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Encouraging Participation in a Labor Market with Search and Matching Frictions

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Encouraging Participation in a Labor Market with Search and Matching Frictions

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Abstract

We analyze the transition of the labor market to a new steady state following a reduction of negative incentives for participation. Due to labor market search and matching frictions, the transition may temporarily increase unemployment while new participants search for jobs. The formal framework is a dynamic search and matching model with an endogenous participation decision and unemployment benefits that are not conditioned on search effort (in other words, non-participants are also entitled to unemployment benefits). We employ the model to explore the mechanisms at work, and their welfare implications, following a reduction of unemployment benefits. We show that, although social welfare may be higher in the new equilibrium, the transition period involves a temporary welfare loss. We consider two alternative policy approaches: a gradual reduction versus an immediate one. We conclude that the transition period associated with a gradual reduction involves a smaller welfare loss.

JEL classification: E24, J21, J64.

Keywords: endogenous participation, search and matching frictions, unemployment.

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עידוד השתתפות בשוק עבודה המתאפיין באבטלה חיכוכית

אלון בנימיני וטלי לרום

תקציר

עבודה זו מתמקדת בתקופת המעבר של שוק העבודה למצב עמיד חדש בעקבות הפחתה של תמריצים שליליים להשתתפות. כיוון שתהליך החיפוש וההתאמה בין עובדים למשרות דורש זמן, הפחתת תמריצים שליליים להשתתפות עלולה להביא לעלייה זמנית באבטלה, עד שיושלם הזיווג בין משתתפים שיתווספו לשוק העבודה לבין משרות חדשות. מסגרת הניתוח הפורמלית היא מודל של חיפוש והתאמה בשוק העבודה, עם החלטת השתתפות אנדוגנית ועם דמי אבטלה שאינם מותנים במאמץ המושקע בחיפוש העבודה (דהיינו, אילו שאינם משתתפים נהנים אף הם מזכאות לדמי אבטלה). אנחנו משתמשים במודל כדי לנתח את תגובת שוק העבודה, ואת ההשלכות שלה על רווחת משקי הבית, בעקבות הפחתה ברמה של דמי האבטלה. אף על פי שהרווחה החברתית אכן יכולה לגדול בשווי המשקל החדש, אנו מראים שתקופת המעבר מתאפיינת באובדן זמני של רווחה חברתית. אנחנו משווים בין שתי גישות אלטרנטיביות: הפחתה הדרגתית לעומת הפחתה מיידית. אנחנו מוצאים שתקופת המעבר המאפיינת הפחתה הדרגתית מביאה לאובדן רווחה קטן יותר.

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1 Introduction

In the presence of search and matching frictions in the labor market, policies aimed at reducing negative incentives for labor force participation may involve temporarily high unemployment and therefore some deadweight welfare loss. The convergence dynamic toward the new equilibrium, as well as the related welfare cost, are sensitive to the pace at which such policies are implemented. We show that a gradual reduction in transfer payments is associated with a smaller welfare loss, compared with an alternative approach of an immediate reduction.

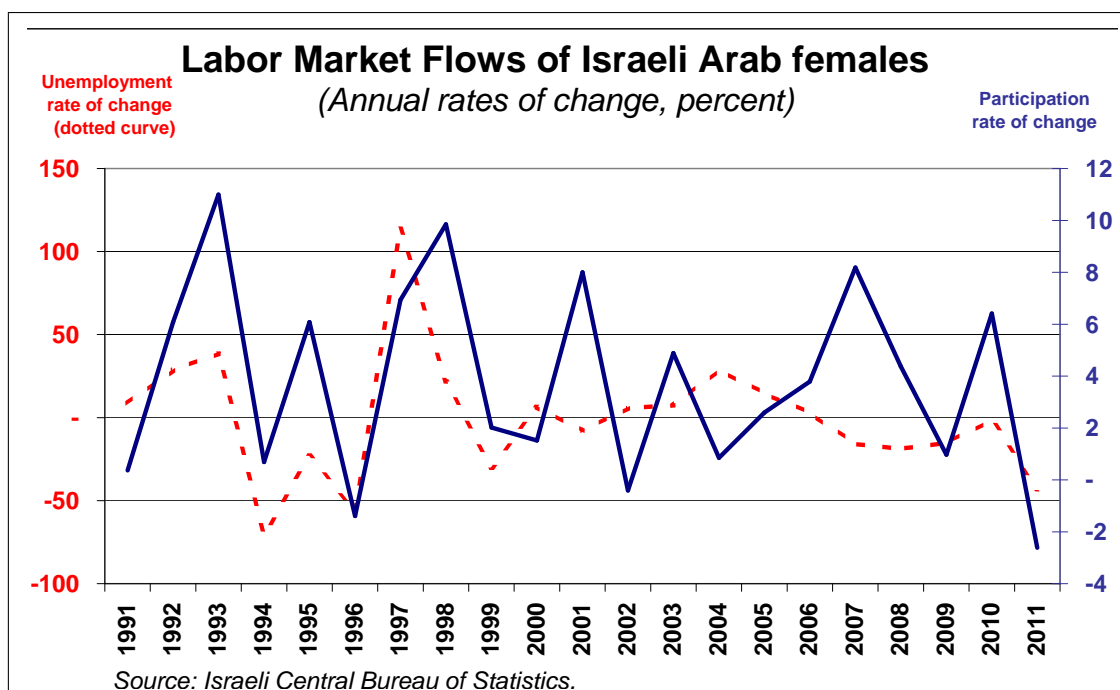


Figure 1.1: Labor market flows of Israeli Arab females aged 25-54.

In order to illustrate the motivation of the analysis, Figure 1.1 shows the changes in the unemployment and participation rates for Israeli Arab females aged 25-54. There is a clear positive correlation between changes in participation and unemployment, which suggests that, at least in this segment of the labor market, search and matching frictions may be hindering direct flows from non-participation to employment.

The focus of the analysis is on the supply side and the interaction between policy and

labor market frictions. We discuss the mechanisms at work during the transition period following a policy initiative, during which the economy converges to a new equilibrium at a lower level of transfer payments. We show that a gradual reduction of transfer payments involves a smaller social welfare loss, compared with the alternative of an immediate reduction.

A closely related line of research in the literature attempts to determine the optimal size and duration of unemployment or non-employment benefits. Thus, [Krueger and Mueller \(2010\)](#) find empirical evidence that job search is inversely related to the generosity of unemployment benefits, while the tradeoffs and factors affecting the optimal size or duration of those benefits are explored by [Acemoglu and Shimer \(1999\)](#), [Pavoni \(2007\)](#), [Hopenhayn and Nicolini \(1997\)](#), [Chéron and Langot \(2010\)](#) and [Cremer et al. \(1995\)](#), among others. In contrast, the focus here is on the transition to a lower level of benefits, which is not necessarily the optimal one.

The prediction that the unemployment rate would increase following an increase in participation is discussed by [Shimer \(2004\)](#), [Tripier \(2004\)](#) and [Veracierto \(2008\)](#), among others. In order to shed some additional light on policy the implications of such prediction, we use a dynamic model with endogenous participation under search and matching frictions. The literature on the endogenization of the participation decision in such an environment is relatively recent and most of it has focused on the steady state implications. [Pissarides \(2000\)](#) analyses the determinants of participation in the steady state. [Haefke and Reiter \(2006\)](#) use a static setup to show that endogenous participation improves the fit of model-based moments to the data. [Garibaldi and Wasmer \(2005\)](#) enrich the setup proposed by [Pissarides \(2000\)](#) by inducing steady state flows into and out of participation and then analyze the effect of taxation and transfers on the participation decision. Recently, [Campolmi and Gnocchi \(2011\)](#) integrated an endogenous participation decision into a New-Keynesian dynamic model, in order to improve model fit as well as to examine the implications for monetary policy.

The current analysis builds on the dynamic models with endogenous participation, such as those in [Tripier \(2004\)](#), [Veracierto \(2008\)](#) and [Campolmi and Gnocchi \(2011\)](#), while attempting to keep the model as simple as possible. The model is used to analyze the

mechanisms at work and their policy implications during the transition period following a reduction in transfers.

The rest of the paper is organized as follows: Section 2 presents the model and Section 3 discusses its calibration. Section 4 uses the model to analyze policy alternatives and their welfare implications. Finally, Section 5 presents some concluding remarks.

2 The model

The model builds on the standard search and matching framework with an exogenous job-destruction probability, known as the Diamond-Mortensen-Pissarides (DMP) model.¹ The DMP model’s basic structure of employment and unemployment is enriched by a third pool of non-participants, who receive government benefits and—if not actively searching for a job—are engaged in utility-increasing home activity. The current model is an extension of [Haefke and Reiter \(2006\)](#), in which we deviate from their preferences structure and extend their static model to include out-of-steady-state dynamics. It is also closely related to the dynamic model presented by [Campolmi and Gnocchi \(2011\)](#); however, since it addresses a different research question, we are able to use a simpler setup.

The economy consists of representative households. Apart from their labor market status, family members are otherwise homogenous. Thus, all matches are equally productive and therefore continuation values and surpluses considered by firms and workers are the same throughout the economy.

2.1 Search and matching frictions

Jobs matches, m_t , are a standard positive and homogenous function of vacancies and unemployment:

$$m_t = \eta V_t^\vartheta U_t^{1-\vartheta}, \quad (2.1)$$

where V_t and U_t are the numbers of posted vacancies and unemployed, respectively. η is a scaling parameter and $\vartheta \in (0, 1)$.

¹[Diamond \(1982\)](#) and [Mortensen and Pissarides \(1999\)](#). See a review by [Yashiv \(2007\)](#).

Due to the homogeneity of the matching technology, matching probabilities are related to the degree of labor market tightness, defined as

$$\theta_t \equiv V_t/U_t. \quad (2.2)$$

Thus, the job-finding rate is

$$p_t = m_t/U_t = \eta\theta_t^\eta, \quad (2.3)$$

and the vacancy-filling rate is

$$q_t = m_t/V_t = p_t/\theta_t. \quad (2.4)$$

2.2 Household labor supply

The economy is populated by identical risk-neutral and infinitely-lived households. We consider each household to be a large family that consists of a continuum $[0, 1]$ of family members. We further assume full risk-sharing within each household. $H_t \in [0, 1]$ denotes the fraction of family members who are not participating in the labor market and instead are engaged in home activity. For simplicity, and without loss of generality, we assume that search is a full-time activity, such that participants, whether employed or unemployed, are not engaged in home activity. Therefore, the production associated with such home activity is related only to the size of the non-participation pool: $\int_0^{H_t} h_t \cdot dH = H_t^\alpha$, where $\alpha < 1$. It follows that the marginal utility from home activity is a positive and diminishing function of non-participation, H_t :

$$h_t = \alpha H_t^{\alpha-1}. \quad (2.5)$$

Whenever not employed, and whether or not they search, family members receive direct transfers, b_t . It is assumed that search effort is unobservable to the policy maker and therefore non-participants receive benefits as well as the unemployed.² Thus, the total amount of transfers to each representative household is $(1 - L_t) b_t$, where $L_t \in [0, 1]$ is the

²Blondal and Pearson (1995) stress that "In half of OECD countries the number of recipients of these benefits exceeds the official numbers of unemployment." Also, note that some of the papers that examine optimal schemes for unemployment systems are concerned with the moral hazards related to search effort that cannot be monitored. See, for instance, Pavoni (2007), Hopenhayn and Nicolini (1997) and Coles (2006).

fraction of working family members. The level of transfers, b_t , is an exogenous policy tool whose future path can be treated either as predetermined or as a stochastic process. On the aggregate level, the dynamics of b_t are the only source for deviations from the steady state.

Note that each family member has two predetermined states: employment or non-employment. In the state of non-employment, the family member faces two choices: either to engage in home activity (non-participation) or to search (i.e. participation). We therefore specify two relevant value functions, one for each of the two predetermined states, based on which families choose the participation margins. Let $\beta \in (0, 1)$ denote the time discount factor and $\delta \in (0, 1)$ the exogenous job-destruction rate. It then follows that the marginal employed and non-employed family members contribute to the value of the household according to:

$$V_t^E = w_t + \beta [\delta E_t V_{t+1}^N + (1 - \delta) E_t V_{t+1}^E] \quad (2.6)$$

and

$$V_t^N = b_t + \max [h_t + \beta E_t V_{t+1}^N, \beta (1 - p_t) E_t V_{t+1}^N + \beta p_t E_t V_{t+1}^E], \quad (2.7)$$

respectively. Here E_t is the mathematical expectation operator conditional on the information set available in period t .

Substituting the surplus from employment, $S_t^E \equiv V_t^E - V_t^N$, into equations (2.6)-(2.7) and rearranging, we obtain:

$$V_t^E = w_t + \beta (E_t V_t^E - \delta E_t S_{t+1}^E) \quad (2.8)$$

and

$$V_t^N = b_t + \beta E_t V_{t+1}^N + \max [h_t, p_t \beta E_t S_{t+1}^E]. \quad (2.9)$$

Note that individual households treat p_t and S_t^E as exogenously given. It is then straightforward to show that there is a cutoff value for h_t , at which the household is indifferent between the two choices reflected by the maximization operator of the value from not working (2.9). The threshold level of marginal home productivity is therefore

$$h_t^c = p_t \beta E_t S_{t+1}^E. \quad (2.10)$$

Thus, there is homogeneity *across* families in the sense that each one chooses the same threshold and, assuming families are large enough, there are similar distributions of states and choices across families. However, there is heterogeneity *within* each family, which makes the participation decision for each one of its members. Once the threshold is decided on, the family essentially decides what share of its non-working members will search and what share will engage in home activity. Once this decision is made, the allocation of each individual to one of the two groups (i.e. participants and non-participants) is arbitrary.

Due to the search and matching frictions outlined in subsection 2.1, the threshold (2.10) reflects a forward-looking decision. In other words, even if the equilibrium wage is temporarily less than the level of the transfers, the threshold may still be positive. Thus, the threshold is positively related to future gaps between the equilibrium net wage and the size of the transfer. If there are no such gaps, the threshold will be zero and there will be no participation. The threshold is related to the expected benefit from search also since it is proportional to the job-finding rate. Shimer (2004) discusses similar intuitions with respect to search intensity.

In order to demonstrate these points, it is useful to write the surplus from employment explicitly. Thus, by subtracting (2.9) from (2.8) we obtain:

$$S_t^E = w_t - b_t + \beta E_t [(1 - \delta - p_t) S_{t+1}^E]. \quad (2.11)$$

That is, the surplus from employment results from the gap between the wage and the size of the transfer, and the continuation value from employment. From equation (2.10), the latter is related to the threshold, which in equilibrium reflects the expected surplus from employment. The continuation value is also related to the separation probability and the job-finding rate, such that the higher they are, the lower the continuation value, and therefore the higher the wage level required to maintain a given surplus. If the threshold is low, thus reflecting a low future surplus from employment, it would take a higher wage to satisfy a given present surplus. The job-finding rate, p_t , affects the threshold—and, therefore, the participation rate—in two opposing directions: a higher job-finding rate increases the probability of an employment surplus and therefore encourages participation, as can be seen from the determinants of the threshold (2.10); however, a higher job-finding

rate also decreases the continuation value embodied in the employment surplus (2.11) and, therefore, reduces that surplus and discourages participation.

Substituting the threshold (2.10) into (2.11), we obtain:

$$S_t^E = w_t - b_t + \frac{(1 - \delta - p_t)}{p_t} h_t^c. \quad (2.12)$$

Taking one period forward and substituting back into (2.10) we get:

$$h_t^c = p_t \beta E_t \left[w_{t+1} - b_{t+1} + \frac{(1 - \delta - p_{t+1})}{p_{t+1}} h_{t+1}^c \right]. \quad (2.13)$$

This recursive expression for the threshold shows that it is positively related to a discounted infinite flow of gaps between the net wage and the size of the transfer, where the discount factor consists of three components: the time discount factor, the job-finding rate and the continuation value. The latter is negatively related to the job-destruction rate and the future job-finding rate. Thus, the job-finding rate affects the threshold in two opposing directions: a high *contemporaneous* job-finding probability, p_t , encourages search, while a high *future* job-finding probability, $E_t p_{t+1}$, reduces the continuation value, thus discouraging search. The ability to decompose the effect of the job-finding rate into *contemporaneous* and *future* components is one advantage of a dynamic model which enables the analysis of out-of-steady-state dynamics.

Note that although it is also intuitive to think about heterogenous earning capacity as explaining heterogenous participation decisions, there is no loss of generality in our modelling choice. Modelling endogenous participation decisions as based on wage dispersion would, in some sense, be analogous to our specification, since in any case the participation decision would end up being driven by the gap between home productivity and labor-market income. Therefore, the intuition captured by the threshold for the forward-looking participation decision (2.13) is valid, regardless of the underlying structure explaining heterogenous participation decisions.

2.3 Vacancies

As in the standard DMP model, the value of a filled job to a firm is

$$J_t^F = A - w_t + \beta E_t [(1 - \delta) J_{t+1}^F + \delta J_{t+1}^V], \quad (2.14)$$

where J_t^V denotes the value of a posted vacancy, and the exogenously given marginal productivity of labor, A , is the same across all worker-firm pairs in the economy.

Given a constant periodic vacancy cost, g , the value of a posted vacancy is

$$J_t^V = -g + \beta E_t [(1 - q_t) J_{t+1}^V + q_t \cdot J_{t+1}^F]. \quad (2.15)$$

Free exit and entry of atomistic firms pushes the equilibrium value of a posted vacancy to zero, such that $J_t^V = 0$, $\forall t$. Substituting into equation (2.15) yields the standard optimality condition related to posted vacancies, whereby expected hiring cost is equated to the discounted expected value of a filled job:

$$g/q_t = \beta E_t J_{t+1}^F. \quad (2.16)$$

From equations (2.14)-(2.15), the firm's surplus from an existing employment relationship, $S_t^F \equiv J_t^F - J_t^V$, is given by

$$S_t^F = g + A - w_t + (1 - \delta - q_t) \beta E_t S_{t+1}^F.$$

Substituting (2.16) in, and using $E_t J_{t+1}^V = 0$, yields

$$S_t^F = A - w_t + (1 - \delta) \frac{g}{q_t}. \quad (2.17)$$

In other words, the firm's surplus from established employment relationships consists of two components: the worker's contribution to the firm, which is his productivity net of his wage, and a continuation value, which is the expected hiring cost conditional on the job-survival probability.

Finally, $S_t^F = J_t^F$, since posted-vacancy value is zero. Together with equations (2.16) and (2.17), we can write the optimal vacancy-posting condition without using the variables S_t^F and J_t^F :

$$\frac{g}{q_t} = \beta E_t \left[A - w_{t+1} + (1 - \delta) \frac{g}{q_{t+1}} \right]. \quad (2.18)$$

2.4 Equilibrium

2.4.1 Wages

Workers and firms Nash-bargain the wage level and thus share the economic rent from a match. The Nash bargaining maximizes $(S_t^E)^\varepsilon (S_t^F)^{1-\varepsilon}$, where $\varepsilon \in (0, 1)$ denotes the bargaining power of the household. The implied first-order condition is therefore

$$S_t^E = \frac{\varepsilon}{1-\varepsilon} S_t^F. \quad (2.19)$$

Substituting equations (2.12) and (2.17) into equation (2.19) and rearranging, we obtain the equilibrium wage level:

$$w_t = (1-\varepsilon) \left(b_t - \frac{(1-\delta-p_t)}{p_t} h_t^c \right) + \varepsilon \left(A + (1-\delta) \frac{g}{q_t} \right). \quad (2.20)$$

This equation for the equilibrium wage extends the standard one through the additional term $\frac{(1-\delta-p_t)}{p_t} h_t^c$. To illustrate the contribution of the extension to the dynamics analysis, note that now, i.e., with endogenous participation, the threat point of the worker can be lower than the size of the transfer. Of course, in a steady state where the household has no bargaining power, the equilibrium net wage ends up being equal to the transfer; which can be seen by substituting $\varepsilon = 0$, using equation (2.13) and solving for the steady state. Obviously, the threshold is zero in this case (see equation (2.13)), as is the participation rate. However, during transition, the wage can be lower than the *contemporaneous* transfer, as long as the discounted path of future wages is expected to be above the discounted path of future transfers. This is captured by the way in which the threshold enters the equation for the equilibrium-wage (2.20). Note also that high separation and job-finding rates reduce the continuation value for the worker, thus increasing the equilibrium wage. The intuition behind this is straightforward: high separation reduces the probability that the job will survive in the future and a high job-finding rate increases the probability of having a job in the future even without having one in the present.

This issue can also be addressed in a static analysis (Pissarides, 2000, Ch.7). However, the extension of the model allows workers to temporarily accept a wage level that is lower than unemployment benefits, if they expect—for instance—a future cut in unemployment

benefits. The willingness to temporarily work for a wage that is lower than the size of the transfer is increased if the future cut is expected to push a large number of new participants into unemployment, thus reducing future job-finding rates and increasing the employment continuation value. This insight is important in the comparison between different policies for reducing the size of the transfer, which is presented below.

2.4.2 Clearing conditions

The structure described above implies the law of motion for each of the three labor-market pools.

The employment pool consists of the surviving jobs and the inflow of new matches:

$$L_t = (1 - \delta) L_{t-1} + p_{t-1} U_{t-1}. \quad (2.21)$$

The size of the non-participant pool is adjusted according to the home productivity threshold, h_t^c . Substituting the latter into (2.5) and rearranging, we obtain

$$H_t = \left(\frac{1}{\alpha} h_t^c \right)^{\frac{1}{\alpha-1}}. \quad (2.22)$$

The rest of the population consists of the unemployed pool. Normalizing the entire population to 1, the unemployed pool is simply

$$U_t = 1 - L_t - H_t. \quad (2.23)$$

We assume that the government maintains a balanced budget at all times, such that

$$b_t (H_t + U_t) = T_t, \quad (2.24)$$

where T_t denotes lump sum taxes.

Admittedly, this is a strong assumption, with restrictive implications for the transition period. However, we will later show that even under such a strong assumption, it is socially desirable to reduce transfers gradually, and therefore this result will be reinforced if we relax the constraint to some extent in order to allow a temporary budget deficit. Therefore, the strong assumption of a balanced budget at all times strengthens our result and makes it possible to shed light on the mechanism at work during the transition period.

2.5 Model solution

The system of equations $\{(2.2), (2.3), (2.4), (2.13), (2.18), (2.20), (2.21), (2.22), (2.23), (2.24)\}$, together with initial and terminal conditions and the exogenous process for b_t , drive the system of 10 endogenous variables:

$$\{V_t, U_t, L_t, H_t, h_t^c, w_t, p_t, q_t, \theta_t, T_t\}_{\forall t > 0}.$$

In order to compare alternative policy approaches, we compute the transition from the initial to the terminal steady state for alternative paths of the transfers, $\{b_t\}_{t=0}^T$. The initial and terminal steady states are computed given the respective transfers, b_0 and b_T , where $b_0 > b_T$. Using a social welfare criterion, we then compare two alternative policies: an aggressive policy, in which the newly announced value for b_T is immediately adopted; and a gradual policy, which involves a gradual adjustment to b_T . In both cases, we assume perfect foresight and simultaneously solve all future states of the entire system.³

3 Calibration

The model is calibrated using the first moments calculated from quarterly Israeli data for the period 1998:Q1-2011:Q4. The sources of the data are the Israeli Ministry of Industry, Trade and Labor (MoITaL), the Israeli Central Bureau of Statistics and the Bank of Israel. The sample period begins in 1998 since this is the first year of the MoITaL survey, which provides the data for hiring, vacancies and separations. In what follows, a variable without a time subscript denotes a steady state level and the "population" refers to the main working age population (25-64). In order to be consistent with the model's definitions, all the ratios are expressed in terms of the total population (with the exception of the separation rate, δ , which is expressed in terms of the working population). Thus, for example, the unemployment rate is not expressed in terms of its standard definition, but rather as the ratio of the number of unemployed to the entire working age population. The results of the calibration are reported in Table 3.1:

³To this end, we employ the Dynare toolbox for Matlab, which uses a Newton-type algorithm for such deterministic and perfect foresight solutions (see [Adjemian et al. \(2011\)](#)).

Table 3.1: Calibrated values

Parameter	Description	Value
A	Productivity	1.00
α	Home production parameter	0.24
b	Transfers	0.25
g	Vacancy cost	0.32
β	Time discount factor	0.99
δ	Job destruction rate	0.07
ε	Bargaining power of households	0.65
ϑ	Matching-function elasticity WRT vacancies	0.35
μ	Matching-function scaling parameter	0.86

We begin by computing some steady-state values, on which the calibration will be based. The average participation rate among the main working-age population in Israel during the sample period is 73.6%. Therefore, the steady state non-participation rate is 100% less than that figure, i.e., $H = 26.4\%$. Substituting this value, together with the average unemployment rate, $U = 5.3\%$, into the constraint (2.23), yields the share of the working population, $L = 68.3\%$.

Given the ratio of matches to working-age population, $m = 4.8\%$, we obtain $p = 0.9$, using the definition of the job-finding rate (2.3). Note that since the present model does not allow for on-the-job search, this probability is likely to be biased upward. Using a steady state version of the law of motion (2.21), we arrive at $\delta = 7\%$, which appears to be consistent with the data.

The average vacancies rate is $V = 6.0\%$, which reflects the sum of hiring *during the quarter* and vacancies *while replying* to the MoITaL survey. Thus, from the definition of labor market tightness (2.2), we obtain that $\theta = 1.13$ and the vacancy-filling rate (2.4) is $q = 0.8$.

Based on the estimation of the matching technology (2.1), we calibrate ϑ to be 0.35, which is consistent with the estimation results reported by [Petrongolo and Pissarides \(2001\)](#).⁴ Therefore, we also had to calibrate the scale parameter of the matching func-

⁴In order to render the involved variables stationary, we estimated a logarithmic-difference transformation of the matching function (2.1). Accounting for simultaneity, we used a 2SLS procedure, with lags of

tion, μ , to be 0.86 in order to satisfy the above-mentioned steady-state job-finding and vacancy-filling rates (p and q). Since we are carrying out a welfare analysis, we assume that the [Hosios \(1990\)](#) condition is satisfied, such that $\varepsilon = 1 - \vartheta = 0.65$.

We next solve for the three variables $\{h^c, w, g\}$, based on a steady state version of the three equations (2.13), (2.18) and (2.20). To this end, we use the normalization $A = 1$, $b = 0.25$ and the conventional calibration for quarterly frequency, $\beta = 0.99$. The results are $h^c = 0.66$, $w = 0.97$ and $g = 0.32$.

Finally, we can use the link between non-participation and marginal home productivity (2.22) in order to calibrate α to 0.24.

With the exception of α , which as far as we know is unique to our model, the calibrations are consistent with those commonly found in the literature. More importantly, the qualitative results are not sensitive to the calibrations, while the quantitative results are sensitive mainly to the level of transfers, b_t .

4 Policy alternatives and their welfare implications

In order to compare alternative policy measures, we define the following generic Social Welfare Function (SWF):

$$SWF_t = E_t \sum_{s=0}^{\infty} \beta^s \Omega_{t+s}^{Type}, \quad (4.1)$$

where $Type = Util$ (Utilitarian), IA (Inequality aversion).

When considering aggregate welfare, it is important to remember that the assumption of a representative risk neutral household is a simplification. Thus, a utilitarian welfare criterion, which is based on average household utility, may be consistent with the model but would not be insightful with respect to distributional considerations. Therefore, in order to account for distributional effects, we also employ the egalitarian approach by adopting a social welfare criterion that reflects inequality aversion.

all three variables (log differences of m_t , U_t and V_t) as instrumental variables.

One option is, therefore, to employ a utilitarian criterion, such that

$$\Omega_t^{Util} = L_t w_t + H_t^\alpha. \quad (4.2)$$

Here the term H_t^α captures the contribution of home activity to social welfare. Note also that under the utilitarian approach (4.2), benefits and taxes, b_t and T_t , cancel each other out due to the budget constraint (2.24). It would also make sense to include the contribution of income from the ownership in firms, such that the SWF_t would be affected by S_t^F as well; however, for the sake of simplicity we decided to focus on the welfare derived from labor income and the home activity of households.

Another option would have been to employ a formal criterion that is concave with respect to the utility associated with each pool, so as to reflect inequality aversion:

$$\Omega_t^{IA} = L_t \ln(w_t - T_t) + (U_t + H_t) \ln(b_t - T_t) + \ln(H_t^\alpha - T_t). \quad (4.3)$$

Based on the above welfare criteria, we can now compare two alternatives for reducing the size of transfers, b_t . The following analyses are based on the criterion that reflects inequality aversion (4.3). The use of the utilitarian approach (4.2) would shed less light on the research question, and would not alter any of the qualitative conclusions.

Figures 4.1 and 4.2 depict the transition of the model economy under the two policy alternatives, computed under perfect foresight, as explained in subsection 2.5. We begin by comparing the two steady states, before and after the reduction of transfers. We then compare the transition stages under the two alternatives and discuss the relevant mechanisms at work. Finally, we analyze the welfare implications.

In the new steady state, the exogenous size of the transfer is lower compared with the initial steady state. Figure 4.1 illustrates that, as expected, the new steady state is identical under both alternatives and is characterized by higher participation and employment. *Ceteris paribus*, with exogenous separation probability, higher steady state employment involves higher steady state unemployment as well. However, unemployment is lower in the new steady state, since the effect of a tighter labor market dominates the effect of more destructed jobs: a tighter labor market increases the job-finding rate, thus reducing the size of the steady-state unemployment pool, which is required in order to counteract

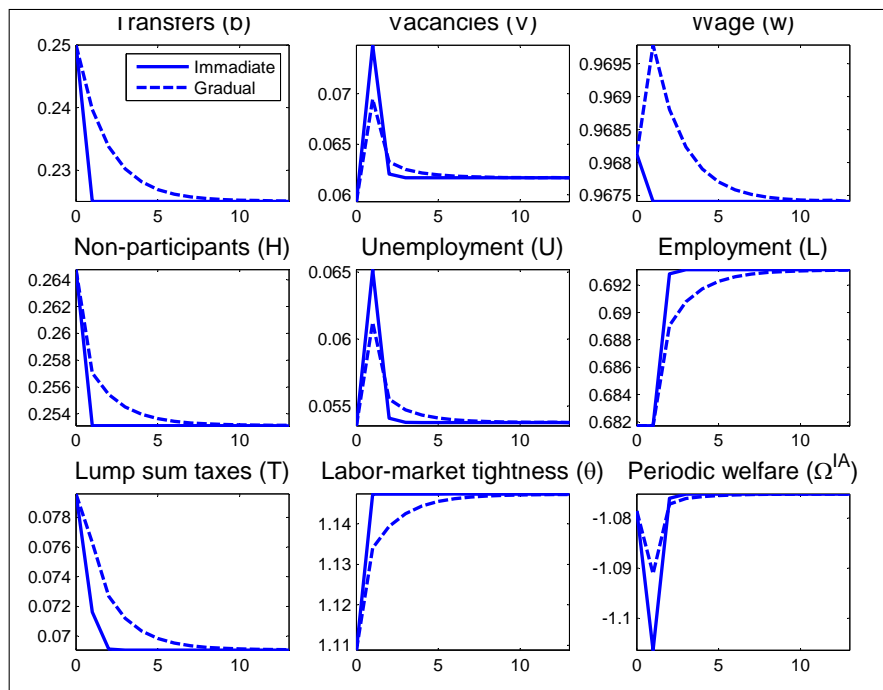


Figure 4.1: Transition to permanently lower transfers

a bigger flow from destroyed jobs. The explanation for a tighter labor market in the new equilibrium is that the lower level of transfers reduces wages (due to a lower threat point); in turn, lower wages increase the firm's surplus, thus encouraging more firms to enter the market, which thus becomes tighter. A tighter labor market increases the expected hiring cost due to the lower vacancy-matching probability, thus washing out some of the extra surplus brought about by the fall in wages.

The new equilibrium is characterized by higher periodic social welfare, according to the inequality-averse criterion (4.3). Figure 4.2 decomposes the dynamics of periodic welfare (4.3). The following components make a positive contribution to welfare: the increase in marginal (and therefore average) home productivity, the reduction of the unemployed pool (which of the three pools makes the smallest direct contribution to welfare) and the tax cut. Together, they dominate the components making a negative contribution: the direct effect of lower transfers and wages on household welfare. Note that the worse-off pool, namely the unemployed, is not only smaller in the new steady state, but its job-finding

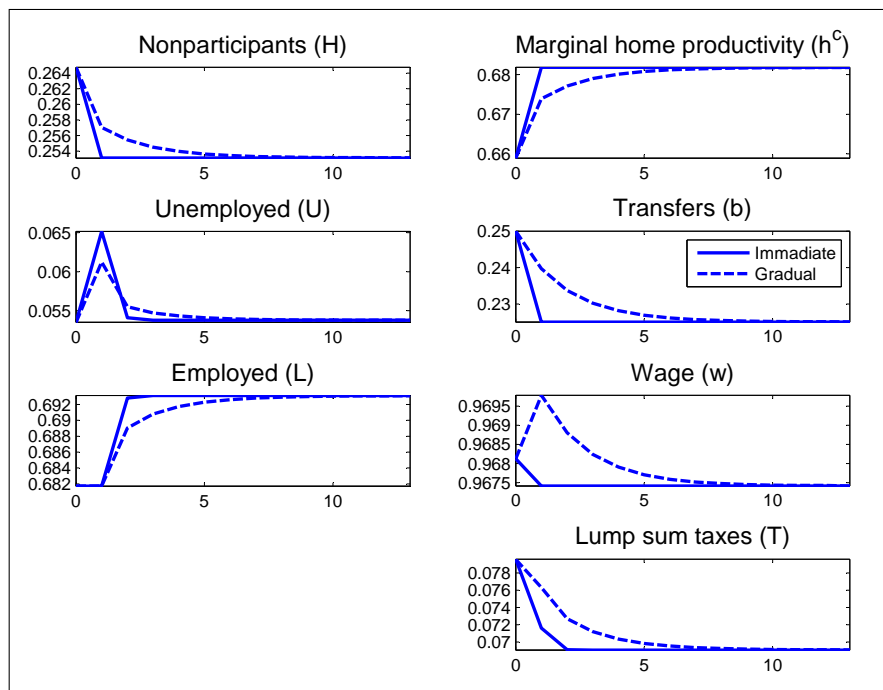


Figure 4.2: Micro welfare analysis during the transition to permanently lower transfers

rate is higher, which increases lifetime utility. This group will be our focus of interest in analyzing the transition period, since it accounts for most of the difference in the *dynamics* of periodic social welfare between the two alternative policies.

In the case of the more aggressive policy, periodic social welfare, Ω_t^{IA} , declines to a greater extent before increasing to the new equilibrium, which implies lower SWF_t during the transition. This is explained by what happens to the pool of the unemployed. Thus, although both alternatives lead to lower equilibrium unemployment, it can be seen from Figure 4.1 that unemployment is temporarily higher during the transition. This is due to labor market frictions: since matches require search, it takes some stochastic period of time for matches to form between new participants and the new vacancies. Note that employment, which is predetermined, does not increase on impact. Figure 4.1 shows that unemployment peaks at a higher rate under the aggressive policy alternative. This is because the more aggressive cut in transfers induces more individuals to participate. Since more individuals decide to participate, unemployment increases faster and peaks at a higher

rate.

The welfare-relevant effects are shown in Figure 4.2. There are two effects that are responsible for a larger reduction in periodic welfare during the transition under the aggressive policy alternative. The first is higher unemployment during the first few periods following the introduction of the new policy, since more individuals near the participation margin begin participating, thus leading to higher unemployment than under the gradual alternative. The second effect is the direct effect of smaller transfers which, on its own, leads to both the unemployed and nonparticipants being worse off than under the gradual alternative. Due to the risk-averse welfare criterion (4.3), these two effects dominate the welfare-increasing effect of lower taxation.

There is another interesting result involving the wage level, which under the gradual alternative increases on impact and under the aggressive alternative converges immediately. This is a result of two forces. The first, which is at work under both alternatives, is a tighter labor market which increases the job-finding rate and thus reduces the continuation value for the worker and increases his wage. The second, which appears only under the gradual alternative, is that the households' threat point converges only gradually to the new (lower) steady state, thus letting the lower continuation value be the dominant effect on the wage in the first period, generating a hump-shaped transition.

Note that under the gradual alternative participation increases only gradually, which is due not only to the direct effect of gradually falling benefits, but also to a discouraged-worker effect (Pissarides, 2000, Ch. 7). Under the gradual alternative, the hump-shaped path of wages, which was described above, affects vacancies posting in a way that delays the convergence of labor market tightness. This, in turn, has a discouraged-worker effect that further slows convergence to a higher participation rate.

Note that the path of employment is higher under the aggressive alternative, suggesting higher overall production. Nonetheless, welfare under this alternative is lower, due to distributional considerations captured by the inequality-averse criterion.

To understand the implication of making participation endogenous, Figures A.1 and A.2 in appendix A depict the transitions paths under exogenous participation.⁵ There are

⁵Note that in the case of exogenous participation, which is therefore constant in this exercise, the sum

two main differences between the two cases, of endogenous and exogenous participation. First, unemployment falls monotonically under exogenous participation, in contrast to its hump-shaped fall under endogenous participation. Second, the economy moves to a new equilibrium with lower social welfare under exogenous participation, in contrast to the welfare improvement under endogenous participation.

In order to shed further light on the model's dynamics, Figures B.1 and B.2 in appendix B depict the response to a *transitory* cut in transfers and a transitory productivity shock, respectively. On impact, the unemployment response to these shocks is positive, in contrast to the case of exogenous participation. Thus, with endogenous participation, there is a flow of new participants into the labor force and, as discussed above, the new participants first have to spend some (stochastic) period of time searching due to matching frictions. Therefore, unemployment increases on impact and falls only subsequently, even though firms post more vacancies.

5 Concluding remarks

We have presented a model with an endogenous participation decision in an environment of labor market search and matching frictions. Though the model includes out-of-steady-state dynamics, we have attempted to keep it as simple as possible. Therefore, the model can be used to study labor-market dynamics with endogenous participation, either in a business cycle context or in a context of structural change.

We applied the model in order to analyze the transition toward a new steady state, following a reduction in unemployment benefits (which are received whether or not the individual participates). It is important to note that the analysis is a general one, and does not assume that the lower level of benefits is closer to the optimum. Accordingly, the research should not be viewed as part of the literature that explores the optimal level of unemployment benefits and other transfer payments. The analysis suggests that incentivizing participation should be done gradually, and that conclusion is relevant in the case of the unemployment and employment rates is always 73.6%, i.e. the participation rate (see section 3 on calibration).

of other policy tools, such as subsidies, for example.

The analysis of the mechanisms at work and their welfare implications, following a policy initiative to encourage participation, has demonstrated that a gradual (rather than an aggressive) approach is to be socially preferred, due to the presence of search and matching frictions. Another argument supporting a gradual approach involves uncertainty with respect to the structure or state of the economy.⁶ Our argument can be thought of as complementary to it: we have shown that even when a policy maker is certain about the structure and state of the economy, and even under perfect foresight, gradualism is still desirable due to other imperfections — in our case, labor-market search and matching frictions. More specifically, we have shown that increasing participation may lead to temporarily higher unemployment and will not change employment (which is predetermined) on impact. Our main conclusion is therefore that a gradual approach is to be preferred when implementing a policy to encourage participation.

Out-of-steady-state dynamics under endogenous participation is a relatively new field of research. We have used it to explore the transition following a structural change. However, as noted above, the model can easily be employed to analyze business cycle fluctuations as well. [Campolmi and Gnocchi \(2011\)](#) show that integrating endogenous participation into a business cycle model improves the moments' fit to the data.

The analysis in this work was based on the assumption of a perfect foresight. In other words, it is assumed that once the future path of transfers is declared, it is treated as certain. Therefore, a possible extension of the analysis would be to include rational expectations or learning, in the case that the policy maker enjoys only partial credibility. In such a context, it would be interesting to explore how the transition to an equilibrium with higher participation is influenced by the extent of the policy maker's credibility.

⁶For instance, in the context of monetary policy, [Barlevy \(2009\)](#) shows that a gradual approach is preferred when policy makers face uncertainty with respect to the transmission mechanism of the policy tool.

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Appendices

Appendix A Transition under exogenous participation

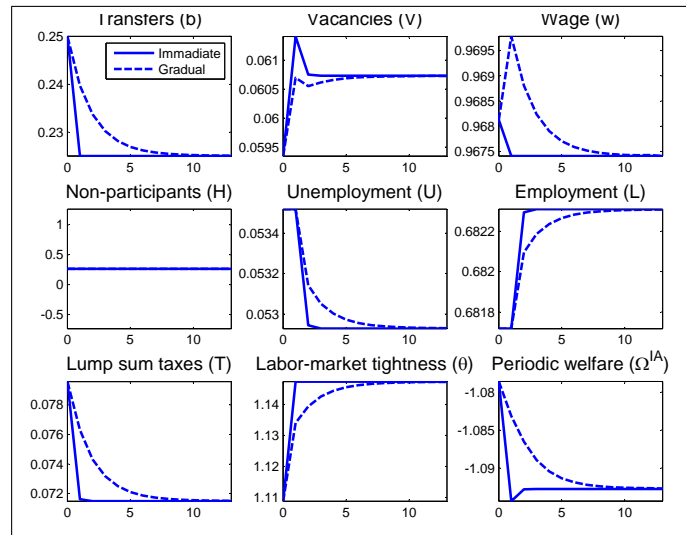


Figure A.1: Transition to permanently lower transfers under exogenous participation

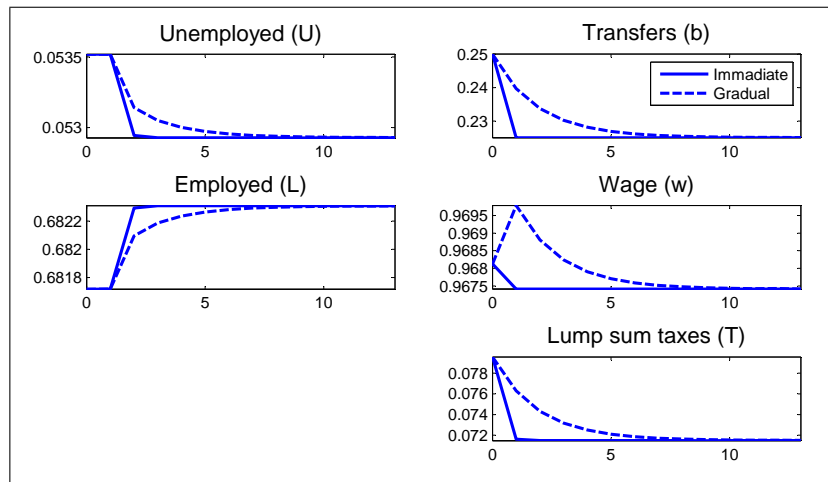


Figure A.2: Micro welfare analysis under exogenous participation

Appendix B Impulse responses

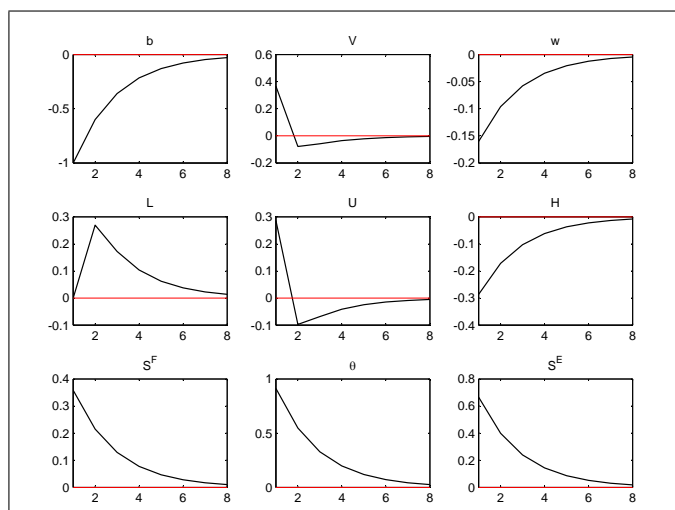


Figure B.1: Impulse response to a transitory fall in unemployment benefits.

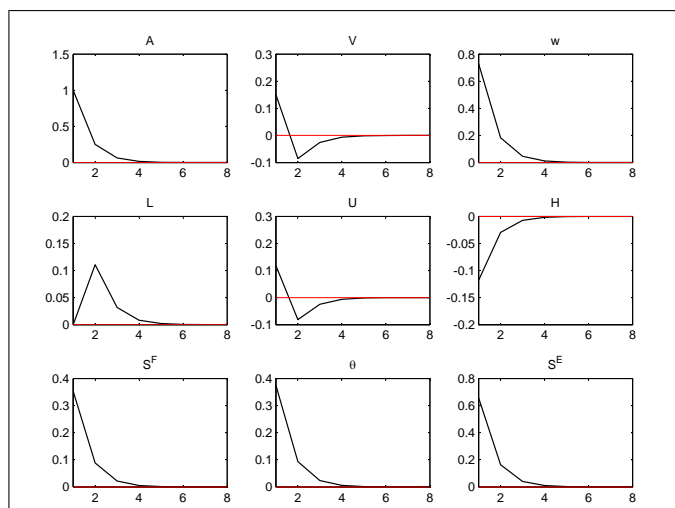


Figure B.2: Impulse response to a transitory productivity shock.