

# **A Theory of Slack**

## **How Economic Slack Shapes Markets, Business Cycles, and Policies**

Pascal Michailat

Draft version: April 2026

Draft URL: [pascalmichailat.org/18/](https://pascalmichailat.org/18/)

21	OPPORTUNITIES FOR FUTURE RESEARCH	3
21.1	Prevalence of slack in other countries . . . . .	3
21.2	Applying the theory of slack to other countries . . . . .	6
21.3	Collecting better evidence on slack . . . . .	9
21.4	Developing the theory of slack further . . . . .	13
21.5	What causes business cycles? . . . . .	17
	BIBLIOGRAPHY	19

## **CHAPTER 21.**

# **Opportunities for future research**

This book has presented evidence that slack is ubiquitous in the US economy and developed a slackish model of markets and business cycles based on the evidence. There is still a lot that we do not understand about slack, however, and many promising avenues for research. In this chapter we briefly map possible paths for productive future research on slack. We also point to early and ongoing work on slack, including exploratory contributions, in the hope of signaling promising research directions and highlighting existing projects. We discuss how slack could help us better understand development and business cycles in other countries, and how slack could be measured and modeled better.

### **21.1. Prevalence of slack in other countries**

The United States is seen as the paragon of competition and free markets; yet, as we saw, most US markets are actually slackish. This means that the markets feature unsold goods and services, and they equilibrate via tightness while prices are determined by norms. In this section we argue that other countries are likely to be at least as slackish as the United States, which implies the book's theory of slack might be useful there too.

#### **21.1.1. Labor market slack in other countries**

Unemployment is a universal problem, found on all labor markets (Feldmann 2009, table 1). This is why it's so important to study it and include it into our models and into policymaking.

Unemployment is of course present throughout the developed world (Elsby, Hobijn, and Sahin 2013). The Beveridge curve is more or less visible in all these countries (Elsby, Michaels, and Ratner 2015).

Unemployment is also prevalent in developing countries (O’Higgins 2003, figure 11). Although developing countries might not have more unemployment than developed countries, they experience a much higher share of self-employment (Poschke 2025, figure 1). And self-employment appears to be a mild form of unemployment in these countries, as workers choose self-employment primarily because they face unemployment in the formal sector (Breza, Kaur, and Shamdasani 2021). Developing countries also experience a significant amount of casual employment, which resembles in many ways self-employment. In India for instance, as of 2019, 72% of total employment was in the informal sector: 50% in self-employment and 22% in casual employment (Das et al. 2025, figure 1).

The psychological cost of unemployment has also been confirmed in other developed countries. Just like in the United States, unemployed workers in the United Kingdom suffer from low mental well-being (Clark and Oswald 1994; Blanchflower and Oswald 2004). And they are much more likely to be anxious and depressed and to suffer from low self-esteem—even compared to workers in low-pay jobs (Theodossiou 1998). A typical concern about studies linking unemployment to poor health is that they might not be able to separate between causality (unemployment causes poor health) and selection (people in poor health are more likely to become unemployed). But panel data, following workers over time, are able to identify the causal effect of unemployment on health. For instance, using a large, representative panel dataset of German workers, Winkelmann and Winkelmann (1998) find that unemployment reduces life satisfaction and that the nonpecuniary cost of unemployment is much larger than the pecuniary cost. Using the same panel dataset, Lucas et al. (2004) find that people do not get used to becoming unemployed: workers who have already lost jobs in the past react as badly to a new spell of unemployment as workers who are becoming unemployed for the first time.

Unemployment also appears to have extremely high psychosocial costs in the developing world. A field experiment by Hussam et al. (2022) in Bangladesh illustrates just how large the psychosocial cost of unemployment is. The experiment shows that paid employment raises psychosocial well-being substantially more than the same amount of cash alone. In fact, two-thirds of the workers who were employed in the experiment would be willing to forgo cash payments and continue working for free.

### **21.1.2. Product market slack in other countries**

Slack is also present in product markets all over the world, and probably even more in developing countries than in developed countries, so the slackish framework might be especially useful there. Walker et al. (2024, figure 1) provide evidence of slack in firms

across the globe, and argue that rates of slack are higher in low-income countries. They also provide specific survey evidence for urban and rural Kenyan firms, which shows widespread product market slack.

A visible source of product market slack is wasted food. UN Environment Programme (2021) documents that food unsold by grocery stores and restaurants generates a significant amount of food waste across the globe. Brancoli (2021) provides a specific example: he explains why bread remains unsold at grocery stores in Sweden and documents how this generates food waste.

Another element suggesting that product market slack is prevalent globally is that sellers strive to form long-term relationships with buyers in all countries. For example, 70% of firms in the Euro area have long-term relationships with their customers Fabiani et al. (2006, table B3). Firms in developing countries also appear to rely heavily on long-term relationships to operate. Macchiavello (2022, p. 340) reviews a wide range of evidence and concludes that in developing countries:

Many—and perhaps most—transactions between firms occur in long-term relationships rather than in spot markets, as typically theorized in economic models.

Long-term customer relationships are governed by implicit contracts that alleviate matching problems, as I found in a survey of French bakers in the summer of 2007.<sup>1</sup> First, customer relationships alleviate the uncertainty associated with random demand. A baker told me that demand is difficult to predict and that having a large clientele of loyal customers who make it a habit to purchase bread in the shop was therefore important. In fact, “good” customers are expected to come every day to the bakery. Customer relationships also alleviate the uncertainty associated with random supply. Being a customer means having the assurance that your usual bread will be available, even on days when supply runs low. Of course, this is possible because bakers know exactly what customers order every day through their long association. A baker told me that it would be “unacceptable” to run out of bread for a customer, and that customers would probably “leave the bakery” if that happened.

### **21.1.3. Price and wage rigidities in other countries**

Finally, the rigidities in prices and wages used in the book’s model also appear in other countries, which makes a framework with rigid price and wage norms particularly applicable.

Indeed, across the globe, prices and wages do not appear to be fully responsive to shocks. Administrative data and household surveys across 16 Western countries show that

---

<sup>1</sup>The survey is described in Eyster, Madarasz, and Michailat (2021).

wages are fairly rigid (Dickens et al. 2007). Wage rigidity is also prevalent in developing countries (Kaur 2019). Large-scale firm surveys show that prices are quite rigid throughout the Euro area (Fabiani et al. 2006). Given such rigidities, we expect fluctuations in slack to be substantial—because adjustments in slack are required to equilibrate supply and demand when prices are rigid.

We argued that price and wage rigidities might be caused by fairness concerns, and we provided evidence from the United States. But there is substantial evidence that people in other countries also care about fairness: Frey and Pommerehne (1993) provides evidence from Switzerland and Germany, Gielissen, Dutilh, and Graafland (2008) from the Netherlands, Boycko and Shiller (2016) from Russia, and Snir et al. (2024) from Israel. Firms across the globe also identify fairness as a major concern in price setting. Researchers have surveyed more than 12,000 firms across developed economies about their pricing practices; among the theories that the managers deem most important in explaining price rigidity, some version of “being fair to customers” invariably appears (Eyster, Madarasz, and Michailat 2021, tables 1 and 2).

## **21.2. Applying the theory of slack to other countries**

In this book we motivated the assumptions of the theory of slack based on US evidence, we calibrated the models to the US economy, and applied the theory to US policies. But, as unemployment and slack exist in every country, this book’s theory should be helpful in other countries too, to understand how markets operate, how business cycles affect the economy, and how policies can be used to improve market outcomes.

### **21.2.1. Labor market policies in other countries**

The slackish labor market model developed in this book, incorporating job rationing within a realistic framework with labor flows, has already been helpful to understand the effects of various policies in several European countries: for example, in France (Crepon et al. 2013), in Austria (Lalive, Landais, and Zweimuller 2015), and in Sweden (Cheung et al. 2025). It might be helpful to study other policies in comparable labor markets.

The model might also be helpful to understand developing economies and design appropriate policies to combat poverty and foster development, and thus to provide more fulfilling lives to workers worldwide. Indeed, although developing countries see large flows of workers on the labor market (Donovan, Lu, and Schoellman 2023), job rationing in the formal sector is prevalent (Breza, Kaur, and Shamdasani 2021). The model implies for instance that policies that stimulate labor demand, such as public employment, might reduce unemployment effectively. Public employment might be especially potent in slack labor markets, when it crowds out private employment less. The theory for

instance provides support for India's public work program, the National Rural Employment Guarantee Act, and suggests that the program might be especially effective in slack local labor markets, just as Breza, Kaur, and Shamdasani (2021, section 8) find.

### **21.2.2. Business cycle shocks in other countries**

In the book we find that US business cycles are mostly driven by aggregate demand shocks. It would be interesting to assess if this conclusion holds in other countries. Because we reached that conclusion by looking at Okun's law, a first step would be to ascertain whether Okun's law holds in other countries. Ball, Leigh, and Loungani (2017) show that it holds in a number of developed economies, which suggests that aggregate demand shocks also play a central role there. The slackish business cycle model might therefore be useful in all these economies, as it features aggregate demand shocks that are nonneutral and produce meaningful fluctuations.

It might also be valuable to leverage more slack data and more sophisticated techniques to identify the sources of business cycles in the United States and other countries. Silva and Urias (2025) take a step in that direction: they use sophisticated macroeconomic techniques and sectoral data on slack to isolate the sources of business cycle shocks in US data. They confirm that US business cycles are mostly driven by aggregate demand shocks. Such a data-rich, sectoral approach might be useful in other countries too.

A related task is to use slack data to obtain better measures of total factor productivity, purified from fluctuations in slack. Although total factor productivity might not be an important driver of business cycles, it is of course the primary driver of economic growth, so measuring it well is important to understand long-run development. As we discussed, measuring total factor productivity accurately requires to measure slack accurately and to properly separate fluctuations in slack from fluctuations in total factor productivity—as both enter fluctuations in measured productivity. Silva and Urias (2025) and Gantert (2025a) collect data and develop techniques to do that.

### **21.2.3. FERU in other countries**

As the slackish framework developed in the book is likely to be applicable in other countries, the policy tools introduced in the book should also be applicable beyond the United States. Many countries have a full-employment mandate, but no clear full-employment target. Computing the FERU in these countries would be helpful to guide policymakers towards full employment.

Unemployment rate, vacancy rate, and labor market tightness can be computed in other countries in which data on the number of job seekers, number of job vacancies, and number of labor force participants are available. From this the FERU formula  $u^* = \sqrt{uv}$

can be applied. And from it it would be possible to compute the unemployment gap  $u - u^*$ . For instance, Gokten, Heimberger, and Lichtenberger (2024) apply the formula to Germany, Sweden, Austria, Finland, and the United Kingdom, and analyze the evolution of the unemployment gap in these countries since the 1970s. Moving forward, the real-time unemployment gaps could be used to adjust monetary and fiscal policy in response to shocks in these countries, as described in the book.

However, the FERU formula does require assumptions on the cost of unemployment, the cost of recruiting, and the shape of the Beveridge curve. In countries in which these statistics take different values than in the United States, the FERU must be computed from a more general formula. The shape of the Beveridge curve is particularly likely to differ across countries (Gaddnas and Keranen 2023, table 1). In that case, it is necessary to use the generalized formula for the efficient labor market tightness and adjust the calibration of the parameters. Gaddnas and Keranen (2023) take a step in that direction and compute the FERU in Finland, Sweden, Germany, and the Netherlands using country-specific Beveridge elasticities.

It would also be possible to compute the FERU and unemployment gap in subnational regions when the data are available. For instance, Germain (2024) compute the FERU in Belgium's three regions—Brussels, Flanders, and Wallonia—using region-specific Beveridge elasticities. Such region-specific unemployment gaps can be useful to tailor regional fiscal policies.

#### **21.2.4. Phillips curve in other countries**

In the book we build a slackish Phillips curve that links labor market tightness to inflation. We also show that the Phillips curve ensures that the divine coincidence holds: inflation is on target whenever the labor market is at full employment.

There is good evidence in favor of the slackish Phillips curve in the United States, and it would be fascinating to see whether the slackish Phillips curve holds in other countries too: Do we see that labor market tightness is a superior indicator of inflationary pressures? And do we see that when labor market tightness is at its efficient level, inflation is on target? Benigno and Eggertsson (2024) have started to explore these questions. They find similar patterns in other countries, but more research to confirm and expand these findings would be invaluable. A key empirical challenge here again is to find measures of job vacancies that are of good quality and that cover a sufficiently long period, to obtain a good measure of labor market tightness.

The slackish Phillips curve has also been observed in regional data in the United States (Gitti 2025). It would be interesting to see if it appears in regional data in other countries.

### **21.2.5. Detecting recessions in other countries**

The Michez+ recession indicator can also be computed for any country in which unemployment and vacancy data are available, but the recession threshold of 0.19pp will need to be recalibrated. In other countries, the recession indicator will take different values, and recessions will occur at different times, so the threshold will have to be recomputed to detect recessions as early and accurately as possible. It might also be possible to optimize how the unemployment and vacancy data are smoothed and combined to best detect recessions in other countries, using the method described in Michailat (2025).

The recession detection methodology might also be helpful to detect rapid changes in disaggregated labor markets—a direction that Sheppard (2025) investigates. Relatedly, it might be possible to combine information obtained in disaggregated labor markets to improve the detection of recessions in the aggregate labor market. For instance, Garimella, Jorda, and Singh (2025) develop a methodology to improve the detection of US recessions using state-level data. This type of methodology might be especially valuable for detecting aggregate recessions in regions composed of very heterogeneous, not necessarily synchronized subregions—the European Union would be one such example.

## **21.3. Collecting better evidence on slack**

Because standard macroeconomic theory has not focused on slack, statistical agencies have not systematically collected data on it—beyond unemployment. Rectifying this omission would greatly improve both theory and policy. In this section we discuss which type of data and evidence would be especially valuable to improve our understanding of slack in the United States and other countries, and to design better slack-based policies.

### **21.3.1. Data on labor market slack in the United States**

When we computed the full-employment rate of unemployment (FERU), we saw that a key statistic is the amount of man-hours devoted to recruiting by firms. There is little evidence on that, so we used the number of job vacancies reported by firms, together with an estimate of the amount of recruiting per vacancy, to infer the amount of recruiting at any point in time. This lack of evidence is not ideal to measure the FERU and unemployment gap in the past, but it could easily be remedied in the future. The BLS would only need to add one question to the Job Opening and Labor Turnover Survey. The recruiting cost could be measured every month by asking firms to report how many man-hours they devote to recruiting in addition to how many vacancies they are currently advertising. As part of the American Time Use Survey, the BLS already asks unemployed workers how many hours they spend every day searching for a job (Aguiar, Hurst, and Karabarbounis 2013). It should be easy to ask firms the same thing. Moving from job vacancies to recruiting

hours would improve the measurement of the unemployment gap and thus the conduct of stabilization policies.

Another key statistic that could influence the FERU is the social cost of unemployment. We have seen substantial evidence from sociology, psychology, public health, and medical science that unemployment is detrimental to physical and especially mental health. But few studies have been able to quantify the social cost of unemployment. One such study, by Borgschulte and Martorell (2018), uses administrative military data to estimate the value of nonwork relative to the value of work. It would be valuable to measure the social value of nonwork for other workers and in other datasets to confirm or refine the findings and ascertain more confidently the social cost of unemployment. Using a wonderful field experiment, Hussam et al. (2022) find dramatic psychosocial costs of unemployment in Bangladesh—to the point where many of the subjects were happier to work for some salary than remaining unemployed for the same amount of money. It would be interesting to see whether such findings also hold in the developed world.

### **21.3.2. Data on product market slack in the United States**

Data on product market slack are especially scarce in the United States. Given the importance of the issue, product market slack is not something that is well-measured or that the government tracks at all—probably because it is not part of standard macroeconomic theory. It would be valuable to collect more data on product market slack. It would be good to know how many goods remain unsold across the economy at a monthly frequency, and how many employees remain idle each month across the economy—waiting for customers to purchase their labor services.

It would also be good to know how many buyers there are for goods and services at any point in time, which would then allow us to measure product market tightness. Unlike on the labor market, where job vacancies are measured systematically, the desired amount of purchases on the product market is not recorded in any centralized dataset.

And while we have some idea of the cost of filling a job vacancy, there is very little data on the cost of visiting shops and filling help-wanted ads. Collecting some data on the matching cost on the product market would be very valuable—for instance, to calibrate the product market in the two-market business cycle model and to compute the efficient product market tightness.

### **21.3.3. Data on slack in other countries**

The most important form of slack is unemployment, so the most important statistic is the number of unemployed workers at any point in time. Developed countries now collect such data, but many developing countries still do not. It seems critical to start measuring unemployment in these countries to track and stabilize business cycle fluctuations.

One challenge is that many workers are self-employed in the developing world. To keep track of slack among the self-employed, we would need to measure the number of hours worked each week by these workers. The unemployment rate among the self-employed would be the share of the time that the self-employed are idle. Presumably the unemployment rate among self-employed workers will be larger than among workers employed in the formal sector—consistent with the idea that self-employment is an intermediate status between unemployment and formal employment, a form of disguised unemployment (Robinson 1936).

To assess the tightness of foreign labor markets, it would be key to collect monthly data on job vacancies. To assess the full-employment rate of unemployment, as well as the unemployment gap, it would be important to measure the amount of labor devoted to recruiting in these labor markets. At the minimum, vacancies can be translated into recruiters by assuming some constant number of recruiters per vacancy; but it would be even better to have direct, monthly measures of the number of recruiters.

Of course, in addition to data on slack in the labor market, it would be extremely instructive to measure slack on the product market abroad. This would require measuring the slack rate in firms, small and large, as the Institute for Supply Management (ISM) does in the United States. The ISM asks firms how much more they could produce, given their current capital stock and workforce and organization, if only they had more demand for their product. In the slackish framework, this is the ideal information to compute the slack rate in the product market.

By processing the content of major newspapers—about 20,000 news articles per month—Caldara, Iacoviello, and Yu (2026, figure 2) construct an index of shortage in the United States from 1900 to 2024. The index includes shortages of food, of energy, in the industrial sector, and on the labor market. What is fascinating is that the episodes of labor market shortage that they measure perfectly overlap with the episodes during which labor market tightness is inefficiently high: World War 2, the Korean War, the Vietnam War, and the post-pandemic period. This suggests that it might be possible to obtain accurate measures of tightness in the labor market and possibly in the product market by textual analysis of newspapers: this might a promising avenue to measure slack when government data are unavailable.

#### **21.3.4. Estimating the rigidity of prices and wages**

Finally, it would be valuable to use the large amount of price and wage data collected in the United States and abroad to estimate the rigidity of price and wage norms. This task would require redirecting current empirical efforts, which are guided by current theories but do not estimate the statistics that are crucial to calibrate slackish models.

A tremendous amount of individual price data are now available in many countries.

However, a lot of the empirical effort is devoted to estimating “the average frequency and size of price changes” (Dhyne et al. 2006). In the New Keynesian paradigm, it is central to know how frequently prices adjust. In the slackish model presented here, what is key is how strongly prices respond to shocks: what is the elasticity of prices with respect to underlying disturbances? In other words, what is the passthrough of shocks into prices? A lot of work is required to have a complete understanding of what the passthroughs are in different settings, and what influences them.

A similar comment applies to wages. A large amount of individual wage data have been collected in many countries, but a lot of the empirical effort is devoted to identifying downward nominal wage rigidity (Dickens et al. 2007). This is because Keynes (1936) postulated such rigidity was the main source of unemployment in recessions. But of course, if firms know that they won’t be able to cut wages, presumably they will be reluctant to raise them too. So logically, we would expect wages to be rigid in both directions, and in the slackish framework such rigidity explains business cycle fluctuations. What is key is how strongly real wages respond to shocks. In other words, what is key is the elasticity of real wages to shocks. Very few papers estimate such elasticity, so much more work is required to have a complete understanding of how wages respond to shocks in different circumstances.

### **21.3.5. Estimating the slack dependence of policy multipliers**

The slackish model is sharply state dependent. This implies that the effectiveness of policies varies sharply with the state of the economy. For example, in the case of the slackish labor market model, we saw that when the labor market is slacker, public employment reduces unemployment more effectively, in-migration raises unemployment more sharply, and unemployment insurance—although it continues to reduce job-search effort—raises unemployment less. In the case of the slackish business cycle model, we saw that when the economy is slacker, public spending and monetary policy reduce unemployment more effectively.

It would be interesting to investigate these predictions systematically, in the United States and other countries. This investigation would help designing better policies—because it would help understanding when certain policies are particularly effective. The investigation would also be useful to evaluate the theory of slack. Ghassibe and Zanetti (2022) show how to estimate slack-dependent fiscal multipliers in the United States, and Auerbach and Gorodnichenko (2013) show how to estimate state-dependent multipliers in numerous OECD countries. These papers offer promising starting points to estimate slack-dependent policy multipliers in the United States and abroad.

## **21.4. Developing the theory of slack further**

The theory of slack presented in the book captures essential mechanisms but remains deliberately stylized, leaving many natural extensions open for exploration. We discuss some extensions that might be especially fruitful here.

### **21.4.1. Microfounding the matching function**

The central tool used to model slackish markets is a matching function. We saw that there are standard forms for matching functions (urn-ball, Cobb-Douglas, constant-elasticity-of-substitution), and that there exist microfoundations for these standard forms. However, the microfoundations remain simple and specific to the labor market. More work on the foundations of matching functions in generic markets would be especially valuable.

It would also be helpful to use this foundational work to understand better the shifts of the Beveridge curve on the labor market. In a dynamic labor market model the location of the Beveridge curve is determined by the job-separation rate—which is observed—and the matching function. So understanding the microdeterminants of the labor market matching function would help understand the shifts of the Beveridge curve, and in turn the movements of the FERU. Typical shifts in the labor-market Beveridge curve do not affect the FERU much, but three large shifts over the past century had a sizable impact on the FERU—therefore on the unemployment target for the Federal Reserve. These three shifts happened during dramatic periods of US history: the Great Depression, World War 2, and the coronavirus pandemic. It is unsurprising that such dramatic events shifted the curve, but it would be good to understand how exactly that happened, and what the precise mechanism was.

### **21.4.2. Modeling the trickle-down from unemployment to underemployment**

In the book we assume that workers who cannot find jobs remain unemployed. This is essentially what happens in the United States: as we saw, when unemployment increases, there is not much trickle-down to involuntary part-time work. But in some other countries, the phenomenon appears much more important. For instance, in India, workers who cannot find jobs in the formal sector appear to trickle down to self-employment (Breza, Kaur, and Shamdasani 2021). In Japan, workers who could not find full-time jobs during its two lost decades appeared to trickle down to part-time employment (Hashimoto, Ono, and Schlegl 2023). In such situations, it would be valuable to have a slackish model with a primary labor market for full-time work, and a secondary labor market with self-employment or part-time opportunities. The challenge would be to model how workers who are unemployed in the primary market trickle down to the secondary market, and more generally the spillovers between the two markets. For this task, the models developed by Barnichon

and Zylberberg (2019) and Hashimoto, Ono, and Schlegl (2023) offer interesting starting points.

### **21.4.3. Modeling price norms**

In the models we have used fairly simple price and wage norms that were rigid. But we also saw that such rigidity is caused in large part by fairness concerns. Sellers do not want to charge prices that buyers find unfair, and firms do not want to pay wages that workers find unfair. It would be fruitful to incorporate more realistic price norms, built to mimic real-world fairness concerns, into the models. The concepts of fair wage developed by Akerlof (1980, 1982) and (Akerlof and Yellen 1990), as well as the concept of fair price developed by Eyster, Madarasz, and Michailat (2021), might be productive starting points.

Relatedly, it would be invaluable to have more estimates of the passthroughs of marginal costs and marginal valuations into prices, as well as estimates of the passthrough of marginal productivity into wages. Having estimates of these passthroughs would be very useful to calibrate price and wage norms more realistically.

### **21.4.4. Studying out-of-equilibrium dynamics**

When we considered dynamic markets, where trading relationships are formed and destroyed over time, we concentrated on the equilibrium of the market—where market flows are balanced so tightness, sales, and slack are constant. It would be interesting to study out-of-equilibrium dynamics too, for instance as Ahn and Crane (2020) do. We argued that on the US labor market out-of-equilibrium dynamics are fast, so unlikely to matter much, because labor market flows are large. But such dynamics may matter more on other US markets, or in other countries. For instance, labor market flows are much smaller in continental Europe than in the United States (Elsby, Hobijn, and Sahin 2013, table 4). So there it would be especially important to study and incorporate out-of-equilibrium market dynamics.

### **21.4.5. Modeling international trade**

An important aspect of the economy that is not discussed in the book but that could be included in the future is international trade. International trade fits well in the slackish framework: it takes time and effort for suppliers to find customers abroad, and it also takes a lot of effort and money for buyers to find producers abroad. The geographical, cultural, and legal distance makes it difficult to trade with buyers or sellers in another country—even more so in another continent (Egan and Mody 1992). It is because of these difficulties that sellers and buyers are keen to form long-lasting cross-country relationships (Egan and Mody 1992, table 3). The slackish framework might be helpful to model such trade

and its macroeconomic impact, for instance following the approaches taken by Drozd and Nosal (2012) and Bai et al. (2024).

#### **21.4.6. Modeling the housing market**

Another market where slack is well documented is the housing market. There is always slack on the US housing market: hundreds of thousands of houses for sale but not sold in any month (Realtor.com 2025a). Another manifestation of the slackishness of the housing market is that it takes time to sell a house: the median time that a house stays on the market is always above 1 month, and sometimes as high as 3 months (Realtor.com 2025b). At the same time, we know that the housing market plays a key role in shaping business cycles (Feldstein 2007; Leamer 2007). Integrating the housing market into the slackish business cycle framework might provide interesting insights. (Bianchi, McKay, and Mehrotra 2024) take a first step in that direction.

#### **21.4.7. Modeling networks and granularity**

Yet another interesting aspect of modern economies not covered in the book are production networks. Production networks are critical in understanding the modern production of goods and services, as well as the propagation of shocks through the economy (Acemoglu et al. 2012; Baqaee 2018; Baqaee and Farhi 2022). Relatedly, the granularity of modern economies is not taken into account, although it also plays a significant role in understanding fluctuations (Gabaix 2011). It might be fruitful to embed slackish markets into networks or granular structures so as to obtain even more realistic business cycle models. Schuele and Sheng (2024) and Ghassibe and Zanetti (2025) have started work in that direction.

#### **21.4.8. Modeling inventory**

When firms produce durable goods but face slack, they will generate unsold inventory. The framework in this book might be helpful to understand movement in inventories. Along these lines, den Haan and Sun (2024) explore how to explain the behavior of inventories using a matching function on the product market.

#### **21.4.9. Introducing capital**

The focus has been on short-run issues, namely business cycles. We have not explored at all how economic slack might help us understand long-run issues, such as economic development and growth. Because of this short-run focus, we have concentrated on labor as a factor of production. We have not paid much attention to capital as a factor of production. We have barely looked at data on capital goods, and we have not explicitly

modeled capital and related quantities, such as investment. Yet, capital also remains idle some of the time, and capital utilization varies over time (Gorodnichenko and Shapiro 2011). The slackish framework might be helpful to connect capital utilization and capital accumulation. Along these lines, Sun (2025) has developed an innovative model in which buyers match with firm capacity on the product market, and which interestingly predicts an over-accumulation of capital.

Moreover, slack in the form of low firm capacity utilization seems to be an important determinant of corporate investment (Grullon and Ikenberry 2025). The slackish framework developed in this book might be useful to think about these issues.

Finally, the market for capital goods is also slackish. Capital goods are very specialized, very complex, and often with unique characteristics, so they take time and effort to sell, and to buy: see for instance Gavazza (2011) in the case of commercial airplanes and Ramey and Shapiro (2001) in the case of aerospace equipment. The framework in the book might be helpful to understand trade in capital goods and slack in those markets. In this vein, Ottonello (2024) shows that a matching framework can help understand why capital goods remain unsold for significant periods.

#### **21.4.10. Introducing borrowing constraints and stronger heterogeneity**

The book shows how to introduce heterogeneous income and wealth in the slackish model. However, because there are no borrowing constraints, it is easy to aggregate the heterogeneity and solve the model. In the real world, heterogeneity matters because poorer people are more constrained than richer people, which affects how they consume and save. A rich literature has extended the New Keynesian model to account for such heterogeneity, and has shown how it affects the model's behavior and its policy implications (Auclert, Rognlie, and Straub 2025). It would be extremely interesting to introduce such heterogeneity in the slackish model. Because the model features unemployment, which is a major source of inequality in modern economies, the model seems well adapted to such extension. Along these lines, Kopiec (2022) explores the implications of heterogeneity on the effectiveness of fiscal policy in a slackish framework.

#### **21.4.11. Building a quantitative version of the model**

Finally, in the book we strove to develop a business-cycle model that is as economical as possible. But eventually, for many applications, especially for policy work, a more complex model will be required. It might be required to introduce several of the elements mentioned above, to introduce stochastic shocks and stochastic policies, and to simulate the dynamic behavior of the model. Such extension would aim to build a computational model that is accurate enough along sufficiently many dimensions to be useful to practitioners. Borys, Doligalski, and Kopiec (2021) take a first step in that direction by building,

estimating, and simulating a quantitative version of the slackish model in chapter 15. Gantert (2025b) develops and simulates a quantitative version of the slackish model in chapter 16.

### **21.5. What causes business cycles?**

Having seen how slack transmits aggregate demand shocks and how policy can mitigate them, the deeper question remains: what generates these demand shocks in the first place? As my students always ask when I take questions at the end of the first lecture of my course on unemployment: “But why does unemployment always spike up after reaching rock bottom?” That’s a great question: why do we perennially have business cycles?

In this book we saw how unemployment would go up and down in response to shocks to aggregate demand, producing realistic business cycles. We also argued that stabilization policy might not have been conducted perfectly, because it might have ignored unemployment fluctuations or might have overestimated the FERU and so might have tolerated more unemployment than it should have. So monetary and fiscal policy could possibly have done better and smoothed out more forcefully the waves of unemployment.

But it still remains to explain what these fluctuations in aggregate demand are, where they come from, and why they seem to endlessly reappear to trigger the next recession. It seems that each recession has its own story: the 2020 recession was caused by the coronavirus pandemic; the Great Recession of 2007–2009 coincided with the global financial crisis; the 2001 recession followed the burst of the dot-com bubble; the 1990–1991 recession followed the Iraqi invasion of Kuwait; the twin 1980–1982 recessions were caused by the tight monetary policy imposed by Volcker; the Great Depression in 1929–1933 was triggered by the stock market crash October 1929; and so on. In all these recessions the unemployment rate spiked. During the pandemic, it was probably unavoidable that a recession followed and unemployment spiked. But in all other cases, why did the events trigger a full-blown recession with a collapse in aggregate demand, why did similarly important global events not, and why are these downturns occurring like clockwork after periods of expansion and confidence? Is there an underlying reason explaining why some events repeatedly trigger sharp economic downturns?

There is no established answer to these questions, and much more work on it is warranted. One possibility is that some of the events unleash the “animal spirits” that lie dormant otherwise, as Keynes (1936, chapter 12) proposed:

Even apart from the instability due to speculation, there is the instability due to the characteristic of human nature that a large proportion of our positive activities depend on spontaneous optimism rather than on a mathematical expectation, whether moral or hedonistic or economic. Most, probably, of

our decisions to do something positive, the full consequences of which will be drawn out over many days to come, can only be taken as the result of animal spirits—a spontaneous urge to action rather than inaction, and not as the outcome of a weighted average of quantitative benefits multiplied by quantitative probabilities.

It might be that after periods of stability, the animal spirits always awaken and produce bubbles and then crashes. This could explain the dot-com recession and Great Depression (stock market bubbles), the Great Recession (housing market bubble), and maybe the next recession (bubble around artificial intelligence and cryptocurrency). Speculative manias, followed by financial crashes, have happened time and time again throughout history and around the world, driven by irrational exuberance from investors, and often exacerbated by fraudulent behavior.<sup>2</sup>

More generally, animal spirits might be an irrational fervor that drives economic decisions of crowds of people, as proposed by Akerlof and Shiller (2009). This fervor may follow certain events and not others, and when it is triggered, may lead to brash, large-scale reactions—consumers suddenly cutting spending and firms suddenly cutting hiring. The slackish model provides a natural way to formalize how these swings in collective optimism translate into real fluctuations in slack and output, and generate recessions and expansions.

Financial crashes often include collapses of the credit market. A prime example is the Great Depression, when the stock market crash triggered a banking crisis and a generalized collapse of the credit market, which deepened and lengthened the depression (Bernanke 1983). As such, it would be useful to append a credit market to the business cycle model proposed here. Of course credit markets are slackish too, so they should be modeled as such. Wasmer and Weil (2004) and Petrosky-Nadeau and Wasmer (2017) show how this could be done.

Lastly, the slackish model here has a unique solution determined by an aggregate-demand parameter, but that parameter might reflect the animal spirits. Another possibility is that the correct model of the business cycle has several solutions, and the animal spirits push the economy from one to the other solution over time. If one solution has low unemployment and the other has high unemployment, then periods of high and low unemployment will alternate—Howitt and McAfee (1992) propose a nice model in this vein.

---

<sup>2</sup>See for instance Akerlof and Romer (1993), Kindleberger and Alibert (2005), Shiller (2005), and Akerlof and Shiller (2015).

# Bibliography

- Acemoglu, Daron, Vasco M. Carvalho, Asuman Ozdaglar, and Alireza Tahbaz-Salehi. 2012. “The Network Origins of Aggregate Fluctuations.” *Econometrica* 80 (5): 1977–2016. <https://doi.org/10.3982/ecta9623>.
- Aguiar, Mark, Erik Hurst, and Loukas Karabarbounis. 2013. “Time Use during the Great Recession.” *American Economic Review* 103 (5): 1664–1696. <https://doi.org/10.1257/aer.103.5.1664>.
- Ahn, Hie Joo and Leland D. Crane. 2020. “Dynamic Beveridge Curve Accounting.” arXiv:2003.00033. <https://doi.org/10.48550/arXiv.2003.00033>.
- Akerlof, George A. 1980. “A Theory of Social Custom, of Which Unemployment May Be One Consequence.” *Quarterly Journal of Economics* 94 (4): 749–775. <https://doi.org/10.2307/1885667>.
- Akerlof, George A. 1982. “Labor Contracts as Partial Gift Exchange.” *Quarterly Journal of Economics* 97 (4): 543–569. <https://doi.org/10.2307/1885099>.
- Akerlof, George A. and Paul M. Romer. 1993. “Looting: The Economic Underworld of Bankruptcy for Profit.” *Brookings Papers on Economic Activity* 1993 (2): 1–73. <https://doi.org/10.2307/2534564>.
- Akerlof, George A. and Robert J. Shiller. 2009. *Animal Spirits: How Human Psychology Drives the Economy, and Why It Matters for Global Capitalism*. Princeton, NJ: Princeton University Press.
- Akerlof, George A. and Robert J. Shiller. 2015. *Phishing for Phools: The Economics of Manipulation and Deception*. Princeton, NJ: Princeton University Press.
- Akerlof, George A. and Janet L. Yellen. 1990. “The Fair Wage-Effort Hypothesis and Unemployment.” *Quarterly Journal of Economics* 105 (2): 255–283. <https://doi.org/10.2307/2937787>.
- Auclert, Adrien, Matthew Rognlie, and Ludwig Straub. 2025. “Fiscal and Monetary Policy with Heterogeneous Agents.” *Annual Review of Economics* 17: 539–562. <https://doi.org/10.1146/annurev-economics-091624-044646>.
- Auerbach, Alan J. and Yuriy Gorodnichenko. 2013. “Fiscal Multipliers in Recession and Expansion.” In *Fiscal Policy after the Financial Crisis*, edited by Alberto Alesina and Francesco Giavazzi, chap. 2. Chicago: University of Chicago Press. <https://www.nber.org/chapters/c12634>.
- Bai, Xiwen, Jesus Fernandez-Villaverde, Yiliang Li, and Francesco Zanetti. 2024. “The Causal Effects

- of Global Supply Chain Disruptions on Macroeconomic Outcomes: Evidence and Theory.” NBER Working Paper 32098. <https://doi.org/10.3386/w32098>.
- Ball, Laurence M., Daniel Leigh, and Prakash Loungani. 2017. “Okun’s Law: Fit at 50?” *Journal of Money, Credit and Banking* 49 (7): 1413–1441. <https://doi.org/10.1111/jmcb.12420>.
- Baqae, David. 2018. “Cascading Failures in Production Networks.” *Econometrica* 86 (5): 1819–1838. <https://doi.org/10.3982/ecta15280>.
- Baqae, David and Emmanuel Farhi. 2022. “Supply and Demand in Disaggregated Keynesian Economies with an Application to the COVID-19 Crisis.” *American Economic Review* 112 (5): 1397–1436. <https://doi.org/10.1257/aer.20201229>.
- Barnichon, Regis and Yanos Zylberberg. 2019. “Underemployment and the Trickle-Down of Unemployment.” *American Economic Journal: Macroeconomics* 11 (2): 40–78. <https://doi.org/10.1257/mac.20160220>.
- Benigno, Pierpaolo and Gauti B. Eggertsson. 2024. “The Slanted-L Phillips Curve.” *AEA Papers and Proceedings* 114: 84–89. <https://doi.org/10.1257/pandp.20241051>.
- Bernanke, Ben S. 1983. “Nonmonetary Effects of the Financial Crisis in the Propagation of the Great Depression.” *American Economic Review* 73 (3): 257–276. <https://www.jstor.org/stable/1808111>.
- Bianchi, Javier, Alisdair McKay, and Neil Mehrotra. 2024. “How Should Monetary Policy Respond to Housing Inflation?” <https://perma.cc/FHU9-K7YM>.
- Blanchflower, David G. and Andrew J. Oswald. 2004. “Well-Being Over Time in Britain and the USA.” *Journal of Public Economics* 88 (7–8): 1359–1386. [https://doi.org/10.1016/S0047-2727\(02\)00168-8](https://doi.org/10.1016/S0047-2727(02)00168-8).
- Borgschulte, Mark and Paco Martorell. 2018. “Paying to Avoid Recession: Using Reenlistment to Estimate the Cost of Unemployment.” *American Economic Journal: Applied Economics* 10 (3): 101–127. <https://doi.org/10.1257/app.20160257>.
- Borys, Pawel, Pawel Doligalski, and Pawel Kopiec. 2021. “The Quantitative Importance of Technology and Demand Shocks for Unemployment Fluctuations in a Shopping Economy.” *Economic Modelling* 101: 105527. <https://doi.org/10.1016/j.econmod.2021.105527>.
- Boycko, Maxim and Robert J. Shiller. 2016. “Popular Attitudes toward Markets and Democracy: Russia and United States Compared 25 Years Later.” *American Economic Review* 106 (5): 224–229. <https://doi.org/10.1257/aer.p20161066>.
- Brancoli, Pedro. 2021. *Prevention and valorisation of surplus bread at the supplier–retailer interface*. PhD thesis, University of Borås. <https://urn.kb.se/resolve?urn=urn%3Anbn%3Ase%3Ahb%3Adiva-26454>.
- Breza, Emily, Supreet Kaur, and Yogita Shamdasani. 2021. “Labor Rationing.” *American Economic Review* 111 (10): 3184–3224. <https://doi.org/10.1257/aer.20201385>.
- Caldara, Dario, Matteo Iacoviello, and David Yu. 2026. “Measuring Shortages since 1900.” <https://perma.cc/Q3K8-Z7QM>.
- Cheung, Maria, Johan Egebark, Anders Forslund, Lisa Laun, Magnus Rodin, and Johan Vikstrom. 2025. “Does Job Search Assistance Reduce Unemployment? Evidence on Displacement Effects and Mechanisms.” *Journal of Labor Economics* 43 (1): 47–81. <https://doi.org/10.1086/726384>.
- Clark, Andrew E. and A.J. Oswald. 1994. “Unhappiness and Unemployment.” *Economic Journal*

- 104 (424): 648–659. <https://doi.org/10.2307/2234639>.
- Crepon, Bruno, Esther Duflo, Marc Gurgand, Roland Rathelot, and Philippe Zamora. 2013. “Do Labor Market Policies Have Displacement Effect? Evidence from a Clustered Randomized Experiment.” *Quarterly Journal of Economics* 128 (2): 531–580. <https://doi.org/10.1093/qje/qjt001>.
- Das, Satadru, Chetan Ghate, Subhadeep Halder, Debojyoti Mazumder, Sreerupa Sengupta, and Satyarth Singh. 2025. “Monetary Policy and Informal Labor Markets.” CAMA Working Paper 47/2025. <https://perma.cc/E262-ZHVX>.
- den Haan, Wouter J. and Tiancheng Sun. 2024. “The Role of Sell Frictions for the Cyclical Behavior of Inventories.” <https://perma.cc/5WRD-MRVP>.
- Dhyne, Emmanuel, Luis J. Alvarez, Herve Le Bihan, Giovanni Veronese, Daniel Dias, Johannes Hoffmann, Nicole Jonker, Patrick Lunnemann, Fabio Rumler, and Jouko Vilmunen. 2006. “Price Changes in the Euro Area and the United States: Some Facts from Individual Consumer Price Data.” *Journal of Economic Perspectives* 20 (2): 171–192. <https://doi.org/10.1257/jep.20.2.171>.
- Dickens, William T., Lorenz Goette, Erica L. Groshen, Steinar Holden, Julian Messina, Mark E. Schweitzer, Jarkko Turunen, and Melanie E. Ward. 2007. “How Wages Change: Micro Evidence from the International Wage Flexibility Project.” *Journal of Economic Perspectives* 21 (2): 195–214. <https://doi.org/10.1257/jep.21.2.195>.
- Donovan, Kevin, Will Jianyu Lu, and Todd Schoellman. 2023. “Labor Market Dynamics and Development.” *Quarterly Journal of Economics* 138 (4): 2287–2325. <https://doi.org/10.1093/qje/qjad019>.
- Drozd, Lukasz A. and Jaromir B. Nosal. 2012. “Understanding International Prices: Customers as Capital.” *American Economic Review* 102 (1): 364–395. <https://doi.org/10.1257/aer.102.1.364>.
- Egan, Mary Lou and Ashoka Mody. 1992. “Buyer-Seller Links in Export Development.” *World Development* 20 (3): 321–334. [https://doi.org/10.1016/0305-750X\(92\)90027-S](https://doi.org/10.1016/0305-750X(92)90027-S).
- Elsby, Michael W. L., Bart Hobijn, and Aysegul Sahin. 2013. “Unemployment Dynamics in the OECD.” *Review of Economics and Statistics* 95 (2): 530–548. [https://doi.org/10.1162/rest\\_a\\_00277](https://doi.org/10.1162/rest_a_00277).
- Elsby, Michael W. L., Ryan Michaels, and David Ratner. 2015. “The Beveridge Curve: A Survey.” *Journal of Economic Literature* 53 (3): 571–630. <https://doi.org/10.1257/jel.53.3.571>.
- Eyster, Erik, Kristof Madarasz, and Pascal Michailat. 2021. “Pricing under Fairness Concerns.” *Journal of the European Economic Association* 19 (3): 1853–1898. <https://doi.org/10.1093/jeea/jvaa041>.
- Fabiani, Silvia, Martine Druant, Ignacio Hernando, Claudia Kwapil, Bettina Landau, Claire Louprias, Fernando Martins, Thomas Matha, Roberto Sabbatini, Harald Stahl, et al. 2006. “What Firms’ Surveys Tell Us about Price-Setting Behavior in the Euro Area.” *International Journal of Central Banking* 3 (2): 3–47. <https://perma.cc/F98Q-43CW>.
- Feldmann, Horst. 2009. “The Unemployment Effects of Labor Regulation Around the World.” *Journal of Comparative Economics* 37: 76–90. <https://doi.org/10.1016/j.jce.2008.10.001>.
- Feldstein, Martin S. 2007. “Housing, Credit Markets and the Business Cycle.” NBER Working Paper

13471. <https://doi.org/10.3386/w13471>.
- Frey, Bruno S. and Werner W. Pommerehne. 1993. "On the Fairness of Pricing—An Empirical Survey Among the General Population." *Journal of Economic Behavior & Organization* 20 (3): 295–307. [https://doi.org/10.1016/0167-2681\(93\)90027-M](https://doi.org/10.1016/0167-2681(93)90027-M).
- Gabaix, Xavier. 2011. "The Granular Origins of Aggregate Fluctuations." *Econometrica* 79 (3): 733–772. <https://doi.org/10.3982/ecta8769>.
- Gaddnas, Niklas and Henri Keranen. 2023. "Beveridgean Unemployment Gap in Finland." Background Report for the Finnish Economic Policy Council. <https://urn.fi/URN:NBN:fi-fe20231109144572>.
- Gantert, Konstantin. 2025a. "Revisiting TFP Fluctuations: The Role of Goods-Market Search and Time Allocation." <https://doi.org/10.2139/ssrn.5783883>.
- Gantert, Konstantin. 2025b. "Shopping Time and Frictional Goods Markets: Implications for the New-Keynesian Model." <https://doi.org/10.2139/ssrn.5440912>.
- Garimella, Rohit, Oscar Jorda, and Sanjay R. Singh. 2025. "Tracking Labor Market Stress." FRBSF Economic Letter 2025-19. <https://perma.cc/LXQ5-HSE4>.
- Gavazza, Alessandro. 2011. "The Role of Trading Frictions in Real Asset Markets." *American Economic Review* 101 (4): 1106–1143. <https://doi.org/10.1257/aer.101.4.1106>.
- Germain, Antoine. 2024. "Sommes-Nous au Plein Emploi en Belgique?" *Regards Economiques* 186. <https://perma.cc/Y46E-MYJ4>.
- Ghassibe, Mishel and Francesco Zanetti. 2022. "State Dependence of Fiscal Multipliers: The Source of Fluctuations Matters." *Journal of Monetary Economics* 132: 1–23. <https://doi.org/10.1016/j.jmoneco.2022.09.003>.
- Ghassibe, Mishel and Francesco Zanetti. 2025. "Keynesian Micromanagement." <https://perma.cc/B2YD-U68M>.
- Gielissen, Robert, Chris E. Dutilh, and Johan J. Graafland. 2008. "Perceptions of Price Fairness: An Empirical Research." *Business & Society* 47 (3): 370–389. <https://doi.org/10.1177/0007650308316937>.
- Gitti, Giulia. 2025. "Nonlinearities in the Regional Phillips Curve with Labor Market Tightness." <https://perma.cc/V7UM-MMAQ>.
- Gokten, Meryem, Philipp Heimberger, and Andreas Lichtenberger. 2024. "How Far from Full Employment? The European Unemployment Problem Revisited." *European Economic Review* 164: 104725. <https://doi.org/10.1016/j.euroecorev.2024.104725>.
- Gorodnichenko, Yuriy and Matthew Shapiro. 2011. "Using the Survey of Plant Capacity to Measure Capital Utilization." US Census Bureau Center for Economic Studies Paper 11-19. <https://doi.org/10.2139/ssrn.1879883>.
- Grullon, Gustavo and David L. Ikenberry. 2025. "Excess Capacity, Marginal  $q$ , and Corporate Investment." *Journal of Finance* 80 (3): 1533–1592. <https://doi.org/10.1111/jofi.13439>.
- Hashimoto, Ken-ichi, Yoshiyasu Ono, and Matthias Schlegl. 2023. "Structural Unemployment, Underemployment, and Secular Stagnation." *Journal of Economic Theory* 209: 105641. <https://doi.org/10.1016/j.jet.2023.105641>.
- Howitt, Peter and R. Preston McAfee. 1992. "Animal Spirits." *American Economic Review* 82 (3): 493–507. <https://www.jstor.org/stable/2117317>.
- Hussam, Reshmaan, Erin M. Kelley, Gregory Lane, and Fatima Zahra. 2022. "The Psychosocial

- Value of Employment: Evidence from a Refugee Camp.” *American Economic Review* 112 (11): 3694–3724. <https://doi.org/10.1257/aer.20211616>.
- Kaur, Supreet. 2019. “Nominal Wage Rigidity in Village Labor Markets.” *American Economic Review* 109 (10): 3585–3616. <https://doi.org/10.1257/aer.20141625>.
- Keynes, John Maynard. 1936. *The General Theory of Employment, Interest and Money*. New York: Macmillan.
- Kindleberger, Charles P. and Robert Z. Alibert. 2005. *Manias, Panics and Crashes: A History of Financial Crises*. 5th ed. New York: Palgrave Macmillan.
- Kopiec, Pawel. 2022. “The Government Spending Multiplier in the Heterogeneous Agent New Keynesian Model.” *European Economic Review* 145: 104125. <https://doi.org/10.1016/j.euroecorev.2022.104125>.
- Lalive, Rafael, Camille Landais, and Josef Zweimuller. 2015. “Market Externalities of Large Unemployment Insurance Extension Programs.” *American Economic Review* 105 (12): 3564–3596. <https://doi.org/10.1257/aer.20131273>.
- Leamer, Edward E. 2007. “Housing IS the Business Cycle.” NBER Working Paper 13428. <https://doi.org/10.3386/w13428>.
- Lucas, Richard E., Andrew E. Clark, Yannis Georgellis, and Ed Diener. 2004. “Unemployment Alters the Set Point for Life Satisfaction.” *Psychological Science* 15 (1): 8–13. <https://doi.org/10.1111/j.0963-7214.2004.01501002.x>.
- Macchiavello, Rocco. 2022. “Relational Contracts and Development.” *Annual Review of Economics* 14: 337–362. <https://doi.org/10.1146/annurev-economics-051420-110722>.
- Michaillat, Pascal. 2025. “Recession Detection Using Classifiers on the Anticipation-Precision Frontier.” arXiv:2506.09664. <https://doi.org/10.48550/arXiv.2506.09664>.
- O’Higgins, Niall. 2003. “Trends in the Youth Labour Market in Developing and Transition Countries.” World Bank Social Protection Discussion Paper 0321. <https://ideas.repec.org/p/wbk/wbrwps/27876.html>.
- Otonello, Pablo. 2024. “Capital Unemployment.” <https://perma.cc/8MZA-BNW2>.
- Petrosky-Nadeau, Nicolas and Etienne Wasmer. 2017. *Labor, Credit, and Goods Markets: The Macroeconomics of Search and Unemployment*. MIT Press.
- Poschke, Markus. 2025. “Wage Employment, Unemployment and Self-employment across Countries.” *Journal of Monetary Economics* 149: 103684. <https://doi.org/10.1016/j.jmoneco.2024.103684>.
- Ramey, Valerie A. and Matthew D. Shapiro. 2001. “Displaced Capital: A Study of Aerospace Plant Closings.” *Journal of Political Economy* 109 (5): 958–992. <https://doi.org/10.1086/322828>.
- Realtor.com. 2025a. “Housing Inventory: Active Listing Count in the United States.” FRED, Federal Reserve Bank of St. Louis. <https://fred.stlouisfed.org/series/ACTLISCOUUS>.
- Realtor.com. 2025b. “Housing Inventory: Median Days on Market in the United States.” FRED, Federal Reserve Bank of St. Louis. <https://fred.stlouisfed.org/series/MEDDAYONMARS>.
- Robinson, Joan. 1936. “Disguised Unemployment.” *Economic Journal* 46 (182): 225–237. <https://doi.org/10.2307/2225226>.
- Schuele, Finn and Haoyu Sheng. 2024. “Unemployment in a Production Network.” <https://>

perma.cc/T7AM-SZ59.

- Sheppard, Mark G. 2025. "The Inequality of Recessions: The Application of Turning Point Analysis with Labor Market Disparities." <https://doi.org/10.2139/ssrn.5865282>.
- Shiller, Robert J. 2005. *Irrational Exuberance*. 2nd ed. Princeton, NJ: Princeton University Press.
- Silva, Mario Rafael and Marshall Urias. 2025. "Productive Demand and Sectoral Capacity Utilization." *Economic Modelling* 153: 107317. <https://doi.org/10.1016/j.econmod.2025.107317>.
- Snir, Avichai, Daniel Levy, Dudi Levy, and Haipeng Allan Chen. 2024. "Price Gouging or Market Forces? Fairness Perceptions of Price Hikes in the Pandemic." arxiv:2403.07617. <https://doi.org/10.48550/arXiv.2403.07617>.
- Sun, Tiancheng. 2025. "Excess Capacity and Demand-Driven Business Cycles." *Review of Economic Studies* 92 (4): 2730-2764. <https://doi.org/10.1093/restud/rdae072>.
- Theodossiou, I. 1998. "The Effects of Low-Pay and Unemployment on Psychological Well-Being: A Logistic Regression Approach." *Journal of Health Economics* 17 (1): 85-104. [https://doi.org/10.1016/S0167-6296\(97\)00018-0](https://doi.org/10.1016/S0167-6296(97)00018-0).
- UN Environment Programme. 2021. "Food Waste Index Report 2021."
- Walker, Michael W., Nachiket Shah, Edward Miguel, Dennis Egger, Felix Samy Soliman, and Tilman Graff. 2024. "Slack and Economic Development." NBER Working Paper 33055. <https://doi.org/10.3386/w33055>.
- Wasmer, Etienne and Philippe Weil. 2004. "The Macroeconomics of Labor and Credit Market Imperfections." *American Economic Review* 94 (4): 944-963. <https://doi.org/10.1257/0002828042002525>.
- Winkelmann, Liliana and Rainer Winkelmann. 1998. "Why are the Unemployed So Unhappy? Evidence from Panel Data." *Economica* 65 (257): 1-15. <https://doi.org/10.1111/1468-0335.00111>.