Changing Jobs to Fight Inflation: Labor Market Reactions to Inflationary Shocks*

Gorkem Bostanci† Omer Koru‡ Sergio Villalvazo §

October 31, 2022

Click For the Latest Version

Abstract: Recent empirical work shows a strong positive correlation between job-to-job transition rates and nominal wage growth in the U.S. First, using time series regressions, structural monetary policy and oil shocks, and survey data on search effort, we provide evidence that inflationary shocks cause higher job-to-job transition rates. Second, to understand the aggregate implications, we build a structural model with competitive on-the-job search in which wages react sluggishly to inflation. When inflation is higher than expected, the decline in real wages incentivizes the employees to search on-the-job more actively, to negotiate a new contract, but also to be less selective in their search behavior. Increased search effort leads to more job-to-job transitions while being less selective reduces the expected efficiency gain in each transition. Therefore, the effect on output becomes ambiguous. Third, we calibrate the model to the U.S. economy and confirm that the output response to inflation shock is non-monotonic.

*We thank Guillermo Calvo, Harold Cole, Jesus Fernandez-Villaverde, Joachim Hubmer, Dirk Krueger, Ben Lester, Iourii Manovskii, Guido Menzio, Guillermo Ordonez, Frank Schorfheide, Andrew Shephard and seminar participants in UPenn and the Bank of Mexico for helpful comments and discussions. The views expressed in this paper are solely the responsibility of the authors and should not be interpreted as reflecting the views of the Board of Governors of the Federal Reserve System or of any other person associated with the Federal Reserve System.

†University of British Columbia, Email: gorkem.bostanci@ubc.ca

‡Penn State University

§Federal Reserve Board

***** PRELIMINARY AND INCOMPLETE DRAFT *****

1 Introduction

The rate of job-to-job transitions is considered a measure of the health of the economy because job switches are usually associated with wage and productivity increases[1]. In this paper, we identify a novel channel that affects the rate of job-to-job transitions: inflation. If wages are not indexed to inflation, real wages decrease when inflation is higher than expected and gains from renegotiation increase. Workers could respond by (1) increasing their search effort, thus, making a new job offer more likely, and (2) being less selective, i.e., looking for lower wage offers which lead to less productive matches. The first channel (search effort, henceforth) increases the number of job switches, while the second channel (selectivity, henceforth) decreases the associated productivity boost for each switch. Hence, the impact of inflation shocks on output is ambiguous and potentially depends on the size of the shock.

We measure how unexpected inflation affects aggregate productivity through its impact on the job search behavior of workers. We begin by utilizing reduced-form evidence to argue a causal link from unexpected increases in inflation to job-to-job transition rates. To quantify the resulting change in productivity, we build a model of directed on-the-job search with aggregate shocks. Numerical exercises confirm the theoretical predictions of our model. The short-run output response is non-monotonic in the size of the inflationary shock: small shocks lead to an increase, and large shocks lead to a decrease.

Our paper is motivated by the recent findings by Faberman et al. (2015), Moscarini and Postel-Vinay (2017), and Karahan et al. (2017) that once job-to-job transition rates are controlled for, unemployment-to-employment transition rates have little to no predictive power on nominal wage growth. On the other hand, the job-to-job transition rate and nominal wage growth have a considerable positive correlation. These findings are at

[1]See, e.g., Fallick and Fleischman (2004), Christensen et al. (2005) and Jolivet et al. (2006). Under a variety of models, job changes come with changes in both wage and productivity (See Postel-Vinay and Robin (2002), and Menzio and Shi (2011)).

odds with the classical Philips Curve reasoning, where low unemployment strengthens workers' bargaining position and puts upward pressure on wages. It instead suggests the real threat point of the workers is switching to another job; that is, firms are more likely to increase wages when job-to-job transitions are more likely. Our analysis confirms the co-movement between job-to-job transitions and the inflation rate. Acknowledging that both objects are equilibrium outcomes, we try to unpack which shocks might be behind the positive correlation and their aggregate implications.

In the first part of the paper, we provide three main pieces of evidence that suggest the positive correlation between inflation and the job-to-job transition rate is driven by the positive effect of the shocks to the former on the latter. First, we run vector autoregressions and Granger causality tests on the aggregate U.S. data. While inflation helps predict future job-to-job transition rates, job-to-job transitions do not help predict future inflation movements. Second, we use the estimates of structural monetary policy shocks and OPEC oil shocks as instruments for inflation. This analysis allows us to look beyond the reverse causality argument, as these shocks are arguably exogenous to economic conditions. Our results suggest that a 1 pp shock to the inflation rate causes an increase in the job-to-job transition rates by 2.9-4.2%. Third, we provide direct evidence of the mechanism using individual-level survey data on inflation expectations and on-the-job search behavior. We find that a one standard deviation increase in yearly inflation expectations increases the probability of search by 4.3%. Furthermore, it increases the hours spent searching by 9% and the number of offers received within the next month by 16% among searchers.

In the second part, we build a model of competitive on-the-job search with endogenous search effort where the contract space is restricted to nominal wage contracts. The agents respond to an unexpected positive inflation shock by increasing their search effort (effort channel) because the option value of searching increases.[2]. Simultaneously, the

[2]See Faberman et al. (2022) for evidence on search effort decreasing with income and Christensen et al. (2005) and Mueller (2010) for evidence on job search effort decreasing as workers move up the job ladder.

agents respond by searching in markets with lower posted wages (selectivity channel) as their current situation becomes more desperate. Hence, they trade a higher wage for a higher probability of finding a new job. Both channels lead to more frequent job-to-job transitions, which, by itself, would increase average productivity. However, the reduced asking wage makes these transitions less productivity-enhancing, creating a force that decreases average productivity. In short, inflationary shocks increase job-to-job transitions while their effect on productivity is ambiguous. Numerical exercises confirm the non-monotone response of the output. When the unexpected increase in inflation is bigger than a threshold value, the selectivity channel starts to dominate, and the output decreases.

The proposed mechanism has important implications. First, it explains how output response may be non-monotonic in the size of the inflation shock. Thus, it provides a bridge between seemingly disparate estimates of the literature on the real effects of monetary policy shocks[3]. Second, it provides a novel mechanism for how monetary policy can affect the real economy in the short run. The monetary authority can improve labor allocation in the economy through monetary policy shocks, thus increasing productivity. Third, it provides a novel channel explaining why some recessions are associated with a more pronounced 'cleansing' effect than others.: the size of the unexpected price movement affects both the speed and the effectiveness of job reallocation during recessions.

This paper is closely related to the literature that analyzes the interaction between inflation and the efficiency of labor markets. In particular, the idea that inflation helps reduce labor market frictions and increase productivity was first proposed by Tobin (1972) and empirically tested by Card and Hyslop (1997). According to this idea, a positive inflation rate prevents nominal downward wage rigidity from translating to a real rigidity[4]. In our baseline model, we shut this channel down to flesh out our novel channel. We

[3]See Wolf (2019) for an overview of these findings.

[4]Lunnemann and Wintr (2010) find that the real wage rigidity is indeed more substantial in Luxembourg where there is a state-imposed automatic wage indexation.

re-introduce it in one of our model extensions to analyze the combined effect of the two channels.

The most closely related work to ours is by Moscarini and Postel-Vinay (2019) (MPV henceforth), who incorporate a random on-the-job search framework into a New Keynesian DSGE model. When there is a positive shock to the efficiency of on-the-job search, employees receive more offers, some of which are matched by the incumbent firm. Matched offers are essentially cost shocks to the firm, and it responds by raising prices. Hence, a higher-than-average job-to-job transition rate is followed by higher-than-average price inflation. The mechanism in MPV and ours are complementary. MPV shows how a shock to job-to-job transition rates brings wage inflation and therefore price inflation. We show how a shock to price inflation increases job-to-job transitions. Thus, our contribution is three-fold. First, our mechanism, in combination with theirs, explains how labor demand shocks can be amplified through offer matching and changing search behavior. Second, shocks to price inflation can also trigger this cycle. Third, the monetary policy recommendations could change once our channel is taken into account[5] because the monetary authority needs to consider the job-switching response to predict the response of the real economy. MPV assumes the on-the-job search effort is fixed, hence shuts down our channel by assumption[6]. The empirical evidence in Section 2 favors our channel if one or the other has to be picked.[7]

[5]Tom Fairless of the Wall Street Journal, in his article based on the results by MPV, argues "If workers are less willing to switch jobs, central banks could press harder on the gas pedal to stimulate the economy without worrying about inflation. And there may be little policy-makers can do to influence the job-switching rate except to watch it." (2019, Nov 17) https://www.wsj.com/articles/one-explanation-for-weak-wage-growth-workers-reluctance-to-switch-jobs-11573999201?shareToken=st5a849d04f72440fca240048db4bad6d1. Our mechanism suggests there is a direct link from monetary policy shocks to job-to-job transition rates.

[6]Incorporating the search effort channel in their model is not trivial. In MPV, only the distribution of productivities across jobs is a state variable, while adding the search effort makes the joint distribution of wages and productivities a state variable. Then, the surplus function is not sufficient to characterize the transitions either because the search effort choice is not efficient due to the restricted contract space. Hence, the tricks in Lise and Robin (2017) cannot be used to simplify the problem. Our model avoids this issue by utilizing the block-recursivity of competitive search where the distributions are no longer state variables. We present a version of our model under random search in Appendix F

[7]See also Faccini and Melosi (2021).

This paper also contributes to the literature on the efficiency of job reallocation. This literature asks when reallocation is productivity-enhancing and when it is not. A broad finding is that U.S. recessions were accompanied with productivity-enhancing job reallocation until the great recession[8] while the reallocation during the great recession was both slower and less productivity-enhancing (Mukoyama (2014) and Foster et al. (2016)). Haltiwanger et al. (2018) asks whether the decline is due to a decreased number of transitions or a smaller productivity gain conditional on making a transition and find most of the decline comes from the latter. Caballero and Hammour (1994) discusses potential frictions that may create inefficient job reallocation during recessions. Barlevy (2003) emphasizes increased credit market frictions. In contrast, Ouyang (2009) suggests early exits as mechanisms large enough to reverse the 'cleansing' effect of the recessions[9]. Gautier et al. (2010), in a model with on-the-job search, analyzes which wage-setting mechanisms generate socially efficient job switches. They conclude that for social efficiency, the hiring premium (to induce the worker to search) should equal the no-quit premium (to prevent the worker from making a job switch later). The equality is satisfied in wage posting with commitment but not in wage bargaining or the sequential auctions of Postel-Vinay and Robin (2002). The competitive search framework we use also satisfies the efficiency requirement posited here; the inefficient switches in our setting are purely due to nominal frictions. The closest papers to ours in this literature are by Moscarini (2001), and Barlevy (2002). Moscarini (2001) considers a trade-off similar to ours. In his model, similar to the competitive search models, workers decide between a good match with a long queue and a mediocre match with a short queue. Thus, in tight labor markets, the initial matches are of higher quality, and the reallocation is slow. Barlevy (2002) shows that decreasing job-to-job transitions during recessions can generate an effect large enough to offset the 'cleansing' effect of recessions. In his model, after a bad productivity shock, firms post

[8]See e.g. Davis and Haltiwanger (1992), Caballero and Hammour (1994), Davis et al. (2006) and (Davis et al., 2012).

[9]Foster et al. (2008) shows if pricing decisions are not taken into account, the effect of demand and productivity shocks on profitability can be confounded. Thus, the reallocation that only enhances profitability can be mislabeled as productivity-enhancing.

fewer vacancies, which reduces the rate of job-to-job transitions, thus, the productive reallocation of workers in the economy. In contrast, our model focuses on the effect of the inflationary shocks and generates productivity drops even when the reallocation rate is higher.

Lastly, our mechanism is also related to the literature that analyzes how the extent of wage flexibility affects the output response to monetary policy shocks. Olivei and Tenreyro (2007) shows that the effects of monetary policy shocks depend on their timing during the year, which is consistent with the fact that many firms renegotiate wage contracts at the end of the year. Björklund et al. (2019), using data on collective wage agreements in Sweeden, find that the output response to monetary policy is bigger when a larger fraction of wage contracts are nominally fixed.

We proceed with the description of the data used. Section 2 provides the empirical analysis. Section 3 lays down the model and provides the theoretical results. Quantitative results of the model are presented in Section 4. Section 5 concludes.

2 Empirical Analysis

This section presents three types of evidence to argue that the positive correlation between inflation and job-to-job transitions stems from the causal effect of inflation on job-to-job transitions. First, subsection 2.1 uses time-series data to show that a high inflation today predicts a high job-to-job transition rate in the future. In contrast, a high job-to-job transition rate today does not predict high inflation in the future. Second, subsection 2.2 uses estimates of monetary policy and global oil shocks as instruments to get a causal estimate of the effect of inflation on job-to-job transitions. Third, subsection A.2 provides direct evidence on how inflation increases the job search effort of the employed from survey data by comparing individuals with different inflation expectations. We later use the estimates from this subsection to discipline the structural model.[10]

The raw data also suggests a potential role for inflation. Figure 1 shows that job-to-job transition rate took a big hit in all three recessions since the data becomes available. While it took the rate several years to recover after 2001 and 2008 crises, it immediately recovered in the 2020 recession. 2020 recession was also the only inflationary recession: while the inflation rate decreased after the previous recessions, it went up to historical levels after the Covid crisis. These patterns suggest a potential role for inflation in post-recession recovery.[11]

2.1 Predictive Regressions

We use the series made available by Fujita et al. (2019)[12] that covers the period from September 1995 to June 2022 for the monthly job-to-job and unemployment-to-employment transition rates. We utilize three measures of inflation. First, over-the-year changes in the Consumer Price Index (CPI) provide price inflation. Second, inflation expectations are taken from the Survey of Professional Forecasters.[13] Third, we define a variable 'inflation surprise' as the discrepancy between the forecasted and the realized inflation for a one-year period. At a time t, this measures the accumulated unexpected prices moves since time $t-1$. We seasonally adjust and HP filter all variables with a smoothing parameter of $1600 * 3^4$.

[10]See Appendix B.1 and B.2 for analyses utilizing state-level and country-level variation in job-to-job transition rates. Although both analyses are suggestive for the role of our channel, we don't have state-level data on inflation expectations and the country-level data is too infrequent (yearly) to draw a causal interpretation.

[11]Although unexpected inflation movements have been relatively small for the U.S., they have lead to large drops in real wages once accumulated. Figure 8 in Appendix G summarizes this idea by showing the real wage losses of a worker who signed a contract according to SPF inflation forecasts. The losses during the post-Covid inflation period reach 9% while they approach 2% several times after 1981. Given that the average wage increase accompanying a job-to-job transition is around 2% (Jinkins and Morin, 2018), a 2% decline in real wages increases the wage gains by 100%. See Appendix Figure 9 for the same plot with the Michigan Consumer Survey inflation forecasts.

[12]See Appendix A for details on the data sources used throughout the empirical analysis.

[13]The results are robust to using the Michigan Survey of Consumers forecasts.

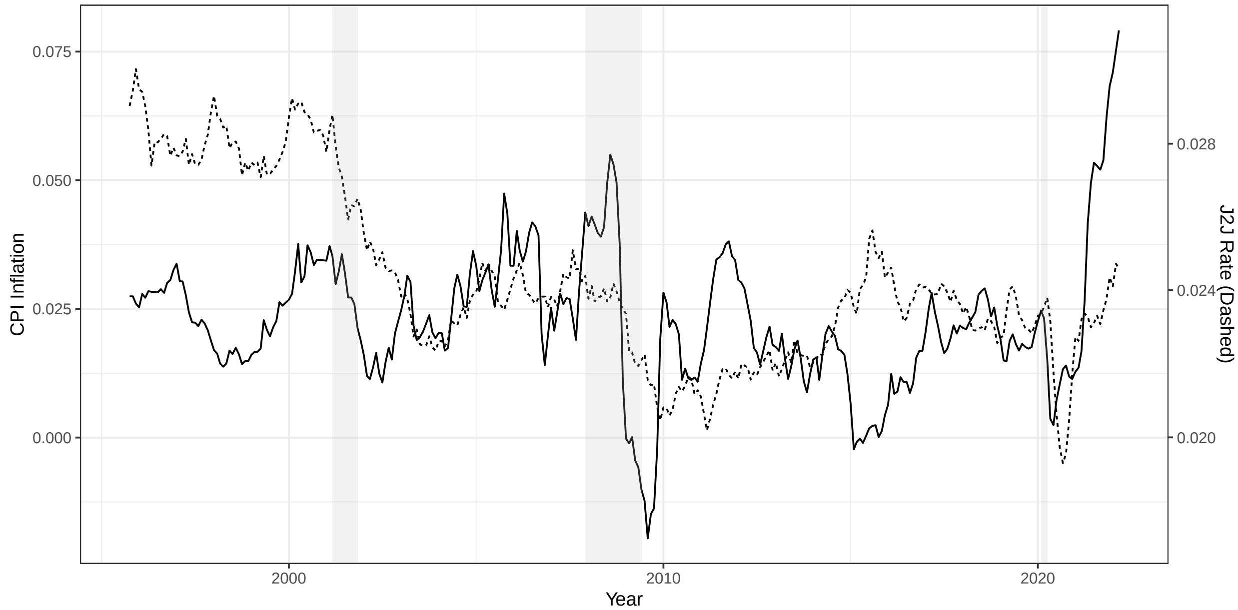

Figure 1: CPI Inflation and Monthly Job-to-job Transition Rates 10/1995 to 06/2022 The dashed line represents the three-month moving average of the seasonally adjusted monthly job-to-job transition rate (Fujita et al., 2019). The solid line represents the CPI inflation. The shaded regions represent NBER recessions.

In our main specification, we run a VARX(n) with a measure of inflation and J2J transition rate:

$$y_t = \sum_{L=1}^{n} (\beta_{yL} y_{t-L} + \beta_{xL} x_{t-L} + \beta_{ZL} z_{t-L}) + \epsilon_t \quad (1)$$

where y and x are the J2J rate and one of the inflation measure and Z represents additional controls.

Table 1 presents the results from a simple VAR(2) exercise with one-month and twelve-month lags. The one-month lag of all three inflation-related measures have a significant positive coefficient for predicting subsequent job-to-job transition rates. On the other hand, the coefficients for job-to-job transition for predicting inflation-related variables are generally negative and insignificant.[14] Although the predictive relationship is sug-

[14]We further conduct Granger Causality tests to formalize the predictive ability of both variables. The

Table 1: VAR(2) Estimates

	J2J Rate	CPI Infl	J2J Rate	SPF Infl Surprise	J2J Rate	SPF 1-yr Ahead Infl
	(1)	(2)	(3)	(4)	(5)	(6)
$Infl_{t-1}$	0.03***	0.92***	0.03***	0.92***	0.21***	0.99***
	(0.01)	(0.02)	(0.01)	(0.02)	(0.04)	(0.02)
$Infl_{t-12}$	0.00	−0.12***	0.01	−0.11***	−0.02	−0.05***
	(0.01)	(0.02)	(0.01)	(0.02)	(0.04)	(0.02)
$J2J_{t-1}$	0.26***	0.04	0.27***	0.00	0.21***	−0.01
	(0.06)	(0.17)	(0.06)	(0.18)	(0.06)	(0.03)
$J2J_{t-12}$	0.07	0.00	0.08	−0.06	0.04	−0.02
	(0.05)	(0.17)	(0.05)	(0.17)	(0.06)	(0.03)
Observations	309	309	309	309	309	309
Adjusted R^2	0.16	0.88	0.16	0.88	0.20	0.93

Notes: The measure use for $Infl$ is CPI year-to-year inflation in columns (1) and (2), inflation surprise from SPF forecasts in columns (3) and (4), and SPF inflation forecasts in column (5) and (6). The columns (1), (3), and (5) have the job-to-job transition rate at time t as the dependent variable while the others have the inflation measures at time t. All variables are seasonally adjusted and HP-filtered. *p<0.1; **p<0.05; ***p<0.01

gestive, the mechanism might be through the demand side, i.e., the inflation might be changing hiring incentives of firms rather than the search effort of workers. We add unemployment-to-employment transition rates as a control for demand side channels as in Moscarini and Postel-Vinay (2019). Table 6 in Appendix G shows that the results are similar.[15]

Granger Causality test rejects if the lags of variable x help predict variable y above and beyond the lags of variable y. The results with all 12-month lags indicate that SPF forecasts Granger-causes job-to-job transition rates with 5% significance, while the test cannot reject the lack of predictive ability for the remaining inflation variables and the other direction.

[15]The results are also robust to excluding the COVID period, adding a third lag, using Personal Consumption Expenditures (PCE) Deflator or core PCE Deflator (excluding food and energy) for price index instead of CPI, and using Michigan Consumer Survey instead of SPF for inflation forecasts. See Tables 7, 8 and 9 in Appendix G.

2.2 Instrumental Variable Analysis with Monetary Policy and Oil Shocks

Section 2.1 shows that unexpectedly high inflation predicts higher job-to-job transition rates in the future. Here, we use structural estimates of monetary policy and oil supply shocks as instruments for the inflation level to establish a causal relationship.

We use several popular monetary policy shock estimates in the literature. The first measure is computed from narrative records of FOMC meetings and internal forecasts of Federal Reserve by Romer and Romer (2004) and updated further by Wieland and Yang (2016). The second measure is by Barakchian and Crowe (2013) who use Fed Funds futures to see exogenous changes in policy. The third measure is by Sims and Zha (2006), who use structural VAR estimates to identify shocks to monetary policy. Fourth, fifth, sixth, and seventh measures are by Gertler and Karadi (2015), Nakamura and Steinsson (2018), and Bauer et al. (2021) who use high-frequency movements in financial series during FOMC announcements to identify monetary policy shocks[16]. The measures not only differ in their methodologies but also in their time coverage, however, results are robust to the choice of measure. Lastly, we use the oil supply shocks by Känzig (2021) who utilizes high frequency identification around OPEC announcements.

In our main specification, we estimate the following equation in the second stage.

$$J2J_t = \beta_0 + \beta_1 CPI_t + \beta_2 CPI_{t-1} + \beta_3 UE_{t-1} + \beta_4 u_{t-1} + \epsilon_t \quad (2)$$

where t denotes a month, $J2J$, UE, and u are monthly job-to-job transition, unemployment-to-employment transition, and unemployment rates respectively, and $Infl_t$ is the percentage growth of CPI from $t-1$ to t. In the first stage, we estimate

[16]Readers should refer to Ramey (2016) for an excellent review on these and other monetary policy shock estimation methods.

$$CPI_t = \beta_0 + \sum_{i=1}^{24} \gamma_{1,i} MPS_{t-i} + \sum_{i=1}^{24} \gamma_{2,i} OSS_{t-i} \epsilon_t \quad (3)$$

where MPS is one of the monetary policy shock measures we have and OSS is the oil supply shock measure. The results from the second stage are given in Table 13.

Table 2: IV Estimates

	BC	GK	BLM	NS	NSFFR	RR	SZ
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$Infl_t$	0.042	0.046**	0.045**	0.060**	0.048*	0.073***	0.075**
	(0.029)	(0.022)	(0.019)	(0.026)	(0.025)	(0.025)	(0.030)
$Infl_{t-1}$	0.018	0.019	0.021	0.026	0.017	0.026	0.013
	(0.039)	(0.035)	(0.023)	(0.039)	(0.035)	(0.028)	(0.038)
u_{t-1}	−0.058	−0.022	−0.023	−0.025	−0.026	−0.068*	−0.050
	(0.038)	(0.025)	(0.020)	(0.026)	(0.025)	(0.040)	(0.088)
UE_{t-1}	0.001	0.008	0.009	0.005	0.007	−0.001	0.006
	(0.009)	(0.008)	(0.006)	(0.008)	(0.008)	(0.009)	(0.012)
Constant	0.000	0.000	0.000	−0.000	−0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Range	1995-2008	1995-2012	1995-2018	1995-2014	1995-2014	1995-2008	1995-2003
Observations	131	179	245	200	200	125	68
Adjusted R^2	0.199	0.206	0.137	0.174	0.197	0.224	0.158

Notes: Each column represents the source used for the monetary policy shock. The controls are unemployment rate and the unemployment to employment transition rate. The instruments are 1 to 24 month lags of monetary policy and oil supply shocks. All variables are seasonally adjusted and HP-filtered. See Appendix A for the data sources and details of how each variable is constructed. *p<0.1; **p<0.05; ***p<0.01

Table 13 shows that the contemporaneous inflation has a significant and positive impact on J2J transitions. Inflation in the previous year has a positive coefficient in all specifications, but is generally insignificant. Furthermore, the magnitude of the effect is similar across specifications. In particular, a 1 p.p. exogenous increase in inflation leads to a contemporaneous increase in J2J transitions by 4.2 to 7.5 basis points, which translates to a 1.7%-3.1% increase on average. The results are qualitatively and quantitatively robust to removing the controls and only using the monetary policy shocks as instruments.[17] These results further add to the evidence in support of our theory, that is, higher price inflation leads to higher job-to-job transitions.

2.3 Survey Evidence on Search Effort

So far, we have showed a connection between inflation rate and job-to-job transition rates at the aggregate level. This subsection supplements the previous ones by providing evidence at the individual level and forming a connection between inflation and direct measures of search effort.

2.3.1 Inflation Expectations

The analysis here utilizes the publicly available micro-data from Federal Reserve Bank of New York Survey of Consumer Expectations (SCE) between 2013 and 2019. The core survey in the SCE is a 12-month panel and asks individuals about their inflation expectations each month. The Labour Survey supplement of the SCE asks respondents about their work status, including basic questions on their job search activity, three times in April, July, and November. Lastly, the Job Search supplement of the SCE asks more detailed questions on job search activities once in October. We combine these surveys to measure how inflation expectations are related to job search.

In our main specification, we regress a variety of job search activities and outcomes on contemporaneous inflation expectations of respondents, controlling for the survey date. We run regressions of the form:

$$y_{jt} = \alpha \hat{i}_{jt} + \gamma_t + \sum \beta X_{jt} + \epsilon_{jt} \tag{4}$$

[17] See Table 13 and Table 14 in Appendix G.

where j indexes respondents, t indexes survey dates, y_{jt} and $\hat{i}_{jt}$ represent job search activities and inflation expectations respectively for respondent j measured at survey t. Lastly, the vector X represents additional controls and always includes survey fixed effects. In addition, we control for demographic and job-related variables (natural logarithms of age, tenure, and annual earnings, dummies for sex and marital status, five dummies for race, four dummies for education, and fixed effects for state, job start-year, and two-digit industries) that can correlate with both inflation expectations and job search behavior. We exclude respondents who are, at the time of the survey, not between the ages 18 and 64, non-employed or self-employed, have less than 6 months of tenure, and searching for non-job related reasons or a firing notice.

Table 3: Direct Evidence on Search Effort

(a) Inflation Expectations and Job Search Activities

	Search(1M)	Search(1M)	Hours(1W)	Hours(1W)	#Methods	#Methods	#Apply(1M)	#Apply(1M)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\hat{\imath}$(1-yr) ahead	0.36***	0.20*	11.62***	7.15***	3.99***	3.34**	4.05***	2.79***
	(0.11)	(0.11)	(2.86)	(2.76)	(1.54)	(1.61)	(1.12)	(1.03)
Survey FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	13,515	13,488	3,113	3,110	2,498	2,495	3,531	3,530
R^2	0.01	0.07	0.04	0.15	0.05	0.15	0.02	0.12

(b) Inflation Expectations and Job Search Outcomes

	#Heard(1M)	#Heard(1M)	#Interviews(1M)	#Interviews(1M)	#Offers(1M)	#Offers(1M)	#Offers(4M)	#Offers(4M)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\hat{\imath}$(1-yr) ahead	−0.215	0.247	0.520*	0.484**	0.645**	0.395	0.298	−0.035
	(0.526)	(0.610)	(0.266)	(0.216)	(0.308)	(0.266)	(0.247)	(0.239)
Survey FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	3,531	3,530	3,057	3,056	3,529	3,528	8,851	8,835
R^2	0.003	0.087	0.010	0.093	0.006	0.090	0.003	0.059

Notes: Each double-column represents a different measure of job search activity as the dependent variable, with and without additional controls. The main dependent variable is the inflation expectation for the next 12 months. All regressions have survey date fixed effects. The additional controls are natural logarithms of age, tenure, and annual earnings, dummies for sex and marital status, five dummies for race, four dummies for education, and fixed effects for state, job start-year, and two-digit industries. The standard errors are clustered at the individual level. See Appendix A for the data sources and details of how each variable is constructed. *$p<0.1$; **$p<0.05$; ***$p<0.01$

Table 3a shows the results on various measures of job search effort. In particular, the respondents who expect inflation to be higher in the next year are more likely to have searched in the past month. Furthermore, conditional on having searched, they spent more hours in the past week, tried more methods, and applied to more employers. Table 3b shows the results on various measures of job search outcomes. The respondents who expect inflation to be higher in the next year have received more interviews and more offers in the past months. We find no significant impact on the number of employers respondents heard from, which may or may not have been solicited by job search activities. Adding several available controls reduce the magnitude of the coefficients, yet the qualitative results are generally robust.

3 The Model

3.1 Environment

The environment has two main frictions that are required to generate the monetary non-neutrality. First, firms and employees are not allowed to sign state-contingent contracts.[18] Second, search frictions prevent perfect competition in the labor markets. Therefore, shocks to inflation introduce shifts in real wages of existing employees. Since employed also search on the job, the model exhibits monetary non-neutrality even though the wages of new hires are completely flexible. If all labor contracts were inflation-adjusted or labor markets were competitive, our model would exhibit monetary neutrality.

Here, we describe an environment where all variables are real. We then introduce shocks to the real wages of existing employees as inflation shocks and match these shocks to the discrepancy between the inflation forecasts and the realized inflation in the data. This will allows us to avoid nominal variables in our modeling which can be conceptual-

[18]Existence of nominal frictions in wage setting has long been documented. See Appendix C for a broad overview of the evidence regarding the extent of wage indexation.

ized as a limit of the classical New Keynesian model where pricing frictions go to zero[19].

3.1.1 Preferences

The economy consists of a continuum of individuals with measure one and a continuum of firms with positive measure. Both the workers and the firms are risk-neutral and maximize the expected discounted income/profits. Time is discrete, and firms and workers share the same discount factor, $\beta \in (0, 1)$.

3.1.2 Production Technology

There is a single homogeneous consumption good in the economy. When a worker and a firm match, they produce $y + z$ units of output. The first component, y, is the aggregate productivity, and it is the same across firms. The second component, z, is match specific. Upon meeting, z is drawn from a distribution $\mathcal{G}$ and remains the same until separation.

Unemployed workers produce b units of output.

3.1.3 Meeting Technology

Workers and firms need to find each other to produce. Search is directed, and markets are indexed by the value offered by a firm to a worker. We denote submarkets by $X \in \mathbb{R}$.

Both unemployed and employed workers can search for a job. After they choose in which submarket to search for a job, workers choose the search effort, e. The cost of exerting effort is denoted by $c(e)$ and it is a strictly increasing and convex function with

[19] We choose to avoid a full New Keynesian structure with pricing frictions. First, this allows us to isolate the effects of inflation through the labor market, without having to worry about other moving parts. Second, once included, pricing frictions require dynamically optimizing firms that break block-recursivity. Thus, we would be forced to use Taylor approximations to solve the model.

the following properties: $c(0) = 0, c'(0) = 0$[20].

Firms also choose in which submarket to post their vacancies. The cost of opening a vacancy for one period is $\kappa > 0$.

In a submarket, firms and workers meet each other via a constant returns to scale matching function, M. Given v measure of vacancies and E unit of total search effort, there are $M(v, E)$ measure of matches. Constant returns to scale assumption implies that market tightness θ, i.e. vacancy-to-total search effort ratio, is sufficient to characterize the probability of matching. Specifically, a worker that exerts e unit of search effort finds a job with probability $ep(\theta)$, where $p : \mathbb{R} \rightarrow [0, 1]$ is a strictly increasing and concave function with following properties: $p(0) = 0, p(x) \rightarrow 1$ as $x \rightarrow \infty$. On the other hand, a vacancy meets a worker with probability $q(\theta)$, where $q : \mathbb{R} \rightarrow [0, 1]$ is a strictly decreasing function with the following property: $\theta q(\theta) = p(\theta)$.

After a firm and a worker meets, they draw match productivity z and decide whether to form a match or not.

3.1.4 Wage Setting

The contract space is limited to fixed-wage contracts. In other words, if a firm and a worker meet in a submarket X and decide to form a match, then firm offers a wage rate w that provides an expected lifetime utility of X to worker, taking into consideration the search effort cost and the separation risk (either exogenous or through the worker finding a better job). X and the aggregate state are sufficient to pin down the wage, since it depends on future lifetime utility X, not past outcomes. Also, the match productivity does not affect the lifetime value of the worker since it is constant throughout the firm-worker match. Let ψ be the aggregate state of the economy, which consists of aggregate

[20]We consider the search cost as a utility cost, thus it doesn't appear in the output calculations.

productivity y and distribution of workers across jobs and wages $\Gamma(z, w)$[21]. We denote the entry wage of a worker in submarket X when the aggregate state is ψ by $h(X, \psi)$.

3.1.5 Timeline

Each period is divided into five sub-periods. In the first sub-period, aggregate productivity y is drawn. In the second sub-period, exogenous separations occur with probability $\delta \in (0, 1)$. In the third sub-period, workers choose where to search and how much effort to exert. In this stage, workers who were separated from their job in the current period cannot search for a job; they remain unemployed with probability one. In the fourth sub-period, workers and firms meet and decide whether to form a match. In the last sub-period, production takes place, and wages are paid.

3.1.6 Discussion of the Model Elements

While setting the environment, we make five main simplifications. Four of them are innocuous while the fifth is not.

First, we denote all the variables in real terms. Second, we avoid modeling an inflation process with rational expectations over it. Third, we assume fixed-wage contracts although all that is needed for the mechanism is that they are not state-contingent. In principle, we can focus on nominal wages, allow an inflation process that follows an AR(∞) and contracts that are functions of time. In that scenario, employees and firms could sign contracts that take the expected future inflation into account and designate an associated increase in nominal wages over time. Therefore, nominal wages would follow a path that leaves the real wages constant over time absent shocks to inflation and aggregate productivity. Using the real wages as the model element allows us to abstract

[21] Unlike Menzio and Shi (2011), the wage distribution matters for determining future tightness because it determines the aggregate search effort.

from the expected paths of the nominal variables and focus on the shocks to the inflation process. None of these three simplifications have a bearing on the final results while they simplify the notation greatly.

Fourth, we don't allow firms to make counter offers for their poached employees. In theory, this might result in workers moving to jobs with lower productivity than their current jobs, which wouldn't happen if the incumbent firms could respond. We make the assumption for computational simplicity. More importantly, in our quantitative exercise, we don't observe this behavior with the calibrated parameters. Therefore, allowing the firms to respond should have no quantitative effect on our results.

The fifth simplification, namely, treating inflation as an exogenous process, is not completely innocuous. In a fully-fledged New Keynesian model, output shocks and monetary shocks both contribute to determining the inflation. Therefore, treating the inflation shocks as completely independent from output shocks would not be entirely correct. On the other hand, introducing firms that price dynamically would break the block-recursivity of the equilibrium. Thus, whenever we draw conclusions from the past data, we will not only rely on the inflation series. Instead, we will focus on the discrepancy between the inflation expectations and the realized inflation while remaining agnostic on how these expectations are formed in the economy.

3.2 Equilibrium

3.2.1 Problem of a Firm

Since the production technology is constant returns to scale, the size of the firm is indeterminate. Hence, we consider single vacancy firms. Let $K(w, z, \psi)$ be the value function of a filled vacancy with match productivity z, wage rate w and aggregate state ψ. Observe that a firm is willing to form a match in submarket X if and only if the match productivity

z satisfies $K(h(X,\psi), z, \psi) \geq 0$. Since the firm value is increasing in z, define $\underline{z}$ such that $K(h(X,\psi), \underline{z}, \psi) = 0$. If such $\underline{z}$ exists, the expected value of finding a worker is:

$$J(X,\psi) = \int_{z \geq \underline{z}} K(h(X,\psi), z, \psi) dG(z).$$

The free entry condition implies that

$$k \geq q(\theta) J(X,\psi), \tag{5}$$

where left-hand side is the cost of vacancy, and the right-hand side is the expected value of a vacancy, which is the product of the probability of finding a worker and the expected value of a filled vacancy. This condition holds with equality whenever there is a positive mass of workers searching for a job in submarket X. Hence, there is a one-to-one relationship between market tightness θ and (X,ψ). Hence, we can write $\theta(X,\psi)$ as the market tightness in active submarkets.

Let $\bar{p}(H(w,\psi),\psi)$ be the probability that a worker leaves the job when his lifetime value is $H(w,\psi)$ and the aggregate state is ψ. Then,

$$K(w,z,\psi) = y + z - w + \beta(1-\delta)\mathbb{E}\left[(1 - \bar{p}(H(w,\psi'),\psi')K(w,z,\psi)\right] \tag{6}$$

The model has endogenous separations, which affect the wage-setting problem in a non-trivial way. In a search model where job switches are efficient, a la Postel-Vinay and Robin (2002), the probability of losing a worker is completely exogenous. Thus, the sequential auctions protocol dictates firms to pay the minimum wage that will allow them to keep/attract the worker. Once search effort is introduced, firms may want to offer a wage that is more than absolutely needed to reduce the incentives of the worker to exert search effort and attract more offers. This kills the simple structure of the sequential auctions protocol. The additional complication is smaller in a directed search framework, however, results in a firm value function K that is not monotone in the wage (or value) offered.

3.2.2 Problem of an Unemployed Worker

Consider an unemployed worker. We write down the problem of the unemployed right before the production sub-period. The value function of an unemployed worker is

$$U(\psi) = b + \beta \mathbb{E}\left[\max_e eR(\psi', U) - c(e) + U(\psi')\right], \tag{7}$$

where $R(\psi, V)$ is return to searching in the optimal submarket for an agent with lifetime value of V:

$$R(\psi, V) = \max_x p(\theta(\psi, X))(X - V)(1 - G(\underline{z}(\psi, X)))$$

e does not appear in $R(\psi, X)$, because search effort is exerted after the choice of submarket[22]. After the choice of submarket, worker chooses an effort level to maximize the term inside the brackets in (8).

3.2.3 Problem of an Employed Worker

Similarly, we can define the value function of an employed worker as:

$$H(w, \psi) = w + \beta \mathbb{E}\left[\delta U(\psi') + (1 - \delta) \max_e (eR(\psi', H(w, \psi')) - c(e) + H(w, \psi'))\right]. \tag{8}$$

3.2.4 Equilibrium Definition

Following Menzio and Shi (2011), we consider block recursive equilibria. In a block-recursive equilibrium, policy functions do not depend on the distribution of workers across jobs. Hence, the only relevant aggregate variable is aggregate productivity y, i.e.,

[22]Since a worker is measure zero, his choice of e does not effect θ, hence it does not effect the choice of submarket.

$\psi = y$[23].

A block-recursive equilibrium consists of a market tightness function $\theta : Y \times \mathbb{R} \to \mathbb{R}_+$, a value function for the unemployed $U : Y \to \mathbb{R}$, a value function for the employed $H : \mathbb{R}_+ \times Y \to \mathbb{R}$, a value function for the firm $K : \mathbb{R}_+ \times Z \times Y \to \mathbb{R}$, optimal choice of submarket $m : \mathbb{R} \times Y \to \mathbb{R}$, optimal choice of search effort $e : \mathbb{R} \times Y$, entry wage $h : \mathbb{R} \times Y \to \mathbb{R}$ and the cutoff for match productivity $\underline{z} : \mathbb{R} \times Y$ such that:

1. $\underline{z}(X, \psi)$ satisfies $K(h(X, \psi), \underline{z}, \psi) = 0$,
2. entry wage $h(X, \psi)$ solves $H(h, \psi) = X$,
3. $H(w, \psi)$ satisfies (8), $U(\psi)$ satisfies (7), $K(w, z, \psi)$ satisfies (6) where probability that a worker finds a job is $\bar{p}(w, \psi) = e(m(H(w, \psi), \psi))p(\theta(\psi, m(H(w, \psi), \psi)))(1 - G(\underline{z}))$,
4. $e(V, \psi)$ and $m(V, \psi)$ solve worker's problem,
5. $\theta(\psi, X)$ satisfies the free entry condition (5).

3.3 Effect of a Decrease in Real Wage

What happens if a worker's real wage decreases for some exogenous reason, for example, inflation? In this section, we show that there are two competing mechanisms: a decrease in selectivity in on-the-job search and an increase in the search effort. First, we prove that when a worker's current lifetime utility decreases, she searches in a lower-valued submarket, which has a lower cutoff for match-specific productivity. Second, we prove that the worker increases the search effort.

Lemma 1. *$\underline{z}(X, \psi)$ is increasing in promised lifetime utility X.*

[23]Since the search effort choice is an innocuous extension of the framework in **?**, we do not prove existence and uniqueness of the block-recursive equilibrium here. Schaal (2017) provides a discussion of the possible scenarios where block-recursivity may fail.

This lemma states that as the promised lifetime utility increases, to form a match, a better match specific productivity draw is needed. The intuition is clear: if a firm promises higher value, its lifetime value decreases. Hence, at the marginal match specific productivity, the firm starts making a loss. Therefore, the firm is more selective in high indexed markets.

Lemma 2. *$m(V, \psi)$ is increasing in current lifetime utility V.*

This lemma states that workers with low current lifetime utility search in a market that promises lower lifetime utility compared to a worker with higher current lifetime utility. This mechanism implies a job ladder, workers start from the bottom and gets better lifetime utilities as they find new jobs and climb the job ladder.

Lemma 3. *$R(\psi, V)$ is decreasing in current lifetime utility V.*

As a worker's current lifetime utility increases, there is a lower gain from finding a better job. Hence, return to searching for a job increases. This mechanism also implies that search effort is decreasing with lifetime value.

Lemma 4. *$e(V, \psi)$ is decreasing in current lifetime utility V.*

Lemmas 1 and 2 show that a worker with a lower current lifetime utility search in a lower indexed submarket, in which cutoff for the match-specific productivity is lower. Hence, if a worker's wage decreases, the expected productivity of her next job is lower than the expected productivity in the market she previously searched in[24]. On the other hand, Lemma 4 shows that the worker increases his search effort. Hence, the probability of moving to a better job increases.

At the micro-level, inflation has a direct impact on individual's lifetime utility. However, at the macro level, inflation does not have a direct effect, i.e., if workers do not

[24]There might even be a probability that she ends up at a worse job than the current one she has. In the calibrated model, we don't observe this possibility.

change their behavior, there would be no change in the aggregate output. However, due to these two competing channels, the aggregate output might decrease or increase in the short-run due to inflation. One time inflation shock does not have an impact on the steady-state, thus, there are no long-run implications.

If the first channel dominates, workers end up with lower match specific productivities, which leads to lower aggregate output. If the second channel dominates, workers increase their search effort and form new matches with higher match productivity. This mechanism leads to a higher aggregate output. Therefore, impact of an inflation shock is ambiguous. We proceed to quantify the importance of each channel in Section 4.

4 Quantitative Analysis

This section presents the preliminary calibration strategy and the quantitative results.

4.1 Calibration Strategy

For the output predictions to have a quantitative interpretation, two implied elasticities should be plausible: (1) the response of job-to-job transitions to an inflationary shock and (2) the response of aggregate output to job-to-job transitions. We measure the former elasticity from micro-data that documents how workers adjust their search behavior with inflationary shocks (see Section 2). The latter can be inferred from wage increases following job switches and a measure of how surplus is shared between firms and workers. Although matching these two elasticities is necessary for pinning down the output response, it is not sufficient. The response of the aggregate output to job-to-job transitions depends on the underlying reasons for these transitions. The output response following increased transitions due to a labor demand shock does not necessarily equal the response due to an inflationary shock. Thus, it is crucial to model these two together instead of stitching two elasticities that are computed separately.

We use a telephone-line matching function: $p(\theta) = \theta\left(1+\theta^{\gamma}\right)^{-1/\gamma}$[25] and assume the match specific productivity distribution $\mathcal{G}$ follows a Pareto distribution with location parameter z_{min} and shape parameter z_{shape}. Lastly, we assume a quadratic search cost function $c(e) = Ae^2$ where the level potentially differs for the employed A_e and the unemployed A_u.

The full set of parameters necessary to compute the model is the vector:

$$\Omega = \{\beta, \delta, \gamma, \kappa, A_e, A_u, b, z_{min}, z_{shape}, \rho_y, \sigma_y\} \tag{9}$$

The model period is taken to be a month. We normalize z_{min} to equal the unemployment benefit replacement rate, calibrate β and δ externally, and calibrate the remaining parameters internally. We calibrate the parameters to match the steady state moments, except for the parameters that determine the process of aggregate productivity process. Then, we calibrate the aggregate productivity process to match the business cycle statistics.

We set the monthly discount factor $\beta = 0.95^{1/12}$ and exogenous separation rate $\delta = 0.011$ consistent with the average EU rate in 2005 (Fallick and Fleischman (2004)).

Calibration Idea

The model doesn't admit an analytic expression for the steady state distribution of workers across jobs, hence we stick to discussing the broad intuition of how the moments inform the parameter values. The calibration uses all moments to discipline all parameters, since general equilibrium effects through market tightness prevents isolating the

[25]The telephone-line matching function, proposed by Stevens (2007), is a flexible matching function that has the Cobb-Douglas as a special case.

response of different moments.

For the model to do a good job in quantifying the output response, it should capture the following elasticities correctly: (1) the elasticity of search effort w.r.t. an exogenous wage decline, (2) the elasticity of target wage w.r.t. an exogenous wage decline, and (3) the elasticity of output w.r.t. an increase in real wages through a transition. Our analysis in Section 2 gives us two ingredients. The cross-sectional analysis with the job-search survey gives us the first elasticity directly. The analysis with monetary policy shocks gives us the elasticity of job-to-job transitions to an exogenous wage decline which helps pin down the second elasticity. For the third elasticity, we combine an external target of 2% average real wage increase from a transition (Jinkins and Morin, 2018) with the implied rent sharing between firms and workers from the structural model.

The residual wage distribution informs the match productivity distribution z_{shape}, and the flow benefit of unemployment b. The flow benefit disciplines the left tail because the wage bargaining between the firm and an unemployed worker depends on the outside option of the worker. The right tail depends on how large the match productivity can be, hence on z_{shape}.

The employment-to-employment (EE) and unemployment-to-employment (UE) transition rates inform the search effort cost level parameters for the employed A_e and the unemployed A_u respectively. A higher transition rate implies a lower cost.

The labor share disciplines the vacancy cost κ, hence the surplus sharing between the firm and the worker in the model. A higher labor share implies a low κ. Lastly, the median tenure helps discipline the matching function elasticity γ. As the elasticity gets larger, firms become more aggressive with the wage postings and the median tenure goes down.

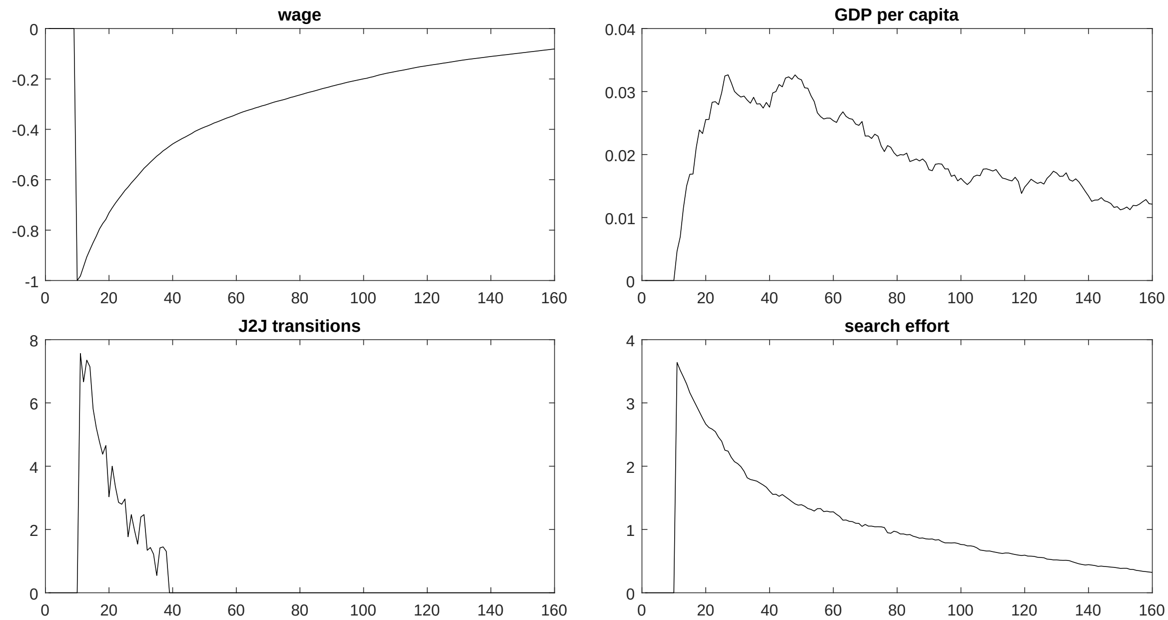

Figure 2: Impulse Response to an Unexpected 1 p.p. Increase in Inflation For each plot, the y-axis values indicate the percentage change relative to the baseline value. The unit of time is a month. The parameter values for the numerical exercise are: $\kappa = 0.1, \gamma = 3, \beta = 0.99, A_u = 12.5, A_e = 4.5, \delta = 0.01, z_{shape} = 2.95, \rho = 0.7, \sigma_y = 0.05, \eta = 0.1, \eta_w = 0.01$.

Calibration Results

In progress.

4.2 Numerical Exercise: Unexpected Inflation Shock

This section presents how the economy responds to unexpected shocks to inflation of different sizes. In particular, the numerical findings confirm the analytic results in Section 3.3. While small positive inflation shocks increase the output in the short run, large positive inflation shocks decrease it.

Figure 2 displays the impulse-response for a 1 p.p. shock to inflation. The instantaneous change in average wages reflects the size of the inflation shock.[26] The impact can be

[26]In this numerical exercise, we assume everyone receives the shock, i.e., no wages are inflation-indexed. In the calibration, we consider measures of inflation indexation in the US economy. Furthermore, there

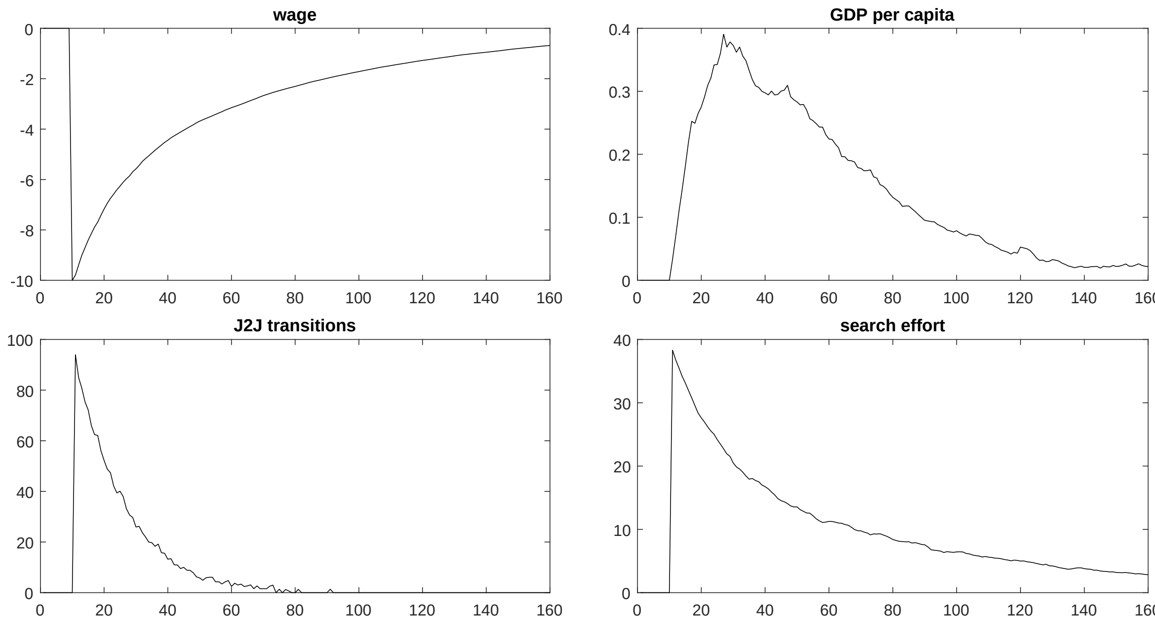

Figure 3: Impulse Response to an Unexpected 10 p.p. Increase in Inflation For each plot, the y-axis values indicate the percentage change relative to the baseline value. The unit of time is a month. See Figure 2 for parameter values.

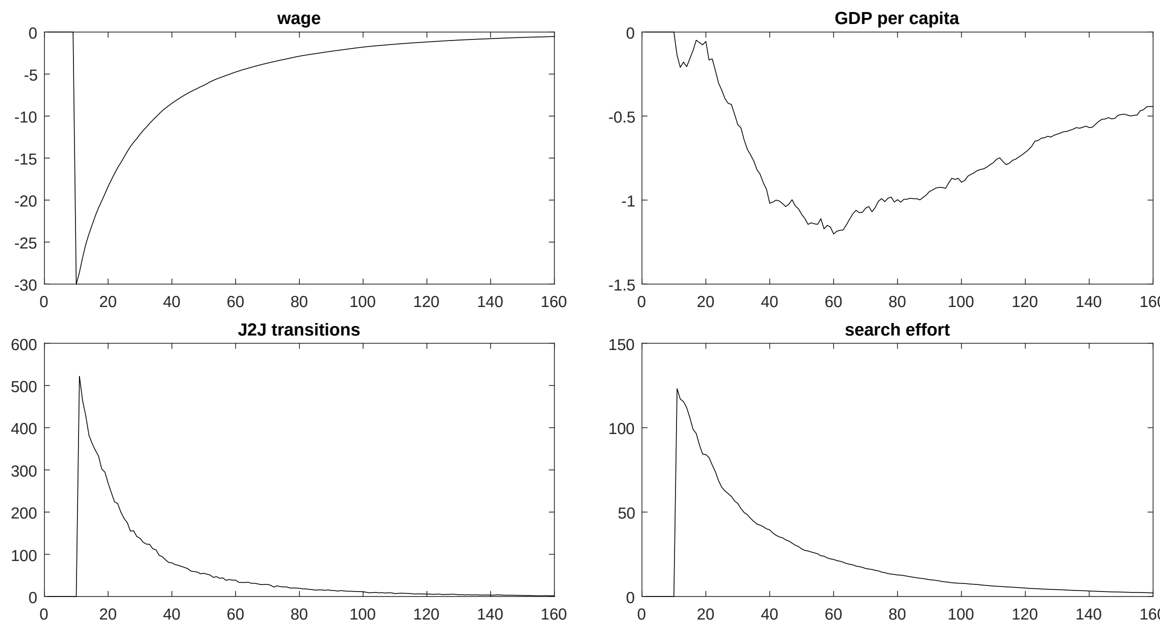

Figure 4: Impulse Response to an Unexpected 30 p.p. Increase in Inflation For each plot, the y-axis values indicate the percentage change relative to the baseline value. The unit of time is a month. See Figure 2 for parameter values.

seen in the search effort, which rises immediately. The job-to-job transition rate increases following the increase in the search effort yet goes back to the steady state value much faster. Lastly, the 1 p.p. shock brings a short-run boost to output that outlasts the increase in the job-to-job transition rate.

Figure 3 displays the impulse-response for a 10 p.p. shock to inflation. The increases in the search effort, job-to-job transition rate, and output seem to scale proportionally with the shock size.

The pattern breaks with a 30 p.p. shock, as shown in Figure 4. Even though the increase in the search effort is roughly proportional to the growth in the shock size, the job-to-job transition rate increases by a larger amount. Here, one important implication of the counter-acting mechanisms manifests itself. The drop in real wages increases the search effort, which results in an increase in the job-to-job transition rate. On the other hand, the same drop causes the employed to be more nervous about finding a new job more quickly. Hence, they look for jobs in markets where it is easier to find a job, where wages and productivity are lower as well. The change in the markets where workers search further boosts the job-to-job transition rate. The unintended consequence of the change in markets is that the productivity boost from each transition goes down. The output figure confirms this intuition. When the shock is small enough, the increased number of switches dominates the fact that each switch is less productivity-enhancing. When the shock gets larger, the latter channel starts to dominate, and we see a drop in output.

Lastly, since the wages of new hires are perfectly flexible, job switches undo the effects of the one-time inflation shocks. Therefore, the model exhibits money neutrality in the long run.

Overall, the numerical exercise confirms our theoretical analysis of the channels in

is no endogenous unemployment in the current version of the model. Hence, there is no change in the unemployment rate.

Section 3. The next step is calibrating the model to estimate the threshold inflation shock value where the output response switches from positive to negative.

5 Conclusion

This paper explores the positive correlation between inflation and job-to-job transitions in the economy. We start by providing reduced-form evidence that supports a causal link from unexpectedly high inflation to a higher job-to-job transition rate. First, we find that inflation shocks precede shocks to job-to-job transition rates: inflation lags are good predictors of job-to-job transitions, while the opposite is not true. Second, using several monetary policy and oil price shocks as instruments, we show that there is a causal link from inflation to job-to-job transition rates. Third, using survey data, we show that individuals with higher than average inflation expectations are (1) more likely to search and (2) exert more effort and get better results conditionals on searching.

We proceed by constructing a model that captures two primary channels through which unexpected inflation impacts worker behavior. Higher-than-expected inflation rates increase the benefit of receiving a new offer in a setting with rigid wages. Hence, workers respond to inflationary shocks by searching more intensively and being less selective. As a result, more job-to-job transitions occur. However, because workers are less selective than before, each transition leads to a smaller boost in aggregate productivity. Hence, labor allocation across firms might improve or deteriorate in the short run.

Lastly, we use the model to quantify the regions of monetary policy shock magnitudes that lead to a positive versus a negative output response in the short run. Numerical results confirm the non-monotonic response of output to inflationary shocks in the short run.

The mechanism carries important implications for monetary policy: an expansionary monetary policy shock can improve the allocation of resources in the economy and increase productivity in the short run.

References

Barakchian, S Mahdi and Christopher Crowe (2013), "Monetary policy matters: Evidence from new shocks data," *Journal of Monetary Economics*, 60, 950–966.

Barlevy, Gadi (2002), "The sullying effect of recessions," *The Review of Economic Studies*, 69, 65–96.

Barlevy, Gadi (2003), "Credit market frictions and the allocation of resources over the business cycle," *Journal of monetary Economics*, 50, 1795–1818.

Bauer, Michael D, Aeimit Lakdawala, and Philippe Mueller (2021), "Market-Based Monetary Policy Uncertainty," *The Economic Journal*, 132, 1290–1308.

Björklund, Maria, Mikael Carlsson, and Oskar Nordström Skans (2019), "Fixed-Wage Contracts and Monetary Non-neutrality," *American Economic Journal: Macroeconomics*, 11, 171–92.

Caballero, Ricardo J. and Mohamad L. Hammour (1994), "The Cleansing Effect of Recessions," *The American Economic Review*, 84, 1350–1368.

Card, David and Dean Hyslop (1997), "Does inflation" grease the wheels of the labor market"?" in "Reducing inflation: Motivation and strategy," 71–122, University of Chicago Press.

Christensen, Bent Jesper, Rasmus Lentz, Dale T Mortensen, George R Neumann, and Axel Werwatz (2005), "On-the-job search and the wage distribution," *Journal of Labor Economics*, 23, 31–58.

Davis, Steven J, R Jason Faberman, and John Haltiwanger (2006), "The flow approach to labor markets: New data sources and micro-macro links," *Journal of Economic perspectives*, 20, 3–26.

Davis, Steven J, R Jason Faberman, and John Haltiwanger (2012), "Labor market flows in the cross section and over time," *Journal of Monetary Economics*, 59, 1–18.

Davis, Steven J and John Haltiwanger (1992), "Gross job creation, gross job destruction, and employment reallocation," *The Quarterly Journal of Economics*, 107, 819–863.

Donovan, Kevin, Jianyu Lu, and Todd Schoellman (2022), "Labor market flows and development," Tech. rep., Mimeo.

Faberman, R Jason, Alejandro Justiniano, et al. (2015), "Job switching and wage growth," *Chicago Fed Letter*.

Faberman, R Jason, Andreas I Mueller, Ayşegül Şahin, and Giorgio Topa (2022), "Job search behavior among the employed and non-employed," *Econometrica*, 90, 1743–1779.

Faccini, Renato and Leonardo Melosi (2021), "Bad jobs and low inflation," .

Fallick, Bruce C. and Charles A. Fleischman (2004), "Employer-to-employer flows in the U.S. labor market: the complete picture of gross worker flows," Finance and Economics Discussion Series 2004-34, Board of Governors of the Federal Reserve System (US).

Foster, Lucia, Cheryl Grim, and John Haltiwanger (2016), "Reallocation in the Great Recession: cleansing or not?" *Journal of Labor Economics*, 34, S293–S331.

Foster, Lucia, John Haltiwanger, and Chad Syverson (2008), "Reallocation, firm turnover, and efficiency: selection on productivity or profitability?" *American Economic Review*, 98, 394–425.

Fujita, Shigeru, Giuseppe Moscarini, and Fabien Postel-Vinay (2019), "Measuring Employer-to-Employer Reallocation," Tech. rep., Mimeo.

Gautier, Pieter A, Coen N Teulings, and Aico Van Vuuren (2010), "On-the-job search, mismatch and efficiency," *The Review of Economic Studies*, 77, 245–272.

Gertler, Mark and Peter Karadi (2015), "Monetary policy surprises, credit costs, and economic activity," *American Economic Journal: Macroeconomics*, 7, 44–76.

Haltiwanger, John C, Henry R Hyatt, Lisa B Kahn, and Erika McEntarfer (2018), "Cyclical job ladders by firm size and firm wage," *American Economic Journal: Macroeconomics*, 10, 52–85.

Hazell, Jonathon, Juan Herreno, Emi Nakamura, and Jón Steinsson (2022), "The slope of the Phillips Curve: evidence from US states," *The Quarterly Journal of Economics*, 137, 1299–1344.

Jinkins, David and Annaïg Morin (2018), "Job-to-job transitions, sorting, and wage growth," *Labour Economics*, 55, 300–327.

Jolivet, Grégory, Fabien Postel-Vinay, and Jean-Marc Robin (2006), "The empirical content of the job search model: Labor mobility and wage distributions in Europe and the US," *European Economic Review*, 50, 877 – 907.

Känzig, Diego R (2021), "The macroeconomic effects of oil supply news: Evidence from OPEC announcements," *American Economic Review*, 111, 1092–1125.

Karahan, Fatih, Ryan Michaels, Benjamin Pugsley, Ayşegül Şahin, and Rachel Schuh (2017), "Do Job-to-Job Transitions Drive Wage Fluctuations over the Business Cycle?" *American Economic Review*, 107, 353–57.

Lise, Jeremy and Jean-Marc Robin (2017), "The macrodynamics of sorting between workers and firms," *American Economic Review*, 107, 1104–35.

Lunnemann, Patrick and Ladislav Wintr (2010), "Downward wage rigidity and automatic wage indexation: Evidence from monthly micro wage data," .

Menzio, Guido and Shouyong Shi (2011), "Efficient search on the job and the business cycle," *Journal of Political Economy*, 119, 468–510.

Moscarini, Giuseppe (2001), "Excess worker reallocation," *The Review of Economic Studies*, 68, 593–612.

Moscarini, Giuseppe and Fabien Postel-Vinay (2017), "The Relative Power of Employment-to-Employment Reallocation and Unemployment Exits in Predicting Wage Growth," *American Economic Review*, 107, 364–68.

Moscarini, Giuseppe and Fabien Postel-Vinay (2019), "The job ladder: Inflation vs. reallocation," *Unpublished draft, Yale University*.

Mueller, Andreas (2010), "On-the-job search and wage dispersion: New evidence from time use data," *Economics Letters*, 109, 124–127.

Mukoyama, Toshihiko (2014), "The cyclicality of job-to-job transitions and its implications for aggregate productivity," *Journal of Economic Dynamics and Control*, 39, 1–17.

Nakamura, Emi and Jón Steinsson (2018), "High frequency identification of monetary non-neutrality: The information effect," *Quarterly Journal of Economics*.

Olivei, Giovanni and Silvana Tenreyro (2007), "The timing of monetary policy shocks," *American Economic Review*, 97, 636–663.

Ouyang, Min (2009), "The scarring effect of recessions," *Journal of Monetary Economics*, 56, 184–199.

Postel-Vinay, Fabien and Jean-Marc Robin (2002), "Equilibrium wage dispersion with worker and employer heterogeneity," *Econometrica*, 70, 2295–2350.

Ramey, Valerie A (2016), "Macroeconomic shocks and their propagation," in "Handbook of Macroeconomics," 2, 71–162, Elsevier.

Romer, Christina D and David H Romer (2004), "A new measure of monetary shocks: Derivation and implications," *American Economic Review*, 94, 1055–1084.

Schaal, Edouard (2017), "Uncertainty and unemployment," *Econometrica*, 85, 1675–1721.

Sims, Christopher A and Tao Zha (2006), "Were there regime switches in US monetary policy?" *American Economic Review*, 96, 54–81.

Stevens, Margaret (2007), "New microfoundations for the aggregate matching function," *International Economic Review*, 48, 847–868.

Tobin, James (1972), "Inflation and Unemployment," *The American Economic Review*, 62, 1–18.

Wieland, Johannes F and Mu-Jeung Yang (2016), "Financial dampening," Tech. rep., National Bureau of Economic Research.

Wolf, Christian K (2019), "SVAR (Mis-) Identification and the Real Effects of Monetary Policy Shocks," *Manuscript, Princeton University*.

Appendices

A Data Sources

A.0.1 Monthly Data

Job-to-Job Transitions: In sections 2.1 and 2.2, we use the series made available by Fujita et al. (2019).[27] It is an adjusted measure of employment-to-employment transition rates in the US computed from the Current Population Survey (CPS) at the monthly level. In section 2.1, we use data from October 1995 to June 2022 for inflation and job-to-job transition measures, and control variables. In section 2.2, the sample varies depending on the availability of monetary policy shock measures. All monthly data are seasonally adjusted and filtered using a smoothing parameter of $1600 * 3^4$.

Inflation: We use Consumer Price Index (CPI) inflation in the US from the Bureau of Labor Statistics. As an alternative measure of inflation, we also use Personal Consumption Expenditures (PCE) inflation from the St. Louis Federal Reserve. Both measures describe year-over-year inflation, reported monthly.

Inflation Forecasts: To construct the measures of inflation shocks we use in sections 2.1 and 2.2, we use quarterly data from the Survey of Professional Forecasters (SPF) by the Philadephia Fed.[28] Professional forecasters are surveyed quarterly and asked to predict various measures of the economy, including inflation. We use the one-year-ahead inflation forecast (INFCPI1YR), constructed by taking the mean of the median quarter-over-

[27]This series is based on the method introduced by Fallick and Fleischman (2004) It corrects for selection into responding to the employment-to-employment question brought on by changes to the survey methodology in 2007 (https://sites.google.com/site/fabienpostelvinay/working-papers/EEProbability.xlsx?attredirects=0&d=1). We repeat our empirical exercises using the original series by Fallick and Fleischman (2004) as a robustness check. The results are BLANK and are presented in Appendix BLANK.

[28]https://www.philadelphiafed.org/surveys-and-data/real-time-data-research/survey-of-professional-forecasters

quarter forecast of the next four quarters.[29] We take the linear interpolation of quarterly forecasts to construct monthly forecasts. We then take the difference between actual inflation and the corresponding forecast to construct our shock measure. For robustness, we also use inflation expectations from the Survey of Consumers from the University of Michigan.[30] These are the median expected price change for the next 12 months.

Monetary Policy Shocks: In our instrumental variable analysis in section 2.2, we use monetary policy shocks as an instrument for inflation. The first measure of monetary policy shocks we use is from Romer and Romer (2004) and extended by Wieland and Yang (2016). They first obtain a series of intended funds rate changes from meetings of the Federal Open Market Committee (FOMC) and the Weekly Report of the Manager of Open Market Operations. They then regress these intended changes on the Federal Reserve's internal forecasts of inflation to account for changes to monetary policy in anticipation of future economic developments. The residuals from this regression should reflect idiosyncratic changes in monetary policy. These are available roughly monthly from January 1969 to December 2007.

The second measure of inflation shocks we use is from Barakchian and Crowe (2013). They use the difference in private sector beliefs about the Fed's policy stance before and after FOMC meetings, indicted by Fed Funds futures contracts, as a measure of monetary policy shocks. This series is available roughly monthly (in line with FOMC meetings) from 1969 to 2007. The third measure is from Sims and Zha (2006), who use a structural VAR model to estimate monetary policy shocks. This series is available monthly from January 1959 to March 2003. The fourth measure is from Gertler and Karadi (2015) and uses futures rate surprises on FOMC dates. They study one month and three month Fed Funds future rates, as well as six month, nine month, and one year ahead futures on three month Eurodollar deposits. It is available monthly from January 1991 through June

[29]The data and methodology can be found here: https://www.philadelphiafed.org/surveys-and-data/real-time-data-research/inflation-forecasts

[30]https://fred.stlouisfed.org/series/MICH

2012. The fifth and sixth measures are from Nakamura and Steinsson (2018), and similarly use Fed Funds futures and Eurodollar futures to estimate monetary policy shocks. The first series is available roughly monthly (around FOMC meetings) from January 1995 to March 2014. The second excludes unscheduled meetings and those around the height of the Financial Crisis, avaiable from February 2000 to September 2019. The seventh and final measure is from Bauer et al. (2021). They use changes in Eurodollar futures around FOMC meetings to derive a measure of monetary policy shocks in their analysis. This series is available from January 1994 to September 2020 at the FOMC meeting frequency.

Oil Shocks: We also use oil price shocks from Känzig (2021) as an instrument in section 2.2. He constructs oil price shocks by observing the difference in oil futures prices surrounding OPEC announcements. These shocks are available from 1983 to 2017. There were an average of 3.5 shocks per year during this time period. Shocks are set to 0 on months without OPEC annoucements.

Controls: We use unemployment-to-employment transition rates (UE) and the unemployment rate (U) as controls in the IV regressions in section 2.2. The unemployment-to-employment transition (UE) rates are from Fallick and Fleischman (2004), computed from the CPS[31]. The unemployment rate series is from the U.S. Bureau of Labor Statistics ((Seas) Unemployment Rate).[32]

A.0.2 Quarterly Data

Job-to-Job Transitions: In our state-level analysis in section B.1, we use job-to-job transition measures from the Longitudinal Employer Household Dynamics (LEHD) data by the U.S. Census[33]. They provide the number of hires and separations to (J2JHire) and from (J2JSep) employment quarterly. We divide these by the state labor force to construct mea-

[31] https://www.federalreserve.gov/pubs/feds/2004/200434/200434abs.html.
[32] https://beta.bls.gov/dataViewer/view/timeseries/LNS14000000
[33] https://lehd.ces.census.gov/data/

sures of transitions to and from employment, respectively. These series are available from 2000 onward. We seasonally adjust and filter all variables with a smoothing parameter of 1600 in the quarterly analysis.

Inflation: For our measure of state-level inflation rates, we use data made available by Hazell et al. (2022). They construct quarterly inflation measures for 34 states from 1978-2017. We focus on annual inflation (pi in the dataset), but we also repeat our analysis using annual inflation in the non tradeable and annual inflation inn the tradeable sector (pi.nt and pi.t, respectively).

Inflation Expectations: We use the same measure of inflation expectations from the SPF as in the monthly analyses. Because it is quarterly to begin with, no additional changes are required. We assume inflation expectations are uniform across states because state-level inflation expectations are unavailable.

Controls: We use the state unemployment to employment transition rate (NEHire) from the LEHD as a control in our state-level regressions. We construct this measure by dividing the number of individuals transitioning to employment from unemployment by the state labor force. This is available quarterly from 2000 onward as for our other state-level measures of job-to-job transitions. We also use state-level unemployment rates from Local Area Unemployment Statistics (LAUS) from the BLS as a control variable. These are available monthly from 2000 onward. To convert from monthly to quarterly, we take the value from the first month of each quarter. State-wide labor force data also come from LAUS.

A.1 Annual Data

Job-to-Job Transitions: In our country-level analysis in section B.2, we use yearly job-to-job transition measures from Donovan et al. (2022). They construct two variables: wage-to-wage transitions (WW) and employment-to-employment (EE) transitions. The former considers only transitions from wage employment to wage employment, whereas the latter also considers transitions to and from self-employment. The data spans 41 countries from 1994-2020.

Inflation: We use annual CPI inflation from the World Bank.[34] It includes information on 266 countries from 1972-2021.

Inflation Expectations: To construct our measure of inflation shocks, we use inflation forecast data from the OECD (Total, Annual growth rate (%), 1961 – 2022)).[35] The forecasts are annual and cover up to 45 countries from 1961-2023. Inflation shocks are defined as the difference between actual inflation and expected inflation.

A.2 Job Search Survey Data

Inflation: All variables used in the analysis in section are from the Survey of Consumer Expectations (SCE) from the New York Fed.[36] The core survey in the SCE is a 12-month panel and asks individuals about their inflation expectations each month. The Labor Survey supplement of the SCE asks respondents about their work status, including basic questions on their job search activity, three times in April, July, and November. Lastly, the Job Search supplement of the SCE asks more detailed questions on job search activities once in October. The SCE is available from 2013-2019.

Inflation Expectations: Individuals surveyed are asked what they expect the inflation to be over the next 12 months (question Q8v2 in the survey). We use the response to this question as our measure of inflation expectations.

Job Search Activities: We use one job search activity variable from the Labor Survey Supplement. It is the response to the following: "Have you done anything in the last 4

[34] https://databank.worldbank.org/reports.aspx?source=2series=FP.CPI.TOTL.ZGcountry=
[35] https://data.oecd.org/price/inflation-forecast.htm
[36] https://www.newyorkfed.org/microeconomics/databank

weeks to look for new work?" (question L6). We code a positive response as a 1, and a no as a 0. The remainder of job search activity variables we use come from the annual Job Search Supplement. These are: the number of hours spent searching for work in the last 4 weeks (question JS7), the sum of the number of methods used to look for a job in the last 4 weeks (constructed from question JS6), and the number of applications sent to potential employers in the last 4 weeks (question JS14).

Job Search Outcomes: All but one job search outcomes we use come from the Job Search Supplement of the SCE. These are: the number of potential employers that have contacted the individual in the last 4 weeks (question JS15), the number of job interviews the individual has had in the last 4 weeks (question JS18b), and the number of offers received in the last 4 weeks (question JS19). We obtain the number of offers received in the last 4 months from the Labor Survey supplement (question NL1).

Control Variables: We use several control variables from the SCE in our analysis. These are the natural logarithms of age (Q32 in the survey) , tenure (Q37), and annual earnings (Q47), dummies for sex (Q33) and marital status (Q38), five dummies for race (Q35), four dummies for education (Q36), and fixed effects for state (D5). Other controls from the Labor Survey supplement are dummies for job start-year (L1), and two-digit industries (LMtype and Lmind).

B Additional Empirical Analyses

B.1 Quarterly Analysis, State Level

Here we utilize the Longitudinal Employer Household Dynamics (LEHD) data by the U.S. Census which provides job-to-job transition rates in quarterly frequency at the state level starting from 2000. For inflation, we use the series by Hazell et al. (2022), who construct quarterly inflation measures for 34 states for 1978-2017.[37] We seasonally adjust and HP filter all variables with a smoothing parameter of 1600.

In our main specification, we run a fixed-effects regression with a measure of inflation and J2J transition rate:

$$y_{it} = \beta_x x_{i,t-1} + \beta_Z z_{i,t-1} + \gamma_i + \eta_t + \epsilon_{it} \tag{10}$$

where i and t represent state and quarter, y and x are one of the measures for J2J rate and inflation, γ_i and η_t are state and quarter fixed effects, and Z represents additional controls. The results are in Table 4. Again, a positive inflation surprise predicts higher inflation in the next quarter across various specifications.[38] Unlike the VAR analysis with monthly aggregate data, higher job-to-job transition rates also predict larger inflation surprises in the next quarter.

B.2 Yearly Analysis, Country Level

Here we utilize the yearly cross-country job-to-job transition data from Donovan et al. (2022) kindly made available to us by the authors. The data is a panel from 41 countries between 1994-2020 and distinguishes all employment to employment (EE) transitions from wage employment to wage employment (WW) transitions.[39] We supplement the EE rates with CPI inflation data from the World Bank and inflation forecast data from the OECD. In our main specification, we run a fixed-effects regression with a measure of

[37] State-level inflation forecasts are not available, hence, we rely on the variation in realized inflation, assuming inflation expectations are uniform across states.

[38] See Table 11 in Appendix G for results with only state and only quarter fixed effects. Table 12 shows that once analyzed separately, only the rate of inflation for non-tradables have a significant effect on job-to-job transitions.

[39] EE transitions include transitions from and to self-employment. Although our mechanism should not affect transitions from self-employment to wage employment, it predicts an effect on transitions from wage employment to self-employment. Hence, we use both measures in our analysis.

Table 4: State-Level Estimates

	$J2J_t$				$Infl_t$			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Infl_{t-1}$	0.069***	0.014**	0.019***	0.014**				
	(0.007)	(0.006)	(0.006)	(0.006)				
NE_{t-1}			0.385***	0.135***			0.563***	−0.208***
			(0.069)	(0.038)			(0.168)	(0.052)
u_{t-1}			−0.262***	−0.067**			0.213***	0.191**
			(0.016)	(0.031)			(0.079)	(0.097)
$J2J_{t-1}$					0.645***	0.411*	0.740***	0.676***
					(0.067)	(0.225)	(0.173)	(0.236)
Controls	No	No	Yes	Yes	No	No	Yes	Yes
State-Quarter FE	No	Yes	No	Yes	No	Yes	No	Yes
Observations	2,162	2,162	2,162	2,162	2,129	2,129	2,129	2,129

Notes: The measure used for $Infl$ is inflation surprise from SPF forecasts. The columns (1)-(4) have the job-to-job transition rate at time t as the dependent variable while the others have the inflation measures at time t. All variables are seasonally adjusted and HP-filtered. The standard errors are clustered at the state level. *p<0.1; **p<0.05; ***p<0.01

inflation and J2J transition rate:

$$y_{it} = \beta_x x_{i,t} + \gamma_i + \eta_t + \epsilon_{it} \tag{11}$$

where i and t represent country and year, y is a measure of J2J rate, x is the inflation surprise, and γ_i and η_t are country and year fixed effects. The results are in Table 5. There is a positive correlation between inflation surprise and both the EE and WW rates. Controlling for the country and year fixed effects do not change the sign of the correlation, yet reduce the magnitude.[40]

[40] See Table 10 in Appendix G for results with only state and only quarter fixed effects.

Table 5: Country-Level Estimates

	WW		EE	
	(1)	(2)	(3)	(4)
$InflS_t$	0.048***	0.019*	0.063***	0.037
	(0.011)	(0.012)	(0.023)	(0.027)
State-Quarter FE	No	Yes	No	Yes
Observations	361	361	361	361

Notes: The measure used for $Infl$ is inflation surprise from OECD forecasts. The columns (1)-(2) have the WW transition rate at time t as the dependent variable while the others have the EE rate at time t. All variables are seasonally adjusted and HP-filtered. The standard errors are clustered at the country level. *p<0.1; **p<0.05; ***p<0.01

C Evidence on the Extent of Wage Indexation

Explicit measures of what fraction of wage contracts are indexed to inflation are unavailable for the U.S. economy. The measures that are based on the actual contract terms are restricted to collective agreements in the U.S., which varies in coverage over the years and does not apply to a random sample of the workers. Measures based on changes in the nominal wages are imperfect due to several other factors affecting the wage process. However, even the most conservative estimates imply a very low level of wage indexation (less than 25%) in developed countries. Here, we discuss the implications of prior research on the extent of wage indexation.

C.0.1 Evidence Based on Contract Terms

The main papers on the prevalence of 'cost-of-living adjustment' (COLA) terms in contracts are Card (1990) for Canada and Ragan Jr and Bratsberg (2000) for the U.S. Card (1990) looks at the universe of manufacturing union contracts (with more than 500 employees) signed between 1968 and 1983. He finds that 26% of them have an 'escalation clause' on average while the explicit indexation is very rare. The fraction with 'escalation clause' peaks at 65% in a period where the inflation is over 10%. Ragan Jr and Bratsberg

(2000) use the U.S. Bureau of Labor Statistics data on collective bargaining settlements to see the prevalence of COLA provisions. They document that even though 61% of the settlements had COLA provisions back in 1976, it has fallen all the way to 22% in 1996 when the data is no longer available. The COLA provisions are known to be much less prevalent among non-union workers. With the decline in unionization, collective agreements cover a smaller fraction of the labor force in either country today. We consider these measures as an upper bound on the extent of wage indexation. Druant et al. (2012) utilize a firm-level survey conducted in 17 European countries regarding wage adjustment practices. Across 15,000 firms from all industries, they document that only 11.5 % of the firms employ any formal indexation clause in employment contracts while only 10.9% have any informal inflation considerations in wage setting[41]. More importantly, the survey also asks about the frequency of wage adjustments. This gives us a back-of-the-envelope mapping between the degree of indexation and the frequency of wage adjustments. Wage adjustments happen either yearly or more frequently for 74.4% of the firms. Thus, even when firms adjust wages frequently, this does not imply an implicit wage indexation.

C.0.2 Evidence Based on Wage Movements

McLaughlin (1994), using PSID data, finds that the effect of unanticipated inflation on nominal wage growth is consistent with 42% indexation between 1970 and 1986. Hofmann, Peersman and Straub (2012), using a DSGE model, infers the extent of wage indexation in the economy from the time variation in U.S. wage dynamics. They estimate the degree of wage indexation to be 0.17 in 2000, compared to 0.91 in 1974, which is roughly in line with the time path of COLA coverage in collective bargaining agreements[42]. More recently, **?**, using data from a payroll processing company in the U.S., found that approx-

[41] There is still large variation across countries. In Belgium, 98.2% of the firms have automatic wage indexation while in Italy, only 5.8% of the firms have any form of wage indexation.

[42] A major implication from the paper is that wage indexation is a response to increasing monetary policy uncertainty. Thus, the level of indexation should be endogenous to run counter-factual exercises that change monetary policy. Since we focus on one-time shocks, we abstract from endogenous indexation.

imately 36% of job stayers experience no nominal wage changes in a one-year period. Once contrasted with the evidence in Druant et al. (2012), the implied wage indexation should be less than 11.5%.

D Proofs

Lemma 1. *$\underline{z}(X, \psi)$ is increasing in promised lifetime utility X.*

Proof. Recall that $\underline{z}$ solves

$$K(h(X, \psi), \underline{z}, \psi) = 0.$$

Clearly, as promised lifetime utility X increases, value of the firm decreases. In order to satisfy equality, $\underline{z}$ must be increased.

□

Lemma 2. *$m(V, \psi)$ is increasing in current lifetime utility V.*

Proof. Let$V_h > V_\ell$. We want to show that $m(V_h, \psi) \geq m(V_\ell, \psi)$. For simplicity, we drop the aggregate state variable, since we are only considering the change in current lifetime utility V and denote the associated choices as m_h and m_ℓ and associated market tightness as θ_h and θ_ℓ. Suppose the contrary: $m_h < m_\ell$. This implies that $m_\ell - V_h > m_h - V_h$. Since m_h is the optimal choice for V_h

$$p(\theta_h)(m_h - V_h) \geq p(\theta_\ell)(m_\ell - V_h)$$
$$\implies p(\theta_h) > p(\theta_\ell).$$

Rearranging the first line also gives us:

$$p(\theta_h)m_h - p(\theta_\ell)m_\ell \geq [p(\theta_h) - p(\theta_\ell)]V_h.$$

Similarly, since m_ℓ is the optimal choice for V_ℓ

$$\begin{aligned}&p(\theta_\ell)(m_\ell - V_\ell) \geq p(\theta_h)(m_h - V_\ell)\\&[p(\theta_h) - p(\theta_\ell)]V_\ell \geq p(\theta_h)m_h - p(\theta_\ell)m_\ell.\end{aligned}$$

Using combining these two conditions:

$$[p(\theta_h) - p(\theta_\ell)]V_\ell \geq [p(\theta_h) - p(\theta_\ell)]V_h \implies V_\ell \geq V_h.$$

Which contradicts the assumption that $V_h > V_\ell$. □

Lemma 3. *$R(\psi, V)$ is decreasing in current lifetime utility V.*

Proof. By envelope theorem:

$$R_V(\psi, V) = -p(\theta(m(V, \psi))) < 0.$$

Hence, R is decreasing in V. □

E Solution Method

We use Value Function Iteration with 20 grid points for the distribution of z, 5 points for the distribution of y, 200 points for the grid for V, and 600 points for the grid for w. We define $\tilde{K}(V, y, z) = K(h(V, y), y, z)$ for convenience and start with an initial guess $\tilde{K}^0(V, y, z)$. The algorithm works sequentially. At step i, we compute

1. $J^i(V, y)$ given $\tilde{K}^{i-1}(V, y, z)$
2. $\underline{z}^i(V, y)$ and $\theta^i(V, y)$ given $J^i(V, y)$
3. $U^i(y)$, $e^i(V, y)$, $R^i(V, y)$, and $m^i(V, y)$ given $\underline{z}^i(V, y)$ and $\theta^i(V, y)$

4. $H^i(w,y)$ given $e^i(V,y)$, $R^i(V,y)$, $m^i(V,y)$, $\underline{z}^i(V,y)$, $\theta^i(V,y)$, and $U^i(y)$

5. $K^i(w,y,z)$ given $e^i(V,y)$, $m^i(V,y)$, $\underline{z}^i(V,y)$, and $\theta^i(V,y)$

6. $h^i(V,y)$ given $H^i(w,y)$

7. $\tilde{K}^i(V,y,z)$ given $K^i(w,y,z)$ and $h^i(V,y)$

We stop when $d_{max}(\tilde{K}^i(V,y,z), \tilde{K}^{i-1}(V,y,z)) < \epsilon$ where d_{max} gives the maximum distance between the two vectors.

F A Model of Search Effort under Random Search

In this section, we present a random-search version of our model in Section 3. The random-search version here doesn't have the selectivity channel, since workers do not direct their search to particular types of firms.

F.1 Preferences

The discrete-time economy is populated by a continuum of infinitely-lived workers and firms. The total measures of workers and firms are fixed and normalized to one. Each worker has ability x, which is distributed with cumulative distribution function G, and each firm has productivity y, which is distributed by cumulative distribution function Γ. Time is discrete.

Both firms and workers are risk neutral and have the same discount factor, $\beta \in (0,1)$.

F.2 Production Technology

There is only one consumption good in the economy. A worker-firm pair (x, y) can produce $f(x, y)$ output, where f is strictly increasing in both arguments and super-modular, i.e. $f_i(x, y) > 0$ for $i \in \{x, y\}$ and $f_{xy}(x, y) > 0$, where f_i is the derivative with respect to i.

Super-modularity of f implies that output maximizing allocation is to match high productivity workers with high productivity firms.

Each unemployed worker produces $b(x)$ unit of output by herself. Lastly, each worker-firm pair dissolves with probability δ in a given period.

F.3 Meeting Technology

In order to produce workers and firms need to find each other through random search.

Both unemployed and employed worker can search for a job. In order to find a vacancy, workers need to exert search effort. $c(e)$ denotes the utility cost of exerting e units of effort for the employed. For simplicity, we assume that search effort of unemployed worker is fixed to 1 and there is no cost attached to this effort. However, employed person chooses e optimally[43]. We assume $c(e)$ is convex and strictly increasing in e, with $\lim_{e \to 1} c(e) \to \infty$ to simplify matching probabilities.

Firms, on the other hand, choose how many vacancies to open. In order to open v units of vacancies, a firm needs to pay $\kappa(v)$, where $\kappa(v)$ is convex and strictly increasing.

Let E and V be the total measure of search effort and vacancies, respectively. Total measure of matches to be formed is denoted with $M(E, V)$, for a given E and V. We assume that $M(E, V)$ is homogeneous of degree one. Then, measure of matches per unit

[43]It is assumed that production level does not depend on search behavior of the worker.

of search effort is given by $M(1, E/V)$. Let λ denote the probability that one unit of search effort matches a vacancy: $\lambda = M(E, V)/E$. The probability that a vacancy meets with a worker is given by $\lambda^f = M(E, V)/V$.

We define market tightness to be the measure of vacancies available per unit search effort and denote it with $\theta = V/E$. Homogeneity of degree one implies that match probabilities of workers and vacancies only depend on aggregate quantities through tightness: $\lambda(\theta) = M(\theta, 1)$, $\lambda^f(\theta) = M(1, 1/\theta)$. This implies that $\lambda^f(\theta) = \theta\lambda(\theta)$.

F.4 Wage Setting

Upon meeting, firm makes a take or leave it offer to worker. Firms can only propose constant nominal wage contracts to workers from which workers can walk away from anytime. Contracts can be re-negotiated without cost.

Contract space is not complete. Firms cannot make wage rate contingent on the state of the economy. Moreover, search effort of worker is not contractible. Hence, when a firm makes an offer, it needs to take into account the search effort of the worker.

When an employed worker meets with another vacancy, incumbent firm can make a counter-offer. As in **?**, this triggers Bertrand competition between incumbent firm and poaching firm.

Let $V_t(w, x, y)$ be the lifetime utility of a worker type x who is employed at firm y with a wage w and let $J_t(w, x, y)$ be the present discounted profits of a firm with productivity y that employs worker x at wage w[44]. Consider two firms with productivity $y' > y$ that are bargaining over a worker with type x. In Bertrand competition, the maximum that a firm can offer as wage is the entire output. In such a situation, the lifetime utility of a worker

[44]For brevity, instead of writing aggregate states in the value function, we index value functions with the time subscript.

type x would be $V_t(f(x,y),x,y)$ with firm y. Therefore, firm y' should solve the following problem:

$$\max_{w} J_t(w,x,y')$$
$$s.t.\ V_t(w,x,y') \geq V_t(f(x,y),x,y).$$

where constraint ensures that firm y cannot outbid the offer.

When a firm makes an offer, it needs to take into account the search effort of the worker. Even though an increase in w decreases the output share of firm, it discourages the worker from searching for a job and getting new offers, which is good for the firm. Depending on which effect dominates, value function J_t might be increasing or decreasing with w. To simplify the model, as in Postel-Vinay and Robin (2004), we assume that $J_t(w,x,y)$ is a decreasing function of w.

Assumption 1. *$J_t(w,x,y)$ is a decreasing function of w.*

This assumption implies that constraint must hold with equality, since $V_t(w,x,y)$ is increasing in w.

There are three possibilities for a worker employed at a firm with productivity y. First, she might match with a firm that has higher productivity, $y' > y$. In this case high productive firm wins the bargaining and worker changes his job. The worker's lifetime utility becomes $V(f(x,y),x,y)$[45]. Let $\phi(x,y,y')$ be the wage that solves $V(\phi(x,y,y'),x,y') = V(f(x,y),x,y)$. In other words, $\pi(x,y,y')$ is the wage rate of worker type x when she moves from y to y'.

In the second case, the worker matches with a firm that has lower productivity, $y > y''$, however poaching firm can offer higher lifetime utility to worker than she currently has. In this case, poacher cannot win the bargaining, though bargaining increases the wage

[45]Here, since all comparisons happen at the same aggregate state, we suppress the time subscripts to reduce notation.

of the worker in the current firm. In this case, the worker's lifetime utility increases to $V(f(x,y''),x,y'')$ and her wage increases to $\pi(x,y'',y)$.

The second case can only happen if the current lifetime utility of the worker is lower than the maximum utility she could get from the poaching firm, i.e. $V(w,x,y) < V(f(x,y''),x,y'')$. In this situation, there is a room for firm y'' to make an offer.

In the third case, the poaching firm's productivity is so low that it cannot make any offer that triggers Bertrand competition. In this case there is no change in the worker's wage and lifetime utility.

Let $\tilde{y}(w,x,y)$ be the minimum productivity level that a firm can trigger a bargaining. The following table summarizes the bargaining outcome between incumbent firm with productivity y and poaching firm with productivity y':

- $y' > y$: Poaching firm offers $\phi(x,y,y')$, worker moves to firm y' and her lifetime utility becomes $V(f(x,y),x,y)$. See Figure **??**.
- $\tilde{y}(w,x,y) \leq y' \leq y$: Incumbent firm offers $\pi(x,y',y)$, worker stays with the incumbent firm and her lifetime utility becomes $V(f(x,y'),x,y')$. See Figure **??**.
- $y' < \tilde{y}(w,x,y)$: The worker ignores the poaching firm, stays with the incumbent firm and her lifetime utility remains $V(w,x,y)$. See Figure **??**.

Now consider an unemployed worker. If she meets a vacancy, the firm has the all the bargaining power, since there is no other firm to make a counter offer. Hence, the firm offers the wage rate that makes the unemployed worker indifferent. Let $\phi_t(x,0,y')$ be the wage rate that firm y' offers to unemployed worker. $\phi_t(x,0,y')$ solves $V_t(\phi_t(x,0,y'),x,y') = U_t(x)$.

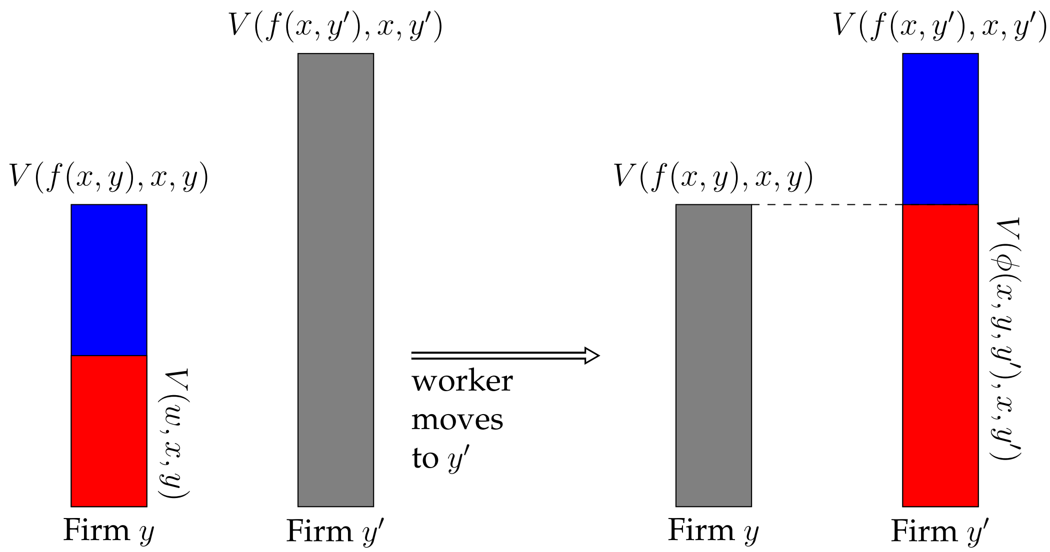

Figure 5: Worker x in firm y matches with firm $y' > y$.

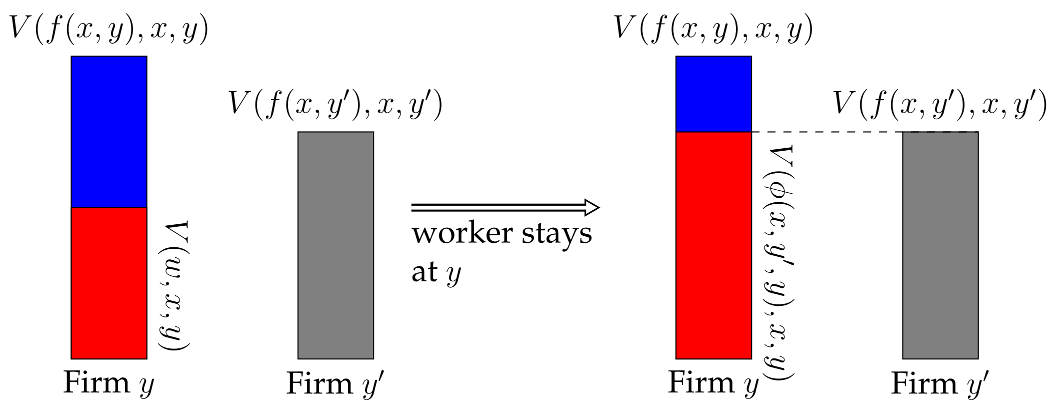

Figure 6: Worker x in firm y matches with firm $y' \in [\tilde{y}, y]$.

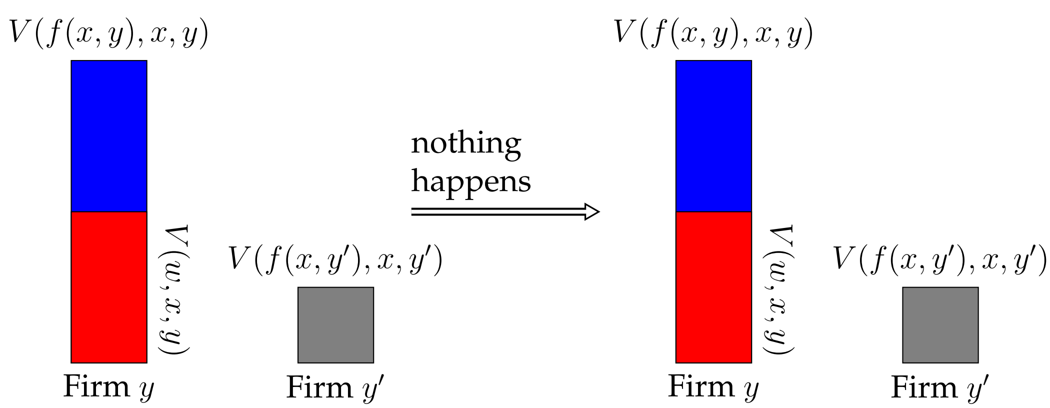

Figure 7: Worker x in firm y matches with firm $y' < \tilde{y}$.

F.5 Market Tightness

Let $h(w, x, y)$ be the measure of workers with skill x employed at firm y earning wage w and let $e^{\star}(w, x, y)$ be the optimal search effort. Let $u(x)$ be the measure of unemployed workers with skill x. Lastly, let $v(y)$ be the measure of vacancies posted by firms of type y.

Total search effort in the economy is given by

$$E_t = \int u_t(x)dx + \int\int\int e_t^{\star}(w, x, y)h_t(w, x, y)dwdydx.$$

Total measure of vacancies in the economy is given by

$$V_t = \int v_t^{\star}(y)dG(y).$$

Then, market tightness is given by

$$\theta_t = V_t/E_t. \tag{12}$$

We define the distribution of vacancies as Γ:

$$\Gamma_t(y) \equiv \int^y \frac{v_t(y')}{V_t}dy'.$$

with $\gamma_t(y)$ is the associated density function.

F.6 Problem of the Firm

The present value of a filled vacancy by firm of productivity y that employs worker with skill x at wage w is

$$J_t(w,x,y) = f(x,y) - w + \beta\Bigg[(1-\delta)(1-e^{\star}_{t+1}(w,x,y)\lambda(\theta_{t+1})J_{t+1}(w,x,y) + (1-\delta)e^{\star}_{t+1}(w,x,y)\lambda(\theta_{t+1})\Bigg[\Gamma_{t+1}(\tilde{y}_{t+1}(w,x,y))J_{t+1}(w,x,y) + \int\limits_{\tilde{y}_{t+1}}^{y} J_{t+1}(\phi_{t+1}(x,y',y),x,y)\gamma_{t+1}(y')dy'\Bigg]\Bigg].$$

Using integration by parts we get

$$J_t(w,x,y) = f(x,y) - w + \beta(1-\delta)\Bigg[J_{t+1}(w,x,y) + e^{\star}_{t+1}(w,x,y)\lambda(\theta_{t+1})J'_{t+1}(\phi_{t+1}(x,y',y),x,y)\gamma(y')dy'\Bigg],$$

where J'_{t+1} is the derivative of $J_{t+1}(\phi_{t+1}(x,y',y),x,y)$ with respect to y'.

The main decision the firm gives is how many vacancies to post each period:

$$\max_{v} v\lambda^{f}(\theta_t)\Bigg[\int u_t(x)J_t(\phi_t(x,0,y),x,y)dx + \int^{y}\int\int J_t(\phi_t(x,y',y),x,y)h_t(w,x,y')dwdxdy'\Bigg] - \kappa(v). \tag{13}$$

A vacancy can be filled by an unemployed worker or an employed worker. The first term inside the bracket is the expected return to vacancy that is filled by an unemployed worker while the second term is the expected return to vacancy filled by an employed worker. A firm with productivity y can hire any worker employed at a firm with lower productivity $y' < y$ and pays the worker $\phi_t(x, y', y)$.

First order condition with respect to v is

$$\lambda^f(\theta_t)\Bigg[\int u_t(x) J_t(\phi_t(x,0,y),x,y)dx \\ + \int^y \int\int J_t(\phi_t(x,y',y),x,y)h_t(w,x,y')dwdxdy'\Bigg] = \kappa'(v). \tag{14}$$

At an interior optimum, firm equates the marginal cost of opening an extra vacancy to return to vacancy.

F.7 Problem of the Worker

Now, we are in a position to define the value function for a worker.

First consider a worker with skill level x employed at firm y and earning w. Suppose she searches for a job with effort level e. The worker gets flow utility of $w - c(e)$ this period. Next period, with probability δ she becomes unemployed and earns lifetime utility of an unemployed worker, $U_{t+1}(x)$. With probability $(1-\delta)$ she remains employed and searches for a job. For a given effort level e, she does not meet with a firm with probability $1 - \lambda(\theta_{t+1})e$ and her lifetime utility becomes $W_{t+1}(w, x, y)$. With probability $\lambda(\theta_{t+1})e$ she meets with a firm. With probability $1 - \Gamma_{t+1}(y)$ the poaching firm has productivity $y' > y$. In this case the lifetime utility of the worker becomes $W_{t+1}(f(x, y), x, y)$. With probability $\Gamma(\tilde{y}_{t+1})$, the poaching firm has productivity $y' < \tilde{y}$. In this case, the lifetime utility of the worker remains as $W_{t+1}(w, x, y)$. If the poaching firm has productivity $y' \in [\tilde{y}_{t+1}, y]$, then his lifetime utility becomes $W_{t+1}(f(x, y'), x, y')$.

Hence, the lifetime utility of a worker with skill level x employed at firm y at wage w

is

$$W_t(w,x,y) = \max_e w - c(e) + \beta\Bigg[\delta U_{t+1}(x) + (1-\delta)[1-\lambda(\theta_{t+1})e]W_{t+1}(w,x,y) + (1-\delta)\lambda(\theta_{t+1})e\Big[(1-\Gamma_{t+1}(y))W_{t+1}(f(x,y),x,y) + \int_{\tilde{y}_{t+1}}^{y} W_{t+1}(f(x,y'),x,y')d\Gamma_{t+1}(y') + \Gamma_{t+1}(\tilde{y}_{t+1})W_{t+1}(w,x,y)\Big]\Bigg]. \quad (15)$$

Consider a worker employed at a firm y with wage rate $f(x,y)$. Clearly, she has no gain from matching an outside firm, since no firm offers more than $W_{t+1}(f(x,y),x,y)$. In other words, optimal search effort for such worker is 0. This implies that the lifetime utility for her is

$$W_t(f(x,y),x,y) = f(x,y) + \beta\delta U_{t+1}(x) + \beta(1-\delta)W_{t+1}(f(x,y),x,y). \quad (16)$$

Observe that state variables affect it through the value of unemployment. Since she does not search on the job, market tightness is irrelevant for on the job value. This implies that y only effects it through the production function. Hence, the derivative of $W_t(f(x,y),x,y)$ with respect to y is $f_y(x,y)/[1-\beta(1-\delta)]$.

Using integration by part and derivative of $W_{t+1}(f(x,y),x,y)$, the lifetime utility of an employed worker becomes

$$W_t(w,x,y) = \max_e w - c(e) + \beta\Bigg[\delta U_{t+1}(x) + (1-\delta)\Big[W_{t+1}(w,x,y) + \lambda(\theta_{t+1})e\int_{\tilde{y}_{t+1}}^{y} \frac{f_y(x,y)}{1-\beta(1-\delta)}[1-\Gamma_{t+1}(y')]dy'\Big]\Bigg]. \quad (17)$$

Taking derivative with respect to e gives us

$$c'(e) = \beta(1-\delta)\lambda(\theta_{t+1}) \int_{\tilde{y}_{t+1}}^{y} \frac{f_y(x,y)}{1-\beta(1-\delta)}[1-\Gamma_{t+1}(y')]dy'. \tag{18}$$

where he left hand side is the marginal cost of effort. The right hand side is the marginal return to search effort. $(1-\delta)\lambda(\theta)$ is the increase in the probability of meeting with a firm. The integral is the return to finding a match. β is the discount factor. At the optimal solution, the cost of increasing the search effort should be equal to benefit of increasing the search effort.

Now consider unemployed worker. Unemployed worker has no choice, she searches for a job with effort level 1. In the current period she gets flow utility of unemployment $b(x)$. In the next period, with probability $\lambda(\theta)$ she finds a job. Given the assumption that firms can make take-it-or-leave-it offers to unemployed, finding a job does not increase lifetime utility. Hence, the lifetime utility of an unemployed worker with skill x can be written as:

$$U_t(x) = b(x) + \beta U_{t+1}(x). \tag{19}$$

F.8 Distribution Accounting

In this section, we derive how the distribution of workers over employment status changes over time.

First, consider distribution of unemployed: $u_t(x)$. $\lambda(\theta_t)$ fraction find a job and leave unemployment. δ fraction of employed workers with skill level x separate from their job and become unemployed. Hence, unemployment distribution evolves according to

$$u_{t+1}(x) = u_t(x) - \lambda(\theta_t)u_t(x) + \delta \int\int h(w,x,y)dwdy. \tag{20}$$

Similarly, employed distribution evolves according to

$$
\begin{aligned}
h_{t+1}(w,x,y) = {} & h_t(w,x,y) - \delta h_t(w,x,y)\lambda(\theta_t)[1-\Gamma_t(\tilde{y})] \\
& + \int e_t(w',x,\hat{y}(x,w))\lambda(\theta_t)\gamma_t(y)h_t(w',x,\hat{y}_t(x,w))dw' \\
& + \int^w e_t(w',x,y)\lambda(\theta_t)\gamma_t(\hat{y}_t(x,w))h_t(w',x,y)dw' + 1\{w \\
= {} & \phi_t(x,0,y)\}u_t(x)\gamma_t(y),
\end{aligned}
\tag{21}
$$

where $\hat{y}_t(x,w)$ satisfies $\phi_t(x,\hat{y}_t(x,w),y) = w$.

F.9 Equilibrium

Definition For given initial distributions $u_0(x)$ and $h_0(w,x,y)$, a competitive equilibrium is a set of value functions $\{U_t(x), W_t(w,x,y), J_t(w,x,y)\}_t$, policy functions $\{e_t^\star(w,x,y), v_t^\star(y)\}_t$ prices $\{\phi(x,y,y')_t\}$, market tightness $\{\theta_t\}_t$ and distributions $\{u_t(x), h_t(w,x,y)\}_t$ such that

- Value functions solve (19), (17), (F.6),
- policy functions solve (14), (18),
- $\phi(x,y,y')$ is the wage rate that solves $W(f(x,y),x,y) = W(w,x,y')$, and $\phi(x,0,y)$ is the wage rate that solves $U(x) = W(w,x,y)$,
- market tightness is given by (12),
- distributions evolve according to (20) and (21).

G Additional Figures and Tables

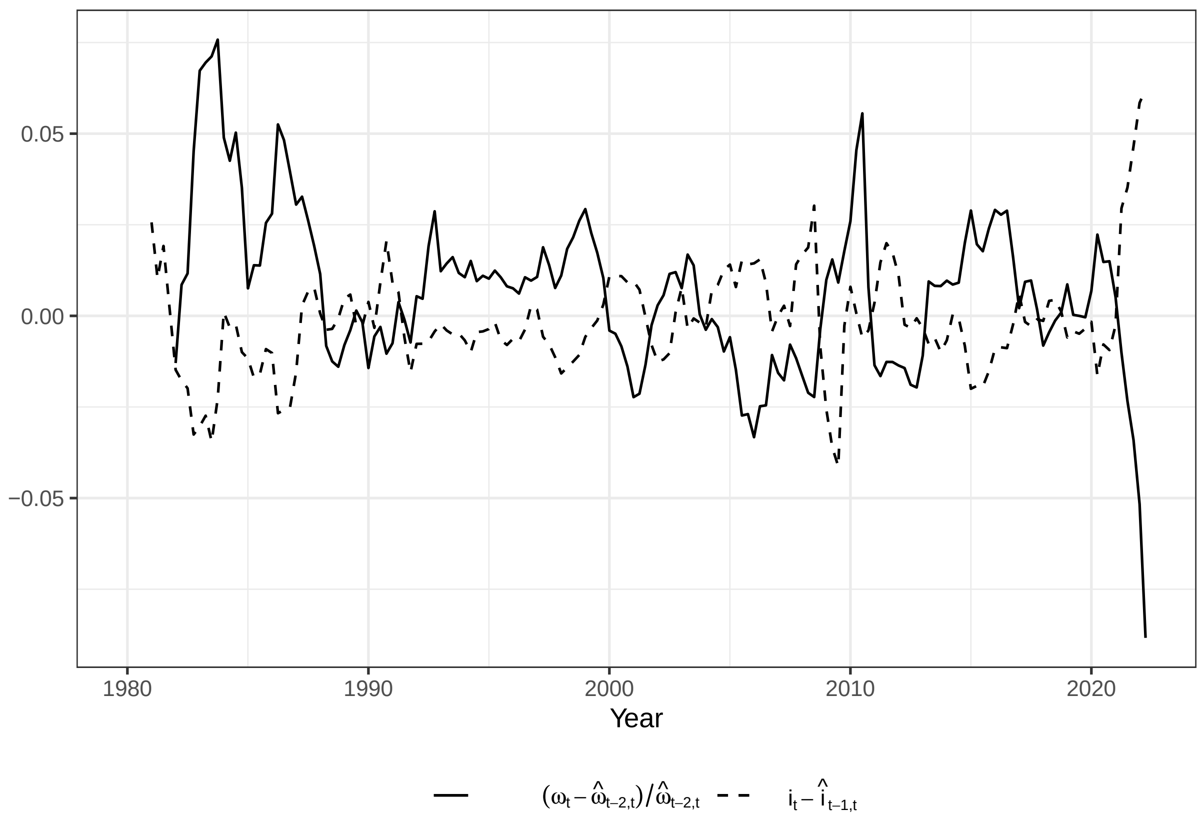

Figure 8: The Discrepancy Between the SPF Forecast and Realized Inflation The dashed red line represents the difference between the realized inflation (i_t) and the 1-year ahead SPF forecast ($\hat{i}_{t-1,t}$) in percentage points. The solid line represents the cumulative real wage loss (as a fraction of the intended wage ($\hat{w}_{t-2,t}$)) for a worker who signed his contract two years ago according to the SPF forecasts.

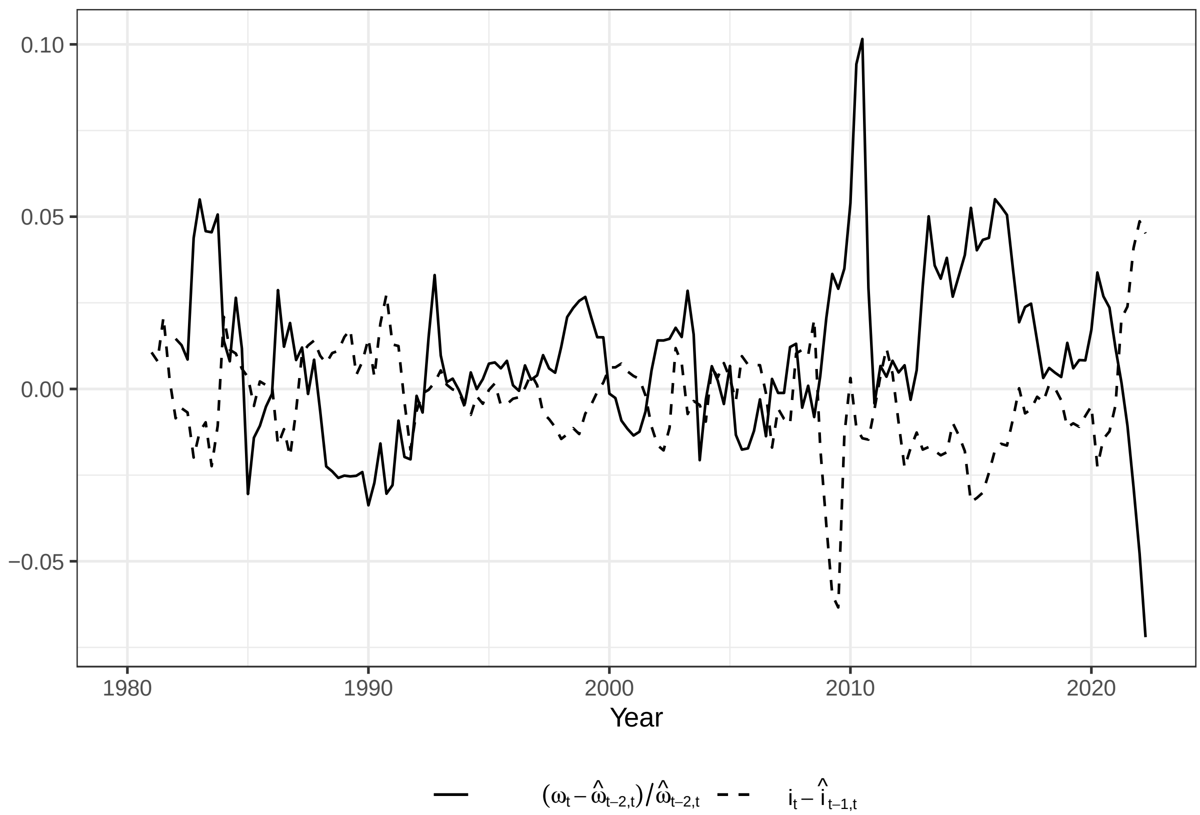

Figure 9: The Discrepancy Between the MCS Forecast and Realized Inflation The dashed red line represents the difference between the realized inflation (i_t) and the 1-year ahead forecasts by the Michigan Survey of Consumers ($\hat{i}_{t-1,t}$) in percentage points. The solid line represents the cumulative real wage loss (as a fraction of the intended wage ($\hat{w}_{t-2,t}$)) for a worker who signed his contract two years ago according to the Michigan forecasts.

Table 6: VARX(2) Estimates

	J2J Rate	CPI Infl	J2J Rate	SPF Infl Surprise	J2J Rate	SPF 1-yr Ahead Infl
	(1)	(2)	(3)	(4)	(5)	(6)
$Infl_{t-1}$	0.03***	0.91***	0.03***	0.91***	0.20***	0.99***
	(0.01)	(0.04)	(0.01)	(0.04)	(0.04)	(0.02)
$Infl_{t-12}$	−0.00	−0.13***	0.00	−0.11**	−0.06	−0.05*
	(0.01)	(0.05)	(0.01)	(0.05)	(0.04)	(0.03)
$J2J_{t-1}$	0.21**	−0.08	0.21**	−0.09	0.17*	−0.01
	(0.10)	(0.16)	(0.10)	(0.16)	(0.09)	(0.03)
$J2J_{t-12}$	−0.00	−0.10	−0.00	−0.13	−0.03	−0.01
	(0.06)	(0.16)	(0.06)	(0.17)	(0.06)	(0.03)
UE_{t-1}	0.01	0.02*	0.01	0.02	0.00	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)
UE_{t-12}	0.01**	0.01	0.01**	0.00	0.01**	−0.00
	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)
Observations	309	309	309	309	309	309
Adjusted R^2	0.18	0.88	0.18	0.88	0.22	0.93

Notes: The measure use for $Infl$ is CPI year-to-year inflation in columns (1) and (2), inflation surprise from SPF forecasts in columns (3) and (4), and SPF inflation forecasts in column (5) and (6). The columns (1), (3), and (5) have the job-to-job transition rate at time t as the dependent variable while the others have the inflation measures at time t. All variables are seasonally adjusted and HP-filtered. *p<0.1; **p<0.05; ***p<0.01

Table 7: VAR(2) Estimates with Dummies for the COVID Period

	J2J Rate	CPI Infl	J2J Rate	SPF Infl Surprise	J2J Rate	SPF 1-yr Ahead Infl
	(1)	(2)	(3)	(4)	(5)	(6)
$Infl_{t-1}$	0.02***	0.89***	0.02***	0.90***	0.19***	0.97***
	(0.01)	(0.03)	(0.01)	(0.03)	(0.04)	(0.02)
$Infl_{t-12}$	0.00	−0.12*	0.01	−0.11*	−0.01	−0.03
	(0.01)	(0.07)	(0.01)	(0.06)	(0.04)	(0.03)
$Covid$	−0.00	−0.00	−0.00	−0.00	−0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
$J2J_{t-1}$	0.23***	−0.07	0.23***	−0.13	0.18***	−0.03
	(0.06)	(0.18)	(0.06)	(0.19)	(0.06)	(0.04)
$J2J_{t-12}$	0.09	0.05	0.09*	0.01	0.05	−0.03
	(0.06)	(0.14)	(0.06)	(0.15)	(0.06)	(0.03)
$Infl_{t-1}xCovid$	0.02	0.08	0.02	0.06	0.04	0.10**
	(0.02)	(0.09)	(0.02)	(0.10)	(0.11)	(0.04)
$Infl_{t-12}xCovid$	−0.03	−0.11	−0.03	−0.08	−0.40	−0.20
	(0.02)	(0.15)	(0.02)	(0.14)	(0.28)	(0.17)
$J2J_{t-1}xCovid$	0.10	0.31	0.11	0.46	0.08	0.02
	(0.21)	(0.83)	(0.21)	(0.87)	(0.24)	(0.05)
$J2J_{t-12}xCovid$	0.01	−0.03	0.00	−0.21	0.15	0.24*
	(0.14)	(0.38)	(0.14)	(0.36)	(0.21)	(0.14)
Observations	309	309	309	309	309	309
Adjusted R^2	0.16	0.88	0.16	0.88	0.20	0.93

Notes: We designate the COVID period as 2020 March onward. The measure use for $Infl$ is CPI year-to-year inflation in columns (1) and (2), inflation surprise from SPF forecasts in columns (3) and (4), and SPF inflation forecasts in column (5) and (6). The columns (1), (3), and (5) have the job-to-job transition rate at time t as the dependent variable while the others have the inflation measures at time t. All variables are seasonally adjusted and HP-filtered. *p<0.1; **p<0.05; ***p<0.01

Table 8: VAR(3) Estimates

	J2J Rate	CPI Infl	J2J Rate	SPF Infl Surprise	J2J Rate	SPF 1-yr Ahead Infl
	(1)	(2)	(3)	(4)	(5)	(6)
$Infl_{t-1}$	0.03***	0.90***	0.03***	0.89***	0.23***	0.97***
	(0.01)	(0.04)	(0.01)	(0.04)	(0.04)	(0.02)
$Infl_{t-12}$	0.00	−0.14***	0.01	−0.13***	−0.02	−0.03
	(0.01)	(0.04)	(0.01)	(0.04)	(0.04)	(0.03)
$Infl_{t-24}$	0.00	−0.06*	0.00	−0.07**	0.03	−0.08**
	(0.01)	(0.03)	(0.01)	(0.03)	(0.04)	(0.03)
$J2J_{t-1}$	0.27***	0.03	0.27***	0.01	0.20***	−0.02
	(0.07)	(0.15)	(0.07)	(0.15)	(0.06)	(0.03)
$J2J_{t-12}$	0.06	0.07	0.07	0.01	0.02	−0.01
	(0.05)	(0.13)	(0.05)	(0.14)	(0.05)	(0.03)
$J2J_{t-24}$	−0.07	−0.09	−0.07	−0.12	−0.08	0.02
	(0.05)	(0.20)	(0.05)	(0.21)	(0.05)	(0.02)
Observations	297	297	297	297	297	297
Adjusted R^2	0.16	0.88	0.16	0.88	0.22	0.93

Notes: The measure use for $Infl$ is CPI year-to-year inflation in columns (1) and (2), inflation surprise from SPF forecasts in columns (3) and (4), and SPF inflation forecasts in column (5) and (6). The columns (1), (3), and (5) have the job-to-job transition rate at time t as the dependent variable while the others have the inflation measures at time t. All variables are seasonally adjusted and HP-filtered. $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

Table 9: VAR(2) Estimates with Alternative Measures

	J2J	PCE Defl.	J2J	PCE exc. FE	J2J	MSC 1-yr Infl	J2J	MSC Surprise
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Infl_{t-1}$	0.04***	0.93***	0.08***	0.92***	0.07***	0.78***	0.02***	0.88***
	(0.01)	(0.03)	(0.02)	(0.04)	(0.01)	(0.05)	(0.01)	(0.05)
$Infl_{t-12}$	0.01	−0.12**	0.01	−0.14***	−0.00	−0.01	0.00	−0.11*
	(0.01)	(0.05)	(0.02)	(0.04)	(0.01)	(0.04)	(0.00)	(0.06)
$J2J_{t-1}$	0.27***	−0.02	0.25***	0.04	0.28***	0.10	0.29***	−0.11
	(0.07)	(0.11)	(0.06)	(0.06)	(0.07)	(0.12)	(0.07)	(0.21)
$J2J_{t-12}$	0.08	0.01	0.07	0.05	0.07	−0.19	0.09*	0.02
	(0.05)	(0.09)	(0.05)	(0.06)	(0.05)	(0.16)	(0.05)	(0.18)
Observations	309	309	309	309	309	309	309	309
Adjusted R^2	0.16	0.90	0.17	0.88	0.16	0.62	0.14	0.81

Notes: The measure use for $Infl$ is PCE deflator inflation in columns (1) and (2), PCE deflator inflation excluding food and energy in columns (3) and (4), inflation surprise from MSC forecasts in columns (5) and (6), and MSC inflation forecasts in column (7) and (8). The columns (1), (3), (5), and (7) have the job-to-job transition rate at time t as the dependent variable while the others have the inflation measures at time t. All variables are seasonally adjusted and HP-filtered. $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

Table 10: Country-Level Estimates with Various Fixed Effects

	WW				EE			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$InflS_t$	0.048***	0.049***	0.019	0.019*	0.063***	0.064***	0.037	0.037
	(0.011)	(0.011)	(0.012)	(0.012)	(0.023)	(0.024)	(0.027)	(0.027)
Country FE	No	Yes	No	Yes	No	Yes	No	Yes
Year FE	No	No	Yes	Yes	No	No	Yes	Yes
Observations	361	361	361	361	361	361	361	361

Notes: The measure used for $Infl$ is inflation surprise from OECD forecasts. The columns (1)-(4) have the WW transition rate as the dependent variable while the others have the EE transition rate. All variables are seasonally adjusted and HP-filtered. The standard errors are clustered in the country level. *p<0.1; **p<0.05; ***p<0.01

Table 11: State-Level Estimates with Various Fixed Effects

	$J2J_t$				$Infl_t$			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Infl_{t-1}$	0.069***	0.014**	0.069***	0.014**				
	(0.007)	(0.006)	(0.007)	(0.006)				
$J2J_{t-1}$					0.645***	0.406*	0.645***	0.411*
					(0.067)	(0.223)	(0.067)	(0.225)
Quarter FE	No	Yes	No	Yes	No	Yes	No	Yes
State FE	No	No	Yes	Yes	No	No	Yes	Yes
Observations	2,162	2,162	2,162	2,162	2,129	2,129	2,129	2,129

Notes: The measure used for $Infl$ is inflation surprise from SPF forecasts. The columns (1)-(4) have the job-to-job transition rate at time t as the dependent variable while the others have the inflation measures at time t. All variables are seasonally adjusted and HP-filtered. The standard errors are clustered in the state level. *p<0.1; **p<0.05; ***p<0.01

Table 12: State-Level Estimates with Alternative Inflation Measures

	pi	*pi*	*pit*	*pit*	*pint*	*pint*
	(1)	(2)	(3)	(4)	(5)	(6)
$Infl_{t-1}$	0.014**	0.015**	−0.006	−0.006	0.011**	0.011***
	(0.006)	(0.006)	(0.005)	(0.004)	(0.004)	(0.004)
NE_{t-1}		0.135***		0.134***		0.134***
		(0.038)		(0.038)		(0.038)
u_{t-1}		−0.067**		−0.067**		−0.068**
		(0.031)		(0.032)		(0.031)
Controls	No	Yes	No	Yes	No	Yes
State-Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,162	2,162	2,162	2,162	2,162	2,162

Notes: The measure used for $Infl$ is inflation surprise from SPF forecasts. The columns (1)-(2) use aggregate inflation, (3)-(4) use inflation for tradables, and (5)-(6) use inflation for non-tradables. The columns (1)-(4) have the job-to-job transition rate at time t as the dependent variable while the others have the inflation measures at time t. All variables are seasonally adjusted and HP-filtered. *p<0.1; **p<0.05; ***p<0.01

Table 13: IV Estimates, No Controls

	BC	GK	BLM	NS	NSFFR	RR	SZ
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$Infl_t$	0.065***	0.051***	0.041***	0.061***	0.038**	0.073***	0.092***
	(0.019)	(0.014)	(0.012)	(0.015)	(0.018)	(0.022)	(0.024)
$Infl_{t-1}$	0.048**	0.041**	0.040***	0.049***	0.035**	0.048**	0.040
	(0.023)	(0.016)	(0.012)	(0.014)	(0.015)	(0.020)	(0.025)
Range	1995-2008	1995-2012	1995-2018	1995-2014	1995-2014	1995-2008	1995-2003
Observations	131	179	245	200	200	125	68
Adjusted R^2	0.178	0.133	0.047	0.085	0.107	0.184	0.159

Notes: Each column represents the source used for the monetary policy shock. The instruments are 1 to 24 month lags of monetary policy and oil supply shocks. See Appendix A for the data sources and details of how each variable is constructed. *p<0.1; **p<0.05; ***p<0.01

Table 14: IV Estimates with only MPS Shocks

	BC	GK	BLM	NS	NSFFR	RR	SZ
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$Infl_t$	0.102***	0.067***	0.077***	0.101***	0.085***	0.108***	0.070*
	(0.031)	(0.018)	(0.015)	(0.019)	(0.021)	(0.030)	(0.037)
$Infl_{t-1}$	0.093**	0.092**	0.021	−0.000	−0.031	−0.001	−0.017
	(0.039)	(0.047)	(0.019)	(0.034)	(0.045)	(0.034)	(0.076)
u_{t-1}	−0.002	0.021	−0.006	−0.059*	−0.073*	−0.079**	−0.080
	(0.040)	(0.037)	(0.017)	(0.031)	(0.037)	(0.040)	(0.098)
UE_{t-1}	−0.001	0.006	0.015***	−0.000	0.002	−0.003	0.006
	(0.008)	(0.008)	(0.005)	(0.007)	(0.007)	(0.009)	(0.011)
Range	1995-2008	1995-2012	1995-2020	1995-2014	1995-2014	1995-2008	1995-2003
Observations	131	179	277	200	200	125	68
Adjusted R^2	0.089	−0.125	0.070	−0.021	−0.024	0.150	0.147

Notes: Each column represents the source used for the monetary policy shock. The controls are unemployment rate and the unemployment to employment transition rate. The instruments are 1 to 24 month lags of monetary policy shocks. See Appendix A for the data sources and details of how each variable is constructed. $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

Appendix References

Card, David. 1990. "Unexpected Inflation, Real Wages, and Employment Determination in Union Contracts." *The American Economic Review*, 80(4): 669–688.

Druant, Martine, Silvia Fabiani, Gabor Kezdi, Ana Lamo, Fernando Martins, and Roberto Sabbatini. 2012. "Firms' price and wage adjustment in Europe: Survey evidence on nominal stickiness." *Labour Economics*, 19(5): 772–782.

Fallick, Bruce C., and Charles A. Fleischman. 2004. "Employer-to-employer flows in the U.S. labor market: the complete picture of gross worker flows." Board of Governors of the Federal Reserve System (US) Finance and Economics Discussion Series 2004-34.

Fujita, Shigeru, Giuseppe Moscarini, and Fabien Postel-Vinay. 2019. "Measuring Employer-to-Employer Reallocation." Mimeo.

Hofmann, Boris, Gert Peersman, and Roland Straub. 2012. "Time variation in US wage dynamics." *Journal of Monetary Economics*, 59(8): 769–783.

McLaughlin, Kenneth J. 1994. "Rigid wages?" *Journal of Monetary Economics*, 34(3): 383–414.

Postel-Vinay, Fabien, and Jean-Marc Robin. 2004. "To match or not to match? Optimal wage policy with endogenous worker search intensity." *Review of Economic Dynamics*, 7(2): 297–330.

Ragan Jr, James F, and Bernt Bratsberg. 2000. "Un-COLA: Why have cost-of-living clauses disappeared from union contracts and will they return?" *Southern Economic Journal*, 304–324.