I will return to law's role in determining potential output in Section 5.) In the long run, actual output is determined by potential output. When actual output, as determined by the IS/LM model, is above potential output, then inflation ensues. Thus, the economy cannot produce above its potential indefinitely without inflation increasing.

Second, assume that there is a central bank that is concerned with stabilizing inflation while keeping output at its potential so as to avoid unnecessary unemployment. If output is above potential, then the central bank tries to reduce output to forestall inflation. If output is below potential, then the central bank tries to stimulate the economy to avoid unemployment.

With the addition of potential output and inflation the IS/LM model contains a mechanism whereby output cannot stay above its potential indefinitely. A demand shock that brings output above potential (see below) induces, over time, inflation. The demand shock also induces a central bank response designed to offset the inflation. Thus, the economy will tend to return to its potential output in spite of most demand shocks. In the long run, growth in a healthy economy can only result from increasing potential output rather than increasing demand. In the short run, however, output can be above potential due to increases in spending. And even more importantly, as shown below, output can remain below its potential indefinitely—even if the central bank tries to bring output back to potential—when the economy is stuck at the ZLB.

## 4.4. IS/LM as a General Equilibrium Model of the Economy

The IS and LM curves together provide a general theory for the joint determination of output and interest rates.[19]

4.4.1. *Output and interest rates in the economy* Consider the initial IS and LM curves from Figures 2 and 3, which are depicted again in Figure 4. The two curves intersect at point A. At this level of output, $Y_{POT}$, and interest rate, $i_0$, both the goods market and the money market are in equilibrium. The IS/LM model uses inputs, such as the law, the base money supply, government spending, etc into a prediction for the economy's resultant output and interest rate levels.

At this equilibrium level of output and interest rates, the economy is producing at capacity. There are no inflationary pressures and the central bank does not engage in stabilization policy to stimulate or inhibit the economy.

19. The IS curve is a set of output/interest rate combinations that balance the investment/savings market. At any point along the IS curve, the market for goods is in equilibrium. The LM curve is a set of output/interest rate combinations that equilibrate the money market. When these two curves intersect, we have found a unique output/interest rate combination that balances both the goods and money markets—at a given price. By Walras' Law, if $n - 1$ markets are in equilibrium, then all $n$ markets are in "general" equilibrium. Thus, if the goods and money markets are in equilibrium, so too is the bonds market. The point where the IS and LM curves intersect is thus a point of general equilibrium in the goods, money, and bonds markets.

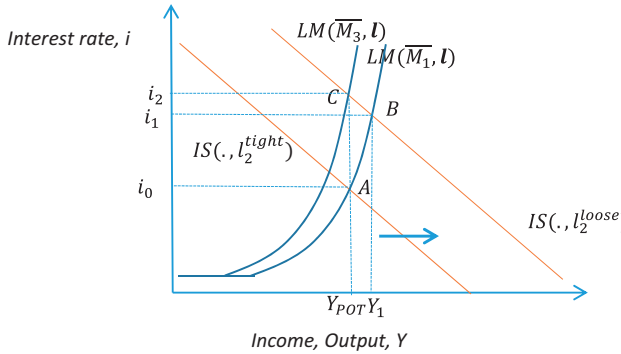


**Figure 4.** The Determination of Output and Interest Rates in the IL/LM Model.

The IS/LM model also offers predictions for what happens to output and interest rates when some inputs to the model change. Suppose, for example, that zoning law, $l_2$, shifts from tight to loose. As discussed in Figure 2 above, this promotes investment spending. This shift in law shifts the IS curve to the right, as depicted.[20] This shift in the IS curve translates into an increase in both output and interest rate, as the economy's equilibrium shifts to point B. As depicted in Figure 4, the shift in law and aggregate demand produces a relatively small increase in output (from $Y_{POT}$ to $Y_1$) and a large increase in interest rates (from $i_0$ to $i_1$). In this environment, the increase in demand for investment spending induced by the change in zoning law mostly displaces other investment and consumption spending. Output changes comparatively little. This suggests that the economy is operating near its potential (as depicted). Increases in demand do not increase output by utilizing excess capacity. Instead, increases in demand mostly raise interest rates by increasing competition for bonds and raising interest rates.

The increase in output caused by the shift in zoning law (from $Y_{POT}$ to $Y_1$) raises inflationary pressures, as the economy is producing at a level above its potential ($Y_{POT} < Y_1$). This induces inflation and induces the central bank to take action to avoid the inflation. The central bank responds

20. Below, I will consider the possibility that the shift in zoning law shifts the economy's potential output level.

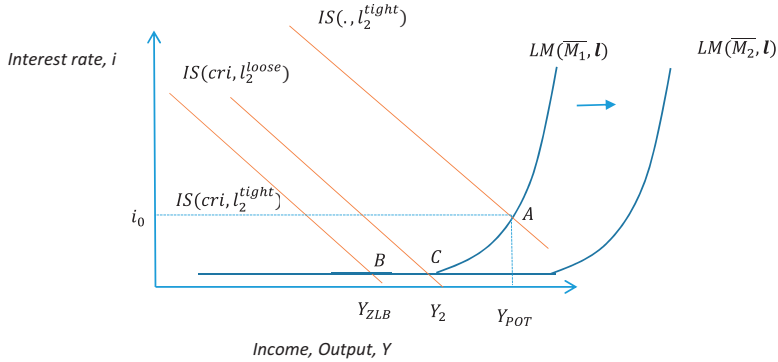


**Figure 5.** Output and Interest Rates at the ZLB.

to the law-induced increase in demand by lowering base money from $\overline{M_1}$ to $\overline{M_3}$. This reduction of base money lowers money supply and raises interest rates still further. The rise in interest rates, in turn, induces a shift along the new IS curve, reducing investment and output until output again equals potential. The central bank has thus offset the inflationary pressures induced by the aggregate demand increase caused by the loosening of zoning law. At point B, the central bank enjoys considerable stabilization capacity to offset shocks to output and the interest rate.

4.4.2. *Equilibrium at the ZLB.* The IS/LM model's predictions for the effects of law and monetary policy on output and interest rates prove very different when the economy is constrained by the ZLB.[21] (See Figure 5). Suppose that the economy is at an initial equilibrium at point A, where the IS curve with tight zoning, $IS(., l_2^{\text{tight}})$ intersects the LM curve with base money level $\overline{M_1}$. At this equilibrium, output equals potential and the interest rate is $i_0$. This initial condition is the same as it was in Figure 5.

The economy is then hit by a negative aggregate demand shock (Figure 5). The shock may be a sudden loss of confidence by consumers and investors due to a political, financial, or environmental crisis. At any interest rate,

21. This discussion follows Hicks's famous analysis (see Hicks, 1937). For recent dynamic and micro-founded treatments of the macroeconomics of the ZLB: see, e.g., Eggertsson and Krugman (2012), Christiano et al. (2011), Eggertsson (2011), Woodford (2011), and Eggertsson and Woodford (2003).

desired spending goes down significantly. The IS curve shifts leftward to $IS(cri, I_2^{\text{tight}})$ to reflect a dramatic reduction in spending as a result of the crisis. The inward shift of the IS curve is enough to trigger the ZLB. At the new equilibrium in the economy at point B, the interest rate is zero and the output level is given by $Y_{\text{ZLB}}$.

At the new equilibrium, output, $Y_{\text{ZLB}}$, is well below the economy's potential, $Y_{\text{POT}}$. Output declines so much because one of the effects that mediates a sudden decline in demand—the reduction in interest rates that promotes a countervailing increase in investment—no longer occurs once interest rates on bonds have gone as low as they can go (zero). As a result, output, rather than interest rates, declines dramatically along with demand.

**Impotence of the central bank**

With output so far below potential, unemployment gets very high. Deflation becomes a risk as well. A central bank will therefore try to stimulate the economy. The central bank's primary tool for stimulation is its control over base money, $\overline{M}$ and very short-term interest rates. In order to stimulate the economy, the central bank will buy bonds from banks and issue currency, raising base money from $\overline{M_1}$ to $\overline{M_2}$, shifting the LM curve outward as shown in Figure 3.

Unfortunately, the central bank's monetary expansion has no effect on the economy. Interest rates are already zero. Raising the money supply ordinarily stimulates the economy by lowering interest rates and making bonds attractive relative to money, triggering investment and consumption. (We can see that this is exactly what would have occurred if the central bank had conducted expansionary policy at the old equilibrium, point A.) But with interest rates already at the ZLB, this type of stimulus is unavailable. The economy is constrained by inadequate demand. The central bank's increase in base money does not promote demand. Instead, the increase in money is held as assets by banks or individuals, failing to stimulate the economy. The economy's equilibrium remains at point B, with output well below potential and interest rates at zero. The central bank is impotent.[22]

22. Even with interest rates at zero, the central bank can try to raise inflationary expectations (e.g., by using "unconventional monetary policy"—increasing base money by buying longer dated bonds) so that the real interest rate can go negative. In order

Figure 3 demonstrated that some forms of financial regulation, such as capital requirements and reserve requirements, operate much like increases in base money. They all increase the money supply and lower interest rates. At the ZLB, changes in financial regulation, just like changes in base money, cannot stimulate the economy in the conventional way because they do not lower the interest rate and promote additional spending. Thus, changing financial regulation does not provide an alternative instrument for the central bank at the ZLB.

Many scholars have argued that economic performance in industrialized countries since the Great Recession of 2008, with interest rates stuck at zero, low labor force participation, and growth well below expectations, constitute a dramatic example of the dangers of the ZLB problem described here (Summers, 2016). In 2015, US GDP was $16.3 trillion in 2009 dollars. Estimates of 2015's potential output in 2007, before the Great Recession, were over $18 trillion (again in 2009 dollars) (Congressional Budget Office, 2014). The U.S.'s output was thus almost 10% below potential, a vast loss of output.

## The efficacy of law at the ZLB

In contrast with monetary policy, legal policy that shifts aggregate demand can be very effective at the ZLB. Imagine, for example, that many state governments preempt local zoning laws temporarily during a liquidity trap. This triggers an investment boom and shifts the IS curve outward, as discussed in Figures 2 and 4.

In Figure 4, we saw that the increase in aggregate demand associated with loosening zoning law did not move output much in ordinary economic conditions. Instead, the outward shift in the IS curve primarily led to an increase in interest rates. Moreover, any increase in output associated with

to raise inflation expectations, the central bank needs to commit to high inflation after the ZLB has been overcome as well as during the "liquidity trap." As a result, achieving sufficiently negative real interest rates proves more difficult than might have been expected (Krugman et al., 1998; Eggertsson and Woodford, 2003). In fact, central banks have mostly failed to raise inflation expectations during the Great Recession in spite of significant unconventional monetary operations.

the loosening of zoning laws might well be offset by central bank monetary policy designed to offset inflation that might result from output above potential.

Not so when the economy is stuck below potential output at the ZLB. Suppose that a large state, such as California, preempts local zoning laws, triggering a residential and commercial investment boom. While the rest of the economy remains moribund as a result of the crisis, construction in California booms. The IS curve shifts outward from $IS(cri, l_2^{\text{tight}})$ to $IS(cri, l_2^{\text{loose}})$. The economy is now in equilibrium at point C, with output of $Y_2$ and an interest rate that remains at zero.

At the ZLB, the expansion of aggregate demand associated with looser zoning rules leads to a large increase in output and reduced unemployment but no change in interest rates. Because the economy is stuck at the ZLB with output well below potential, the increased spending does not replace other spending and raise interest rates. Instead, the increased spending utilizes idle capacity, raising output considerably.

Moreover, the central bank does not offset the increase in output caused by the legal change. Rather, the central bank welcomes the demand stimulus and resulting increase in output. Even with the demand stimulus, output is below potential ($Y_2 < Y_{POT}$). The central bank would like to use monetary policy to reduce unnecessary unemployment and stop deflationary tendencies, but it is unable to do so because of the ZLB constraint on interest rates. The demand expansion caused by the change in zoning laws thus helps the central bank achieve its goals when its primary instruments are unavailable. Indeed, after the increase in demand caused by the zoning shift, the central bank would like still further expansion to demand (perhaps from some of the other legal policies discussed above) in order to bring output even closer to potential.

The effect of demand expansion via legal policy is thus very different at the ZLB (Figure 5) than it is when the economy is near its potential (Figure 4). At the ZLB, "expansionary legal policy" raises output, does not change interest rates, and diminishes deflationary pressures. When the economy is near its potential, by contrast, expansionary legal policy raises output only slightly. Instead, its primary effect is on interest rates. Moreover, any short-term effect of expansionary legal policy on output away from the

ZLB is likely to be snuffed out quickly by the central bank in order to restrain inflationary pressures.

## 5. From the Short Run to the Long Run in Macroeconomics and Law and Economics

### 5.1. From the Short Run to the Long Run in Macroeconomics

The IS/LM model and its more modern "New Keynesian" descendants provide a model for the economy in the short run, in which prices are fixed.[23] In the long run, however, prices change. In New Keynesian models, long-run output is not determined by demand by rather by real factors such as the size and sophistication of the labor force, the capital stock, and the level of technological sophistication.

If the economy is operating above potential, then, over the long run, prices rise. In the IS/LM model, an exogenous rise in prices effectively reduces the real money supply, raising interest rates, and reducing output. This process gradually continues until output returns to its potential level. If output is below potential, then prices should fall in the long run. This decrease in prices raises the real money supply, lowers the interest rate, and raises output until in returns to its potential level.

Over the long run, recessions or booms in which output differs from potential generate price and interest rate pressures that ultimately bring the economy back to its long run potential. One question that remains unanswered is how long it takes for the economy to transition between the "short run" of the IS/LM model and the "long run" in which output equals potential. The more easily prices change, the shorter the short run should be. It is

23. New Keynesian models are not universally accepted. A school of macroeconomics that emphasizes "Real Business Cycles" argues that output reaches its potential in the short run as well as the long run. In real business cycle models, monetary policy is irrelevant and recessions and booms are caused by shocks to technology and labor supply. As one graduate macroeconomics textbook summarizes real business cycle models, "there is broad agreement that the [real business cycle] models do not provide a remotely accurate account of fluctuations. Moreover, there are important features of fluctuations that appear impossible to understand without incorporating some type of nominal rigidity or imperfection" (Romer, 2012, p. 229). Because of this consensus, I do not discuss real business cycle critiques here.

important to emphasize, however, that even relatively rapid but uncoordinated price changes can lead to relatively large degrees of price stickiness (Romer, 2012, pp. 275–8). Moreover, the length of the short run may be much longer in deep recessions than it is in booms because prices are much stickier "downward" than "upward"—for example, it is much harder to decrease someone's salary in nominal terms than it is to increase it (Akerlof et al., 1996). And when sufficiently deficient aggregate demand triggers the ZLB on interest rates, even perfect price flexibility does not guarantee that output equals potential (Wren-Lewis, 2014). Finally, a bad recession in the short run can have negative long-term effects on potential output, a process known as hysteresis (Blanchard and Summers, 1986).

## 5.2. Law and Economics and Long-Run Macroeconomics

If the economy always quickly returns to its "potential" due to price and interest rates adjustments and the central bank hastens the adjustment with its influence over the interest rate, then law and economics can focus on microeconomic efficiency. In macroeconomic terms, this means that law and microeconomics is focused on making potential output as high as possible.

Consider the choice between a carbon tax and a solar power mandate discussed in Section 3. The traditional law and economics approach is as follows. The carbon tax internalizes the externalities at the least cost, while the

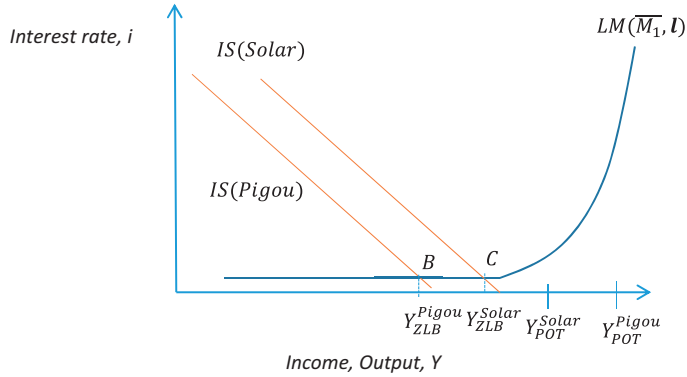


**Figure 6.** Solar Power Mandate versus Pigouvian Taxation at the ZLB.

solar panel mandate is extremely costly. Therefore the economy's potential, taking into account externalities as well as actual output, is higher with the Pigovian carbon tax than it is with the solar panel mandate ($Y_{POT}^{Pigou} > Y_{POT}^{Solar}$) in Figure 6. True, the instrument choice may affect aggregate demand and short-run output. But, so long as the economy is operating normally, the effect on output will be small and short-lived, analogous to the effect of the zoning change on output in Figure 4. With little at stake in terms of short-run macroeconomics, law and microeconomics focuses on getting long-run potential output as high as possible.

This explanation for law and economics' avoidance of short-run macro proves compelling in ordinary circumstances. Legislators, regulators, judges, etc. are not macroeconomic experts, to put it mildly. If the macroeconomic effects of legal decisions are not particularly important, then the legal system should focus on a different goal and that means microeconomic efficiency. If the Pigovian tax makes long-run potential output higher than the solar power mandate, then we should choose the Pigovian tax.

At the ZLB, however, the justification for law and economics' avoidance of macroeconomics—that the effects of law on aggregate demand lead to short-lived changes in output that can be easily handled by the central bank—falls apart. As we have seen throughout in this article, at the ZLB, law's effects on aggregate demand cause large changes in output. Moreover, these changes to aggregate demand cannot be offset by the central bank, which is constrained by the ZLB. In addition, the "short run" is likely to be quite long at the ZLB because prices do not adjust downward as smoothly as they adjust upward—meaning that price movements do not cause output to adjust as quickly as they do in ordinary times.

Thus, in deep recessions, law and economics should change. Suppose that the solar panel mandate promotes aggregate demand relative to the Pigovian Carbon tax, as shown in Figure 6. ($IS(\text{Solar}) > IS(\text{Pigou})$). In the short run, this means that the solar panel promotes higher output than the Pigovian tax. ($Y_{ZLB}^{Pigou} < Y_{ZLB}^{Solar}$). At the same time, long-run potential output is higher with the Pigovian tax ($Y_{POT}^{Pigou} > Y_{POT}^{Solar}$).

Which policy should a lawmaker or regulator choose? At the ZLB, the answer may well be the solar panel mandate. The preference for the solar power mandate relative to the Pigovian tax gets stronger as (a) the solar

panel mandates promotes much more spending than the Pigovian tax, (b) hysteresis effects loom larger (meaning that perhaps even $Y_{POT}^{Pigou} \geq Y_{POT}^{Solar}$), (c) alternative aggregate demand promotion policies are not in the offing and (d) the value of the future gets smaller relative to the present because the short run lasts years or decades.

## 6. What about Alternative Macro Mechanisms?

Many readers are likely thinking something along the following lines "Even if law is theoretically valuable for macroeconomics, we may prefer to use alternative mechanisms to promote aggregate demand. Lawyers are no experts in macroeconomics, after all." Here, I sketch a few brief responses to this common critique, which will be addressed in depth in other work:

a. Central banks have taken unprecedented risks, increasing their balance sheets by almost an order of magnitude, during the Great Recession without ending the period of inadequate aggregate demand. Thus, the central bank acting alone cannot be the alternative mechanism that people prefer.
b. Expansionary fiscal policy itself is law and is subject to many of the concerns (macroeconomically ignorant decision-makers, legislative inertia, long-time lags) that limit law in responding to macroeconomic concerns. There is thus no reason to make fiscal policy *a priori* dominant over other areas of law as a macroeconomic policy tool. Indeed, fiscal policy has not responded vigorously to the secular stagnation in the last eight years. The lack of fiscal response has been so glaring that central bankers, like Chair Ben Bernanke of the Federal Reserve, have taken the unprecedented step of requesting a softer fiscal stance from lawmakers in the short term (Bernanke, 2013). (Maybe Chair Bernanke should also have spoken to the government's chief regulators.)
c. Lawmakers, regulators, and judges are not macroeconomic experts. But ZLB recessions have clear indicators (zero short-term interest rates and very low long-term interest rates) that even macroeconomically unsophisticated lawyers can observe.

d. ZLB recessions tend to last many years. Even if regulators and judges are slow to respond to macroeconomic concerns and their responses are slow to take effect, they are likely to be able to respond fast enough to make a difference to a prolonged recession at the ZLB.
e. Part of the reason lawyers are macroeconomically unsophisticated is that we do not teach them any macro. This can be rectified by teaching macro to lawyers as we teach micro to lawyers. (This would also help future legislators who go to law school understand the economics of recessions.)
f. While it is hard to know whether a particular legal policy will promote or inhibit spending and employment, it seems equally hard to know whether or not a policy will be microeconomically efficient. The direct effects of the law on spending are a coherent empirical question that is already studied by some agencies as part of "feasibility analysis" (Masur and Posner, 2012). If the law can make educated guesses about what is microeconomically efficient, it can also make educated guesses about what policies will increase spending.

## 7. Conclusion

This article provided a theoretical framework for analyzing the effects of laws on aggregate demand. I demonstrated that, when demand is depressed and interest rates are at the ZLB, the effects of law on aggregate demand should be a factor in making legal policy. Laws that promote spending become more attractive relative to other laws when the economy is constrained by the ZLB.

Law offers a hitherto unexplored means of responding to one of the central social problems of the day—secular stagnation in growth rates and labor force participation rates. Because the stakes in macroeconomics are so large (tens of trillions of dollars in Gross Domestic Product (GDP), ruined lives, social upheaval), it is worth pursuing law and macroeconomics even if it will be hard to implement.

An incredible amount of work remains, of course, in order to make law a plausible option for macroeconomic policy. I hope that this article has

furthered this project by providing a theoretical framework in which to examine the macroeconomic effects of any law and to focus those efforts on the times when they are most needed—when the economy is stuck below its potential output levels at the ZLB.

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