Degrowth and Unemployment: The Implications of Okun's Law

Summary

One of the biggest fears that most people have when they hear "no growth" is "no jobs". This abstract describes the results of a detailed theoretical and empirical analysis into the relationship between degrowth and unemployment. The theoretical analysis suggests that a stabilisation or reduction of economic output could lead to rising unemployment, in part due to the role of technological progress in increasing labour productivity. The analysis also suggests, however, that unemployment may be combated by reducing working hours, increasing resource efficiency, and by an ageing population. The empirical analysis, which includes an economic and biophysical assessment of Okun's law for OECD countries, suggests that there is a relationship between growth and job creation, but that this relationship varies remarkably between countries. All in all, these results suggest that it may be possible for countries to decouple the goal of stable employment from the rate of economic growth.

Keywords: Unemployment, Okun's law, degrowth, steady-state economy, labour productivity.

Introduction

Perhaps one of the most worrying critiques of degrowth is that it will lead to unemployment. Jackson (2009) describes the "dilemma of growth" in terms of two propositions: (1) growth is unsustainable due to rising resource use and environmental damage, and (2) degrowth is unstable, under present economic arrangements at least, because falling consumer demand leads to rising unemployment.

A number of solutions to this dilemma have been proposed by various authors, including reducing working hours, shifting to lower productivity sectors of the economy, implementing a job guarantee, and rethinking the very nature of employment as a way of distributing income. In this extended abstract, I describe some of my recent work on both the theoretical and empirical evidence for a relationship between growth and employment. In particular, I investigate the implications of Okun's law—an empirically observed relationship between GDP growth and unemployment.

Theoretical Foundations

To understand the relationship between growth and employment, it's useful to start with a simple production function that relates economic output (i.e. GDP) to the annual input of labour L, and the productivity of labour p_L:

$$\mathrm{GDP} = p_L \cdot L \tag{1}$$

Following Jackson and Victor (2011), the input of labour can be further decomposed into three constituent elements:

$$L = h \cdot e \cdot F \tag{2}$$

where h is average annual working hours per person, e is the employment rate (expressed as a fraction of the total labour force), and F is the number of people in the labour force. The production function then becomes:

$$\text{GDP} = p_L \cdot h \cdot e \cdot F \tag{3}$$

Rearranging terms gives us the following equation for the employment rate:

$$e = \frac{\text{GDP}}{p_L \cdot h \cdot F} \tag{4}$$

Based on this equation, it's possible to identify a number of threats to stable employment. The first is a fall in the demand for goods and services, as measured by GDP. If GDP decreases then the employment rate will fall, all else being equal. This is the phenomenon that Jackson (2009) refers to when describing the "dilemma of growth". Of course, the goal of degrowth is not to decrease GDP *per se* (Kallis, 2011; O'Neill, 2012), but to decrease resource use, and therefore it is probably more appropriate to replace the GDP term in the employment rate equation with a production function that relates GDP to resource use R and resource productivity p_R:

$$\text{GDP} = p_R \cdot R \tag{5}$$

If we do this, then the employment rate equation becomes:

$$e = \frac{p_R \cdot R}{p_L \cdot h \cdot F} \tag{6}$$

Let us assume for a moment that we manage to stabilise resource use within ecological limits and achieve a steady-state economy. What would happen to employment? If the other variables in the equation also remained constant then the employment rate would remain stable. The problem is that this seems unlikely to happen given long-term trends in the other variables.

Trends in the Variables

The first trend is that labour productivity has increased over time. Technological progress has allowed businesses to become more efficient at producing goods and services, such that a given volume of goods can be produced with much less labour today than was previously possible. Instead of using new technologies to reduce working hours, however, we have largely used them to produce more goods and services (i.e. increase GDP), while keeping working hours relatively constant. The choice to use labour productivity in this way has seemingly made GDP growth a requirement for creating and maintaining jobs.

The alternative recommended by almost all authors is to use gains in labour productivity to increase leisure time—instead of production—by gradually shortening the paid working day, week, year, and career (Victor, 2008; Jackson, 2009; Dietz and O'Neill, 2013; Kallis et al., 2013). Instead of technological progress causing some people to lose their jobs while others keep theirs, the reduced amount of labour required could be spread more evenly throughout the population. Everyone would work a bit less, but no one would lose their jobs.

However, we shouldn't forget that there are two other important variables in Equation (6): resource productivity and the labour supply. Resource productivity has also been increasing over time as more resource-efficient technologies have been developed. Unlike increases in labour productivity, however, increases in resource productivity do not destroy jobs. In fact, increasing resource productivity has the potential to create jobs if additional economic value can be generated without increasing resource use. I say "if", because p_R and R are not necessarily independent of each other (as the rebound effect demonstrates). Nevertheless, improvements in resource efficiency could help generate employment in an economy where resource use was firmly limited.

Similarly, a declining labour supply could also help fight unemployment, as it would mean fewer people seeking jobs relative to the number of positions available. This would be the most likely situation in a steady-state economy. The steady-state requirement of a stable population would mean an ageing population, and therefore a shrinking labour force over time. Japan and many European countries already demonstrate this phenomenon.

Empirical Analysis

Equations (4) and (6) suggest a relationship between the employment rate and both GDP and resource use, respectively. These equations suggest that a decline in either GDP or resource use would lead to a decrease in the employment rate (hence rising unemployment). In fact, the literature abounds with claims of a link between GDP growth and the unemployment rate (e.g. Lee, 2000; Ball et al., 2013). This relationship is often referred to as "Okun's law", after economist Arthur Okun who estimated in the early 1960s that a 1% drop in the unemployment rate was associated with a 3% increase in real GDP (Okun, 1962). The relationship found by Okun, which is really more of a rule-of-thumb than a law, may be investigated by regressing the change in the unemployment rate from one year to the next against the percentage change in GDP.

Following Okun's method, I have conducted a detailed empirical analysis of the relationship between the unemployment rate and both economic growth (as measured by GDP) and resource use growth (as measured by material and energy use) for OECD countries. For the United States, where the longest time series is available, I find a strong relationship between change in real GDP and the unemployment rate. A 1% decline in real GDP is accompanied by a 0.37% increase in unemployment ($R^2 = 0.70$, $p < 0.001$). I find a similar, albeit weaker, relationship between unemployment and the biophysical quantities. For example, a 1% decline in energy use is accompanied by a 0.20% increase in unemployment ($R^2 = 0.35$, $p < 0.001$). These data suggest that, in the United States at least, economic growth and unemployment are tightly coupled.

This is not the case in all countries, however. Although I find that the economic and biophysical forms of Okun's law hold across most countries, the strength of the relationship varies considerably. In Germany, for example, the effect of a 1% decrease in real GDP is a 0.22% decrease in unemployment (compared to 0.37% in the U.S.), while in France it is only a 0.17% decrease. In Japan, there is almost no relationship between the rate of GDP growth and unemployment. A 1% decrease in real GDP in Japan is associated with only a 0.03% change in the unemployment rate ($R^2 = 0.19$, $p < 0.001$). The relationship between the rate of change of resource use and unemployment is even weaker.

Overall, the empirical analysis suggests that the unemployment rate is not a simple product of changes in GDP or resource use. There are several variables in Equations (4) and (6), and no reason to think that they are necessarily independent of one another. A decrease in output may be "soaked up" by a fall in labour productivity if businesses are reluctant to fire employees, or by a reduction in working time. Moreover, the stronger relationship between unemployment and GDP growth as compared to resource use growth suggests that increases in resource productivity may be limiting the impact of falling demand on the employment rate to some degree.

Conclusion

There are certainly reasons to think that degrowth could lead to rising unemployment. However, the analysis reported here suggests that the relationship between growth and employment is weaker than one might expect, and varies remarkably between countries. Some countries, such as Germany, already use the sorts of policies advocated for a steady-state economy to prevent unemployment from rising (e.g. working time reduction; see Crimmann et al., 2010). Others, such as Japan, have different cultural values that discourage businesses from laying off workers during an economic downturn (The Economist, 2006). All in all, these findings may give some support to ecological economist Blake Alcott's claim that "Ultimately society, not the economy, determines how many people are out of work" (Dietz and O'Neill, 2013, p. 127).

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