DOES ECONOMIC GROWTH EXHIBIT A DIFFERENT IMPACT ON JOB CREATION AND JOB DESTRUCTION?

by

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Abstract

This aim of this paper is to empirically investigate the link between economic growth and unemployment, using microeconometric evidence for the United Kingdom. The results show a significant and negative relation between unemployment and economic growth, using fixed effects panel regression methods. This implies that faster sectoral change, driven by higher rates of innovation and therefore by higher rates of economic growth, would foster structural unemployment. Moreover, we find that economic growth even more strongly influences job creation and job destruction. (JEL-Codes: J63, O41, O52, C23)

Keywords

Sectoral Shifts, Endogenous Growth, Structural Unemployment, Panel Data Estimation.

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1 Introduction

The economy is permanently exposed to structural change, both within sectors and between sectors. The literature of intersectoral change finds that both employment and consumption have continuously shifted towards the service sector (Clark, 1957, Kuznets, 1957, and Chenery, 1960). Echevarria (1997) attributed these facts to demand shifts due to non-homothetic preferences. By contrast, Kongsamut, Rebelo, and Xie (1997) attribute the sectoral shifts to exogenous changes in productivity. Changes in productivity can account for changes in nominal and real shares of output for wide classes of preferences. In order to obtain intersectoral shifts in both employment and output, potentially leading to a transitory, but rather persistent relation between economic growth and unemployment, they have to deviate from homothetic preferences, too.

However, the employment dynamics is not mainly due to shifts between sectors, but due to shifts within sectors of the economy (Davis and Haltiwanger, 1999). The endogenous growth literature claims that economic growth drives this intrasectoral structural change, i.e. a change within the sectoral composition of the economy (Romer, 1990). The introduction of new modes of production, which allow for a more efficient allocation of resources, or the innovation of a new product line itself, which augments the value of the product, form the essence of the growth process, but necessitate the decline of existing products or production techniques alongside. In that respect, differentiated products and markets will be more exposed to intrasectoral structural change than traditional homogenous markets and goods.

The cost associated with economic growth is structural unemployment, as structural change destroys jobs in one firm and creates jobs in another (Aghion and Howitt, 1994). Firms producing a product in a declining market will lay off workers. Workers specializing in a particular mode of production will loose their jobs as new modes of production make their qualifications redundant. Until these workers requalify and are matched to new jobs in an expanding product segment or adopt to a new technology, these workers will suffer through periods of unemployment. The source of unemployment is the rate of intrasectoral structural change associated with faster economic growth. Hence the model predicts a constant unemployment rate for a given rate of economic growth. The unemployment rate would reach its lowest bound in a static economy, described by a static matching model (Mortensen and Pissarides, 1999). Higher growth induces larger structural shifts, and therefore fosters unemployment. Once we include intersectoral change, this no longer needs to be the case.

Depending on the size of the traditional sector with respect to the innovative sector, the degree of job creation and destruction may differ, and hence the unemployment rate may change over time, even controlling for economic growth (Zagler, 2000a).

This view on unemployment and economic growth can, in principle, be tested. Whilst conventional theories of economic growth (Solow, 1956) and unemployment (for a survey, cf. Layard, Nickell, and Jackman, 1991) find that neither unemployment influences economic growth, nor that long-run economic growth effects equilibrium unemployment (Blanchard, 1997). The endogenous growth and unemployment literature concludes that economic growth plays a significant role in the determination of equilibrium unemployment.

Much of the empirical literature on the effect of economic growth on unemployment has focused on aggregate time series. The evidence on the choice of the correct underlying model is mixed. Topel (1999) finds time series evidence of a positive association of growth on unemployment within the Solow-framework, whereas Altissimo and Violante (forthcoming) find results favoring an association which would support an endogenous growth setting. As economic growth may influence unemployment both through the business cycle and through its impact on the creative destruction of jobs, authors have turned attention to panel data methods. Both Blanchard and Wolfers (2000), and Bulli (2000) use international panel data evidence, the former to test a neoclassical model, and the later to test endogenous growth models. Both find empirical support for their respective estimates, thus not enabling us to distinguish between the two hypotheses. Time series currently available are too short to distinguish between an neoclassical growth framework with a lot of persistence, and an endogenous growth model which generates a unit root. We will therefore use microeconomic data of individual unemployment experiences, where we can control for business cycle effects, as many individuals are hit by identical shocks, in order to capture the long-run impact of economic growth on equilibrium unemployment.

The idea to use microeconomic panel data is not completely new to growth models. Harberger (1998) has been able to assess the significance of human capital investment and innovation on the long-run growth rate of revenues of US companies, thus confirming many of the arguments within the theoretical literature on endogenous growth.

Panel data have received a much wider attention within the empirical labor market literature. Bailey, Hulten, and Campbell (1992) use plant level data to estimate the effect of labor reallocation on productivity growth on the plant level, finding that faster changes in the labor force result in higher rates of productivity. Foster, Haltiwanger, and Krizan (1998) have decomposed the impact of factor reallocation on productivity growth between exiting, entering and surviving firms, finding a similar impact of labor reallocation on productivity throughout. This has two implications for the following analysis. First, „reallocation plays a significant role in labor productivity growth via net entry" (Davis and Haltiwanger, 1999, p. 2767), and hence for output growth. Second, the type of firm seems irrelevant, and hence we need not necessarily control for it, allowing us to focus on panel data evidence which captures employment flows.

Using UK microdata on unemployment, Layard, Nickell, and Jackman (1991, p. 286ff) summarize the reasons for being unemployed. First, they find that the usual occupation and the geographical region of the unemployed exhibit a significant impact on the workers chance to be unemployed. As some jobs and some regions are exposed to stronger structural change, it is quite evident that the process of creative destruction would lead to such a pattern. Indeed, economic growth may be the driving force behind differences in regional and occupational unemployment rates. Second, they find that a number of personal characteristics play an important role, in particular age, race, and gender.

As the former and the latter are typically associated with additional detriments to occupational change and regional flexibility (Böheim and Taylor, 1999), we shall control for these factors explicitly. Moreover, we shall include stable relationships, such as marriages and partnerships, for the same reason, in our panel.

2 Theoretical Background

Structural change is a byproduct of economic growth, as the literature discussed above lets us believe. Because of structural change, a share of the unemployed find a job fU (job creation), and a share of employees gets separated from their jobs sL each period (job destruction). Formally, we can postulate that the rate of job creation $f(g)$ is a typically increasing function of economic growth, $df(g)/dg > 0$, and the rate of job destruction $s(g)$ is a typically decreasing function of economic growth, $ds(g)/dg < 0$. We will test these two hypotheses separately.

If we define the rate of unemployment as the number of unemployed U divided by the total labour force $U + L$, then in equilibrium, when the flow into unemployment equals the flow out of unemployment, the unemployment rate equals $u = s(g)/[\ s(g) + f(g)]$. Economic growth will only affect unemployment if it exhibits a different impact on job creation and job destruction. This is the third hypothesis, which shall be tested in this paper. In order to account for differences between individuals, sectors, and over time, a panel structure, where we can control for both observable and unobservable components between groups, is adopted to estimate the impact of growth on unemployment.

3 The Data

The core of the econometric investigation in this paper is based on the Joint Unemployment and Vacancies Online System (Juvos) database. It randomly generates a 5 % sample of all entries and exits into unemployment, alongside with some other statistical information, for a total of 3.398,223 UK cases over a period from October 1982 to December 1999, based on daily information supplied by the Employment Service local offices (ONS, 1997). The database is longitudinal, as it assigns a code to each individual (generated to replace the National Insurance Number), and can hence be transformed into a panel structure, reporting every exit and entry to the pool of unemployed over time (Ward and Bird, 1995).

The panel contains 319,057 men and 163,555 women, with 338,082 living in a stable relationship (marriage and partnerships), and 144,530 living alone. On October 1, 1982, 4,202 individuals were over fifty, 49,987 were over forty, 79,860 were over thirty, 92,424 were over twenty, 148,707 were older than ten, and 107,432 younger than ten at the beginning of the sample.

The econometric analysis, which follows, uses as dependent variables the time series of exits, the time series of entries, and a self-generated series, labeled the individual unemployment rate. The latter captures the number of days a person spends being unemployed over the entire year, and therefore represents the closest individual correspondence to the aggregate unemployment rate.

The best individual representation of a growth rate would probably be individual wage growth. Three arguments speak against the use of this series. First, individual wage growth does not account for total value added by the individual, unless we assume perfect competition and constant returns to scale in production. Second, as high wage claims by individuals will certainly lead to a higher risk of unemployment, we will face a sample selection bias. Third, individual wage data cannot yet be matched with individual unemployment spells. Therefore, we have used the closest available proxy to individual value added growth, which is the GDP growth rate of the region and the sector in which the individual is occupied[1]. The Juvos data provide the individuals unemployment benefit office number, which can be transformed into the 11 standard statistical regions (SSR) of the United Kingdom.[2] They provide both usual (in the past) and sought (wanted) occupational codes for 1.028,396 cases or 482,612 individuals, which have been matched to the 12 industry sectors and 13 manufacturing classes as defined by the European System of Accounts (ESA 95) classification (Sweeney, 1996a).[3] GDP growth rates, taken from the ONS Regional Accounts, for these 264 observations per annum were then assigned to the individuals in the Juvos panel. The growth rates have been assigned in three different ways, by region only, by region and sought occupation, and by region and usual occupation.

Unemployment is driven by the business cycle. In order not to capture effects of the business cycle, but of economic growth, we will instrumentalize the average growth rate with the two period lagged growth rate, which exhibits the highest correlation with the current growth rate, and therefore seems an appropriate instrument.

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[1] In contrast to the prediction of the convergence hypothesis, even highly integrated regions may well exhibit very different growth rates, provided persistent stochastic supply shocks would be large enough to give one region an unrecoverable competitive advantage (Maier, 1999).

[2] These are the North, North West, Yorkshire and Humberside, East Midlands, West Midlands, East Anglia, South East, South West, Wales, Scotland, and Northern Ireland.

[3] Note that we have eliminated all individual cases which are still seeking employment (53,464 cases), as well as all individuals which have not returned to work for some reason or another. This leaves us with a sample of 238,036 cases, or about 40 % of the unemployed, who return to job (Sweeney, 1996b), whereas the remaining 60 % cannot be termed structurally unemployed in the spirit of Mortensen (1986) or Pissarides (1990). The industries are agriculture, hunting, forestry and fishing; mining and quarrying including oil and gas extraction; manufacturing (see footnote below); electricity, gas and water supply; construction; wholesale and retail trade, repairs, hotels and restaurants; transport, storage, and communication; financial intermediation, real estate, renting and business activities; public administration, national defense and compulsory social security; education, health, and social work; and other services, including sewage and refuse disposal. The manufacturing industry can be divided into manufacturing classes, which are food, beverages, and tobacco products; textiles and leather products; wood and wood products; pulp, paper and products, printing and publishing; solid nuclear fuels, oil refining; chemicals and man-made fibers; rubber and plastic products; other non-metallic mineral products; basic metal and metal products; machinery and equipment; electrical and optical equipment; transport equipment; and other manufacturing.

4 Does Economic Growth Determine Unemployment?

This chapter presents estimation results and the test of the third hypothesis, which predicts a negative correlation between unemployment and economic growth. The innovation here is clearly the use of microeconomic panel data in testing this hypothesis. As discussed in the introduction, unemployment can be viewed as the difference between flows of workers into unemployment, and flows of workers out of unemployment. Evidently these flows are in part driven by the willingness of a particular worker to accept a job, and by the willingness of firms to hire a particular type of worker. As each worker is different from another, we would like to control for these individual characteristics. Panel data allow us to control for both observable and unobservable time invariant individual characteristics. In principle, we are faced with two types of biases in our estimation, non-stationarity and measurement errors due to unobserved components, which are correlated with the dependent variable, and we shall address these issues in turn.

There may be non-stationarity in the dependent series, due to hysteresis in unemployment. This holds for aggregate data, where the fact that there is unemployment today is good indicator that there will be unemployment tomorrow, but even more true in individual data, where the fact that someone is unemployed today implies that she will most likely be unemployed tomorrow. In order to eliminate the non-stationarity bias, we estimate everything in first differences, and include twice lagged level of the dependent variable as an uncorrelated dependent variable in order to check for hysteresis.

In contrast to pure time series or cross sectional analysis, panel data allow us to eliminate some of the measurement error. The measurement error appears, as independent regressors may be correlated with unobserved individual characteristics. To give an example, it may well be the case that some workers are more mobile than others, and therefore exhibit a higher search intensity. This can be the case of individuals in stable relationships, which are bound to seek work in the vicinity of their partner. However, this effect can be eliminated by adopting a fixed effects estimator (Baltagi, 1995, p. 10ff).

The following table summarizes the results of the empirical estimation of the above equation for three different methods of assigning growth rates to individual workers. We could not reject hypothesis one if the coefficient on the growth rate is significant and negative.

(Table 1 about here)

The reported estimations can explain a remarkably large part in the variation of the dependent variable, with the relevant R^2 above 30 %. The F-test reveals that all regressors taken together are significant, and we find that indeed all regressors taken individually are significant at least at the 1 % significance level. This implies that we find a statistically significant impact of economic growth on unemployment at the microeconomic level. The sign is negative, as predicted by hypothesis one (H 1).

The three estimated coefficients on economic growth cannot be directly compared. Whilst the first scenario has only 11 different regional growth rates attributed in every year, the later two scenarios attribute both regionally and sectorally differentiated growth rates to each individual. The growth rates in the first column therefore contain more averaging than the later two, thus explaining the higher coefficient of scenario 1. If we would account for this fact, the coefficient of the first column would be much closer to the other two.

The effect is also economically significant. Given an average individual unemployment rate of 12,5 % in our sample[4], a one percentage point increase of a particular regional and sectoral growth rate would reduce unemployment by 5 percent, or the equivalent of one working week per employee.

All time invariant individual characteristics, such as date of birth, race, and gender have been implicitly accounted for by the fixed effect estimation. We could however explicitly control for all time varying effects. We find, in particular, that both a regional migration and a change of occupation increase the individual unemployment experience. Evidently, as agents are forced to leave there region to find a job elsewhere, they will be more reluctant to move, thus prolonging the duration of unemployment. As agents loose a job in a declining sector, employers in other sectors will be less inclined to offer them a new job, hence their probability to remain unemployed increases by the same token.

Whilst most personal characteristics are time invariant, we can explicitly account for changes in the marital and partnership status of individuals. We find that people entering a stable relationship will see their unemployment experience on average increasing, which may be due

[4] The individual unemployment rate is higher than the national aggregate for the period in question. The difference is due to the measurement of intramonthly unemployment spells, which are omitted in national aggregates, and the fact that national unemployment statistics have a different (and much stricter) definition of unemployment compared to claimant counts.

to the fact that regional flexibility in the search strategy on the labor market declines. By contrast, we find that people who break up with their relationship are more likely becoming unemployed as well. This can be explained both from individual characteristics - people who are in the process of splitting up will be less focused on their job and are therefore likely to be fired - and from employer characteristics. Employers may be less likely to hire divorced people, with only the increased regional flexibility to offset these two psychological factors.

Finally, note that the lagged dependent variable exhibits a negative impact on the variables current level. This implies that a bad shock to individual unemployment today will be partly offset next period. However, given a coefficient below unity, the negative effect of the shock is not totally reversed, implying that shocks to unemployment are indeed persistent.

Fixed effects estimation is based on the idea that each individual has particular time invariant observable and unobservable characteristics, and therefore relies entirely on the information obtained from variation within each individual observation. Evidently, this leads to a loss of degrees of freedom, and therefore to inefficient estimators. In our analysis, we have suggested that it is the fact that we cannot observe important individual characteristics, such as search intensity, therefore a fixed effect model is appropriate. The most popular alternative is a random effect model, where we treat our missing knowledge over a particular individual as individual ignorance with respect to that individual (and assume some distribution over that lack of knowledge). We can test whether it is indeed individual ignorance, by testing whether the error terms are indeed not systematically correlated, following a test procedure as described by Hausmann (1978). The Hausmann-tests rejects the null hypothesis that the difference in coefficients is not systematic. Therefore, we would have to reject the random effect specification in favor of something else, which gives additional support for the fixed effects modeling choice pursued here.

Summarizing, we can conclude that economic growth exhibits a significant and negative impact on unemployment. The estimation is rather robust with respect to the particular attribution of growth rates to individuals, hence we shall pursue by only using the last representation, by usual occupation and region.

5 Does Economic Growth Exhibit a Different Impact on Exits and Entries?

We will now proceed to test whether impact of economic growth on entry and exit from employment is identical or not. As our data provide information on both exits and entries into the labor market, we can in principle test the two hypothesis separately, and then test for parameter equality.

The econometric procedure is equivalent to the previous chapter, substituting entries and exits for the individual unemployment rates of the previous chapter. There is, however, one important distinction. As agents can either be entering a new job or not, or either be leaving a job or not, both dependent variables are binary, which implies that the variance of the error term varies systematically, or that the error terms are heteroscedastic (Mofitt, 1999). We therefore estimate the model using logistic regressions, estimating the probability of an individual to find a job or to loose her job, but otherwise remain to follow the fixed effects panel data estimation procedure described in the previous chapter. As logit is a nonlinear estimation procedure, we have to take care in interpreting the results. In particular, note that the coefficients in table 2 below represent the marginal effect of a unit change in independent variable from the baseline scenario.

The first two columns in table 2 are the diseggregated equivalents to the last column in table 1. We note from the likelihood ratio test that the model performs better than the simplest alternative, or that all coefficients taken together are highly significant[5]. Indeed, every coefficient is again significant at the 1 % significance level. The coefficient on the lagged dependent variable is positive. This implies that if you have been fired in your last job, you are likely to be fired again from your new job. This is consistent with theories of segmented labor markets, which find that part of the work force will be subject to frequent job changes, and another part of the work force will continue to enjoy long-term employment relationships (Piore, 1987, and Bentolila and Dolado, 1994).

(Table 2 about here)

The principal result is that we again find that economic growth exhibits a significant association with the probability to enter or leave employment. Both signs are positive, as predicted by theory. However, the coefficients are different, and a formal χ^2-test rejects the null hypothesis of parameter equality. The Hausmann test reveals again that a random effect

[5] As the result is derived using maximum likelihood methods, we cannot give a coefficient of determination. The log likelihood is presented instead, but it only allows us to differentiate between different models, but does not reveal an overall goodness of fit.

specification for the same variables would have to be rejected. The likelihood ratio test indicates all coefficients together are significant.

Job creation and destruction may vary over the business cycle. Caballero and Hammour (1996) suggest that an efficient economy would concentrate its job creation and job destruction efforts during cyclical downturns. Their hypothesis has first been confirmed empirically by Davis, Haltiwanger, and Schuh (1998). In order to ensure that we are not picking up business cycle effects, we include positive (negative) changes in the GDP growth rate in the last two columns of table 2, in order to control for booms (downturns).

The model performs slightly worse than the simpler alternative, excluding the change in the economic growth rate. Comparing the two coefficients describing the impact of growth on job creation and destruction, they seem closer together than in the previous model, columns 1 and 2 of table 2. However, in order to ensure that the impact of economic growth on the creation and the destruction of jobs offset each other, we must have that both coefficients together cannot be significantly different to zero. We can test this hypothesis with a standard Wald test, presented in the last line of table 2. We find again that the null hypothesis of parameter equality has to be rejected, thus leading to a rejection of a pure model of intrasectoral change in favor of a model of both intersectoral and intrasectoral change.

6 Conclusions

This paper has empirically investigated the link between economic growth and unemployment, using microeconometric evidence for the United Kingdom. The results show a significant and negative relation between unemployment and economic growth, using fixed effects panel regression methods. This implies that faster sectoral change, driven by higher rates of innovation and therefore by higher rates of economic growth, would foster structural unemployment.

Moreover, we found that economic growth even more strongly influences job creation and job destruction. This implies that in faster growing economies, many more people will be affected by unemployment, though for shorter periods.

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Appendix

Table 1: Change in Individual Unemployment Experiences due to Economic Growth

	Scenario 1	Scenario 2	Scenario 3
Lagged Dependent Variable	-0.2398 (0.0076)	-0.2295 (0.0076)	-0.2299 (0.0076)
GDP Growth Rate (assigned by Region only)	- 0.8866 (0.0362)		
GDP Growth Rate (by Region and Sought Occupation)		- 0.0601 (0.0050)	
GDP Growth Rate (by Region and Usual Occupation)			- 0.0569 (0.0053)
Regional Change	0.0425 (0.0037)	0.0433 (0.0037)	0.0433 (0.0037)
Occupational Change	0.0996 (0.0019)	0.1007 (0.0019)	0.1008 (0.0019)
Entering Stable Relationship	0.0967 (0.0114)	0.0983 (0.0114)	0.0987 (0.0114)
Breaking up of a Stable Relationship	0.0691 (0.0132)	0.0694 (0.0132)	0.0693 (0.0132)
Constant	- 0.0713 (0.0007)	- 0.0708 (0.0007)	- 0.0707 (0.0007)
R^2 (between)	31.84 %	31.43 %	31.48 %
F-test	860.77 (0.0000)	782.34 (0.0000)	777.68 (0.0000)
Unit-root-χ^2-test	282 511.99 (0.0000)	281 359.80 (0.0000)	281 285.17 (0.0000)
Hausmann-test for the equivalent RE-model	16 648.27 (0.0000)	16 343.21 (0.0000)	16 326.02 (0.0000)

Remarks: The columns differ only in the way the regionally and sectorally different growth rates are assigned to individuals. Standard errors for coefficients and p-values for test statistics are given in parenthesis. The reported Hausmann-test corresponds to the equivalent random effect model. The quasi-unit root test corresponds to a χ^2-test of the coefficient of the lagged dependent variable equaling unity.

Table 2: Change in Exits and Entries to Employment due to Economic Growth

	Entry to Employment	Exit from Employment	Entry to Employment	Exit from Employment
Lagged Dependent Variable	2.8657 (0.0189)	2.7890 (0.0192)	2.8767 (0.0193)	2.7985 (0.0192)
Change in the GDP Growth Rate	0.4005 (0.0436)	0.2565 (0.0510)	0.3628 (0.0459)	0.2243 (0.0508)
GDP Growth Rate (positive values)			0.0132 (0.0104)	0.0042 (0.0028)
GDP Growth Rate (negative values)			0.0067 (0.0051)	0.0169 (0.0123)
Regional Change	- 1.2855 (0.0377)	- 1.3167 (0.0410)	- 1.2878 (0.0364)	- 1.3125 (0.0410)
Occupational Change	- 2.0232 (0.0185)	- 2.0440 (0.0207)	- 2.0264 (0.0187)	- 2.0464 (0.0206)
Entering Stable Relationship	- 1.7723 (0.1033)	- 1.6790 (0.1222)	- 1.7682 (0.1027)	- 1.6791 (0.1222)
Breaking up of a Stable Relationship	- 2.5036 (0.1471)	- 2.8675 (0.1686)	- 2.5363 (0.1486)	- 2.9056 (0.1703)
Log Likelihood	- 41 801.80	- 30 924.88	- 41 654.24	- 30 856.22
LR-χ^2-test	48 216.35 (0.0000)	44 609.34 (0.0000)	48 078.46 (0.0000)	44 461.75 (0.0000)
Quasi-unit-root-χ^2-test	3 010.92 (0.0000)	4 191.57 (0.0000)	3 035.65 (0.0000)	4 187.12 (0.0000)
Hausmann-test for the equivalent RE-model	6 167.25 (0.0000)	23 234.90 (0.0000)	7 234.15 (0.0000)	36 956.23 (0.0000)
χ^2-Test of parameter equality between job creation and destruction		25.26 (0.00)		45.67 (0.00)

Remarks: The coefficients represent the marginal effect of a unit change in independent variable from the baseline scenario, which is $X_{i,t} = 0$. Standard errors are given in parenthesis. The reported Hausmann-test corresponds to the equivalent random effect model. The quasi-unit root test corresponds to a χ^2-test of the lagged dependent variable equaling unity.