IS THERE A TRADE-OFF BETWEEN EMPLOYMENT AND GROWTH?

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This paper investigates how unemployment and the long-run growth rate influence each other in steady state. It builds on Pissarides but Ramsey preferences are introduced, influencing the interest rate. A central finding is that there is a trade-off between successful growth and unemployment if one considers direct changes in the growth rate, but when the changes are indirect, what is good for growth is also good for employment. Thus to increase both growth and the employment rate, the policy implication seems to be that one should improve incentives (lower capital tax or unemployment benefits) rather than subsidize R&D incentives.

1. Introduction

At least since the industrial revolution there has been a widespread belief that technological progress creates unemployment. Considering, however, the vast productivity increases that the last two centuries have witnessed (see Madison, 1991), without generating any long-term increasing trend in unemployment, it seems fair to say that there is no long-term crowding-out effect from the technology factor to unemployment. On the other hand, it is evident that technological innovations create unemployment in the short run. For example, they make workers redundant because of automation, or less useful because they lack the special skills or education that the new technology requires, or they force firms that are less successful in innovating to scale down their production, or even close down their business. This does, however, not imply that unemployment has to increase permanently. Instead we can observe that most western countries manage to reallocate unemployed workers to new jobs, albeit with varying degrees of success.¹

To the extent that unemployed workers are averse to technological change, it can thus be understood from the fact that it may force them to go through an unpleasant process of finding a new job, being frictionally unemployed meanwhile. This alone suggests that there is reason to investigate whether or not there is a trade-off between high growth rates and low unemployment in steady state, and this is the central purpose of the present paper.

Other economists have recently analyzed this problem in depth, notably Bean and Pissarides (1993), Aghion and Howitt (1994), Caballero and Hammour

¹ For empirical descriptions of this process, see Blanchard and Diamond (1990) and Davis and Haltiwanger (1990).
(1994), and Cohen and Saint-Paul (1994). The work most closely related to
the present paper is however Pissarides (1990). Among the differences that can
be mentioned between the two, I endogenize consumers' behavior, and I analyze
in more detail the effects of growth on the labor market and how the
performance of the labor market influences growth. Furthermore, this is done
both in models of exogenous and endogenous growth.

One main finding (subject to the qualification that consumers' intertemporal
elasticity of substitution is small) is that there is a trade-off between successful
growth and high employment, if one considers direct changes in the rate of
growth; that is, if one considers exogenous changes in the growth rate, or in
the productivity parameter in the production function (which is crucial for the
growth rate) when there is endogenous growth. On the other hand, when growth
(levels or rates) is affected in indirect ways (i.e. when growth is endogenously
changing in response to variations in parameters such as the capital tax rate
or the unemployment benefit) variations in exogenous parameters that decrease
unemployment also make growth more successful. Since such variations can
arise anywhere in the economy, we find not only that growth conditions affect
unemployment, but also that labor market conditions affect growth.

The rest of this paper is organized as follows. In Section 2 the labor market,
with search unemployment and firms' decisions are described. In Section 3 I
assume that technological progress takes place at an exogenous rate, and I also
introduce households in the model. The central purpose of this section is to
discuss what happens to the steady state growth path if exogenous parameters
change. A similar discussion is found in Section 4, where it is assumed that
growth occurs at an endogenous rate. The properties of these two cases are
compared at the end of this section.

2. Labor market and firms' decisions

As in many search models, we shall assume that there is frictional unemploy-
ment, because some time is needed for an unemployed worker and a firm with an
unoccupied job to find each other. The reason for this is that it takes a number
of meetings to make a good match. In the aggregate, the results of this search
process are described by the matching function

\[ xL = x(uL, vL) \]  

(1)

The total labor force is here denoted by \( L \), \( u \) is the unemployment rate and \( v \)
is the number of vacancies divided by the labor force. Thus the number of
successful matches \( (xL) \) is a function of the number of unemployed workers
and the number of vacancies that all the firms in the economy decide to put
out (at a cost). In order to allow for a constant unemployment rate along
the steady state growth path, we will make the common assumption (cf.

\[^2\] Other references of interest are Wigniolle (1992) and Stadler (1993). A survey of earlier
discussions can be found in Petit (1993).

\[^3\] This section draws on Pissarides (1990, chs 1 and 2).
Pissarides, 1985, 1987, and 1990) that this function is concave, linearly homogeneous, and increasing in both arguments. This allows us to write it on the more compact form

\[ \frac{x}{v} = q(\theta) \equiv x \left[ \frac{u}{v}, 1 \right] \theta \equiv v/u, q(\theta) \leq 0 \]  

(2)

We can interpret \( \theta \) as the tightness of the labor market and \( q(\theta) \) as the rate at which vacancies are filled. Multiplying (2) by \( \theta \), we can also see that \( \theta q(\theta) \) is the rate at which unemployed workers leave unemployment.

There are many firms in this economy, and the number of workers employed in firm \( i \) is expressed by \( N_i \). Because of adverse price or productivity shocks a firm finds it best to dissolve some of its matches at every point of time. Denoting the exogenous separation rate by \( s \), this means that the number of fired workers in firm \( i \) is \( s N_i \) at each instant. On the other hand, firms are also engaged in recruiting activities in order to create matches that yield acceptable returns. If firm \( i \) puts out \( V_i \) vacancies, it hires \( q(\theta)V_i \) workers at every moment. Hence, the less tight is the labor market (i.e. the smaller is \( \theta \)) the more likely it is that a vacancy will lead to a match. Summing these two flows, we get an expression for the change in firm \( i \)'s work force

\[ \dot{N}_i = q(\theta)V_i - sN_i \]  

(3)

Along the balance growth path, the flows into and out of unemployment cancel each other. That is \( \dot{N}_i = 0 \) and we have \( V_i/N_i = s/q \). Using the definitions above and summing over all firms, we get the equalities \( \sum_i V_i = \theta u L \) and \( \sum_i N_i = (1 - u)L \). We assume that firms are identical and therefore choose the same ratio between \( V_i \) and \( N_i \). Therefore we have \( \theta u/(1 - u) = s/q \). Finally, we can solve this for the natural unemployment rate

\[ u = \frac{s}{s + \theta q(\theta)} \]  

(4)

This is one of the central equations of the model, and it determines the unemployment ratio when the tightness of the labor market is known.

All workers are assumed to be identical, which means that we have just one representative wage. Considering the range in which it has to be found, the lower bound must be the unemployment benefit \( \lambda_0 \) which is a worker's opportunity income. The upper bound is the total value of the match, which is not only the marginal product of labor \( (F_N) \) but also the vacancy cost saved \( (\theta y_0) \). It is assumed that a negotiation between a firm and a worker results in a wage that is somewhere between these two extremes: \( w = (1 - \beta)\lambda_0 + \beta(F_N + \theta y_0) \). Thus the parameter \( \beta (\in [0, 1]) \) represents the bargaining power of the worker; the larger is \( \beta \), the more the worker manages to get from the value

- More precisely, if \( y_0 \) is the cost of one vacancy, then \( vL\gamma_0/uL = \theta y_0 \) is the average hiring cost for each unemployed worker. When one worker is matched with a firm, this sum is saved.
of the match. For various reasons, it might be argued that $\lambda_0$ and $\gamma_0$ should follow the general development of productivity and standard of living in the economy. Since this is well captured by the wage, it is reasonable to make the definitions $\lambda_0 = \lambda w$ and $\gamma_0 = \gamma w$, where $\lambda$ and $\gamma$ are constants. Thus, when all optimum conditions are derived and we turn to a study of the balanced growth path, the wage rate can be written as

$$w = \frac{\beta}{1 - (1 - \beta)\lambda - \beta\gamma} F_N$$

Firms act on competitive commodity and capital markets. They all produce and sell the same (malleable) good, by use of labor and capital ($K_i$) according to the linearly homogeneous production function $F(K_i, AN_i)$. The level of technological development is here represented by $A$. At every instant, the cost of firm $i$ consists of the wage sum, investment costs ($K_i$), but also vacancy expenses, since it has to search actively for new workers. More precisely, a firm that puts out $V_i$ vacancies has to pay $\gamma w V_i$ for this. We can interpret this sum as consisting of wages to persons working at the recruitment department and of advertising costs. It turns out to be useful to eliminate $V_i$ by noting that according to eq. (3) $V_i = (\dot{N}_i + sN_i)/q(\theta)$. The profit maximization problem of firm $i$ can therefore be stated as

$$\max_{K_i, N_i} \int_0^\infty e^{-rt} \left[ F(K_i, A(t)N_i) - wN_i - \gamma w(\dot{N}_i + sN_i)/q - \dot{K}_i \right] dt$$

We will only discuss steady states, in which $\theta$ and $N_i$ are constant. Therefore the Euler equations are

$$F_K - r = 0$$

$$e^{-rt} \left[ F_N - w - \gamma ws/q \right] - \frac{\partial}{\partial t} \left[ -e^{-rt} \frac{\gamma w}{q} \right] = 0$$

It should be noted that we are making a simplification here, because this wage is not derived as a result of a Nash-bargain, which is often done in less elaborated models. Anyhow, the wage must be somewhere between the two extremes mentioned in the text, but the weights $(1 - \beta)$ and $\beta$ will perhaps have to be thought of as not only representing bargain power, but also including elements of the utility function. See Aghion and Howitt (1994) and Caballero and Hammour (1994) for treatments similar to the present one.

To motivate this, we note that it is likely that the persons who work with recruiting workers are paid salaries that follow the general trend of wages. Similarly, we can observe that unemployment benefits usually are proportional to wages. See Pissarides (1990, pp. 24–26) for further motivation.

We disregard workers' search costs, assuming that the time that they use for job search has no opportunity cost.
Thus
\[ F_N - w - \gamma w(s + r - \hat{w})/q = 0 \] (8)
where a circumflex denotes the proportional rate of change. The first condition expresses the usual requirement that capital on the margin produces a value that is equal to the cost. In the second condition, however, the marginal product of labor exceeds the wage rate by an amount that can be interpreted as the expected cost per successful matching (see Pissarides, 1990, chs 1 and 2). From here on, we shall proceed in two different directions, depending on what we assume about the nature of technological progress.

3. Exogenous growth

Let us start by assuming that labor productivity increases at the exogenous rate \( g \), so that \( A(t) = e^{gt} \). We also define capital in efficiency units as \( k_i = K_i/(N_i A) \). The corresponding production function is \( f(k) = F(K, N, A)/(N, A) \) and it follows that \( F_k = f'(k) \) and \( F_N = [(f(k) - kf'(k))e^{gt}] \). From (5) and the last equality we can also conclude that \( \hat{w} = g \) in steady state. If we use this and substitute the wage eq. (5) into (8) (the firm's optimum condition for labor) another key equation emerges
\[ (1 - \beta)(1 - \lambda) - \beta \gamma q - s + r - g \beta \gamma = 0 \] (9)

At a given interest rate, this equation determines the tightness of the labor market. Thus eqs (4) and (9) together describe the labor market.

Turning now to aggregate demand, the only asset available is capital. Therefore the budget constraint of household \( j \) is
\[ \dot{K}_j = (1 - \tau)\tau K_j + w(1 - u)L_j + \lambda w u L_j - C_j + T + VI_j \] (10)
where \( \tau \) is the tax rate on capital income, \( (1 - u)L_j \) is the expected amount of work in production for this household, \( C_j \) is consumption, \( T \) is a lump-sum transfer (or tax), and \( VI_j \) is the income from work with putting out vacancies. The objective of this household is to maximize utility of consumption over an infinite time horizon. Assuming that the instantaneous utility is captured by the function \( C_j^{-\sigma}/(1 - \sigma) \) and that the discount factor is \( \rho \), it is a standard result that the optimal growth rate of consumption is
\[ \hat{C}_j = \sigma^{-1}((1 - \tau)r - \rho) \] (11)
We shall assume that \( \sigma > 1 - \tau \). Many of our subsequent results hinge on this assumption, but from an empirical point of view it should not be

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8 Each household consists of a large number of members.
Besides, it is a straightforward exercise for the interested reader to investigate to what extent the results are reversed when this inequality does not hold. As usual, it is more convenient to analyze the model if we assume that households are identical, and if we define the variable \( c = C/N_{e}^{t} \). In steady state \( N \) is constant, so we have \( \dot{C} = \dot{c} + g \). This means that (11) can be written as

\[
\dot{c} = \sigma^{-1} \left\{ (1 - \tau) f'(k) - \rho - \sigma g \right\}
\]

where \( \tau \) has been eliminated by use of eq. (7).

In order to simplify the budget constraint, we assume (without loss of generality) that the number of firms is equal to the number of households. Since the government transfers tax revenues back to the public (and finances subsidies by taxes) in a lump-sum way, the outcome is that every household has a net income equal to the value of the production of a firm. Therefore the material balance equation for a representative household simply is \( \dot{K} = F - C \).

Again, it is more convenient to work with efficiency units

\[
k = f(k) - c - gk
\]

The steady state behavior of this model is described by eqs (4), (7), (9), (12), and (13), with \( k \) and \( c \) constant in the last two of them. The endogenous variables are \( u, \theta, r, k, \) and \( c \).

We are now prepared to analyze the properties of the model. In particular, we are interested to see how endogenous variables respond to changes in exogenous parameters. Because the model is recursive, we can start by using (7), (12), and (13) to see how \( r, k, \) and \( c \) respond to changes in exogenous parameters. The reader can check that both \( k \) and \( c \) will fall as \( g, \sigma, \rho, \) or \( \tau \) increase. These are standard properties of the neoclassical growth model. Of greater interest for the performance of the labor market is the response of \( r \)

\[
\frac{dr}{d\tau} = \frac{f'(k)}{1 - \tau}, \quad \frac{dr}{d\rho} = \frac{1}{1 - \tau}, \quad \frac{dr}{d\sigma} = \frac{g}{1 - \tau}, \quad \frac{dr}{dg} = \frac{\sigma}{1 - \tau}
\]

These expressions are all positive.

We now differentiate (4) and (9) while taking the last derivative in (14) into account

\[
du = -K s q (1 + \eta(\theta)) d\theta
\]

\[
d\theta = -\omega q \left[ \frac{\sigma}{1 - \tau} - 1 \right] dg
\]

\[\kappa \equiv [s + \theta q]^{-2} > 0, \omega \equiv [q^2 - (r + s - g)q_{\theta}]^{-1} > 0\]

\[\text{According to the evidence in for example Blundell (1988), Hall (1988), and Paterson and Pesaran (1992), it even seems warranted to assume that } \sigma > 1.
\]

\[\text{For this to be true, we have to assume that } f'(k) > g. \text{ By (12) this holds, for instance, when } \sigma > 1 - \tau.\]
where \( \eta(\theta) \in (-1, 0) \) is the elasticity of \( q \) with respect to \( \theta \). Instead of eliminating \( d\theta \) between (15) and (16) I will discuss them in the present form.\(^{11}\)

A first conclusion is that by (15) \( \theta \) and \( u \) are inversely related; when firms decide to offer more vacancies, compared to the number of workers, the latter will have easier to find jobs that fit them. Hence unemployment goes down.

In order to see how the growth rate in turn affects \( \theta \), we note that by (16) \( d\theta/dg < (>)0 \) as \( \sigma > (\omega)1 - \tau \). This can be better understood if we go back to eq. (9) from which (16) is obtained. With everything else unchanged, \( \theta \) will increase if \( (r - g) \) increases. Both terms of this difference are functions of \( g \); the relationship between \( r \) and \( g \) is given in (14). We can see that a hike in \( g \) makes the difference \( (r - g) \) grow if and only if \( \sigma > 1 - \tau \).\(^{12}\) There are two economic mechanisms at work here. First, an increase in the interest rate means that the expected present value of a successful matching falls. This makes firms less willing to put out costly vacancies. Second, the term \( g \) comes from the cost of a vacancy (which, perhaps, is more clear from (8)). A higher \( g \) means that this cost is going to grow faster. Therefore a firm saves money if it is more active in recruiting workers in a closer future. Hence the number of vacancies tends to rise. The overall effect of \( g \) on \( \theta \) depends on \( \sigma \) and \( \tau \) in the way mentioned above. By the assumptions we have made, we have found a positive relationship between the rate of economic growth and unemployment\(^{13}\) (since \( du/d\theta < 0 \)). (The reader should, however, recall the importance of our assumptions; if the intertemporal elasticity of substitution is large (i.e. \( \sigma < 1 - \tau \) which does not seem to be empirically plausible) the results just discussed are reversed.)

Turning now to other possible influences from the production/household side of the economy (described by eqs (9), (12), and (13)) on the labor market side of the economy (described by eqs (4) and (9)) it is clear that this can only be through the interest rate. Thus if \( g \) is constant, (16) collapses to

\[
\begin{equation}
\frac{d\theta}{dr} = -\omega q dr
\end{equation}
\]

Recall now that all derivatives in (14) are positive. This means that if for example \( \sigma \) or \( \rho \) get larger (which can be interpreted as decreased thriftiness) we get a higher \( r \) and a lower \( k \), which implies less capital (and output) per employed and per capita. The implied decrease in marginal product of labor, and the decreased present value of a successful match, make firms less willing to put out vacancies. By (16') this makes \( \theta \) lower, which in turn leads to increased unemployment. The same qualitative results hold for an increased capital tax.

It is also interesting to see how the environment of the labor market

\(^{11}\) We assume that \( r + s - g > 0 \), which does not seem unreasonable; if we solve (12) for \( r = f'(k) \) as \( c \) is constant, and put the result into the inequality just mentioned, we find that what is required is that \( \rho + (1 - \tau)s > g(1 - \tau - \sigma) \). A sufficient, but far from necessary condition is that \( \sigma > 1 - \tau \).\(^{12}\) When \( \sigma \) is high, it takes a relatively large change in \( r \) for consumers to reach a new intertemporal equilibrium when \( g \) changes.\(^{13}\) Note that this result is the opposite of what comes out from Pissarides' model. Thus, introducing Ramsey preferences extends the range of possible outcomes of the model.
(captured by $\beta$, $\lambda$, and $\gamma$) influences the economy. We start by noting that these parameters only occur in eq. (9). Therefore we can use this equation to conclude that a hike in any of them leads to a lower $\theta$. This is simply because a wage increase or a vacancy cost increase will discourage firms from putting out vacancies. The consequence is an increase in unemployment, as we have seen. Unemployment in turn influences growth; to be sure, the ratio $K/Ne^{\theta t}$ remains constant as $N$ decreases, because of a proportional decrease in $K$. But this means that $K/Le^{\theta t}$ will be smaller at every point of time, since $L$ is constant. Hence we can say that the level of growth, and income per capita, will be lower.

Summing these properties of the model, we may say that if the exogenous rate of technological change happens to get larger, unemployment rises. Therefore it seems warranted to say that there is a trade-off between the growth rate and employment. On the other hand, concerning the level of growth, we have seen that it is low when the interest rate is high and unemployment is high. Hence, any measure that leads to a lower $r$ (lowering the capital tax or measures that make households more thrifty) will result in growth with a higher income per employed worker, and a lower unemployment. Both these effects imply a higher income per capita.

4. Endogenous growth

It is a standard result (cf. Barro and Sala-i-Martin, 1995) that once a growth model switches from having an endogenously growing technology factor, to becoming an endogenous growth model, many things start to influence the growth rate. In this section we are particularly interested to see how labor market conditions affect growth, but of course mechanisms working in the other direction are also of interest.

We assume that perpetual growth is made possible by a positive technological externality, working through the presence of the average capital stock ($\bar{K}$) in the individual firm's production function: $F = AK^\alpha K^\gamma N^{1-\alpha}$, where $\alpha + \gamma = 1$. In equilibrium (when $K_f = \bar{K}$) this implies that the private marginal products in the representative firm are $F_K = \alpha AN^{1-\alpha}$ and $F_N = (1 - \alpha)AKN^{-\alpha}$. Therefore (5), (7), and (8) are changed to

$$w = \frac{\beta}{1 - (1 - \beta)\lambda - \beta \gamma \theta} (1 - \alpha)AKN^{-\alpha}$$  \hspace{1cm} (5')

$$\alpha AN^{1-\alpha} = r$$  \hspace{1cm} (7')

$$(1 - \alpha)AKN^{-\alpha} - w - \gamma w(s + r - \hat{w})/q = 0$$  \hspace{1cm} (8')

Furthermore, if we substitute (5') into (8') the equation that corresponds to (9)

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14 For empirical evidence supporting this assumption, see Caballero and Jaffe (1993).
in the preceding section is

\[(1 - \beta)(1 - \lambda) - \beta \gamma \theta - \frac{r + s - \dot{w}}{q} = 0\]  \hspace{1cm} (9')

As usual the optimal growth rate \((G)\) of consumption, production, capital, and the wage is

\[\hat{K} = \hat{Y} = \hat{C} = \hat{w} \equiv G = \sigma^{-1}[(1 - \tau)\alpha AN^{1-s} - \rho]\]  \hspace{1cm} (17)

We now substitute (17) and (7') into (9')

\[(1 - \beta)(1 - \lambda) - \beta \gamma \theta - \frac{\beta \gamma}{q} \{s + \alpha AN^{1-s}(1 - (1 - \tau)/\sigma) + \rho/\sigma\} = 0\]  \hspace{1cm} (18)

Finally, if we recall the definition of the unemployment ratio, eq. (4) can be written as

\[u \equiv \frac{L - N}{L} = \frac{s}{s + \theta q}\]  \hspace{1cm} (19)

Thus the behavior of this model economy can be characterized by eqs (17) through (19). In particular it is interesting to see how the endogenous variables \(G, N,\) and \(\theta\) respond to changes in exogenous parameters. This is described in Table 1, and the computations can be find in the working paper version of this paper (available from the author on request). While interpreting these results, we start by noting that increasing \(\sigma\) and \(\rho\) (households get less thrifty) and \(\tau\) (incentives to save get lower) all have the same effect. As is well known from the growth literature, the growth rate will fall as a consequence of this. For a firm considering how many vacancies to put out, this means that the cost of vacancies will grow slower. Thus some of the recruiting activities are pushed into the future, i.e. \(\theta\) falls. This means that employment falls, which gives an additional negative effect on growth.

| Table 1 |
|---------|---------|---------|---------|
| Ex. var. |  \(G\)  |  \(N\)  |  \(\theta\)  |
| \(\sigma\)  |   -    |   -    |      -     |
| \(\tau\)   |   -    |   -    |      -     |
| \(\rho\)   |   -    |   -    |      -     |
| \(A\)      |   +    |   -    |      -     |
| \(\beta\)  |   -    |   -    |      -     |
| \(\lambda\)|   -    |   -    |      -     |
| \(\gamma\) |   -    |   -    |      -     |
| \(s\)      |   -    |   -    |      ?     |
Considering next an increase in the productivity parameter $A$, this directly gives a positive effect on growth. We also note that a decrease in $\theta$ and $N$ will follow. In (18) we can see that this is because the interest rate rises more than the growth rate of vacancy costs. By the same arguments as in Section 3, the total effect is that firms find it optimal to decrease the number of vacancies, which leads to lower employment. Although $A$ and $N$ change in different directions, we have an unambiguously positive effect on growth.

Increasing the parameters $\beta$ and $\lambda$ makes the revenue to a firm from a successful matching smaller. Similarly, a hike in $\gamma$ means that the cost of a vacancy increases. All such changes make firms less prone to put out vacancies. Thus $\theta$ and $N$ decrease. We also get a negative change in the growth rate, because the marginal product of an investment falls as $N$ falls.

The relation between $s$ and $\theta$ is unclear. On the one hand, an increase in $s$ decreases the duration of a match, and thus the present value of the income that it is going to generate. On the other hand, this increases the stock of workers in unemployment, which makes it more likely that a vacancy will lead to a match. Nevertheless, the effect on employment is certainly negative, which gives the usual negative effect on growth.

Comparing the patterns in this section and the preceding one, we find that in both cases there is a trade-off between the growth rate and employment, as long as we consider changes that directly affect growth rates, i.e. changes in $g$ and $A$ respectively. With this exception, however, it seems like changes that promote employment also promote growth. The main lesson from this exercise is therefore that, whether there is a conflict between the goals of successful growth and low unemployment, depends on what kind of changes one is considering.

5. Conclusions

In this paper we have found that it is not adequate to raise the question 'Does growth create unemployment?' Rather, one should ask 'Under what conditions is there a trade-off between growth and employment, and when is there a reverse relationship?'. We have found quite clear-cut answers, provided that consumers have low elasticities of intertemporal substitution. That is, their consumption patterns have to exhibit small reactions when the intertemporal prices change. This implies that there has to be large change in the interest rate when the growth rate varies, for the household to be in optimum. This assumption is made with some empirical support.

The relatively large change in the interest rate, compared to the growth rate of vacancy costs, is the driving force behind the result that firms decide to contribute to reduction in the tightness of the labor market when there is an increase in the growth rate. Consequently, there is a positive relation between growth and unemployment rates, both when there is endogenous and exogenous growth.

Economic growth can, however, also be influenced in indirect ways, for
example by changes in the capital tax rate, unemployment compensation, or consumers' preferences. Without exceptions, we have found that when such changes happen, what is good for growth is also good for employment.

If one dares to take these results seriously, and if the government wants to increase both employment and the growth rate, it should not stimulate growth directly (e.g. through R&D subsidies). Rather, it should improve incentives that simultaneously affect growth and labor market performance.\textsuperscript{15}

Needless to say, we should not expect the real world to behave along these clear lines. In further research, a host of realistic complications should be taken into account. Departing from the models mentioned in the introduction, this is likely to be possible without making the models untractable.

\textsuperscript{15}This conclusion would probably not hold if, for instance, perpetual growth would require basic research activities, financed by the government

\textbf{ACKNOWLEDGEMENTS}

I am grateful to Jonas Agell, Per-Anders Edin, Nils Gottfries, Bertil Holmlund, Johan Lindén, Thomas Lindh, Hovick Shahnazarian, and two anonymous referees for helpful comments. Financial support from \textit{Finanspolitiska Forskningsinstitutet} is gratefully acknowledged.

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