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Labor Market Power and the Effects of Fiscal Policy*

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Abstract

We propose a new fiscal transmission channel based on countercyclical monopsony power in the labor market. We develop a Two-Agent New Keynesian model incorporating a time-varying degree of monopsony power, with workers valuing various job aspects and firms having wage-setting power, inversely related to the elasticity of labor supply to individual firms. As government spending increases, labor supply to individual firms becomes more elastic, creating more competition, larger fiscal multipliers, and stronger distributional consequences. We examine this channel's interactions with other fiscal transmission channels. Finally, we confirm empirically the model's prediction of reduced employer market power following government spending expansions.

Keywords: fiscal policy, labor-market monopsony, income inequality

JEL classifications: E62, J42, E25, E32

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1 Introduction

Fiscal policy as a tool for economic stabilization has gained renewed interest following the Great Recession. However, standard models used to evaluate the impact of government spending rely on two transmission channels with uncertain empirical support: a negative wealth effect on labor supply and countercyclical price markups.

The strength of the wealth effect on labor supply remains a topic of ongoing debate. While some studies suggest that the effect is negligible, others have documented it to be relatively significant.[1] A near-zero wealth effect on labor supply implies that wasteful government spending has little or no output effect in a neoclassical model, which is at odds with the majority of empirical evaluations that suggest government spending has a substantial expansionary effect (Ramey, 2011a, 2019).

New Keynesian models rely on countercyclical price markups to explain why demand shocks boost economic activity. This holds for both the Representative Agent New Keynesian (RANK) model and the Heterogeneous Agent New Keynesian (HANK) framework. In the latter, the effects of government spending can be amplified when income is redistributed from consumers with low marginal propensities to consume (MPC) towards consumers with high MPCs (Auclert, 2019; Bilbiie, 2008, 2020; Hagedorn et al., 2019).

However, there is no consensus in the literature, as reviewed by Nekarda and Ramey (2020), regarding the cyclicality of price markups.[2] Nekarda and Ramey (2020) emphasize the importance of investigating the markup's conditional cyclicality and provide evidence

[1]For instance, Schmitt-Grohé and Uribe (2012) estimate the wealth effect on labor supply to be close to zero, while Khan and Tsoukalas (2012) document a relatively strong effect. Galí et al. (2012) show that estimates for the strength of the wealth effect in DSGE models are highly sensitive to the set of observable variables used in the estimation. Another strand of the literature exploits lottery prize wins to estimate the effect of unearned income on labor earnings. While Imbens et al. (2001) and Golosov et al. (2021) find substantial wealth effects, Picchio et al. (2018) and Cesarini et al. (2017) report more modest effects.

[2]Some researchers, e.g., Anderson et al. (2020), Domowitz et al. (1986), Haskel et al. (1995), have found the markup to be procyclical, while others, e.g., Bils (1987), Rotemberg and Woodford (1999), Bils et al. (2018), have provided evidence for price markup countercyclicality.

that price markups actually rise in response to government spending expansions.

This paper proposes a complementary transmission channel for fiscal policy that operates through countercyclical monopsony power of firms in the labor market.[3] Monopsony power allows firms to mark down wages below workers' marginal revenue products, resulting in an employment level that falls short of what would be expected under perfect competition. This form of labor market power being countercyclical, in turn, implies that these effects are less pronounced in upturns and become more pronounced in downturns.

Our analysis is based on two firmly established facts. First, it is well documented that firms hold substantial market power in the U.S. labor market (Berger et al., 2022; Langella & Manning, 2021; Yeh et al., 2022). Second, empirical evidence shows that employer market power is cyclical, with firms possessing more monopsony power during economic downturns (Bassier et al., 2022; Hirsch et al., 2018; Webber, 2022). In our study, we enhance our empirical understanding of the business-cycle properties of employer market power by investigating its conditional cyclicality and providing evidence that employer market power declines in response to expansionary government spending shocks.

Our primary focus is on studying the consequences of employer market power for the effects of government spending. To accomplish this, we develop a business-cycle model that accounts for the endogenous fluctuations of employer market power over time. This situates our paper within the literature investigating the macroeconomic consequences of monopsony power in the labor market, reviewed in detail below (Alpanda & Zubairy, 2021; Bachmann et al., 2022; Berger et al., 2022; Burya et al., 2022). Specifically, we expand upon the worker-capitalist version of the Two-Agent New Keynesian (TANK)

[3] A complementary work is Proebsting (2022). He lays out a multi-sector real business-cycle model incorporating two observations: government demand is concentrated in a few sectors, and there are high costs of factor reallocation across sectors. By accounting for these features, he shows that government spending can have substantial output effects, even in cases where the wealth effect on labor supply is negligible, as it also can in our model.

framework of Cantore and Freund (2021) and introduce a monopsonistically competitive labor market as described by Card et al. (2018). This laboratory enables us to examine the effects of time-varying employer market power and its interactions with other important fiscal transmission channels, including the wealth effect and countercyclical price markups, as well as income redistribution between agents with different marginal propensities to consume as a mediator of changes in government spending.

In our model, workers care about various aspects of a job, not just the wage, and firms differ in non-pay characteristics, giving firms wage-setting power. The labor supply elasticity to individual firms determines how strongly firms can pay workers below their marginal revenue product. In our model, this elasticity is endogenous and depends positively on workers' labor earnings and their marginal valuation of income. The rationale behind this is as follows. If marginal valuation of income is high (holding labor income constant), then workers are more willing to give up appreciated non-pay job attributes for higher pay. When labor income is high (holding marginal income valuation constant), workers become more responsive to relative pay differences between firms because these relative differences translate into larger dollar differences on workers' pay checks.

An increase in government spending raises both labor income and the marginal valuation of income, leading to an unambiguous rise in the labor supply elasticity to the individual firm, thus making the labor market more competitive. Workers observe the government purchasing more goods and services and realize that they will have to pay for this eventually. In response, they seek jobs with higher pay even if those jobs have non-pay characteristics they like less. At the same time, firms offer higher wages to attract more labor to satisfy the additional demand, which for a worker makes it even more valuable to work for a firm that pays more than its competitors. Both development reinforce each other in increasing worker mobility between firms and reducing employer market power. This decline in employer market power raises employment, labor income, and output while simultaneously reducing profits relative to the no or constant monopsony power case. Therefore, introducing cyclical variation in monopsony power leads to larger fiscal multipliers and stronger distributional consequences.

We demonstrate that this new transmission channel interacts significantly with other main transmission channels. The amplification effect due to countercyclical employer market power is strongest when the wealth effect on the quantity of labor supply is weak. In other words, when workers facing a decrease in their after-tax income would prefer not to increase their working hours but rather seek higher-paying job opportunities, expansions in government spending significantly diminish labor market power. In general, the amplification through cyclical monopsony power is more pronounced the greater the boost in workers' marginal valuation of income. This occurs when there is a redistribution of profits from capitalists toward workers, exposing the latter to the adverse wealth effect of declining profits, when taxes are not too progressive, and when the extent of deficit financing is small.

Finally, we confront the model's prediction regarding the influence of government spending on monopsony power with U.S. data. We employ a standard expectations-augmented vector autoregressive model for this purpose, incorporating the wage elasticity of separations, estimated using household-level microdata from the Survey of Income and Program Participation (SIPP). This elasticity serves as a proxy for the labor supply elasticity to individual firms, making it a model-consistent (inverse) indicator of monopsony power in the labor market. Our analysis provides empirical evidence that supports our model's prediction: the elasticity of labor supply to individual firms increases, suggesting that employer market power diminishes in response to government spending expansions. We further find that increased spending by the government boosts output substantially and redistributes income from profit recipients to wage earners, both of which are consistent with our model.

Related literature. Our research is linked to several partially intertwined streams of the literature. First, this paper contributes to the broader literature on the impact of government spending, as reviewed by Ramey (2019). As mentioned earlier, the theoretical literature on the effects of government spending depends in no small degree on transmission channels with uncertain empirical support, and this paper introduces a novel fiscal transmission channel that operates without these channels.

Our paper is specifically situated within the literature on fiscal policy and heterogeneity. This literature, which uses heterogeneous-agent New Keynesian models, emphasizes the interplay between differences in marginal propensities to consume (MPC) and income redistribution for the effects of government spending (Auclert et al., 2023; Bilbiie, 2020; Broer et al., 2021; Cantore & Freund, 2021; Ferriere & Navarro, 2022; Hagedorn et al., 2019). In a series of papers, Bilbiie (2008, 2020, 2021) uses analytically tractable TANK models to demonstrate how heterogeneity shapes equilibrium outcomes through a cyclical-inequality channel. He shows a Keynesian multiplier effect arises if income is redistributed from unconstrained (low-MPC, rich) to constrained (high-MPC, poor) households. However, this channel has been criticized for relying on wealth effects on labor supply resulting from countercyclical variations in firm profits that induce unconstrained (rich) households to supply more labor (Broer et al., 2019; Broer et al., 2021).

To address this issue, Cantore and Freund (2021) proposed a TANK model with workers and capitalists that do not participate in the labor market. Our work builds upon the Cantore-Freund framework by considering a labor market characterized by monopsony power. Cyclical variations in employer market power result in a novel form of cyclical variations in inequality that has not been previously studied in this context.

Although heterogeneity is not essential for the functioning of the countercyclical-monopsony channel, the TANK framework enables us to examine the impact of employer market power variations on the income distribution and the interaction between the determinants of the cyclical-inequality channel and our novel mechanism. For instance, the existing literature on fiscal policy and heterogeneity highlights the importance of the distribution of taxes across households in determining the effects of government spending (Bilbiie, 2020; Ferriere & Navarro, 2022). We demonstrate the interplay between the tax and transfer system and our countercyclical-monopsony channel. Our analysis shows that when tax progressivity is increased, the amplification of fiscal multipliers through the countercyclical-monopsony channel is weakened. This effect runs counter to the cyclical-inequality channel that predicts larger multipliers with progressive taxation due to the redistribution of income to households with higher MPCs (Bilbiie, 2020; Ferriere & Navarro, 2022; Klein et al., 2022).

Our paper also contributes to the literature on monopsony in the labor market, reviewed at large by, e.g., Card (2022) and Manning (2021). We revisit the empirical debate about the cyclical properties of employer market power (Bassier et al., 2022; Hirsch et al., 2018; Webber, 2022) and expand this literature by examining the cyclicality of employer market power, conditional on government spending shocks.

Our work, in particular, adds to the literature investigating the macroeconomic consequences of employer market power (Alpanda & Zubairy, 2021; Bachmann et al., 2022; Berger et al., 2022; Burya et al., 2022). Berger et al. (2022) estimate a general equilibrium model of oligopsony to quantify the degree of employer market power in the US. Their analysis reveals substantial reductions in both output and welfare attributable to labor market power. Bachmann et al. (2022) point to such effect to explain why the East German economy has not converged to that of West Germany. Burya et al. (2022) provide empirical evidence that labor market power may affect monetary policy transmission by flatting the wage Phillips curve. Their findings demonstrate that expansionary monetary policy has a more pronounced impact on labor demand among firms endowed with greater labor market power compared to those facing stronger competition for workers. Alpanda and Zubairy (2021) develop, as we do, a business-cycle model that incorporates labor market power held by firms. To be more precise, they lay out a RANK model with endogenous firm turnover and oligopsonistic competition within the labor market. Their results indicate that an uptick in industry concentration within labor markets can explain a flattening of the wage Phillips curve and a slower pass-through from productivity growth to wages.

Our research differs from previous contributions in several significant ways. First, we are the first to investigate the interplay between monopsony power and fiscal policy. Second, we incorporate monopsony power into a heterogeneous agent business-cycle model, enabling us to study the interplay between labor market power, macroeconomic aggregates, and the income distribution. Third, we offer empirical evidence for and illustrate the potentially pivotal role of endogenous fluctuations in employer market power in response to economic disturbances and policy interventions.[4] To study endogenous changes in labor market power, we adopt a modeling approach distinct from the aforementioned studies. Recent papers on the macroeconomic consequences of monopsony power in the

[4]Burya et al. (2022) do not study how stabilization policies change employer market power; instead, they compare the effects of monetary policy across labor markets with different *given* degrees of monopsony power.

labor market, such as Berger et al. (2022) and Alpanda and Zubairy (2021), employ constant elasticity of substitution (CES) preferences to represent the imperfect substitutability of workplaces. Under this CES framework, there is a constant wage markdown in the presence of monopsonistic competition, akin to the constant desired price markup under CES monopolistic competition. In contrast, we employ a discrete workplace choice model inspired by Card et al. (2018). In our approach, the wage markdown depends on workers' responsiveness to pay when choosing employers, which, in turn, depends on workers' labor earnings and their valuation of income. Notably, Berger et al. (2022) have shown that the CES approach can be viewed as a special case of the discrete choice model, subject to certain assumptions regarding individual workers' hours responses to wage changes. However, we intentionally avoid these assumptions because our primary goal is to model the inherent fluctuations in labor market power, as observed in the data. Similar to our model, the one in Alpanda and Zubairy (2021) also features endogenous variation in employer market power. However, they achieve this using a nested CES framework with strategic interaction between competitors (oligopsonistic competition), where endogenous firm entry affects labor market competition. In their model, the endogenous change in labor market power through firm entry has only very modest consequences for the effects of monetary policy and productivity shocks. Conversely, we demonstrate that endogenous shifts in employer market power, brought about by changes in workers' responsiveness to pay, can significantly amplify the effects of government spending.

The remainder of the paper is organized as follows. Section 2 lays out the model. Section 3 presents the model results. In Section 4, we provide evidence from vector autoregressive (VAR) models on the cyclicality of monopsony power, conditional on government spending shocks. Section 5 concludes.

2 The model

This section outlines our model, which extends the Two-Agent New Keynesian (TANK) model developed by Cantore and Freund (2021) to include monopsony power in the labor market. In the TANK model, there are two groups of households: capitalists who earn profit income from firms and workers who supply labor to make a living. Workers have limited access to financial markets due to portfolio adjustment costs. Firms face price adjustment costs, operate in a monopolistically competitive product market, and set their prices as a (time-varying) markup over their marginal costs.

Our model builds on this baseline framework by incorporating monopsony power in the labor market. Employers' market power stems from the fact that workers consider not only wages but also non-pay characteristics of a job when deciding on their preferred workplace (Bhaskar et al., 2002; Card et al., 2018; Hirsch et al., 2018). Firms differ in these non-pay characteristics over which workers have heterogeneous preferences. This workplace differentiation could reflect various factors such as firm location, corporate culture, work flexibility, or other factors that are valued differently by different workers. This differentiation endows firms, which cannot observe individual workers' preferences, with monopsony power in setting wages (Card et al., 2018). Thus, our model follows the so-called "idiosyncrasy" (Langella & Manning, 2021) or "new classical monopsony" (Manning, 2021) strategy to model monopsony power in the labor market and allows frictionless worker flows between firms. Yet, we do so in an explicitly dynamic framework which allows analyzing business-cycle dynamics. We assume that the labor market is characterized by monopsonistic competition, where many firms operate and each firm takes the wages offered by its competitors as given.

2.1 Firms

The firm sector comprises of two types of firms: final-good firms and intermediate-good firms. The latter produce intermediate goods using labor as the only input factor and are distributed over a continuum of local labor markets. In each local labor market, firms compete monopsonistically for workers and can pay wages below marginal revenue products. In contrast, intermediate-good producers sell their output in a national market for intermediate goods, where they compete with other producers, including those from other local labor markets, in a perfectly competitive environment. Final-good producers are modeled as is standard: they produce differentiated varieties of the final good using intermediate goods as inputs and sell them to households in monopolistically competitive markets, where they can price at a markup over their marginal costs.

Intermediate-good firms. A unit mass of intermediate-good firms, indexed by $k \in [0, 1]$, operates within a perfectly competitive output market and a monopsonistically competitive labor market. The firms are distributed over a continuum of local labor markets, each consisting of K firms. The number of firms, K, is assumed to be sufficiently large to eliminate strategic interactions among wage setters. In other words, firms regard the wage decisions of their competitors as given when determining their optimal wage postings.

Each worker is assigned to a local labor market and has preferences over the firms within their labor market. Each firm k cannot observe the job preferences of individual workers and thus sets a firm-specific wage rate that workers can observe at no cost. Firms employ any worker willing to accept the offered wage rate and subsequently absorb any hours worked supplied by the hired workers (since equilibrium wages are below the marginal revenue product of labor).

Each firm k produces homogeneous intermediate goods, denoted by $x_{k,t}$, using labor, denoted by $n_{k,t}$, as the sole input factor. The firm sells its goods to final-good producers at a price of mc_t, which equals the marginal costs of the final-good producers. Firm k maximizes its profits subject to the condition that $x_{k,t} = a_k n_{k,t}$ and $n_{k,t} = n(w_{k,t})$, where $w_{k,t}$ is the wage rate paid to workers by firm k at time t, and a_k is firm-specific productivity with mean one. The latter term induces some wage variation in equilibrium, which is necessary for a counterpart to the separation elasticity analyzed in our empirical estimations. Yet, to keep the exposition streamlined we will assume that firm heterogeneity is minimal, i.e., that $var(a_k) \to 0$ such that the symmetric equilibrium is a reasonable approximation. The profit function, denoted by $d_{k,t}$, is given by $(1+\tau^I)mc_t x_{k,t} - w_{k,t}(n_{k,t})n_{k,t} - \tau^I x_t$, where τ^I is a subsidy financed through lump-sum taxes on all firms, designed to ensure zero profits in equilibrium, and $w_{k,t}(n_{k,t})$ gives the inverse labor supply function to firm k (to be determined in the next section). The first-order condition for profit-maximizing labor demand of firm k reads

$$\underbrace{w_{k,t} + \frac{\partial w_{k,t}}{\partial n_{k,t}} \cdot n_{k,t}}_{\text{marginal cost of labor, } mcl_{k,t}} \quad = \quad \underbrace{\left(1+\tau^l\right) mc_t a_k}_{\text{marginal revenue product, } mrp_{k,t}} \tag{1}$$

and equalizes the marginal cost of labor (mcl) to the marginal revenue product (mrp).

In a symmetric equilibrium where $x_t = x_{k,t}$, $n_{k,t} = n_t$, and $w_{k,t} = w_t$, profit maximization leads to the optimal wage-setting rule

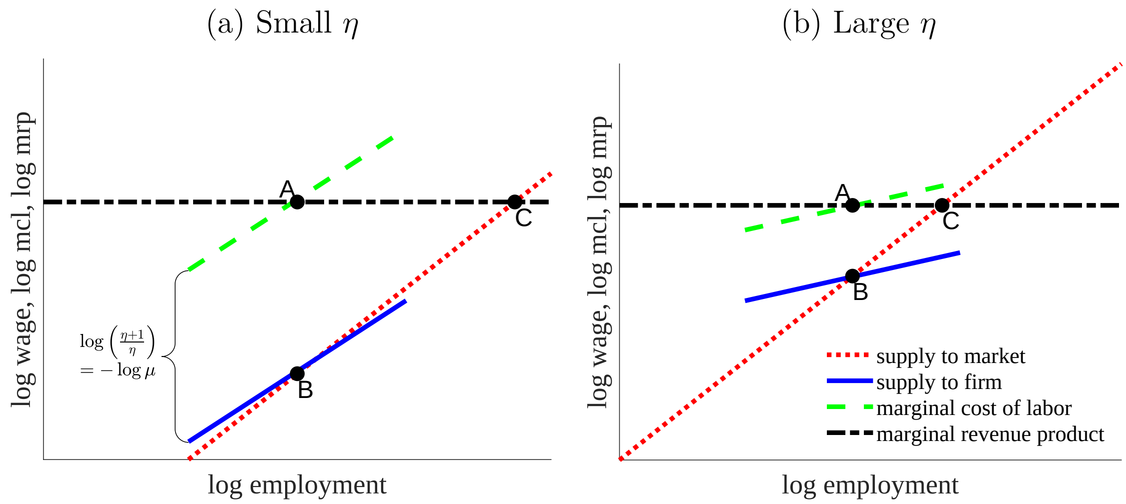
$$w_t = \mu_t(1+\tau^I)mc_t\,, \tag{2}$$

where

$$\mu_t = \frac{\eta_t}{\eta_t + 1}$$

is the wage markdown, bounded between zero and one. The markdown determines the extent to which wages deviate from the marginal revenue product. A smaller μ_t implies

Figure 1: Equilibrium in local labor market.



Notes: The figures illustrate the local labor market equilibrium for a relatively small elasticity of labor supply to the firm (panel a) and a relatively large elasticity of labor supply to the firm (right panel). Point A marks the firms' first-order condition, which requires the marginal cost of labor to equal its marginal revenue product. Point B represents wage and employment in the monopsonistically competitive equilibrium. Point C is the perfect-competition equilibrium, which is included as a benchmark situation. For simplicity, we have visualized the labor supply to individual firms as isoelastic (constant log-slope) over an interval around the market equilibrium.

a larger markdown from the marginal revenue product. The markdown is positively dependent on the time-varying labor supply elasticity of the individual firm, η_t. Perfect competition in the labor market is a limiting case, represented as $\eta_t \to \infty$, in which the markdown $\mu_t \to 1$, i.e., wages correspond to the workers' marginal revenue product.

The behavior of intermediate-good firms and the equilibrium on a local labor market is illustrated in Figure 1 for two different slopes of the inverse labor supply to individual firms $w_{k,t}(n_{k,t})$. The dash-dotted black horizontal line represents the real marginal revenue product (mrp) of labor. It describes the increase in revenue that firms achieve by employing an additional unit of labor. This increase is determined by two factors: the amount of output that an extra unit of labor generates (marginal productivity) and the degree of price markup that final-good firms can command in the product market, which reduces the relative price for intermediate goods (in terms of final goods). Marginal productivity is constant in our model because of the linear production function and individual intermediate-good firms cannot affect markups in the final goods market, together making the *mrp* curve horizontal.

The upward-sloping dotted red line, which passes through points B and C in the graph, represents the labor supply provided to the entire local labor market, expressed in per-firm terms. Labor supply to the market equals the number of workers multiplied by the hours of labor offered per worker. In a labor market characterized by perfect competition, the equilibrium would be where this line intersects with the marginal revenue product. This corresponds to point C in our figure.

In the presence of monopsony power, however, the labor supply to individual firms differs from that to the market. The individual firm's labor supply, represented by the blue solid, is more wage-elastic than the market supply because the individual firm has an additional margin along which it can attract more labor by raising wages, namely attracting workers from other firms. Thus, the labor supply function of the individual firm is flatter than the market supply.

The marginal cost of labor (*mcl*) for a firm, represented by the green dashed line, exceeds the wage paid to the worker. This is because when a firm seeks to hire an additional worker, it not only has to pay the marginal worker the wage needed to attract them but also needs to offer a wage increase to all the workers already employed. In logarithmic terms, the wedge between the marginal cost of labor and the wage rate is approximately equal to the slope of the inverse labor supply to individual firms $w_{k,t}(n_{k,t})$, $\log(1 + 1/\eta) \approx 1/\eta$ for η not too small. The slope of the labor supply curve to individual firms unambiguously determines how much the marginal cost of labor exceeds the wage rate, thus, graphically, the gap between the two curves. When labor supply to individual firms is relatively wage inelastic (a relatively steep curve), the marginal cost of labor is relatively far above it and vice versa.

The firm's profit maximum lies at the intersection of the marginal revenue product and marginal cost, i.e., in point A. The equilibrium combination of wage and employment lies below this intersection on the labor supply curve, represented by point B in the figure. Workers are paid at a markdown below the marginal revenue product of labor and the size of this markdown equals the gap between the marginal cost of labor and wage rate, unambiguously determined by how wage elastic labor supply to individual firms is.

The difference between the monopsonistic competition equilibrium (point B) and the perfect competition benchmark (point C) is more substantial when labor supply to individual firms is relatively inelastic (small η), as shown in the left panel of Figure 1. In contrast, when labor supply to individual firms is relatively elastic (large η), the monopsonistically competitive equilibrium is closer to the perfect competition equilibrium, as depicted in the right panel of Figure 1.

Final-good firms. There is a unit mass of final-good firms, indexed by $j \in [0,1]$. Each firm j produces a quantity $y_{j,t}$ of a particular variety of the final goods bundle y_t, where $y_t = \left(\int_0^1 y_{j,t}^{(\zeta-1)/\zeta} dj\right)^{\zeta/(\zeta-1)}$, using intermediate goods as inputs. Final-good firms operate in a perfectly competitive factor market but a monopolistically competitive final goods market, which enables them to set prices above their marginal costs, resulting in a price markup. Each firm j sells its goods to a final goods bundler at a price $p_{j,t}$ and faces quadratic price adjustment costs, resulting in countercyclical price markups. To guarantee zero profits in the steady state, we implement a production subsidy τ^S, funded through lump-sum taxes on all final-good firms.

Each final-good firm j maximizes its profits

$$E_0 \sum_{t=0}^{\infty} \Lambda_{0,t} \Bigg((1+\tau^s) \frac{p_{j,t}}{p_t} y_{j,t} - mc_t x_{j,t} - \frac{\xi}{2} \left(\frac{p_{j,t}}{p_{j,t-1}} - 1 \right)^2 y_t - \tau^s y_t + ac_t \Bigg), \tag{3}$$

where $\Lambda_{0,t} \equiv \beta^t u^C_{c,t}/u^C_{c,0}$ is the stochastic discount factor for real payoffs, subject to the demand function for variety j, $y_{j,t} = \left(\frac{p_{j,t}}{p_t}\right)^{-\zeta} y_t$, and the firm's production function $y_{j,t} = x_{j,t}$. The variable $p_t = \left(\int_{0,1} p_{j,t}^{1-\zeta} dj\right)^{1/(1-\zeta)}$ is the consumer price index, y_t denotes aggregate demand, and ζ is the elasticity of substitution between the different varieties. The term $\frac{\xi}{2}\left(\frac{p_{j,t}}{p_{j,t-1}} - 1\right)^2$ represents the costs of price adjustment, where ξ measures the degree of nominal price rigidity. The costs are rebated to the firm as a lump-sum transfer ac_t that is not taken into account by the firm j when choosing its optimal price.

2.2 Households

A continuum of households with infinite lifetimes, indexed by i, populates the economy. The mass of households is normalized to one. Among the households, a fraction λ are workers ($i \in (0, \lambda)$ and as a group indexed by W) with limited access to financial markets, while the remaining fraction $1 - \lambda$ are capitalists ($i \in [\lambda, 1)$ and as a group indexed by C).

Since all capitalists hold identical portfolios of stocks, encompassing the total universe of firms in the economy, and have homogeneous preferences, we can focus our analysis on a representative capitalist, denoted by the superscript C. The representative capitalist chooses consumption c^C_t and bond holdings b^C_t to maximize expected lifetime utility,

$$E_0 \sum_{t=0}^{\infty} \beta^t u(c^C_t), \tag{4}$$

subject to a sequence of per-period budget constraints (in real terms)

$$c^C_t + b^C_t - b^C_{t-1}/\Pi_t = y^{d,C}_t, \tag{5}$$

where $y_t^{d,C} \equiv \frac{d_t}{1-\lambda} - \tau_t^C + (R_{t-1} - 1)/\Pi_t b_{t-1}^C - \frac{tr_t}{1-\lambda}$ is the capitalist's disposable income. The parameter $\beta \in (0,1)$ represents the discount factor, d_t denotes dividends, τ_t^C are taxes, R_t represents the gross nominal interest rate, $\Pi_t = p_t/p_{t-1}$ is gross inflation, and tr_t denotes transfers between capitalists and workers. Steady-state transfers, tr, are calibrated to ensure consumption equality between the two agents in the steady state.

Workers supply labor to firms, which differ in their non-pay characteristics. At the beginning of each period, worker i draws preferences over firms' characteristics. Worker i's utility includes the taste shifter $v(k_{i,t}, \omega_{i,t})$ that determines utility from non-pay characteristics at the worker's chosen firm k and follows a type-1 extreme value distribution with unit variance. This term reflects how well the firm's non-pay characteristics align with the worker's current preferences over the non-pay characteristics of a job, as summarized by $\omega_{i,t}$.

Individual worker $i \in (0, \lambda)$ chooses consumption $c_{i,t}$, bond holdings $b_{i,t}$, the supply of working hours $n_{i,t}$, and the workplace $k_{i,t}$ to maximize expected lifetime utility

$$E_0 \sum_{t=0}^{\infty} \beta^t \left(u(c_{i,t}, n_{i,t}) + \frac{1}{\theta} v(k_{i,t}, \omega_{i,t}) \right), \tag{6}$$

The parameter θ captures the inverse importance of non-pay job characteristics in the worker's utility function. In the limiting case when θ approaches infinity, workers do not value non-pay characteristics and choose the employer with the highest wage rate. Consequently, firms do not have any monopsony power, and the model reduces to the Cantore and Freund (2021) model. On the other hand, when θ tends to zero, worker utility depends entirely on non-pay attributes, and they select the employer based on non-pay characteristics alone, independently of pay. For values of θ that lie between zero and infinity, workers choose their employer by weighing both pay and non-pay attributes.

Worker i's period-by-period budget constraint (in real terms) is given by

$$c_{i,t} + b_{i,t} - b_{i,t-1}/\Pi_t + \frac{\psi}{2}\frac{(b_{i,t} - b_i)^2}{c_i} = y_{i,t}^d + \frac{f_t}{\lambda}, \tag{7}$$

where $y_{i,t}^d \equiv w_{i,t}n_{i,t} - t_{i,t} + (R_{t-1} - 1)/\Pi_t \cdot b_{i,t-1} + \frac{tr_t}{\lambda}$ is worker i's disposable income. The variable $w_{i,t} = w_t(k_{i,t})$ denotes the wage rate offered by chosen firm $k_{i,t}$, and $\frac{\psi}{2}\frac{(b_{i,t}-b_i)^2}{c_i}$ represents portfolio adjustment costs, penalizing deviations of bonds holdings from their steady-state value (variables without time subscript denote steady-state values). The strength of this financial friction is determined by the parameter ψ. The costs are rebated to the worker as a lump-sum transfer f_t that is not taken into account by the worker when making savings decisions.

For given workplace choice $k_{i,t}$, worker i chooses consumption, savings, and hours worked. Optimal choices, together with symmetry, yield the representative worker's consumption Euler equation $u_{c,t}^W\left(1 + \psi/c^W\left(b_t^W - b^W\right)\right) = \beta E_t\left(u_{c,t+1}^W R_t/\Pi_{t+1}\right)$ and $w_t = -u_{n,t}^W/u_{c,t}^W$, pinning down the optimal amount of hours worked.

Workplace choice and the labor supply elasticity to the individual firm. Applying standard logit solution techniques for discrete choice models (McFadden, 1974), we can calculate the probability that each worker will choose to work for a given firm based on the relative attractiveness of that firm in terms of pay compared to others in the market. We can then use the law of large numbers to determine the mass of workers that will work for firm k', which is given by

$$m_{k',t} = \lambda\frac{\exp\left(\theta\,\mathcal{V}(w_{k',t}, b_{t-1}^W)\right)}{\sum_{k=1}^K \exp\left(\theta\,\mathcal{V}(w_{k,t}, b_{t-1}^W)\right)}, \tag{8}$$

where $\mathcal{V}(w_{k',t}, b_{t-1}^W)$ is the value function of the standard utility maximization problem without taste shifters, for a given wage rate $w_{k',t}$ and an initial wealth b_{t-1}^W. In this equation, the numerator represents the attractiveness of firm k' to workers in terms of pay (measured in utility values) weighted by θ, which captures the importance of pay characteristics. Workers compare this to the attractiveness of other firms, as included in the denominator.

The derivative of the number of workers working for firm k' with respect to the wage rate it pays is given by $\frac{\partial m_{k',t}}{\partial w_{k',t}} = m_{k',t}\theta \frac{\partial \mathcal{V}}{\partial w_{k',t}} = m_{k',t}\theta u^W_{c,t} n^W_t$. The elasticity of the workforce of individual firms to wage adjustments in the symmetric equilibrium is then given by $\frac{\partial m_{k,t}}{\partial w_{k,t}} \frac{w_{k,t}}{m_{k,t}} = \theta \cdot u^W_{c,t} \cdot w_t \cdot n^W_t$. Additionally, workers adjust their working hours at the intensive margin when the firm they work for changes the wage rate it offers.[5] The wage elasticity of labor supply to the individual firm in the symmetric equilibrium is then simply the sum of the extensive-margin elasticity, $\frac{\partial m_t}{\partial w_t} \frac{w_t}{m_t}$, and the intensive-margin elasticity, $1/\varphi$:

$$\eta_t = \theta \cdot u^W_{c,t} \cdot w_t \cdot n^W_t + \frac{1}{\varphi} \, . \tag{9}$$

This elasticity is the decisive measure of monopsony power since it determines how much firms can pay workers below their marginal revenue product. Intuitively, when workers place little value on non-pay job characteristics (i.e., when θ is large), they become more responsive to the wages offered by different employers when choosing their preferred workplace. As a result, the value of η becomes large. When θ tends to infinity, workers place no value on non-pay attributes, and the firm with the highest wage rate attracts all available workers. This represents the limiting case of perfect competition. In contrast, when θ approaches zero, workers only consider non-pay attributes, leading to an equal distribution of workers across all firms based on the appeal of their non-pay characteristics. This represents the limiting case in which workplace choices do not respond to wages at all, implying maximum monopsony power and a constant elasticity of labor supply to individual firms, given by the intensive-margin elasticity.

[5] Note that within the preferences we are examining, the elasticity of this intensive-margin response is constant.

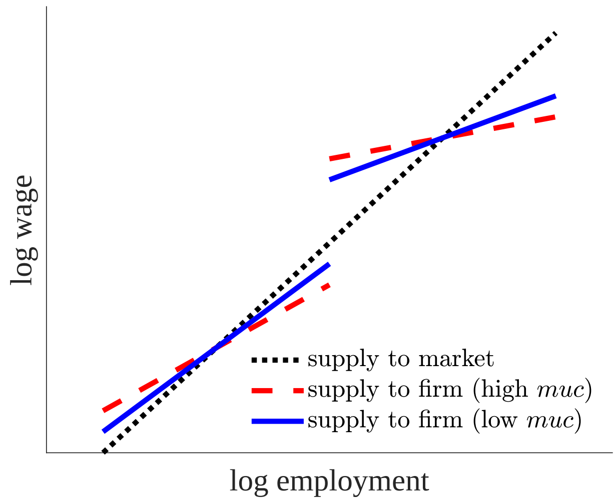
Beyond the exogenous parameter θ, the elasticity of labor supply to the individual firm depends positively on workers' earnings $w_t n_t^W$ and their marginal valuation of income, which equals marginal utility $u_{c,t}^W$. The impact of these endogenous determinants of η_t are illustrated in Figure 2.

Holding marginal utility constant, an increase in labor earnings raises the elasticity of labor supply to individual firms. In the figure, this is illustrated by the firm-level labor supply curves (red dashed and blue solid lines) being flatter, thus more wage-elastic, in the upper right part of the figure. When the general pay level is high, not only supply workers higher quantities of labor to the market (dotted black line), but firms can enlarge their share of the workforce more strongly by raising pay. In the monopsonistically competitive equilibrium, it is the labor supply reaction to *relative* pay differences that determines employers' effective market power and, when labor incomes are high, such relative pay differences between firms translate into larger dollar differences on workers' pay checks.

At any level of labor income, labor supply to individual firms is more wage elastic when marginal utility of consumption is relatively high (dashed red lines) compared to when marginal utility is low (solid blue lines). The reason is that marginal utility affects workers' relative valuations of pay and other job characteristics in their workplace choices. When their marginal utility is high, workers are relatively strongly concerned with pay, the supply of labor to individual firms is relatively wage-elastic (the dashed red lines are relatively flat).

At this point, we can take a first look on the cyclicality of the elasticity of labor supply to individual firms in our model. We start with the unconditional cyclicality before turning to the conditional cyclicality due to government spending shocks. The effect of labor earnings, on its own, makes the elasticity procyclical, as earnings tend to

Figure 2: Labor supply to individual firms.



Notes: The figure illustrates the labor supply to individual firms for different levels of the marginal utility of consumption (*muc*) and wage incomes. For simplicity, we have visualized the labor supply to individual firms as isoelastic (constant log-slope) over an interval around the market equilibrium.

be higher during economic expansions. However, the effect of marginal utility is in general countervailing, because workers' marginal utility $u^W_{c,t}$ tend to be low during good times when workers consume more. Therefore, it is in general unclear, in the model, whether job mobility rises or falls during economic upturns. With consumption less volatile in the data than earnings, one may expect the model to generate a countercyclical pattern of the elasticity of labor supply to individual firms. We have set up Figure 2 in this way, the solid blue line in the upper right (high earnings, low marginal utility) is flatter than the dashed red line in the lower left (low earnings, high marginal utility).

It is important to note that the impact of government spending shocks on employer market power may be less uncertain compared to the effect of other disturbances, such as favorable productivity shocks. This is because government spending shocks typically increase both labor earnings and the marginal valuation of income. The latter is because a government spending expansion leads to an increase in current or future taxes, which, in isolation, reduces the lifetime net income of consumers. This, in turn, induces them to value income more. In the figure, a spending expansion may move the labor supply to individual firms from the solid blue line in the lower left (low earnings, low marginal utility) to the dashed red line in the upper right (high earnings, high marginal utility), which in unambiguously flatter, i.e., more wage elastic.

Separation elasticity. Above, we have determined the elasticity of labor supply to individual firms, which is the key measure for firms' ability to pay wages below the marginal revenue product of labor. In Section 4, we will analyze empirically the elasticity of worker-firm separations, which is a different yet closely related concept.

In our model, wage variation between firms results from productivity differences of intermediate-good producers, and worker flows between firms result from the random reshuffling of worker preferences over workplaces. As both measures thus have observable within-period equilibrium variation, an econometrician observing the model can estimate a separation elasticity to wages. The monopsony literature uses this separation elasticity to measure monopsony power in the labor market. The intuition is that wages paid by a firm affect the firm's size in terms of the number of workers it attracts – with elasticity $\eta - 1/\varphi$ – and larger firms have lower separation rates. Thus, it is helpful to decompose the separation elasticity, γ, as

$$\underbrace{\frac{\partial s_k}{\partial w_k} \cdot \frac{s_k}{w_k}}_{\gamma} = \underbrace{\frac{\partial s_k}{\partial m_k} \cdot \frac{m_k}{s_k}}_{<0} \cdot \underbrace{\frac{\partial m_k}{\partial w_k} \cdot \frac{w_k}{m_k}}_{\eta - 1/\varphi},$$

where s_k is the separation rate of firm k, i.e., the share of its workers that transition to other firms. To see the relation between this firm-specific rate and empirical estimations of the separation elasticity with workers as the unit of observation, notice that the separation rate s_k equals the probability that a randomly selected worker leaves the firm between one period and the next. The equation above shows that the separation elasticity is inversely related to the elasticity of labor supply to individual firms. The monopsony literature uses the inverse of the former as a proxy of the latter, which relies on a roughly constant elasticity of separations to size $\partial s_k/\partial m_k \cdot m_k/s_k$. In Appendix B, we show that the relation between size and separations is constant in our model.

2.3 Monetary and fiscal policy

The fiscal authority finances government spending, denoted by g_t, by collecting lump-sum taxes from workers and capitalists, and issuing one-period bonds b_t. The government budget constraint is given by: $b_t + \lambda\tau_t^W + (1-\lambda)\tau_t^C = g_t + R_{t-1}/\Pi_t \cdot b_{t-1}$, where $\lambda\tau_t^W + (1-\lambda)\tau_t^C$ are total tax revenues. As a baseline specification, that will later be varied, we assume that lump-sum taxes are identical for both household types ($\tau_t = \tau_t^W = \tau_t^C$).

The evolution of lump-sum taxes is governed by the rule $t_t - t = \phi_b(b_{t-1} - b) + \phi_g(g_t - g)$, where the feedback parameters ϕ_b and ϕ_g determine the financing mix. Government spending g_t, evolves according to $g_t = \rho_g g_{t-1} + \varepsilon_t^g$ where ρ_g is the parameter for the persistence of government spending, and $\varepsilon_t^g \sim n.i.d.(0, \sigma_g^2)$ is a normally distributed shock to government spending.

The transfer between capitalists and workers follows $tr_t - tr = \phi_d(d_t - d)$, where ϕ_d determines the extent to which profits, d_t, are redistributed. In our baseline scenario, we assume no profit redistribution ($\phi_d = 0$). Later, we will investigate the impact of varying the degree of profit redistribution on our results.

The central bank determines the nominal interest rate, R_t, according to a feedback rule described by $R_t/R = (\Pi_t/\Pi)^{\phi_\pi}$, where $\phi_\pi > 1$ represents the sensitivity of the nominal interest rate to changes in inflation.

2.4 Market clearing and aggregate statistics

Bonds market clearing requires $b_t = \lambda b_t^W + (1-\lambda) b_t^C$. Goods market clearing requires $y_t = c_t + g_t$, where $c_t = \lambda c_t^W + (1-\lambda) c_t^C$. Aggregate production is given by $y_t = n_t$, where $n_t = \lambda n_t^W$. Total profits, consolidated over all firms, are $d_t = y_t - w_t n_t$. The full set of equilibrium conditions can be found in Appendix A.

2.5 Functional forms and parameterization

Following Jaimovich and Rebelo (2009), workers' period utility function, $u(c_t^W, n_t^W)$, is expressed in a way that allows us to parameterize the wealth effect on labor supply as follows: $u(c_t^W, n_t^W) = \log\left(c_t^W - \frac{\nu}{1+\varphi}(n_t^W)^{1+\varphi} x_t\right)$. Here, $\nu > 0$ is a scaling parameter, x_t is a weighted average of current and past consumption that evolves according to $x_t = (c_t^W)^\chi x_{t-1}^{1-\chi}$, where $\chi \in (0,1]$ governs the wealth elasticity of labor supply, and $1/\varphi$ represents the intensive-margin elasticity of labor supply to individual firms and, in the limiting case where $\chi \to 0$, it is equal to the Frisch elasticity of aggregate labor supply. In this instance, there is no wealth effect on labor supply, and preferences are consistent with the type of utility function considered by Greenwood et al. (1988). Capitalists, who supply zero working hours, have log utility, $u(c_t^C) = \log c_t^C$.

Wherever possible, we adopt the parameterization strategy of Cantore and Freund (2021) and calibrate the variables related to monopsony power and the wealth effect on labor supply in line with existing empirical evidence. Time is measured in quarters. The discount factor is set to $\beta = 0.99$, implying an annual real interest rate of 4%. The share of workers λ and portfolio adjustment costs ψ_W are calibrated to match evidence on the intertemporal marginal propensity to consume (iMPC), resulting in $\psi_W = 0.07$ and $\lambda = 0.8$; see Cantore and Freund (2021) for details. As a baseline, we assume a near-zero wealth effect on labor supply, in line with estimates provided by Schmitt-Grohé and Uribe (2012), by setting $\chi \to 0$. This also aligns with the estimate of Galí et al. (2012) in the specification with their full set of observable variables, where they find the very small value of $\chi = 0.02$. The parameter governing the Frisch elasticity of hours worked is set to $\varphi^{-1} = 2/3$. The weight on hours in the worker's utility function, ν, is calibrated such that the steady-state value of hours worked equals one.

The price elasticity of product demand ζ is calibrated to a 20% markup. Price adjustment costs ξ are calibrated to match an average price duration of 3.5 quarters. In the Taylor rule, ϕ_π is set to 1.5. The following parameters are used in the fiscal policy equations: $\phi_g = 0.1$, $\phi_b = 0.33$, $\rho_g = 0.8$.

The subsidy τ^I is calibrated such that intermediate-good firms earn zero profits in the steady state. This is achieved by setting τ^I equal to the inverse of the steady-state value of the labor supply elasticity to the individual firm, η. Similarly, the subsidy τ^S is set to $(1-\zeta)^{-1}$ to induce marginal cost pricing, thereby ensuring zero profits for final-good firms. Finally, the importance of non-pay job characteristics, $1/\theta$, is calibrated to generate a steady-state markdown of $\mu = 2/3$, which is in line with estimates provided by Yeh et al. (2022).

3 The effects of government spending

In this section, we investigate the impact of government spending on our model economy. We start by analyzing a simplified version of our baseline model to better understand how time-varying employer market power influences the effects of government spending. After that, we explore the effects of government spending in the calibrated baseline model.

3.1 Analytical results from simplified model

To focus on the novel countercyclical-monopsony channel, we eliminate other fiscal transmission channels by making two assumptions: (i) prices are flexible ($\xi = 0$), resulting in constant price markups, and (ii) there is no wealth effect on labor supply ($\chi = 0$). To facilitate an analytical solution, we also assume that workers do not have any access to financial markets ($\psi^W \to \infty$), government spending is entirely tax-financed ($g_t = t_t$), and there is no profit redistribution ($\phi_d = 0$). By applying these simplifications and log-linearizing the equilibrium conditions, we obtain the following equations for the elasticity of labor supply to individual firms, the marginal cost of labor, the marginal revenue product of labor, and labor supply to the market,

$$\widehat{\eta}_t = \tfrac{\theta(1+\varphi)\varphi}{(1+\varphi)(\theta\varphi+\lambda)-1} \left(\widehat{w}_t + \widehat{n}_t + \widehat{u}^W_{c,t} \right), \tag{10}$$

$$\widehat{mcl}_t = \widehat{w}_t - \tfrac{\varphi((1+\varphi)\lambda-1)}{(1+\varphi)((1+\varphi)\lambda+\theta\varphi-1)} \widehat{\eta}_t, \tag{11}$$

$$\widehat{mrp}_t = 0, \tag{12}$$

$$\widehat{n}_t = \frac{1}{\varphi} \widehat{w}_t, \tag{13}$$

where hats denote percentage deviations from steady state. Equilibrium requires profit maximization by firms, i.e., $\widehat{mrp}_t = \widehat{mcl}_t$. Finally, by using the budget constraints of workers, $\widehat{c}^W_t = \frac{1}{\lambda}(\widehat{n}_t + \widehat{w}_t) - \widetilde{t}_t$, and the government, $\widetilde{t}_t = \widetilde{g}_t$, workers' marginal utility of consumption can be expressed as

$$\widehat{u}^W_{c,t} = -\frac{(1+\varphi)}{(1+\varphi)\lambda - 1} (\widehat{w}_t - \lambda \widetilde{g}_t) \tag{14}$$

where $\widetilde{g}_t = (g_t - g)/y$ and $\widetilde{t}_t = (t_t - t)/y$.

Solving the system (10) to (14) and using the linearized production function $\widehat{y}_t = \widehat{n}_t$ and profit equation $\widetilde{d}_t = -\widehat{w}_t$, we can express the reactions of output, $\widehat{y}_t$, and labor earnings, $\widehat{le}_t$, (both expressed in percentage deviations from the respective steady states), as well as profits, $\widetilde{d}_t = (d_t - d)/y$, to government spending, $\widetilde{g}_t$, as

$$\widehat{y}_t = \frac{1}{\varphi} \cdot \Gamma\Lambda \cdot \widetilde{g}_t \tag{15}$$

$$\widehat{le}_t = \frac{1+\varphi}{\varphi} \cdot \Gamma\Lambda \cdot \widetilde{g}_t \tag{16}$$

$$\widetilde{d}_t = -\Gamma\Lambda \cdot \widetilde{g}_t \tag{17}$$

where

$$\Gamma = \tfrac{\varphi^2((1+\varphi)\lambda-1)}{(1+\varphi)\lambda+\theta\varphi-1} \tfrac{\theta\varphi}{(1+\varphi)(\theta\varphi+\lambda)-1} \geq 0$$

$$\Lambda = \tfrac{(1+\varphi)\lambda}{((1+\varphi)\lambda-1)\varphi+(1+\varphi)^2(1-\lambda)\Gamma} > 0$$

When we set the parameter θ to infinity, eliminating the endogenous variation of the labor supply elasticity to the individual firm, the parameter Γ, whose denominator is quadratic in θ, becomes zero. As a result, government spending has no impact on output and the income distribution. The same holds true when θ is set to zero, implying that workers do not attach any value to pay when selecting their workplace, thereby eliminating endogenous fluctuations in the labor supply elasticity to the individual firm. Consequently, the parameter Γ also equals zero in this case. Conversely, when θ is finite, the parameter Γ is greater than zero. In this scenario, fiscal expansions lead to an increase in output and a redistribution of income from capitalists to workers.

The system of equations (10) to (14) provides insights into the countercyclical-monopsony channel triggered by changes in government spending. As the government increases spending, taxes go up and workers' marginal valuation of income rises, see (14). In response, workers change their relative valuations of pay and other job characteristics in their workplace choices. As they become more concerned with pay, the supply of labor to individual firms becomes more wage-elastic, i.e., η rises, see (10).

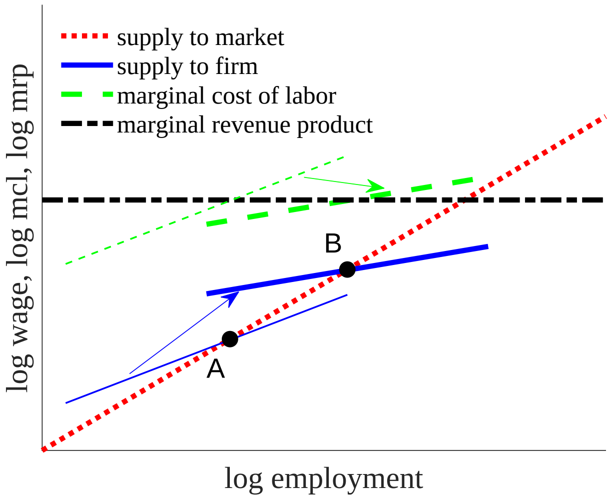
With more wage-elastic labor supply, it is easier for firms to attract workers from other firms through offering higher wages. This also means that the marginal costs of labor – for a given wage rate – decline, see (11). The reason is that a firm that wants to increase its employment level by a given amount now needs to increase its wage, and thus its labor cost, by less.

Profit maximization implies that firms employ workers until the marginal cost of labor equals the marginal revenue product of labor, which is assumed to be constant in this model version, as shown in equation (12). As the marginal cost of labor falls due to the increase in wage-elastic labor supply, the wage rate increases to maintain the equilibrium between the marginal cost of labor and the constant marginal revenue product of labor. Consequently, employment rises along the labor supply curve to the market, (13). Furthermore, the endogenous response of labor income reinforces these effects by making labor supplied to individual firms even more wage-elastic, see (10), which again reduces the marginal cost of labor and leads to higher employment and wages.

As a result, the countercyclical-monopsony channel leads to higher levels of employment and wages in the labor market, providing a mechanism for the positive impact of government spending on economic activity. At the same time, an increase in wage income for workers is associated with a decline in profits for capitalists, resulting in redistribution of income from capitalists to workers.

We can also illustrate the countercyclical-monopsony channel using the graphical representation of the local labor market equilibrium, as depicted in Figure 1. Figure 3 provides a clear illustration of the labor market effects of government spending in our simplified model economy, where we assume a zero wealth effect on hours worked and constant price markups. As before, the green dashed lines depict the marginal cost of

Figure 3: The countercyclical-monopsony channel of government spending shocks.



Notes: The figure illustrates the local labor market equilibrium. Point A depicts the pre-shock equilibrium, point B shows the equilibrium after a government spending expansion.

labor, the horizontal dash-dotted black line depicts the marginal revenue product, the solid blue lines show the labor supply elasticity to individual firms, and the dotted red line shows the labor supply to the market.[6]

As discussed earlier, a rise in government spending renders the labor supply curve to individual firms flatter. In Figure 3, the labor supply curve shifts from the thin solid blue line to the thick solid blue line. At the same time, the marginal cost curve shifts downward and rotates, moving from the thin dashed green line to the thick dashed green line. Recall that the marginal cost of labor is the wage rate plus a term that depends on the slope of labor supply curve to individual firms, such that a rotation of the latter curve induces the former curve to both rotate and shift. As a result of the changes, the profit maximization condition $mcl = mrp$ shifts to the right along the unchanged marginal revenue product line, shifting the equilibrium combination of wages and employment from point A to point B along the unchanged market supply curve. This adjustment brings

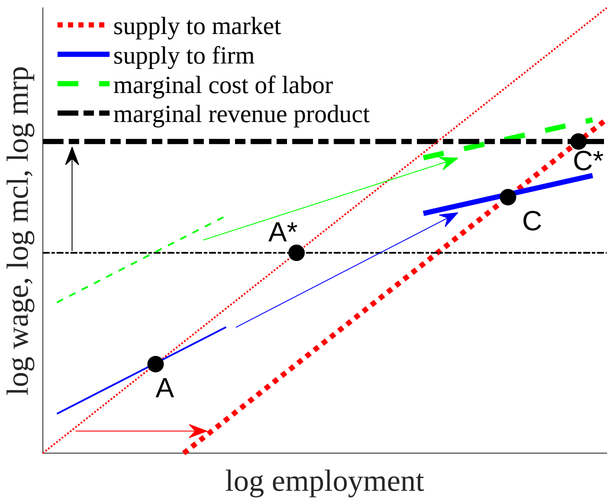
[6]Note that equation (10) gives (changes in) the slope of the solid blue line (not the line itself). Equation (11) describes the marginal cost of labor in terms of how much it is above the labor supply curve to firms, where the second term on the right-hand side describes (changes in) the gap between the solid blue line and the green dashed line. Equation (12) states that the marginal revenue product curve is horizontal as its change is zero. Equation (13) describes the dotted red line. When wages increase, so does employment (along the intensive margin); the slope is $1/\varphi$.

the equilibrium closer to that under perfect competition, increasing wages, employment, and output while decreasing monopsonistic profits.

As a preview, Figure 4 illustrates the effects of changes in government spending when also the wealth effect on hours worked and the countercyclical-markup channel are active (i.e., when $\chi > 0$ and $\xi > 0$). The negative wealth effect of higher taxation to finance the spending hike induces households to increase their labor supply to the whole market if $\chi > 0$. Graphically, the market labor supply curve shifts to the right, as shown in our figure by the movement from the initial curve (thin dotted red line) to the after-shock curve (thick dotted red line). If there is price stickiness, which occurs when $\xi > 0$, the spending hike reduces price markups, which increases the marginal revenue product. Our figure depicts this by the upward shift of the marginal revenue product curve from the thin dash-dotted black line to the thick dash-dotted black line. In addition, labor supply to individual firms becomes more elastic also here, leading to a decline in the extent to which firms can offer wages lower than marginal revenue products. When all channels are at work, the equilibrium shifts from point A to point C. By comparison, in a perfectly competitive labor market, the equilibrium would shift between the two intersections of the market labor supply and the marginal revenue product, i.e., from point A* to point C*. This shift is smaller than that observed under monopsonistic conditions, indicating that the model-implied employment and output effects are less pronounced when ignoring the effects of time-varying employer market power.

The quantitative significance of the boost to the efficacy of government spending resulting from time-varying markdowns and its interaction with the other two channels remains an open question. The channels' interactions are ambiguous in the model. On one hand, the other two channels can independently increase labor earnings, thereby

Figure 4: Transmission of government spending shocks with all three channels – wealth effect, countercyclical price markups, and countercyclical monopsony power.



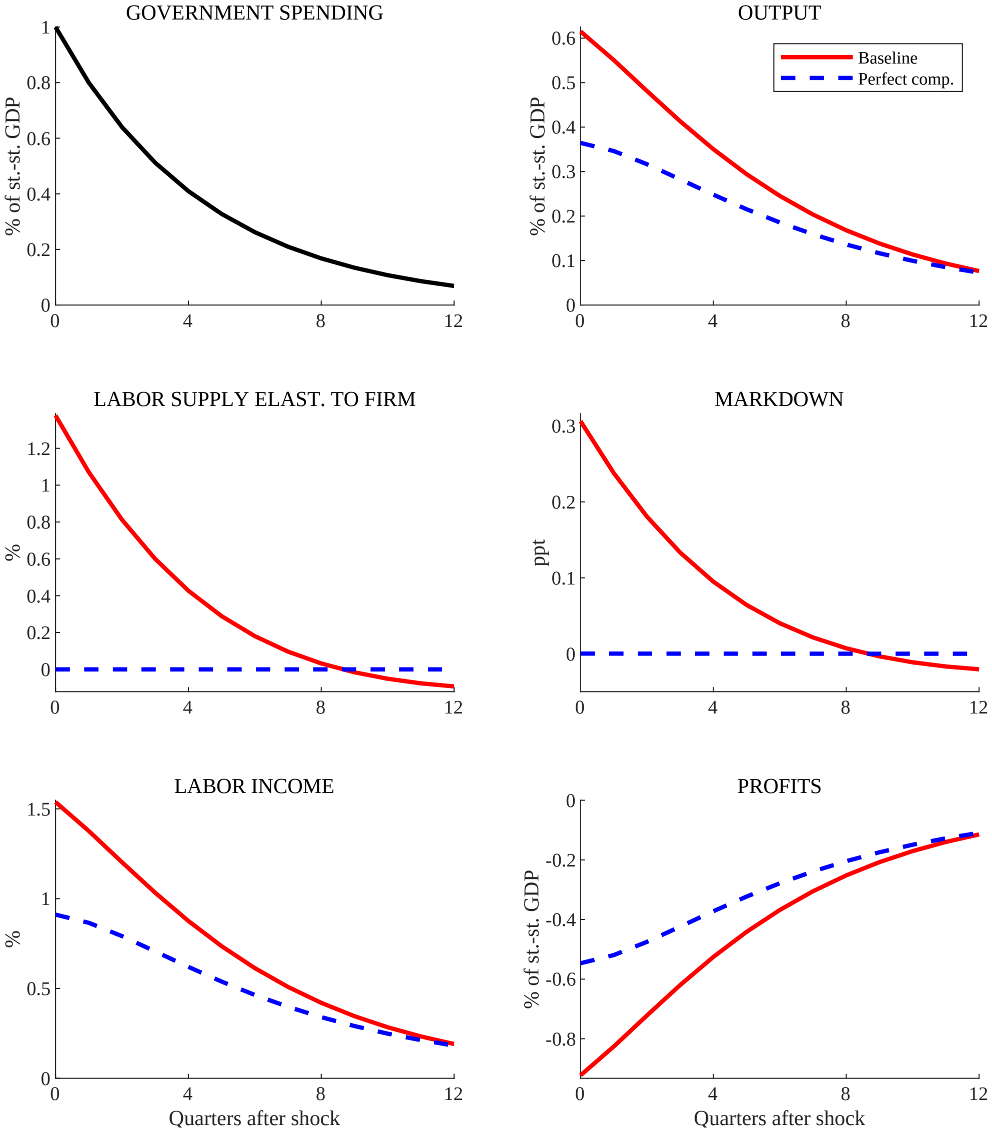
Notes: Point A (A^*) depicts the pre-shock equilibrium under monopsonistic (perfect) competition in the labor market, point C (C^*) shows the equilibrium after a government spending expansion under monopsonistic (perfect) competition.

increasing the elasticity of labor supply to individual firms. On the other hand, a larger wealth effect on labor supply is associated with a smaller wealth effect on consumption, which is a key factor in triggering the countercyclical-monopsony channel. Next, we use numerical simulations of the baseline model to investigate these questions.

3.2 Numerical results from baseline model

Figure 5 shows the impulse responses resulting from a government spending shock. We normalize the size of the innovation to generate a 1% of GDP impact rise in government spending. All variables are expressed in deviations from their steady-state levels. The solid lines depict the impulse responses of our baseline model with a monopsonistically competitive labor market, while the dashed lines show the impulse responses of a model economy featuring perfectly competitive labor markets. Perfect competition is achieved by assuming that workers place no value on non-pay job characteristics ($\theta \to \infty$). Consequently, the labor supply to each firm becomes perfectly elastic, and the wage equals the marginal revenue product at all times, resulting in a constant wage markdown of one.

Figure 5: Impulse responses to government spending shock.

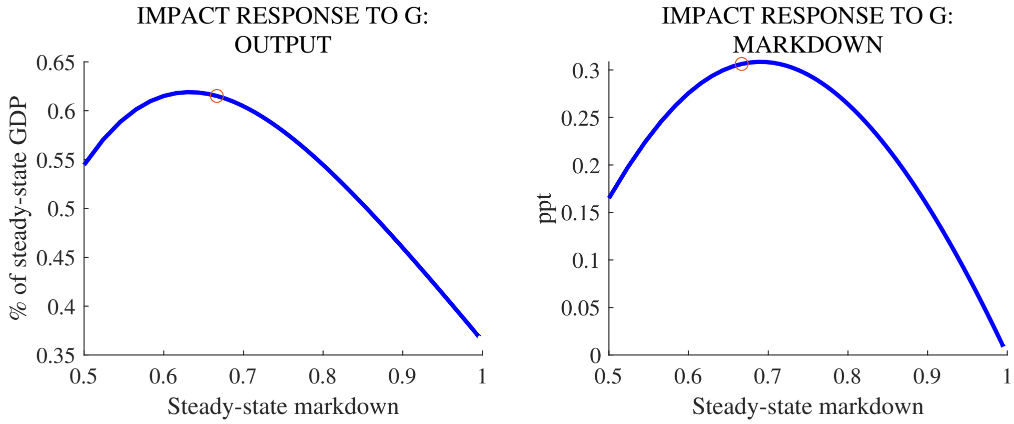


Notes: Deviations from steady state. Solid lines show responses in baseline economy with employer market power; dashed lines show responses in economy with perfectly competitive labor markets. Horizontal axes show quarters after the shock.

As seen in the figure, an expansion in government spending leads to a significant increase in output, particularly when labor markets are monopsonistically competitive compared to perfectly competitive labor markets. In our baseline model, the impact multiplier is approximately 0.6, while in the case of perfect competition, it is slightly less than 0.4. The reason for the greater efficacy of fiscal policy in our model can be seen in the second row of the figure, which displays the responses of the elasticity of labor supply to individual firms and the wage markdown. While, by construction, both measures stay constant in the case of perfectly competitive labor markets, the elasticity of labor supply to individual firms and the markdown rise in response to an increase in government spending in our baseline model. An increase in the markdown indicates a decrease in the extent to which workers' wages are marked down from their marginal revenue product. This is tantamount to a rise in labor market competitiveness, leading to an increase in employment, and as a result, output also increases.

The panels in the lower half of Figure 5 display the distributional consequences of government spending in both model economies. The results show an increase in labor income and a decrease in profits. There are two mechanisms behind this distributional consequence of government spending hikes. First, the decline in price markups – that results in an outward shift of the labor demand curve – leads to an increase in labor income and a decrease in profit income. Second, the reduction in employer market power forces firms to pay wages closer to the marginal revenue product of labor. This development increases labor income and decreases profit income, redistributing income from capitalists to workers. The reference model with perfect competition in the labor market has only the first mechanism while the full model with monopsonistic competition in the labor market has both. Thus, under monopsonistic competition with endogenous employer market

Figure 6: Varying the degree of monopsony power.



Notes: Impact responses of output and markdown after 1% of GDP government spending expansion. All variables are expressed as deviations from the steady-state level. The horizontal axes represent the steady-state markdown. A markdown of 1 indicates the absence of a markdown and represents the perfect competition case. The circle in the figure displays the results obtained from our baseline calibration.

power, the distributional consequences of government spending are stronger compared to the perfect competition case.

So far, we have compared the effects of government spending in our baseline model, which assumes a certain steady-state, or average, degree of employer market power that we have calibrated, to the limiting case of no employer market power. Next, we investigate the effects of government spending under varying degrees of steady-state employer market power. To do this, we simulate the impact of government spending expansions for different values of the parameter θ, which represents the inverse of the weight workers place on non-pay characteristics when choosing a workplace. Higher values of θ indicate that workers place more importance on wages, resulting in a higher labor supply elasticity to individual firms and a lower average degree of employer market power.

Figure 6 displays the impact responses of output and the markdown to a government spending expansion amounting to 1% of GDP for varying degrees of average employer market power, measured by the steady-state markdown. In our baseline scenario (indicated by a circle), the steady-state markdown is 0.67, meaning that wages are set at two-thirds of the marginal revenue product. The limiting case of a markdown equal to unity (wages equal marginal revenue products) represents the perfect competition case. As observed in the right panel, the endogenous response of the markdown to government spending and the steady-state markdown exhibits an inverted U-shaped relationship. The sensitivity of the markdown to spending changes increases with rising employer market power if it is not excessively high. For example, at the baseline value of 0.67, a government spending shock raises the markdown by approximately 0.3 percentage points, which is around twice as large as the markdown change at a steady-state value of 0.9. Remarkably, the sensitivity of the markdown declines again for very high average employer market power values. This can be explained by considering the limiting case of $\theta \to 0$, where workers' valuation of non-pay characteristics approaches infinity and workplace choices thus do not depend on wages, resulting in maximum employer market power and a constant wage markdown (of zero). Between the two limiting cases where the markdown remains constant – perfect competition and the complete absence of competition in the labor market – the sensitivity of the markdown is hump-shaped in the steady-state degree of employer market power.

3.3 Interactions with other fiscal transmission channels

This section investigates the interactions between the countercyclical-monopsony channel and other key fiscal transmission channels: i) the wealth effect on labor supply, ii) countercyclical price markups, and iii) income redistribution between capitalists and workers through the tax system, which has shown to be a crucial factor for the effects of government spending in models that, as ours, feature heterogeneous households (Auclert et al., 2023; Bilbiie, 2020; Broer et al., 2021; Ferriere & Navarro, 2022).

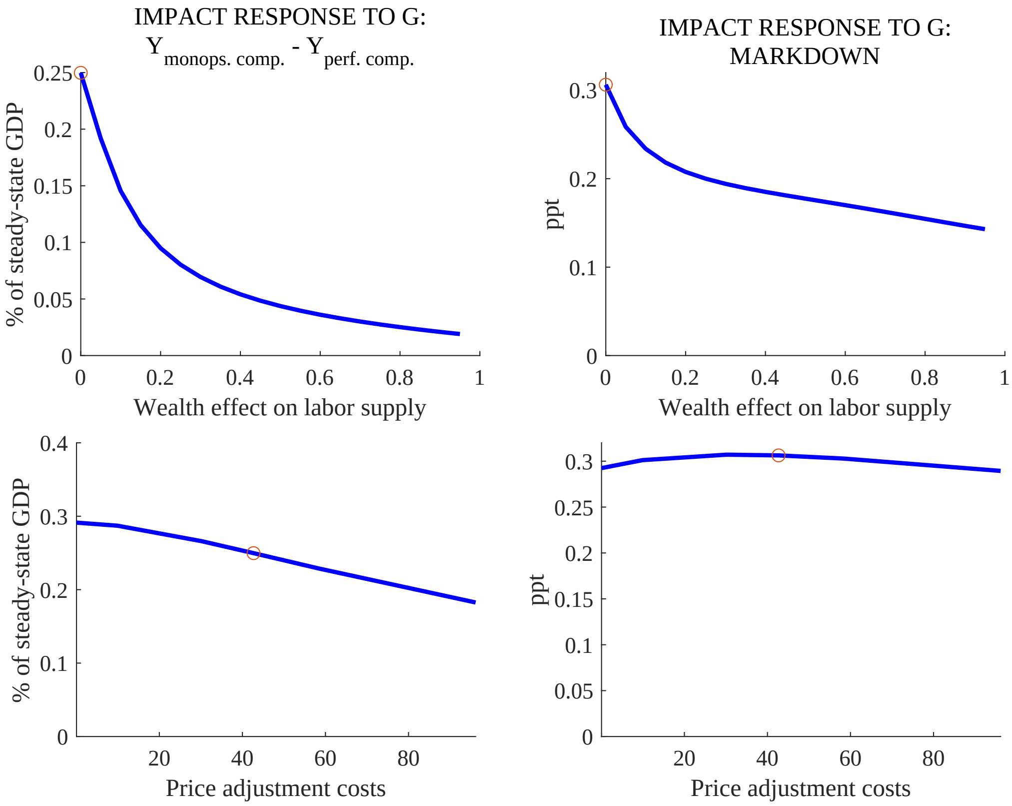
Wealth effect and countercyclical price markups. To begin with, we investigate the impact of the wealth effect on labor supply by varying the parameter $\xi \in (0, 1]$. Our baseline model assumes a near-zero wealth effect on labor supply ($\xi \to 0$). As the parameter ξ increases, the wealth elasticity of hours worked increases. Workers' lifetime income declines when the government increases current or future taxes to finance the rise in spending. With a wealth effect on labor supply, workers will supply more hours in response.

The panels in the first row of Figure 7 present the impact impulse responses to a 1% of GDP government spending expansion for different levels of ξ. The left panel displays the impact response of output in the baseline relative to the impact response in the perfect competition case. This metric measures the degree of amplification due to time-varying employer market power. The right panel shows the impact response of the markdown.

Our analysis shows that as the wealth effect on hours worked increases, the markdown response to government spending expansions becomes weaker. This, in turn, leads to a muted positive effect on output through the countercyclical-monopsony channel. To understand this, note that a higher wealth effect on hours worked results in a lower wealth effect on workers' consumption. This means that the impact of higher taxes on the marginal valuation of income declines, which reduces the effect of government spending on the elasticity of labor supply to the individual firm and on markdowns.

The lower panels of Figure 7 show the results of our analysis when we vary the level of price adjustment costs, which captures the degree of price stickiness. It is important to note that price stickiness is positively correlated with the degree to which price markups decline in response to a government spending expansion. The figure presents again the impact responses of relative output (left panel) and markdowns (right panel),

Figure 7: Varying the wealth effect and the degree of price stickiness.



Notes: Impact responses of relative output and markdown after 1% of GDP government spending expansion. Relative output is defined as the output response in the baseline case minus the output response in the perfect competition scenario. The horizontal axes in the upper panels display the parameter χ, capturing the magnitude of the wealth effect on hours worked. The horizontal axes in the lower panels display the price adjustment cost parameter ξ, capturing the degree of price stickiness. The circle in the figures displays the results obtained from our baseline calibration.

with our baseline indicated by a circle. As can be seen, changing the degree of price stickiness has little effect on the markdown's response and, consequently, on the strength of the countercyclical-monopsony channel in amplifying the output effect of government spending.

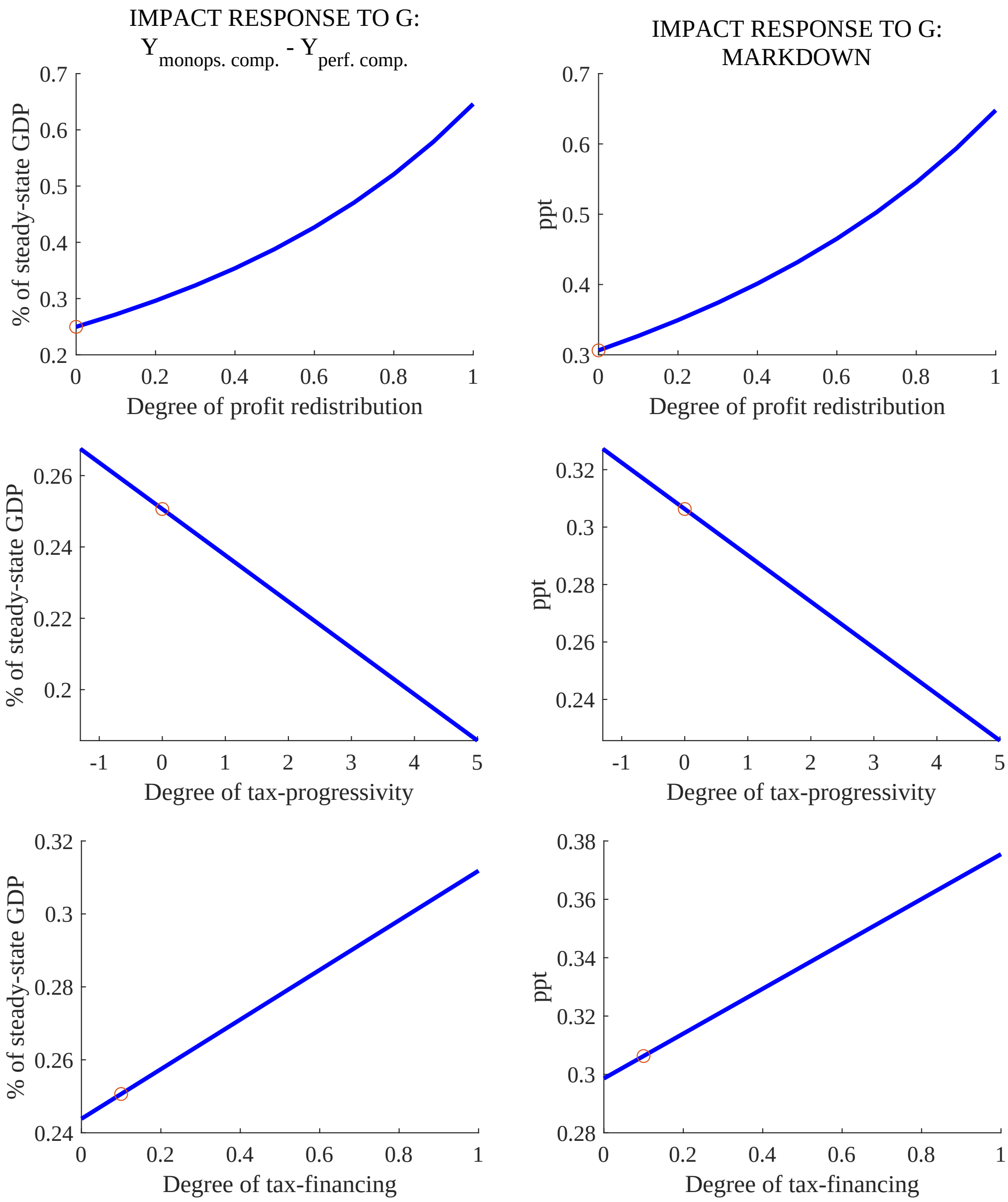
Income redistribution and the financing mix. The literature has demonstrated that the effect of government spending in a model with agents with different marginal propensities to consume depends crucially on the endogenous redistribution of profit income and the distribution of taxes raised to finance the spending increase (Auclert et al., 2023; Bilbiie, 2020; Broer et al., 2021; Ferriere & Navarro, 2022). In our baseline model, we assume that only capitalists receive the profit income, and there is no redistribution of profit income through the tax system. Moreover, we assume that both types of households equally share the additional tax burden from increased government spending (in accordance with their respective population shares). We proceed to demonstrate how modifications to these assumptions influence our results.

To start with, we investigate the impact of allowing for an endogenous redistribution of profit income from capitalists to workers. This is achieved by adjusting the parameter ϕ_d in the transfer rule $tr_t - tr = \phi_d(d_t - d)$, where $\phi_d = 0$ represents no profit redistribution (our baseline scenario), and $\phi_d > 0$ implies that a portion of profit income is reallocated toward workers. The results of this analysis are shown in the first row of Figure 8.

The figure shows that the effect of government spending on markdowns and, therefore, the output effect through the countercyclical-monopsony channel is elevated if profits are redistributed from capitalists to workers. For example, the amplification of the fiscal multiplier in comparison to the perfect competition scenario is approximately 0.4 when half of the profit income is redistributed to workers. In contrast, in our baseline no-redistribution case, amplification is about 0.25. The rationale for this finding is that under profit redistribution, workers share some of the adverse income effects of declining profits, which increases their marginal valuation of income. Consequently, the elasticity of labor supply to the individual firm rises, reducing employers' market power and increasing markdowns. As markdowns increase, employment and output are boosted.

We now explore how the results change when altering how the government finances the spending boost. To analyze this, we allow taxes of both types to differ according to $t_t^C = t_t^W + \phi_\tau(t_t - t)$. If $\phi_\tau = 0$, taxation is uniform (as in our baseline). If $\phi_\tau > 0$, the tax burden falls more heavily on capitalists. We refer to this situation as progressive

Figure 8: Varying the degree of profit redistribution and the financing mix.



Notes: Impact responses of relative output and markdown after 1% of GDP government spending expansion. Relative output is defined as the output response in the baseline case minus the output response in the perfect competition scenario. The horizontal axes in the upper panels display the parameter ϕ_d, capturing the degree of profit redistribution. The horizontal axes in the middle panels display the the parameter ϕ_τ, capturing the degree of tax progressivity where negative values imply regressive taxation, ranging from the one limiting case $\phi_\tau = -1/\lambda$ (tax burden falls only on workers) to the other limiting case $\phi_\tau = 1/(1-\lambda)$ (tax burden falls only capitalists). The horizontal axes in the lower panels display the parameter ϕ_g, capturing the degree of tax financing. The circle in the figures displays the results obtained from our baseline calibration.

taxation. Conversely, if $\phi_\tau < 0$, the tax burden is higher on workers, so we refer to this case as regressive taxation. Note that in the limiting cases $\phi_\tau = -1/\lambda$ and $\phi_\tau = 1/(1-\lambda)$, the tax burden of increased government spending falls solely on workers and capitalists, respectively.

The middle panels of Figure 8 show that the reduction in employer market power, as reflected by a rise in wage markdowns, and the resulting output impact of government spending under monopsony tend to be more pronounced when taxes are regressive. The reason is that most of the added tax burden now falls on workers. As a result, workers' marginal valuation of income increases, prompting them to give up non-pay job characteristics for higher pay. This, in turn, boosts the labor supply elasticity to the individual firm and reduces the extent to which firms can offer wages lower than marginal revenue products. However, the effect of varying who bears more of the additional tax burden due to increased government spending is relatively minor. This is primarily due to our baseline calibration, which implies that government spending has a small direct impact on taxes, and a substantial portion of the expenditure is funded via debt ($\phi_g = 0.1$). Next, we modify this assumption.

The last row of Figure 8 shows the impact of varying degrees of tax financing on our results by varying the tax-rule parameter ϕ_g. When doing so, we maintain our baseline assumption of uniform taxation ($\phi_\tau = 0$). Increasing the degree of tax financing intensifies the markdown response, thereby amplifying the output multiplier. This pattern arises because higher taxes raise workers' marginal valuation of income, which in turn boosts the elasticity of labor supply to individual firms.

4 Empirical evidence

We will now present empirical evidence that supports our model's primary predictions and fundamental mechanism. To accomplish this, we employ vector autoregressive (VAR) models to examine the consequences of an unforeseen exogenous rise in government spending on the degree of employer market power and the income distribution.

Econometric model. We estimate expectations-augmented vector autoregressive (VAR) models using quarterly U.S. data from 1981Q3 to 2019Q4. The reduced-form VAR model takes the form:

$$Y_t = C + \sum_{i=1}^{q} B_0^{-1} B_i Y_{t-i} + B_0^{-1} \eta_t, , \tag{18}$$

where Y_t is a $k \times 1$ vector consisting of k endogenous variables, C is a $k \times 1$ vector of constants, and η_t is a $k \times 1$ vector of serially and mutually uncorrelated structural shocks. The matrix B_i is a $k \times k$ matrix (for $i = 0, \ldots, q$), where B_0 contains the parameters for the contemporaneous endogenous variables, and q is the maximum lag length. By performing equation-by-equation ordinary least squares regression of the reduced-form VAR (18), we obtain estimates of the coefficients $B_0^{-1} B_i$ (for every $i = 1, \ldots, q$) and the reduced-form residuals $B_0^{-1} \eta_t$, as well as the covariance matrix of the reduced-form residuals Σ.

Variables. Our baseline set of variables Y_t comprises government spending (log real government consumption and gross investment per capita), output (log real GDP per capita), the average tax rate (tax revenues as a share of GDP), the real interest rate (constructed as the difference between Wu and Xia (2016)'s shadow policy rate and the year-on-year log-change in the GDP deflator), and the average forecast for total government spending growth from the Survey of Professional Forecasters (the forecast made at time t for the growth rate of real government purchases for time $t + 1$).

Our primary research interest is to examine the consequences of unanticipated government spending shocks on both the income distribution and monopsony power. To conduct this analysis, we adhere to the methodology proposed by Burnside et al. (2004), which involves employing a fixed set of macroeconomic aggregates (comprising the five variables mentioned above) and systematically introducing different variables of interest through rotation. These variables include corporate profits (after taxes, with adjustments for inventory valuation and capital consumption, measured in log real per capita terms), labor income (the product of the employment level, average weekly hours, and hourly compensation in the non-farm business sector, also measured in log real per capita terms), and the wage elasticity of worker-firm separations, estimated from the Survey of Income and Program Participation (SIPP).

The wage elasticity of separations is a standard measure of (inverse) monopsony power within the labor market. In most models incorporating monopsony power in the labor market, including our own (see Section 2.2 for comprehensive details), this elasticity of separations is proportional to the elasticity of labor supply to individual firms. The latter, in turn, determines the extent to which firms can reduce wages below the marginal revenue product. Building upon the work of Langella and Manning (2021), who estimated annual elasticities of wage separations between workers and firms using data from the Survey of Income and Program Participation (SIPP), we extend their estimations to a quarterly frequency and expand the dataset to include the most recent observations up to the structural break of the pandemic, resulting in a sample period 2000Q4-2019Q4. We provide a comprehensive description of the estimation process and some descriptive statistics of the resulting monopsony measure in Appendix B.

All variables entering our VARs are measured as deviations from linear trends.

Identification. We use a standard recursive identification scheme to identify government spending shocks, with government spending ordered first. Technically, we assume that B_0 is lower triangular. The underlying assumption is that government spending does not respond to economic changes within a quarter due to decision and implementation lags (Blanchard & Perotti, 2002). We include a fiscal news variable, specifically the spending growth forecast, following Auerbach and Gorodnichenko (2012)'s approach, to account for anticipation effects. The innovation in government spending that is orthogonal to this forecast represents an unexpected shock to government spending, as professional forecasters did not foresee it.

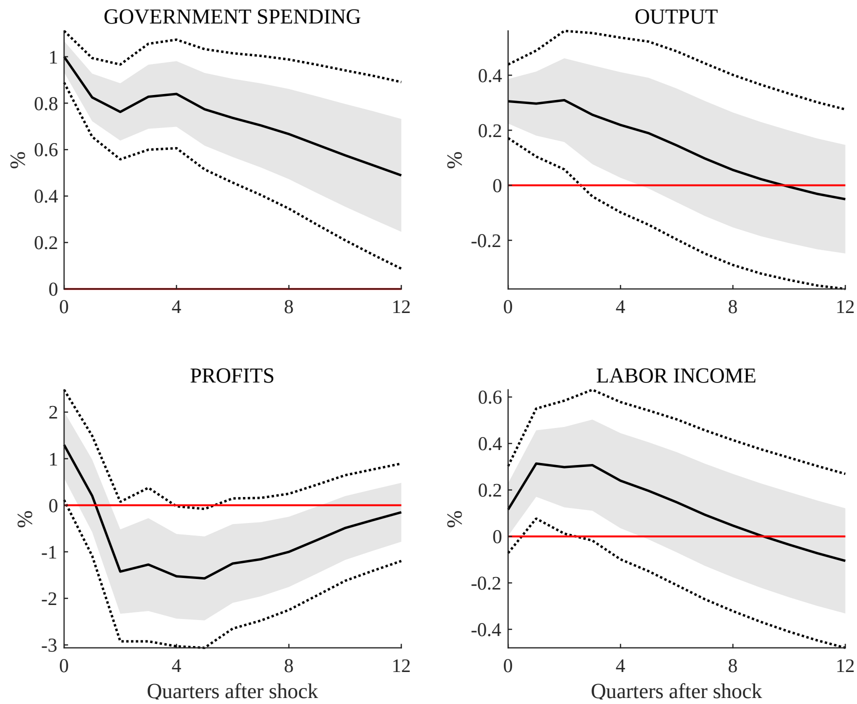
We incorporate the real interest rate and the average tax rate as controls for monetary policy stance and government budget financing (Ramey, 2011b; Rossi & Zubairy, 2011). By utilizing the Wu-Xia shadow federal funds rate as our interest rate measure in the VARs, we can capture the accommodative nature of monetary policy achieved through unconventional measures, such as quantitative easing, especially during the period of the lower bound on interest rates, which constitutes a substantial part of our sample.

Results. Figure 9 shows the estimated responses of government spending. The horizontal axes represent quarters following the shock, and the responses are expressed in percentage terms (percentage points for the inverse monopsony measure).

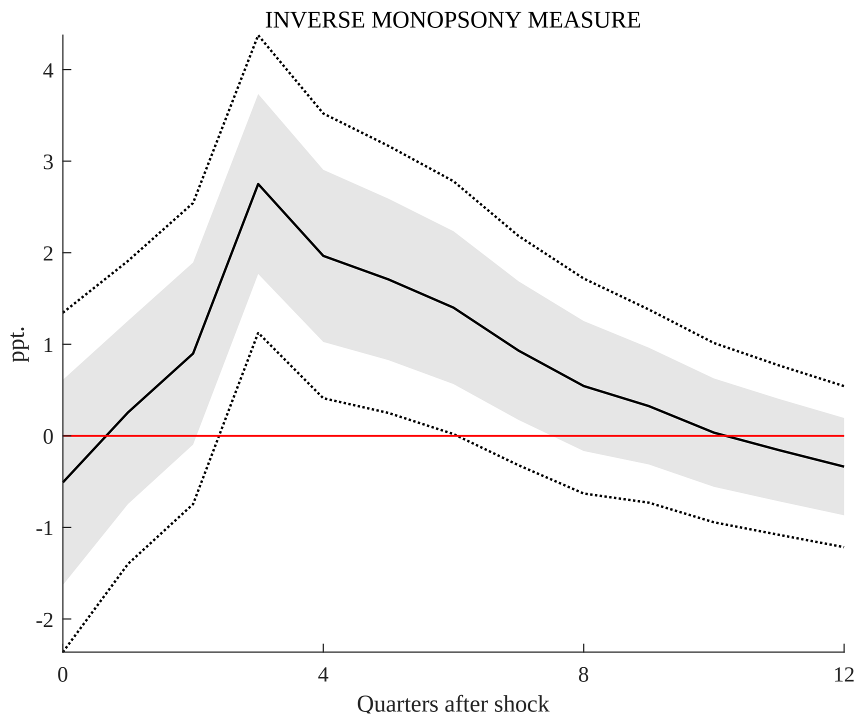
Panel (a) of the figure shows a sustained increase in government spending and a substantial boost in output, consistent with the literature; see, for example, Ramey (2016). The panel further reveals a substantial income redistribution from profit recipients to wage earners in response to government spending hikes. While profits fall in the medium term, labor earnings rise, in accordance with our model's prediction.

Figure 9: The effects of government spending shocks.

(a) Effects on macroeconomic aggregates and income distribution



(b) Effects on monopsony power



Notes: Solid lines are impulse responses to a government spending shock. Gray areas and dotted lines show 68% and 90% confidence bands. Responses are expressed in percent (percentage points for the inverse monopsony measure). On the horizontal axes, the horizon is given in quarters. Sample period is 1981Q3-2019Q4 in panel (a) and 2000Q4-2019Q4 in panel (b).

However, our primary objective is to evaluate our model's central element: how employer market power reacts to government spending shocks. Panel (b) of Figure 9 shows that a government spending expansion leads to an increase in the wage elasticity of separations, i.e., fosters greater worker mobility between firms, translating into a steeper slope of individual firms' labor supply curves. Put differently, firms' market power in the labor market declines as their wage-setting power erodes. This finding aligns with our model's prediction, where we anticipate an increase in the slope of individual firms' labor supply curves and a countercyclical behavior of monopsony power in reaction to government spending shocks. In our model, this endogenous change in employer market power is a crucial element of the transmission channel of fiscal policy.

5 Conclusion

In conclusion, our study proposes a novel fiscal transmission channel that operates through countercyclical monopsony power. We develop a Two-Agent New Keynesian model incorporating endogenously time-varying employer market power. Our results demonstrate that as government spending increases, employer market power declines, leading to larger fiscal multipliers and stronger distributional consequences. We examine the interplay of the novel countercyclical-monopsony channel with other crucial fiscal transmission channels, yielding two key findings. First, we observe that the strength of the countercyclical-monopsony channel exhibits an inverse relationship with the magnitude of the wealth effect on hours worked. Second, our analysis reveals that the degree to which workers bear the costs of an increase in government spending (via either profit losses or increased taxes) is positively related to the decline in employer market power and the resulting amplification of fiscal multipliers. We provide direct empirical evidence on the cyclical behavior of employer market power in response to government spending shocks, allowing us to test the model's predictions. The data show that increases in government spending decrease monopsony power in the labor market, as predicted by our model. Overall, our study provides valuable insights into the role of countercyclical monopsony power for stabilization policy.

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Appendix A: Model

A.1: Equilibrium conditions

This appendix collects the equilibrium conditions of our model. The first-order conditions of households' utility maximization problems are given by

$$u^W_{c,t}\left(1+\psi^W/c^W\left(b^W_t-b^W\right)\right)=\beta r_t E_t u^W_{c,t+1}\,, \tag{A.1}$$

$$c^W_t+b^W_t=w^W_t n^W_t-t^W_t+r_{t-1}b^W_{t-1}+\tfrac{tr_t}{\lambda}\,, \tag{A.2}$$

$$w_t=-u^W_{n,t}/u^W_{c,t}\,, \tag{A.3}$$

$$u^W_{c,t}=\Omega_t+\chi\iota_t x_t/c^W_t\,, \tag{A.4}$$

$$u^W_{n,t}=-\nu\Omega_t x_t(n^W_t)^{\varphi}\,, \tag{A.5}$$

$$\iota_t=-\tfrac{\nu}{1+\varphi}\Omega_t(n^W_t)^{1+\varphi}+\beta(1-\chi)E_t\left\{\iota_{t+1}\tfrac{x_{t+1}}{x_t}\right\}\,, \tag{A.6}$$

$$x_t=(c^W_t)^{\chi}x^{1-\chi}_{t-1}\,, \tag{A.7}$$

$$c^C_t+b^C_t=\frac{d_t}{1-\lambda}-t^C_t+r_{t-1}b^C_{t-1}-\frac{tr_t}{1-\lambda}\,, \tag{A.8}$$

$$u^C_{c,t}=\beta r_t E_t u^C_{c,t+1}\,, \tag{A.9}$$

$$\eta_t=\theta\cdot u^W_{c,t}\cdot w_t\cdot n^W_t+\tfrac{1}{\varphi}\,, \tag{A.10}$$

where $r_t\equiv R_t/(E_t\Pi_{t+1})$ is the real interest rate, ι_t denotes the Lagrange multiplier on the definition of x_t, and $\Omega_t\equiv\left(c^W_t-\tfrac{\nu}{1+\varphi}(n^W_t)^{1+\varphi}x_t\right)^{-1}$.

The first-order conditions of the firms' profit maximization problems are given by

$$w_t=(1+\tau^I)mc_t\,\mu_t\,, \tag{A.11}$$

$$\mu_t=\frac{\eta_t}{\eta_t+1}\,, \tag{A.12}$$

$$y_t=n_t\,, \tag{A.13}$$

$$\xi\Pi_t(\Pi_t-1)-(1+\tau^S)(1-\eta)-\eta\,mc_t=\beta\xi E_t\left\{\tfrac{u^C_{c,t+1}}{u^C_{c,t}}\,\Pi_{t+1}\left(\Pi_{t+1}-1\right)\tfrac{y_{t+1}}{y_t}\right\}\,. \tag{A.14}$$

Fiscal and monetary policy are described by

$$b_t + \lambda\tau_t^W + (1-\lambda)\tau_t^C = g_t + r_{t-1}\cdot b_{t-1} \tag{A.15}$$

$$t_t - t = \phi_b(b_{t-1} - b) + \phi_g(g_t - g) \tag{A.16}$$

$$t_t^C = t_t^W + \phi_\tau(t_t - t) \tag{A.17}$$

$$tr_t - tr = \phi_d(d_t - d) \tag{A.18}$$

$$g_t = \rho_g g_{t-1} + \varepsilon_t^g \tag{A.19}$$

$$R_t/R = (\Pi_t/\Pi)^{\phi_\pi} \tag{A.20}$$

The following conditions describe market clearing and aggregate statistics:

$$c_t = \lambda\, c_t^W + (1-\lambda)\, c_t^C\,, \tag{A.21}$$

$$n_t = \lambda\, n_t^W\,, \tag{A.22}$$

$$b_t = \lambda\, b_t^W + (1-\lambda)\, b_t^C\,, \tag{A.23}$$

$$d_t = y_t - n_t\, w_t\,. \tag{A.24}$$

A.2: Separation elasticity in the model

In this appendix, we characterize the relationship between a firm's size and its separation rate from workers in our model. This relation is key for the link between the elasticity of labor supply to individual firms, which is the decisive measure of employer market power in the model, and the separation elasticity, which is the empirical proxy for employer market power, see Section 4.

Regarding separations, we can use the result derived in Langella and Manning (2021, equation (14)) for the special case of idiosyncrasies and unrestricted flows between firms (in their model achieved by setting the probability of receiving an alternative job offer to one). If we use the notation of our model, the separation rate of a firm k' is given by

$$s_{k',t-1,t}(\{w_{k,t}\}_{k=1}^{K}, b_{t-1}^{W}) = 1 - \frac{\partial H\left(\left\{\mathcal{V}(w_{k,t}, b_{t-1}^{W})\right\}_{k=1}^{K}\right)}{\partial \mathcal{V}(w_{k',t}, b_{t-1}^{W})} \tag{A.25}$$

where

$$H\left(\{\mathcal{V}(w_{k,t})\}_{k=1}^{K}\right) = \mathrm{E}\left(\max\left(\left\{\mathcal{V}(w_{k,t}) + \frac{1}{\theta}\upsilon(k, \upsilon_{i,t})\right\}_{k=1}^{K}\right)\right).$$

with the expectation operator defined over the distribution of workers' idiosyncratic job preferences. The derivative of the H function to the pay component of a firm's attractiveness $\mathcal{V}$ equals the probability that a randomly selected worker chooses the firm in question. If preferences over job characteristics are reshuffled for every worker in every period, this also applies to the firm's previous workforce such that the above gives the separation rate as one minus the share of workers that choose the firm in question as their employer for two consecutive periods. Hence, the above is equivalent to

$$s_{k,t-1,t} = 1 - m_{k,t}/\lambda,$$

implying a constant relation between firm size m and separation rate s.

Appendix B: Empirical analysis

B.1: Estimation of separation elasticity

We replicated the analysis of Langella and Manning (2021) at a quarterly (rather than annual) frequency for the maximum available sample period 2000Q4-2019Q4.[7] Our procedure to determine the separation elasticity exactly follows Langella and Manning (2021) in that we run month-by-month complementary log-log models of separations with a residualized log hourly wage rate as the explanatory variable, from which the effects of demographics, industry, occupation, human capital, and time effects have been purged

[7] We have extended the sample to include years 2017 through 2019. For the time before 2000, a quarterly analysis is not possible as there are data for too few months.

in an initial filtering regression.[8] The residualized wage gives an estimate of whether the job is high- or low-paying in a particular labor market defined by the controls.

Formally, we estimate for every month t

$$Pr(S_{i,t,t+1} = 1) = \exp(\exp(\gamma_{t,t+1} \cdot \widetilde{w}_{i,t} + X_{i,t}\beta_t^S))$$

with

$$\log w_{i,t} = X_{i,t}^w \beta^w + \alpha_t + \widetilde{w}_{i,t},$$

where $S_{i,t}$ is a dummy indicating separations between the current and the next month[9], w_{it} is the hourly wage rate, $X_{i,t}$ is the set of controls described above, and α_t is a time effect. The parameter $\gamma_{t,t+1}$ is the separation elasticity.

The monopsony literature has identified several problems that can result in biased estimates of separations elasticities, among them the importance to effectively control for determinants of alternative wage offers, unobserved heterogeneity and the lack of identified exogenous wage variation at the firm level. Yet, the literature tends to view the resulting biases as rather constant which allows interpreting changes in $\widehat{\gamma}_{t,t+1}$ as changes in $\gamma_{t,t+1}$, see, e.g., Langella and Manning (2021, p. 2942).

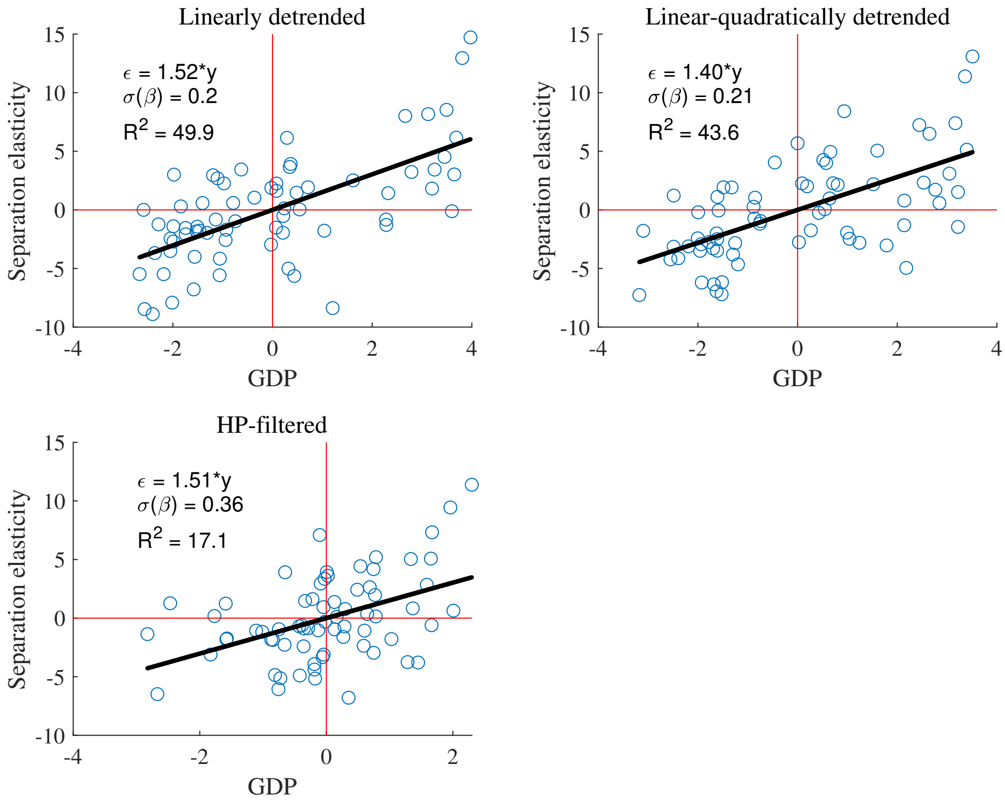
B.2: Descriptive statistics on the monopsony measure

To provide some descriptives on the unconditional cyclicality of employer market power, we conduct trend-cycle decompositions and extract the cyclical components of the natural logarithm of real GDP per capita and the estimated time series of the separation elasticity. Figure B.1 displays the cyclical components after linear detrending (upper left

[8] The demographic controls are gender, ethnicity, marital status, the number of children under 18, and state of residence. Industry and occupation are both measured at the two-digit level. Human capital is measured as potential work experience (included as a fourth-order polynomial) and dummies for highest degree.

[9] The SIPP contains the information whether an individual has the same employer as in the previous month, i.e., one can observe whether a separation took place while not knowing the identity of the employer.

Figure B.1: Procyclicality of separation elasticity.



Notes: Figures show the cyclical components of log real GDP per capita and the separation elasticity concerning the wage for alternative detrending methods.

panel), linear-quadratic detrending (upper right panel), and HP-filtering with a parameter value of $\lambda = 1600$ (lower panel). Regardless of the method of detrending used, we observe that the separation elasticity is procyclical. In other words, during periods of economic expansion, the wage elasticity of labor supply to the individual firm is relatively high, whereas, during downturns, the elasticity is relatively low. This implies that employer market power is countercyclical, decreasing during upswings and increasing during downturns. This aligns with the findings of previous studies by Hirsch et al. (2018) for Germany, Bassier et al. (2022) for the U.S. state of Oregon, and Webber (2022) for the United States.

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