Labor Market Reform and the Cost of Business Cycles

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Abstract

This paper uses a tractable model with idiosyncratic labor market risk and risk-averse workers to analyze the effect of labor market reform on the welfare cost of business cycles and hence the potential gain from macroeconomic stabilization policy. The paper shows theoretically that an improvement in labor market flexibility that increases job finding rates of unemployed workers reduces the welfare cost of business cycles. A quantitative analysis based on a model calibrated to German data shows that the German labor market reforms of 2003-2005 (Hartz reforms) have reduced the cost of business cycles in Germany by XXXX percent.

Keywords: Labor Market Reform, Cost of Business Cycles

JEL Codes: E21, E24, D52, J24

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1. Introduction

In his highly influential contribution Lucas (1987, 2003) has argued that the welfare costs of business cycles are small. This result suggests that the potential gains from macroeconomic stabilization policy are small and economic research on business cycles and stabilization policy is of second-order importance. Subsequent research, however, has shown that the cost of business cycles can be substantial once worker heterogeneity and idiosyncratic risk are introduced into the analysis. Further, the Great Recession has provided a fresh reminder of the devastating labor market consequences of severe economic downturns, and has acted as impetus to a large body of theoretical and empirical work on the macroeconomic effects of stabilization policy. Overall, policy makers and many academics alike seem to have adopted (once again) the view that business cycle fluctuations are very costly and that macroeconomic stabilization policy is the most effective instrument for reducing the cost of business cycles.

In this paper, we argue that well-designed labor market reform is a highly effective tool for reducing cost of business cycles. In other words, labor market reform and stabilization policy are substitutes, and implementing the one reduces the need for the other. Our analysis is based on a tractable macro model with idiosyncratic labor market risk and incomplete insurance markets. We show theoretically that any labor market reform that enhances labor market flexibility has two beneficial effects. First, it reduces the non-cyclical component of the unemployment rate, an effect that has been the focus of previous macro research on labor market reform. Second, it reduces the response of the unemployment rate to macroeconomic shocks and thereby reduces the cost of business cycles (recessions), an effect that is the focus of the current paper. In other words, well-designed labor market reform is not only good in the long-run, but also helps reduce the cost of short-run aggregate fluctuations. We provide a quantitative analysis based on a model economy calibrated to German data, and find that the German labor market reforms of 2003-2005 have reduced the cost of business cycles by XXXX percent.

In 2003-2005 the German government implemented a package of far reaching labor market

reforms that constitutes one of the most ambitious attempts in recent history to enhance the flexibility of the labor market of an advanced economy, the so-called Hartz reforms. Two essential ingredients of these reforms were i) a complete overhaul and restructuring of the Public Employment Agency (Hartz III) to improve matching efficiency and ii) a substantial reduction in the unemployment benefits for the long-term unemployed (Hartz IV) to increase search incentives. There is overwhelming empirical evidence that, consistent with economic theory, these two parts of the reform package led to a substantial increase in the non-cyclical component of the job finding rate of unemployed workers. In this paper, we show that the German labor market reforms also reduced the responsiveness of the unemployment rate to adverse macroeconomic shocks. If unemployment is associated with skill loss, then these reforms also reduced the cost of recessions and therefore the potential benefits from stabilization policy.

Literature

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Optimal Unemployment Insurance: Hansen and Imrohoroglu (1992), Hopenhayn and Nicolini (1997) and Shimer and Werning (2008)

Empirical Evaluation of Hartz reforms: See Krebs and Scheffel (2013) for survey

2. The German Labor Market 1970 - 2012

In this section, we briefly review the German labor market experience since the 1970s in

section 2.1 and discuss the main elements of the labor market reforms implemented in 2003-2005, the so-called Hartz reforms, in section 2.2. A more detailed account of the Hartz reforms can be found in Jacobi and Kluve (2006). In section 2.3 we discuss the empirical evidence on the effect of the Hartz reforms on matching efficiency and job finding rates.

2.1. Macroeconomic Performance

Figure 1 shows the unemployment rate in Germany in the period 1970-2012. The graph suggests that the German unemployment rate has a trend-component and a cyclical component, and that both have been affected by the Hartz reforms implemented in 2003-2005. Specifically, the trend component has been rising since the 1970s until the mid 2000s, and then started a secular decline that continued until the end of 2012. Further, the response of the German unemployment rate to the Great Recession was relatively mild compared to the cyclical increases of the German unemployment rate in previous recessions that occured before the Hartz reforms.

FIGURE 1 HERE

Figure 2 shows the evolution of per capita output and real wages in the post-unification period 1992-2011. We see that per capita output grew modestly at an average annual rate of 1 percent. In this period, Germany went through three recessions, 1993, 2003-2004, and 2008-2009, and had two periods of strong economic expansion, 2004-2007 and starting in 2010, and one prolonged period of weak but positive GDP growth in 1994-2001. Real wages stagnated between 1992 and 2003, and then fell about 4 percent in the period 2004-2009.

FIGURE 2 HERE

2.2. Labor Market Reforms: Hartz I-IV

The dismal labor market performance and a tightening of the social security budget convinced the German government that a drastic policy reversal had to take place. As a consequence, the German government implemented in 2003-2005 a number of labor mar-

ket reforms, the so-called Hartz reforms named after the chairman of the commission that worked out the reform package.[1] The far reaching reform package had three ambitious goals: i) improve the services of the employment agencies (increase the matching efficiency), ii) activate the unemployed (provide better incentives to search for jobs), and iii) foster new employment opportunities with low tax wedges and deregulate the labor market (increase labor demand). Overall, the Hartz reforms constitute one of the most ambitious attempts in recent history of restructuring the labor market of an advanced economy.[2]

Hartz I and Hartz II took effect in Jan 1st, 2003. Their main objective was to reduce labor costs through wage subsidies and to create new employment opportunities. For example, these laws eliminated the social security tax for jobs paying up to 400 Euro per month (Mini-job) and reduced social security contributions for jobs paying up to 800 Euro per month (Midi-jobs) and for firms hiring older workers. Further, Hartz I introduced measures that were meant to improve the search effort of the unemployed, in particular benefit sanctions for non-compliance. In this sense, Hartz I was a predecessor to Hartz IV by making it more costly for unemployed workers not to search for new jobs or to reject job offers.[3]

In Jan 1st 2004, Hartz III was enacted with the goal to increase the efficiency of the job placement service for the unemployed. To this end, the Federal Employment Agency was re-structured and a heavy emphasis was placed on quality control. Moreover, the German government adopted a more market-based approach by allowing the Federal Employment Agency to outsource services to private firms and by offering unemployed workers the option to choose private employment agencies. Finally, Hartz III improved the process of matching particular measures of active labor market policy to the needs of unemployed individuals.

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[1]To gather public support for the reforms, the government took advantage of a scandal involving the Federal Employment Agency, which had grossly mis-reported the success of job placement.

[2]Of course, most European countries introduced some type of labor market reform in the last 20 years, but they were either much more limited in scope or the implementation was much more gradual.

[3]They also deregulated the labor market. In particular, restrictions on temporary work agencies and fixed-term contracts were weakened and dismissal regulations were simplified and additional exceptions were introduced.

The best-known part of the reform package, Hartz IV, was implemented in Jan 1st, 2005. It constituted a radical overhaul of the German unemployment benefit system. Before the reform, the system was characterized by very long period of Unemployment Benefit entitlement and an essentially unlimited, means-tested Unemployment Assistance and/or Social Assistance after the eligibility for Unemployment Benefits had expired. The Hartz IV reform merged Unemployment Assistance and Social Assistance into Unemployment Benefit II and reduced the benefits payments for most households previously receiving Unemployment Assistance/Social Assistance (i.e. for most of the long-term unemployed).[4]

The Hartz IV reform reduced entitlement duration and benefit levels for most households, but the extent of the reduction varies substantially across household groups. One way to aggregate this heterogeneity is to follow the OECD and to report the median net replacement rate for short-term unemployed households, defined as unemployment less than one year, and long-term unemployed households, defined as unemployment more than one year. Figure 5 shows the average net replacement rate for single households based on the OECD data (see Krebs and Scheffel, 2013, for more details on the construction of this variable). Clearly, Hartz IV had almost no effect on the net replacement rate of the short-term unemployed, but a very large effect on the net replacement rate of the long-term unemployed.

FIGURE 3 HERE

2.3. Effect of Hartz Reforms on Job Search and Matching Efficiency

3. Model

This section develops the model and provides a convenient characterization of equilibrium.

[4]In addition, the eligibility period for short-term unemployment benefits (Unemployment Benefit I) was reduced in February 2006, but this change was not officially a part of the Hartz-laws and had only a small effect on the average net replacement rate (see figure 5).

3.1 Workers

Time is discrete and open ended. There is a unit mass of infinitely-lived workers. The employment status of a worker in period t is denotes by s_t and can take on three values, $s_t \in \{e, su, lu\}$, where e stands for employed, su for short-term unemployed, and lu for long-term unemployed. Unemployed workers search for jobs and the job finding rate depends on search effort l and possibly the aggregate state S_t. We denote the job finding rate of the short-term unemployed by $\pi(e|su, S, l)$ and the job finding rate of the long-term unemployed by $\pi(e|lu, S, l)$. At the beginning of any unemployment spell, the household is short-term unemployed, and then becomes long-term unemployed with probability $\pi(lu|su)$. Employed households become unemployed with probability $\pi(su|e, S)$ (job destruction rate), which is independent of effort but depends on the aggregate state S. We assume that the aggregate state follows a Markov process with transition probabilities denoted by $\pi(S'|S)$. We denote the transition probabilities of the joint Markov process over individual and aggregate states by $\pi(s', S'|s, S, l)$.

We consider two types of labor market policy/institution and corresponding labor market reforms. The first type of policy/institution is defined by the structure of the Public Employment Agency affecting job matching efficiency. This policy affects the job finding rates $\pi(e|su, S, l)$ and $\pi(e|lu, S, l)$ directly and its effect is summarized by an efficiency parameter θ. We suppress the dependence of these transition probabilities on the parameter θ until we return to the discussion of labor market reform in section 4.3. The second type of policy/institution analzyed in this paper is unemployment insurance. The level and duration of unemployment benefit payments do not affect job finding rates directly, but have an indirect impact through their effect on search effort l.

Employed workers receive labor income $(1 - \tau_{ht})r_{ht}h_t$, where r_{ht} is the wage per unit of human capital (the rental rate of human capital) and τ_{ht} is a linear tax on labor income. In the baseline model, we confine attention to tax policies that render the after-tax wage, $(1 - \tau_h(\tilde{K}))r_h(\tilde{K})$, constant. We denote this constant by w. Unemployed workers receive

unemployment benefits $b(s_t)h_t$ with $s_t = su, lu$. Human capital is exogenous and evolves according to

$$h_{t+1} = (1 + \epsilon(s_{t+1}, S_{t+1}))h_t \tag{1}$$

Note that we assume that ϵ may depend on both the individual employment states and on business cycle conditions.

Workers have no financial wealth and no access to financial markets so that consumption equals labor income:

$$c_t = \phi(s_t)h_t \tag{2}$$

where $\phi(s_t) = w$ if $s_t = e$ and $\phi(s_t) = b(s_t)$ if $s_t = su, lu$.

Workers are risk-averse and have identical preferences that allow for a time-additive expected utility representation. One-period utility is a state-dependent function $u(c, l, s)$ defined over current consumption c and current search effort l. Expected life-time utility associated with a consumption-effort plan, $\{c_t, l_t\}$ for a worker with initial employment status s_0 is given by

$$U(\{c_t, l_t\}) \;=\; E_{\{l_t\}}\left[\sum_{t=0}^{\infty} \beta_w^t u(c_t, l_t, s_t)|s_0\right] \tag{3}$$

where β_w is the pure discount factor of workers. Note that the expectations in (1) is taken with respect to joint distribution over idiosyncratic and aggregate shocks that depends through the transition probabilities π on the effort choice $\{l_t\}$, which we emphasize by the notation $E_{\{l_t\}}[.]$. The one-period utility function is assumed to have the functional form

$$u(c, l, s) = \begin{cases} \frac{c^{1-\gamma}}{1-\gamma}\tilde{d}(l, s) & if\ \gamma \neq 1 \geq 0 \\ \ln c - d(l, s) & otherwise \end{cases} \tag{4}$$

where d is an increasing and strictly convex function in l and $\tilde{d}$ is a strictly decreasing and strictly concave function in l.

Workers choose a plan $\{c_t, l_t\}$ so as to maximize (3) subject to (2) taking into account that human capital evolves according to (1).

3.2 Firms

There is one good that can be consumed or invested. Production takes place under the aggregate production function $Y_t = F(K_t, L_t)$, where Y_t is aggregate output in period t, K_t the aggregate physical capital stock employed in production and L_t the aggregate stock of effective labor employed in production (the human capital stock of employed households). We assume that F is a standard neoclassical production function. In particular, it exhibits constant returns to scale.

There is a representative firm that has access to the production function F. The representative firm can rent physical capital and labor in competitive markets at rental rates r_{kt} and r_{ht}, where r_{ht} is the wage rate per unit of effective labor (human capital). In each period, the representative firm hire physical capital and effective labor so as to maximize profit

$$F(K_t, L_t) - r_{kt}K_t - r_{ht}L_t \ . \tag{5}$$

3.3 Capitalist

There is a representative, infinitely-lifed capitalist who has no human capital and begins life with initial capital K_{0c}. The capitalist has the opportunity to save or borrow at the risk-free rate r_t. The capitalist' budget constraint reads:

$$\begin{aligned} K_{c,t+1} &= (1 + (1 - \tau_{kt})r_t)K_{ct} - C_{ct} \\ K_{c,t+1} &\geq -D \ , \ K_{c0} \ given \end{aligned} \tag{6}$$

Lifetime utility associated with the consumption plan $\{C_{ct}\}$ is given by

$$U(\{C_{ct}\}) \ = \ \sum_{t=0}^{\infty} \beta_c^t \ln(C_{ct}) \tag{7}$$

where β_c is the pure discount factor of the capitalist.

The representative capitalist chooses a plan $\{C_{ct}, K_{ct}\}$ so as to maximize (7) subject to (6).

3.4 Equilibrium Definition

We assume that the government runs a balanced budget in each period. Thus, the government budget constraint requires that the revenues from capital and labor taxation have to finance the unemployment benefit payments:

$$\tau_{kt} r_{kt} K_{ct} + \tau_{ht} r_{ht} E_t[h_t | s_t = e] \;=\; E_t[b(s_t) h_t] \tag{8}$$

where the notation E_t indicates that the expectation is taken conditional on S^t.

In equilibrium, choices of firms and households have to be consistent, that is, the capital market and the labor market have to clear:

$$\begin{aligned} K_t &= K_{ct} \\ L_t &= H_{et} \end{aligned} \tag{9}$$

where $H_{et} = E[h_t | s_t = e]$ is the aggregate stock of human capital of employed workers. Similarly, we use the notation $H_{su,t} = E[h_t | s_t = su]$ and $H_{lu,t} = E[h_t | s_t = lu]$ for the aggregate stock of human capital of the short-term unemployed and long-term unemployed, respectively. Note that the aggregate resource constraint reads

$$C_{ct} + C_{wt} + K_{t+1} + H_{t+1} \;=\; (1 - \delta_k) K_t + (1 - \delta_h) H_t + F(K_t, L_t) \tag{10}$$

where $C_{wt} = E[c_t]$ and $H_t = H_{et} + H_{su,t} + H_{lu,t}$. A standard argument shows that the government budget constraint (8), the worker "budget constraint" (2), and the market clearing condition (9) imply the resource constraint (10) under the assumption of competitive rental markets and constant returns to scale in production. In other words, in our model Walras law states that capital market clearing and labor market clearing (equation 9) implies goods market clearing (equation 10).

A (sequential) competitive equilibrium is defined in the standard manner:

Definition For given government policy $\{b_t, \tau_t\}$, a competitive equilibrium is a sequence of rental rates, $\{r_{kt}, r_{ht}\}$, a workers' plan, $\{c_t, l_t\}$, a plan or the representative capitalist, $\{C_{ct}, K_{ct}\}$, and a sequence of firm choices, $\{K_t, L_t\}$, so that

i) for given rental rates (r_{kt}, r_{ht}) the production choice (K_t, L_t) maximizes profit (5) in each period t.

ii) for given sequence of rental rates $\{r_{kt}, r_{ht}\}$ the individual plan $\{c_t, l_t\}$ maximizes expected lifetime utility (3) subject to (2) and the plan $\{C_{ct}, K_{ct}\}$ maximizes (7) subject to (6).

iii) market clearing condition (9), respectively (10), holds in each period t

iv) the government budget constraint (8) holds.

A recursive equilibrium is defined accordingly. In this paper, we confine attention to recursive equilibria with aggregate state $(K, \vec{H})$ consisting of the different components of the capital stock (physical and human), where $\vec{H} = (H_e, H_{su}, H_{lu})$. We next turn to the construction of recursive equilibria.

3.5 Equilibrium Characterization

From the firm's profit maximization problem it follows that rental rates are a function of the capital-to-labor ratio $\tilde{K} = \frac{K}{L}$:

$$\begin{aligned} r_{kt} &= r_k(\tilde{K}_t) \\ r_{ht} &= r_h(\tilde{K}_t) \end{aligned} \tag{11}$$

We consider tax policies of the type $\tau_{kt} = \tau_k(K_t, \vec{H}_t)$ and $\tau_{ht} = \tau_h(\tilde{K}_t)$. In our baseline application, we choose the labor income tax, τ_h, to ensure that the after-tax wage rate is constant over the cycle. The capital income tax, τ_k, is then used to ensure that the government budget constraint (8) holds in each period.

The recursive formulation of the household maximization problem reads

$$\begin{aligned} V(h,s,S) &= \max_l \left\{ \ln \phi(s) + \ln h - d(l,s) + \beta \sum_{s',S'} V(h',s',S')\pi(s',S'|s,l,S) \right\} \\ & s.\,t. \quad h' = (1+\epsilon(s',S'))h \end{aligned} \tag{12}$$

Guess-and-verify shows that the value function has the functional form

$$V(h,s,S) \;=\; v(s,S) + \frac{1}{1-\beta} ln\, h \tag{13}$$

where v is the solution to the intensive-form Bellman equation

$$\begin{aligned} v(s,S) \;\; &= \;\; \max_l \Bigg\{ \ln \phi(s) - d(l,s) + \frac{\beta}{1-\beta} \sum_{s',S'} \ln(1+\epsilon(s',S'))\pi(s',S'|s,S,l) \\ &\quad + \beta \sum_{s',S'} v(s',S')\pi(s',S'|s,S,l) \Bigg\} \end{aligned} \tag{14}$$

Further, a standard argument shows that the capitalist' utility maximization problem has the solution:

$$\begin{aligned} K' \;\; &= \;\; \beta(1+(1-\tau_k(K,\vec{H}))r_k(\tilde{K}))K \\ C_c \;\; &= \;\; (1-\beta)(1+(1-\tau_k(K,\vec{H}))r_k(\tilde{K}))K \end{aligned} \tag{15}$$

Equations (12), (13), and (14) define a recursive equilibrium in conjunction with the market clearing conditions $K = K_c$ and $L = H_e$. The law of motion Γ mapping current states $(K, \vec{H})$ into future states $(K', \vec{H}')$ is defined by the first equation in (14) together with the equilibrium law of motion for human capital:

$$H'(s') \;=\; \sum_s (1+\epsilon(s',S'))\pi(s',S'|s,S,l(s,S))H(s) \tag{16}$$

Finally, the government budget constraint in a recursive equilibrium reads:

$$\tau_k(K,\vec{H})r_k(\tilde{K})K + \tau_h(\tilde{K})r_h(\tilde{K})H_e \;=\; b(su)H_{su} + b(lu)H_{lu} \tag{17}$$

Proposition 1. A competitive recursive equilibrium is the solution to equations (14)-(17).

Proof: Appendix.

4. Cost of Business Cycles

In this section, we analyze the cost of business cycles. In section 4.1 we discuss how to eliminate business cycles in our framework and in section 4.2 we derive a useful formular for the cost of business cycles. Section 4.3 considers the effect of labor market reform, in particular permanent changes in unemployment benefits and permanent changes in job search efficiency.

4.1 Eliminating Business Cycles

We now confine attention to the case of logarithmic utility function for the worker.

We follow Lucas (1987, 2003) and analyze the welfare consequences of macroeconomic stabilization policy without having an explicit model of the interaction between stabilization policy and the business cycle. As in Lucas (1987, 2003) we consider a thought experiment in which stabilization policy completely eliminates business cycles, that is, we consider moving from an economy with S-dependent labor market risk π and ϵ to an economy with labor market risk $\hat{\pi}$ and $\hat{\epsilon}$, that is, independent of business cycle conditions S. The question that arises is how to find $\hat{\pi}$ and $\hat{\epsilon}$ given π and ϵ.

For economies without idiosyncratic risk Lucas (1987, 2003) postulates that the elimination of business cycles amounts to replacing all S-dependent random variables by their expected value. In this paper, we follow Krebs (2003) and Krusell and Smith (2002) and extend this principle to economies with idiosyncratic risk by taking the expected value conditional on each possible individual state s:

$$\begin{aligned} \hat{\pi}(s'|s,l) &= \sum_S \pi(s'|s,S,l)\tilde{\pi}(S|s) \\ \hat{\epsilon}(s) &= \sum_S \epsilon(s,S)\tilde{\pi}(S|s) \end{aligned} \tag{18}$$

with $\tilde{\pi}(S|s) = \frac{\tilde{\pi}(s,S)}{\tilde{\pi}(s)}$. We use two different assumptions for the weighting distribution $\tilde{\pi}$ corresponding to two different assumption regarding the effect of macroeconomic stabilization

policy. In the first approach, which is the one commonly used in the literature, we assume

$$\tilde{\pi}(s,S) \;=\; \pi(s,S) \tag{19}$$

In the second approach, we assume that stabilization policy has an asymmetric effect on the business cycle in the sense that it removes recessions without affecting negatively the economy in all other states.:

$$\tilde{\pi}(s,S) \;=\; \begin{cases} \frac{\pi(s,S)}{\sum_{S\neq R}\pi(s,S)} & if\ S\neq R \\ 0 & if\ S=R \end{cases} \tag{20}$$

where R stands for recession.

4.2 Cost of Business Cycles

Let Δ_v stand for the welfare cost of business cycles. We define this welfare cost as the ex-ante welfare difference for workers, in consumption units, between living in an economy with business cycles (recessions) and an economy without business cycles (recessions). If we denote variables in the economy without business cycles by a hat, then this welfare cost is

$$E_{\{l_t\}}\left[\sum_{t=0}^{\infty}\beta_w^t u(c_t(1+\Delta_v),l_t,s_t)\right] \;=\; E_{\{\hat{l}_t\}}\left[\sum_{t=0}^{\infty}\beta_w^t u(\hat{c}_t,l_t,s_t)\right] \tag{21}$$

where c_t is worker consumption in the economy with business cycles and $\hat{c}_t$ is worker consumption in the economy without business cycles. Our equilibrium characterization result (proposition 1) allows us to compute equilibrium consumption for given fundamentals and our method of eliminating business cycles (19) specifies the fundamentals for the economy without business cycles. Using our equilibrium characterization result and the definition (21), we find that the cost of business cycles can be written as:

$$\begin{aligned} \ln(1+\Delta_v) \;=\; & \sum_s \ln\hat{\phi}(s)\hat{\pi}(s) - \sum_s \ln\phi(s)\pi(s) \\ & - \left[\sum_s \hat{d}(\hat{l}(s),s)\hat{\pi}(s) \;-\; \sum_{s,S} d(l(s,S),s)\pi(s,S)\right] \\ & + \int \ln h\, d\hat{\pi}(h) - \int \ln h\, d\pi(h) \\ & + \frac{\beta}{1-\beta}\left[\sum_s \ln(1+\hat{\epsilon}(s))\hat{\pi}(s) \;-\; \sum_{s,S}\ln(1+\epsilon(s,S))\pi(s,S)\right] \end{aligned} \tag{22}$$

where π and $\hat{\pi}$ are the stationary distributions of the economy with business cycles, respectively without business cycles. Of course, these stationary distributions depend on equilibrium effort choices l, respectively $\hat{l}$, through their dependence on the transition probabilities $\pi(s', S'|s, S, l)$, respectively $\hat{\pi}(s'|s, l)$.

4.3 Labor Market Reform

We consider two types of labor market reform: a change in unemployment benefits $b(s)$ and a restructuring of the Public Employment Agency that changes the matching efficiency θ. Clearly, both b and θ affect the welfare cost of business cycles (22) through their effect on the equilibrium transition matrix π. For the quantitative analysis conducted below, we use the exact formula (22) to analyze the interaction between labor market reform and cost of business cycles. For our theoretical result, we confine attention to the limit $\beta \to 1$. In the Appendix we show that in the limit $\beta \to 1$ the welfare cost of business cycles becomes

$$\begin{aligned} \tilde{\Delta}_v(b,\theta) &= \lim_{\beta \to 1}(1-\beta)\ln(1+\Delta_w(\beta,b,\theta)) \\ &= \left[\sum_s \ln(1+\hat{\epsilon}(s))\hat{\pi}(s) \; - \sum_{s,S} \ln(1+\epsilon(s,S))\pi(s,S)\right] \end{aligned} \tag{23}$$

We have the following result:

Proposition 2

The welfare cost of business cycles is given by (22). In the limit $\beta \to 1$, the welfare costs of business cycles is given by (23). This welfare cost of business cycles is an increasing function of unemployment benefits, b, and a decreasing function of matching efficiency θ:

$$\begin{aligned} \frac{\partial \tilde{\Delta}_v}{\partial b}(b,\theta) &> 0 \\ \frac{\partial \tilde{\Delta}_v}{\partial \theta}(b,\theta) &< 0 \end{aligned}$$

Proof: Appendix.

To see the intuition behind the proposition, consider now our baseline case with two aggregate states, $S \in \{R, N\}$ (recession and normal times), and assume that the elimination of business cycles removes recessions without affecting the normal times (method 2). Suppose further that ϵ only depends on s but not on S. For $s = su, lu$ let $\Delta\pi(s; b, \theta) = \pi(s|R; b, \theta) - \pi(s|N; b, \theta)$ stand for the increase in the unemployment rate of the short-term unemployed, respectively long-term unemployed, during a recession. Denote the utility cost of being unemployed as $L(s) = \ln(1 + \hat{\epsilon}(e)) - \ln(1 + \hat{\epsilon}(s))$ with $s = su, lu$. In this case, expression (23) becomes:

$$\tilde{\Delta}_v(b, \theta) \quad = \quad \pi(R) \left[L(su)\Delta\pi(su; b, \theta) + L(lu)\Delta\pi(lu; b, \theta) \right] \tag{24}$$

Labor market reform affects the cost of business cycles through its effect on $\Delta\pi$. Specifically, successful labor market reform is modeled as a change in unemployment benefits, b, and/or a change in matching efficiency, θ. In the Appendix we show that a reduction in b or an increase in θ increases the equilibrium job finding rate $\pi(s' = e|s, l; b, \theta)$ for $s = su, lu$, and that this reduces the increase in the unemployment rate during recessions, $\Delta\pi$. A glance at formula (24) shows that this reduces the cost of business cycles and hence the potential gains from stabilization policy.

5. Quantitative Analysis

To be written.

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