A Theory of Slack

How Economic Slack Shapes Markets, Business Cycles, and Policies

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CHAPTER 2.

Research on which this book is based

This book is based for the most part on research conducted during my PhD at the University of California–Berkeley between 2006 and 2010, under the supervision of George Akerlof and Yuriy Gorodnichenko, and after my PhD in collaboration with Emmanuel Saez. This chapter briefly summarizes that research and provides the key references.

2.1. Combining frictional and rationing unemployment

We had learned in first-year PhD courses that inflation and unemployment, tied together in the misery index, are the two main diseases affecting developed economies. I started working on inflation, because I was struck by the fact that seemingly tiny changes in the price of a baguette in France triggered such outrage from customers. But that project proved to be too challenging, so after a year I turned to unemployment. George's advice was to start reading *Equilibrium Unemployment Theory* by Christopher Pissarides (2000)—the gold standard on unemployment theory—and to see whether anything was missing from it.

The textbook introduces the matching model of the labor market. Early work on this model was conducted by Pissarides, together with Peter Diamond and Dale Mortensen, in the 1970s and 1980s, so the canonical version of the model is called the Diamond-Mortensen-Pissarides or DMP model. For their work, the three of them received the Nobel Prize in Economics in 2010.[1]

[1]Their notable papers include Diamond (1981), Diamond (1982b), Diamond (1982a), Mortensen (1977), Mortensen (1978), Mortensen (1982b), Mortensen (1982a), Pissarides (1979), Pissarides (1984a), Pissarides

I wrote my PhD thesis based on this advice. The core ideas from the thesis were then published in the *American Economic Review* in 2012 (Michaillat 2012). This first paper introduces a model that features not only frictional unemployment—the modern approach to unemployment—but also rationing unemployment—the older approach to unemployment, in which firms might not want to create enough jobs for all workers who want to work. The main result of the paper is that in recessions, frictional unemployment is very small and most of unemployment is accounted for by job rationing—that is, by a lack of jobs.

The AER paper introduces one of the book's key ideas: that a matching structure allows us to bridge the gap between older, Keynesian theories that emphasize the role of demand in macroeconomics and modern theories that emphasize the role of supply. In doing so, the book offers a model that accounts for both demand-side and supply-side factors simultaneously, and that can be used to analyze both demand-side and supply-side policies, as well as policies influencing both supply and demand simultaneously. This idea is found throughout the book, but a streamlined version of labor market model from the AER paper is presented in chapter 10.

A second idea in the paper, which is also an important part of the book, is that matching models are well suited to accommodate realistic, somewhat rigid price and wage norms, and that such price and wage rigidity generates realistic business cycle fluctuations. That idea was developed by Hall (2005), which showed that fixed wages are compatible with bilateral efficiency in matching models, and that with fixed wages labor market matching models generate realistic labor market fluctuations, thus solving the puzzle described by Shimer (2005). A further insight from Blanchard and Gali (2010) is that in fact, wages don't have to be fixed: they can simply be a rigid function of productivity, or of any model parameters. In the real world, very few prices are determined at auction, as the Walrasian model assumes. Instead, most sellers and buyers are engaged in repeated, long-term relationships where norms of fairness matter a great deal. In a paper with Erik Eyster and Kristof Madarasz, that stemmed from but greatly developed and improved the baguette project, we document and model these norms and pricing in these conditions (Eyster, Madarasz, and Michaillat 2021). The book does not use the pricing model developed there, but many of the ideas and facts documented there are used to build realistic price norms in the book, and especially in chapter 6.

Towards the end of my PhD thesis, I stumbled on an interesting property of the matching model with job rationing: it is highly state dependent, in that it operates very differently in booms and slumps. As a result some policies are systematically more effective when the economy is slack, while other policies are systematically more effective when the economy is tight. This result was published in the *American Economic Journal: Macroeco-*

(1984b), Pissarides (1985), Pissarides (1986), and Mortensen and Pissarides (1994).

nomics in 2014 (Michaillat 2014). The state dependence is present throughout the book in various contexts, but especially in chapter 8, where general results of state dependence are obtained, and in chapter 17, where state dependence generates the cyclicality of fiscal multipliers.

2.2. Assessing unemployment insurance extensions

I went on the job market in 2009–2010, in the aftermath of the Great Recession. One of the big policy questions at the time was whether to make unemployment insurance more generous. Emmanuel Saez attended a mock job talk that I gave in December 2009, thought that the model that I had developed in my thesis could be helpful to think about the question, and reached out to see if I wanted to collaborate with him and Camille Landais, who was doing a postdoc at Berkeley at the time, on a project to determine how unemployment insurance should vary over the business cycle. The reason why the model was promising is that public finance only took into account supply-side factors—how unemployment insurance affected job search—but did not have the tools to also include demand-side factors—the number of workers that firms are willing to hire. The key idea was that if firms do not want to hire more workers, then searching more for jobs will only result in a giant rat race, but not additional employment, which would severely reduce the purported social cost of higher unemployment insurance and make an unemployment insurance extension in bad times more desirable.

So in summer 2010, Camille, Emmanuel, and I started working on the following question: how should the generosity of unemployment insurance respond to unemployment fluctuations? We found that in the presence of job rationing, optimal unemployment insurance is more generous than the conventional Baily (1978)-Chetty (2006) level when the labor market is inefficiently slack and below it when the labor market is inefficiently tight. We also show how to identify empirically the presence of job rationing: there is job rationing if and only if the macro effect of unemployment insurance on employment is less than its micro effect. We collect evidence of the presence of job rationing in the US labor market. The implication is that unemployment insurance should be more generous in bad times than in good times—as it is in practice in the United States. The project was finally published in 2018, in a pair of papers in the *American Economic Journal: Economic Policy* (Landais, Michaillat, and Saez 2018b,a). This analysis of optimal unemployment insurance is discussed in chapter 11.

The AEJ papers aimed to bridge the gap between macroeconomics and public economics by proposing a transparent model for policy analysis and by deriving optimal policy formulas in sufficient statistics. Macroeconomics and public economics were in close contact in the 1950s and 1960s but drifted apart after that. Public economics developed powerful and transparent methods to study optimal policy: the sufficient-statistics

approach (Chetty 2009; Kleven 2021). Emmanuel's own job market paper played a central role in the shift towards sufficient statistics (Saez 2001). The idea of sufficient statistics is to describe optimal policy with formulas expressed in terms of statistics that are directly measurable (unlike model parameters) and that apply across a range of models (not just a specific model). Sufficient statistics make the policy tradeoffs clear and rooted in empirical evidence. But public economics limited itself mostly to micropolicy questions. Macroeconomics studied macropolicies but in a clunky, structural way that kept the policy tradeoffs and mechanisms obscure. This is because the results often rely on the specific model used, and on the specific values of parameters that are not directly observable. The AEJ papers brought sufficient statistics to macropolicy design, and this book continues to follow this methodology, especially in part IV.

2.3. Modeling aggregate demand and product-market slack

Despite the difficulties encountered in our project on unemployment insurance, Emmanuel and I decided to keep working together with the framework. A natural question that arose is why labor demand is sometimes high and sometimes low. In the labor market model from my thesis, which we then used in our unemployment insurance project, fluctuations in labor productivity lead to fluctuations in labor demand. This is just the same as in the DMP model. But in reality, labor productivity is unlikely to be the main driver of business cycles. Surely aggregate demand fluctuations, stemming from changes in monetary policy or animal spirits, are bound to influence labor demand. The question is therefore how to connect aggregate demand to labor demand.

The answer, it turns out, is slack on the product market. Unemployment is the most studied form of slack but slack also exists on the product market: firms are always looking for customers to buy their products and services. We generalize the approach to a model with both the product market and the labor market. The resulting model of unemployment incorporates the three traditional types of unemployment—Keynesian, classical, and frictional. Unemployment has a Keynesian component because it depends on how easy or difficult it is for firms to sell their goods. It has a classical component because it depends on the real wage. And it has a frictional component because it depends on how costly it is for firms to recruit workers. This work was published in the *Quarterly Journal of Economics* in 2015 Michaillat and Saez (2015), and is covered in chapter 13.

While our 2015 paper offers a simple model that is useful to understand why slack exists and how slack on the different markets interact, it is static so cannot be used to think about interest rates, which inherently involve dynamic savings decisions. And interest rates are the tool used by central banks to stabilize the economy in modern times. So, Emmanuel and I next developed a dynamic model and inserted interest rates into it. In this monetary model, unemployment is determined by the intersection of an aggregate-demand curve,

stemming from households' consumption-saving decisions, and an aggregate-supply curve, corresponding to the Beveridge curve. Monetary policy influences the real interest rate, which is a key determinant of the aggregate-demand curve, so monetary policy can be used to stabilize the economy. This work was published in the *Oxford Economic Papers* in 2022 Michaillat and Saez (2022). The model is covered in chapter 12 and the implications for monetary policy are covered in chapter 16.

2.4. Great Recession questions: zero lower bound and stimulus spending

One of the challenges that we faced in developing the OEP paper was how to build a nondegenerate aggregate demand curve. By nondegenerate I mean an aggregate demand curve that is downward-sloping, just like the old IS curve, and that can be used to study a monetary model at the zero lower bound or away from it, without requiring any specific monetary rules. The standard aggregate demand, arising from a standard Euler equation, actually fails these requirements, because it is perfectly price elastic: it only tolerates a real interest rates equal to the time discount factor.

We discovered that it was possible to obtain a nondegenerate aggregate demand curve by assuming that people had wealth in their utility function. The justification for the assumption is that wealth is a marker of social status, and people value high social status. Thanks to this assumption, the model featured a nondegenerate aggregate demand curve. In particular, the model behaved well at the zero lower bound, even if the zero lower bound episode was very long lasting, just like in the aftermath of the Great Recession in the United States and Europe.

The assumption of wealth in the utility function is extremely useful to produce a well-behaved aggregate demand curve, and is used for that reason throughout part III and part IV. That assumption had been used sporadically since the 1960s in various macroeconomic contexts, especially to understand long-run growth, saving behavior, and financial patterns.[2] But it had not been used in business cycle models, especially in combination with a slackish framework, so we could not publish the paper until 2022, although we wrote it in 2014.

What we did manage to publish was a related paper that showed that the wealth-in-the-utility assumption resolved all the anomalies that appear in the New Keynesian model at the zero lower bound—especially when the zero-lower-bound episode is long-lasting, such as after the Great Recession. The paper appeared in the *Review of Economics and Statistics* in 2021 (Michaillat and Saez 2021b). Indeed, with wealth in the utility function, the New Keynesian model does not predict a collapse of output and inflation at the zero lower

[2] See for instance Kurz (1968), Konrad (1992), Cole, Mailath, and Postlewaite (1992), Zou (1994), Bakshi and Chen (1996), Corneo and Jeanne (1997), Futagami and Shibata (1998), Carroll (2000), Gong and Zou (2002), Fisher and Hof (2005), and Kumhof, Ranciere, and Winant (2015).

bound. Moreover, the predicted effects of government spending and forward guidance are bounded and reasonable. In chapter 14 we use the phase-diagram approach developed in the REStat paper to analyze forward guidance in the slackish model with a Phillips curve. We find that thanks to the wealth-in-the-utility assumption, the effects of forward guidance are reasonable, and in fact dissipate as the zero-lower-bound episode lasts an increasingly long time.[3]

When monetary policy is constrained by the zero lower bound—as during the Great Depression and the Great Recession—the Federal Reserve is not able to stabilize the unemployment rate to its efficient level. In that case, monetary policy is ineffective, but government spending can be used to stabilize unemployment. This is why the US government designed a large stimulus package during the Great Recession. But it was unclear at the time how large that stimulus package should be, because there was no framework to answer such a question.

The policy debate motivated Emmanuel and I to study optimal stimulus spending when there is unemployment, and in particular unemployment is inefficiently high. Public economics studied the optimal provision of public goods in normal times (Samuelson 1954). Macroeconomics focused on the size of government multipliers, whether it was affected by the zero lower bound or the amount of unemployment, but not the optimal amount of government spending (for instance, Christiano, Eichenbaum, and Rebelo 2011; Ramey 2011; Auerbach and Gorodnichenko 2012; Michaillat 2014). Using a sufficient-statistics approach again, we found that optimal government spending deviates from the Samuelson rule to reduce, but not eliminate, the unemployment gap. The amplitude of the deviation depends on three sufficient statistics: the unemployment gap, the fiscal multiplier, and the elasticity of substitution between public and private goods. These results were published by the *Review of Economic Studies* in 2019, and are covered in chapter 17.

2.5. Measuring the unemployment gap

In the model of slack, unlike in neoclassical models, there is no guarantee of efficiency. Since the amount of slack is generally inefficient, there is generally a role for policy to stabilize the economy. In fact, as our work on unemployment insurance and stimulus spending shows, optimal policies depend critically on whether the current unemployment

[3] Once wealth enters the utility function, however, the Euler equation is "discounted", in the sense of McKay, Nakamura, and Steinsson (2017). People now save partly because they enjoy holding wealth; this is a present consideration, which does not require them to look into the future. As people are less forward-looking, their consumption responds less to interest rates, which creates discounting. With enough marginal utility of wealth, the discounting is strong enough to resolve the forward-guidance puzzle that otherwise appears in the New Keynesian model (Del Negro, Giannoni, and Patterson 2023). Several other New Keynesian models have used discounted Euler equations to solve the forward-guidance puzzle. See for instance McKay, Nakamura, and Steinsson (2016), Angeletos and Lian (2018), Campbell et al. (2017), Gabaix (2020), and Del Negro, Giannoni, and Patterson (2023).

rate is above or below the socially efficient unemployment rate. The issue at that point to implement all these policies is that we did not know what the efficient unemployment rate, often denoted u^*, was.

So our next project was to develop a measure of the socially efficient unemployment rate and of the unemployment gap. We find that the socially efficient unemployment rate depends on the current unemployment and vacancy rates, and three sufficient statistics: the cost of recruiting workers, the social value of nonwork, and the elasticity of the Beveridge curve. When we apply the measure to the United States, we find that the unemployment gap is generally positive, and it is sharply countercyclical. This means that the US labor market is generally inefficient and especially inefficiently slack in slumps. This also means—going back to the REStud paper—that government spending should be countercyclical. This project was published by the open-access outlet of the *Journal of Public Economics* in 2021 (Michaillat and Saez 2021a). The results are covered in chapter 9.

In the course of our work on the JPubE paper, Emmanuel and I uncovered that in the United States, servicing a vacancy requires about one worker, home production by jobseekers is almost nonexistent, and the US Beveridge curve is close to a rectangular hyperbola. As a result, our formula for the efficient unemployment rate u^* can be simplified greatly to $u^* = \sqrt{uv}$. The value u^* also measures the full-employment rate of unemployment (FERU), because legal texts define full employment as the amount of employment maximizing social welfare. We also find that since 1929—so for almost a century, since the Great Depression—the US economy has generally been inefficiently slack. In other words, the US economy has generally operated short of full employment. These results were published by the *Brookings Papers on Economic Activity* in 2024 (Michaillat and Saez 2024b). They are presented in chapter 15.

2.6. Post-pandemic questions: inflation, immigration, next recession

A lot of the work in the book was motivated by the significant slack that appeared in the US economy after the Great Recession and during its long recovery. The recovery of the pandemic recession of 2020, by contrast, was fast and led to significant tightness in the US labor market. In fact the US labor market had not experienced such tight conditions since the end of World War 2. These tight conditions led to new questions.

The first is whether the inefficient tightness experienced on the US labor market could explain the high inflation experienced at the same time, and if so through which mechanism. Until then Emmanuel and I had stuck to rigid inflation rules because inflation had remained exceedingly stable in the thirty years prior to the pandemic. But the inflation spike after the pandemic pushed us to study how slack and inflation could be connected. We propose a new theory of the Phillips curve that directly connects the unemployment gap to inflation, and which predicts that inflation is above its target any time that the economy

is inefficiently tight—in line with the evidence unearthed by Benigno and Eggertsson (2023). This work was circulated on arXiv (Michaillat and Saez 2024a) and is described in chapter 14.

A second question that arose during the post-pandemic overheating is whether there were other policies beside cutting aggregate demand that could help. Naturally, another policy that can help stabilize the economy is to expand aggregate supply via immigration. I find that immigration indeed reduces labor market tightness, and that the effect of immigration on tightness and unemployment depends on the state of the labor market. In particular, when the labor market becomes slacker, native workers are more negatively impacted by immigration, as the competition for jobs is fiercer. I also argue that while immigration has a negative effect on native workers because it increases their unemployment rate, it has a positive effect on native firms because it makes it easier for them to recruit—explaining why immigration is such a polarizing topic. This work on immigration was circulated on arXiv (Michaillat 2024) and is discussed in chapters 10 and 12.

Finally, after labor market tightness peaked in 2022, the US labor market cooled fairly rapidly in 2023–2025. This naturally led to the question: Has a new recession started? The JPubE and BPEA papers show that the combination of vacancy and unemployment data is useful to compute the FERU and unemployment gap in real time. But it turns out that these data are very useful to detect recessions in real time too. Indeed, Crump, Giannone, and Lucca (2020a,b) show that unemployment data, combined with simple threshold rules, provide a more reliable signal of US recessions than other detection methods—especially those based on the gross domestic product (GDP).[4] The logic behind unemployment-threshold rules is simple: unemployment always goes up in recessions, so a recession can be detected when the unemployment rate increases sharply.

However, the unemployment rate is only a noisy measure of the latent state of the labor market. Another measure is the vacancy rate, as recessions feature not only an increase in the unemployment rate but also a decline in the vacancy rate as the economy moves along the Beveridge curve. Therefore, by combining data on unemployment and job vacancies, we obtain a recession indicator that is less noisy than unemployment-based indicators. Thanks to the reduced noisiness, the detection threshold can be lowered once both unemployment and vacancy data are used. The rule that we construct (Michez rule) detects recessions faster than the popular Sahm (2019) rule: with an average delay of 1.2 months instead of 2.7 months, and a maximum delay of 3 months instead of 7 months. It is also more robust: it identifies the 15 recessions that occurred since 1929 without false positives, while the Sahm rule fails before 1960. This work was published by the *Oxford Bulletin of Economics and Statistics* in 2025 (Michaillat and Saez 2025).

While the Sahm rule, Michez rule, and other threshold rules choose their thresholds

[4] For examples of threshold rules based on unemployment data, see Schannep (2008), Hatzius and Stehn (2012), Sahm (2019), and Sun, Feng, and Hu (2021).

optimally, they filter the data in an arbitrary way. As such, they may not extract the most information possible from unemployment and vacancy data. To address this issue, I developed a method to optimize how recession classifiers are constructed—to extract the most information possible from labor market data. By optimally filtering the data and selecting the threshold, recessions can be detected even more rapidly and accurately than with the Michez or Sahm rule. This method identifies a collection of recession rules along an anticipation-precision frontier, and in chapter 18, I present one of these optimal rule. The rule presented here (Michez+ rule) is optimal—in that it lies on the anticipation-precision frontier—and is simple to construct. This work on the anticipation-precision frontier was circulated on arXiv (Michaillat 2025).

2.7. So what is new in this book?

Readers familiar with my research papers will recognize some of the elements of the slackish model and policy analysis. This book, however, is not a simple collection of those papers. It aims to provide a treatment that is more comprehensive and, in doing so, offers a more complete statement of the theory than is possible in individual papers.

First, the book offers a unified and systematic treatment of the material. Whereas individual papers necessarily focus on specific questions in isolation, the book integrates the research into a single, coherent framework. All the models and policies are presented and analyzed with a consistent notation and methodology, showing how the various pieces of the argument connect to form a whole.

Second, the book provides a more extensive empirical grounding. It aggregates evidence from numerous sources and constructs and analyzes consistent, historical data series for the United States. This allows for a comprehensive empirical assessment of the slackish framework that spans nearly a century of economic data.

Third, the book systematically relates the slackish framework to the main paradigms in macroeconomics. We draw explicit comparisons to the General Disequilibrium, Real Business Cycle, and New Keynesian models to delineate precisely where the assumptions and predictions differ. This clarifies how the slackish model provides a different lens through which we can look at short-run fluctuations and rethink the appropriate design of stabilization policies.

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