What drives the level of youth unemployment?

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Preliminary version. Comments are most welcome

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Abstract

The lot of youth on the labour market, as reflected by their unemployment rate, varies dramatically across OECD countries and over time. This paper tries to identify the economic forces underpinning these variations. Using OECD labour market aggregate time series it pursues two main objectives. First, assess the relative importance of (aggregate) labour demand versus (youth) labour supply as determinants of the youth unemployment rate. In particular the paper assesses the "lower demographic dividend" idea: have smaller entering cohorts since the 1980s translated into lower youth unemployment rate. The second objective is to identify countries where the level [and the variability] of youth unemployment significantly deviates from what is predicted by the overall/adult level of unemployment (i.e. a good proxy of the state of the business cycle) and demographic factors. Atypical countries in that respect would constitute a tentative proof that there are specific institutional arrangements that can make a (positive or negative) difference in terms of the risk of youth unemployment. In the absence of these atypical countries, the case for focussing on youth unemployment rate (and not just the overall rate of unemployment), or for developing youth-specific employment policy (and not just sound employment policy in general) would appear considerably weaker. Our results are essentially fourfold. First, the youth unemployment rate since 1980 has been strongly driven by the adult unemployment rate and the overall demand for labour. Second, lower demographics since 1980 have translated into lower youth

unemployment. Third, some countries seem to be able to strive better (or worse) in terms of youth unemployment that their overall employment performance and demographics would presage. Fourth, the countries with the lowest youth unemployment rate are also those where is it the most sensitive to changes in the overall/adult unemployment rate.

1. Introduction

While the unemployment rate of the prime-age male workers in most countries now vary around generally moderate average rates, those of the youth remains quite high. Youth unemployment rates are approximately twice as high as adult unemployment rates across most OECD countries, and that ratio has remained fairly stable over the past two decades. Therefore, efforts to improve labour market performance tend now to focus on youth. There are, of course, many other reasons to pay attention youth unemployment. The positive effects of lower youth unemployment can hardly be exaggerated, as it has been well established by now that high youth unemployment rates have detrimental effects in factors that affect individual and collective welfare in the longer term.

The rest of the paper is structured as follows. Section 2 presents the data used and some key stylized fact. Section 3 presents the econometric analysis of the labour demand versus labour supply determinants of youth unemployment. Section 3, explore the existence of country fixed-effect and gauges the potential role of policy and labour market institutions in influencing youth unemployment. Section 4 concludes.

2. OECD labour market data and key stylized fact about youth unemployment

Data

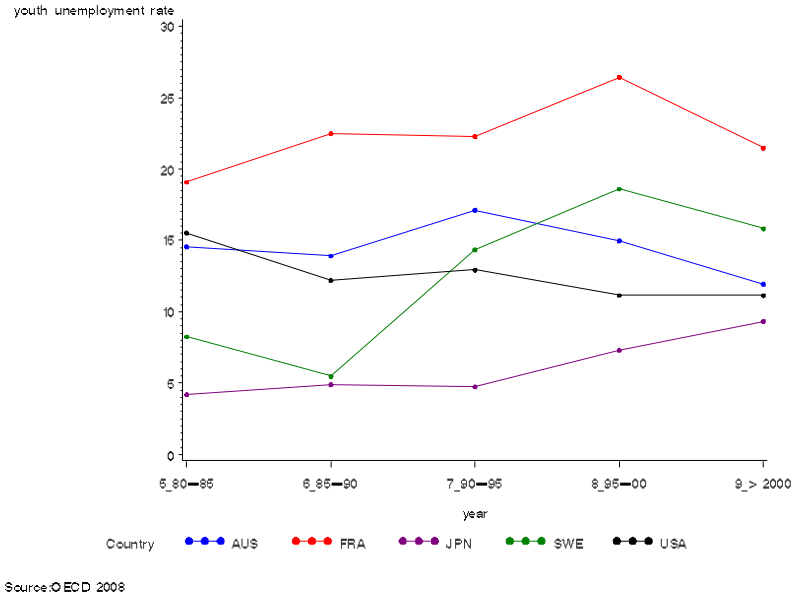
The data on population, labour force, participation, cohort size, births and unemployment used here are from the OECD Labour force statistics database. They cover the period 1980 -2006 and document the situation of 15 countries that report data for at least 10 years during that period

(Australia, Canada, Finland, France, Germany, Ireland, Italy, Japan, Korea, Netherlands, Norway, Portugal, Spain, Sweden and the United States of America). Note that data on births are not available for Korea for the period of interest.

Stylized facts about youth unemployment

Youth[1] unemployment rates[2] remains high, although they vary dramatically across OECD countries and over time. Figure 1 below gives to idea of the inter-country variance. It also exposes how levels of youth unemployment have apparently changed within a selection of OECD countries.

Figure 1 – Youth unemployment rate for a selection of OECD countries, 1980 - 2006, men & women confounded, fiver year averages



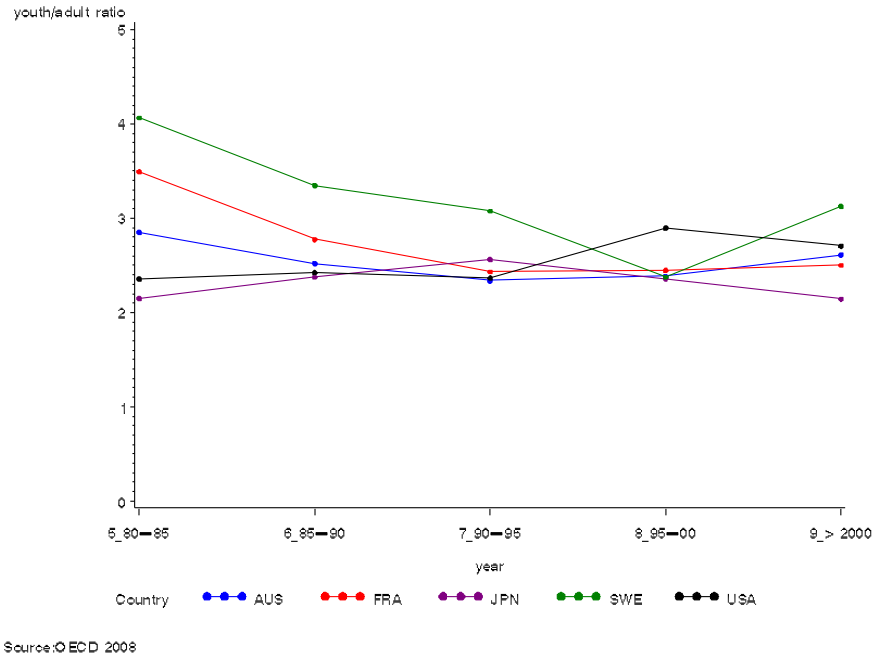
Beyond, the most obvious general labour market characteristic of youth unemployment is that its rate is much higher than that of adults (Figure 2). In most countries examined here the youth to adult

[1] Youth comprises the age-group between fifteen (15) and twenty-four (24) inclusive.

[2] According to the ILO definition underpinning OECD statistics the unemployed are defined as those people who have not worked **more than one hour** during the short reference period but who are available for and actively seeking work.

unemployment ratio remains superior to 2. All that can be said at this stage is that there is moderate negative trend emerging between 1980 and 2006.

Figure 2 – Youth/adult unemployment rate ratio for a selection of OECD countries, 1980 – 2006, men and women confounded. Five year averages;



Source:OECD 2008

The third stylized fact is that variations in youth unemployment rates are closely related to variations in adult (i.e. 2554) unemployment rates across most of the countries considered (Figure 3). There is a fair degree of cross-country variation, however, in the majority of cases considered here (except Italy), on finds an R-square superior to .8 (Table 1, column 2). In other words, across a wide range of countries, variations in the youth unemployment rate are directly proportional to movements in the adult rate. In other words youth unemployment rates vary in response to variations in economic conditions as do adult rates, increasing in recessions and recovering during booms.

Figure 3 – Youth and adult unemployment rate correlation, 1980 – 2006, men and women confounded

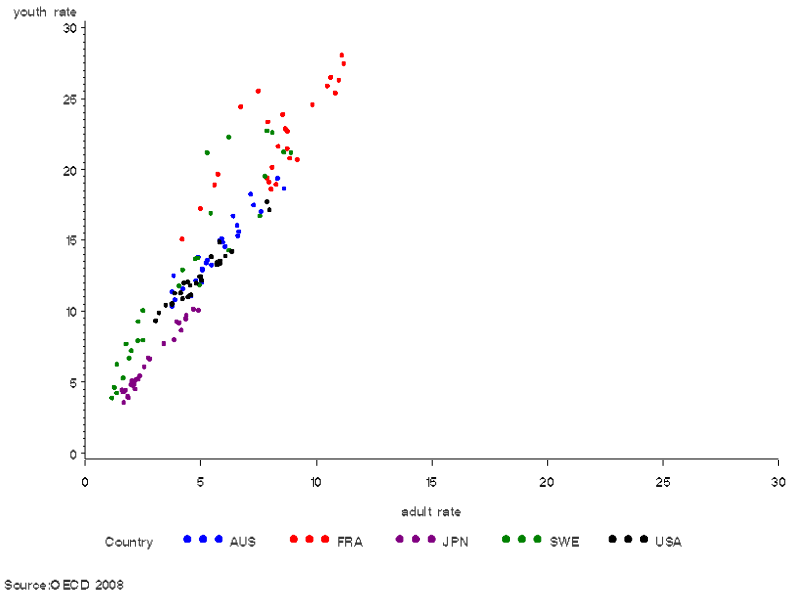


Table 1. Quality of fit of a (log) linear equation estimated by OLS, 1980 – 2006, men and women pooled. By country

Country	RSquare
AUS	0.91
CAN	0.70
DEU	0.69
ESP	0.67
FIN	0.90
FRA	0.64
IRL	0.97
ITA	0.15
JPN	0.96
KOR	0.92
NLD	0.86
NOR	0.93
PRT	0.68
SWE	0.93
USA	0.94

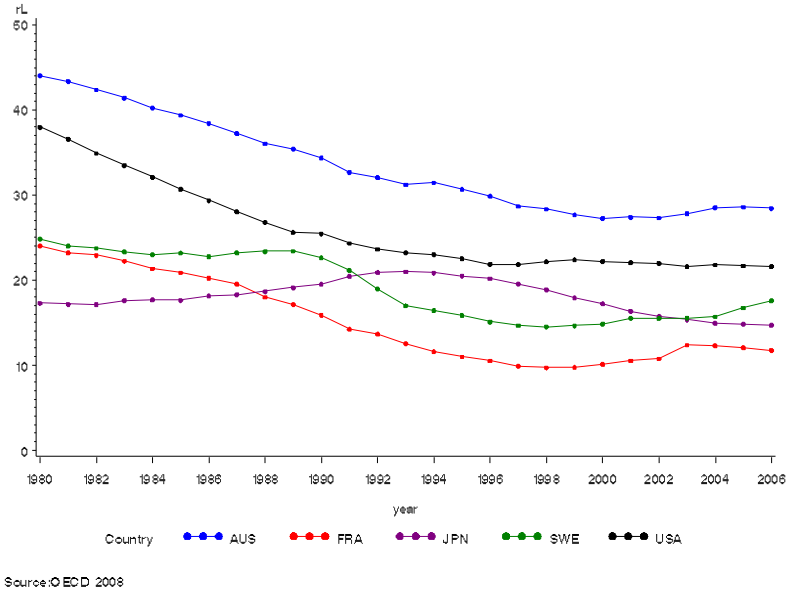
Source: OECD 2008

Finally, these youth labour markets outcomes exist against a backdrop of lower youth labour supply Considering that *YL* is the number of youth who participate to the labour market (those who have a

job + those who are actively seeking one) and *YC* is the cohort size of youth (i.e. the number of youth in the population *P*), there is by definition that $YL=YPr*YC$ where $0 \leq YPr \leq 1$ is the youth participation rate to the labour force. Similarly for adults, $AL=APr*AC$. And in relative terms, adopting the convention that $rL \equiv YL/AL$, $rPr \equiv YPr/APr$, and $rC \equiv YC/AC$, we necessaritly have that $rL=rPr * rC$. In other words, youth's declining labour supply (both in absolute and relative terms) can be due to *i)* a lower propentity to participate to the labour force and /or *ii)* lower cohort sizes.

Figure 4 shows the evolution of each of the factors in relative terms (*i.e.* for youth relative to adults aged 25-54). There is not doubt that the trend for youth in most OECD countries has been towards decreasing youth labour supply (*rL*). The latter can be ascribed to lower participation (*rPr*) but also lower share of youth in population (*rC*). Lover participation (Figure 6) probably directly reflects increasing educational participation of teenagers and is a feature of most OECD countries, whereas smaller share of youth in total population highlighted in Figure 6 is probably the consequence decline of birth rate that started in the 1960s.

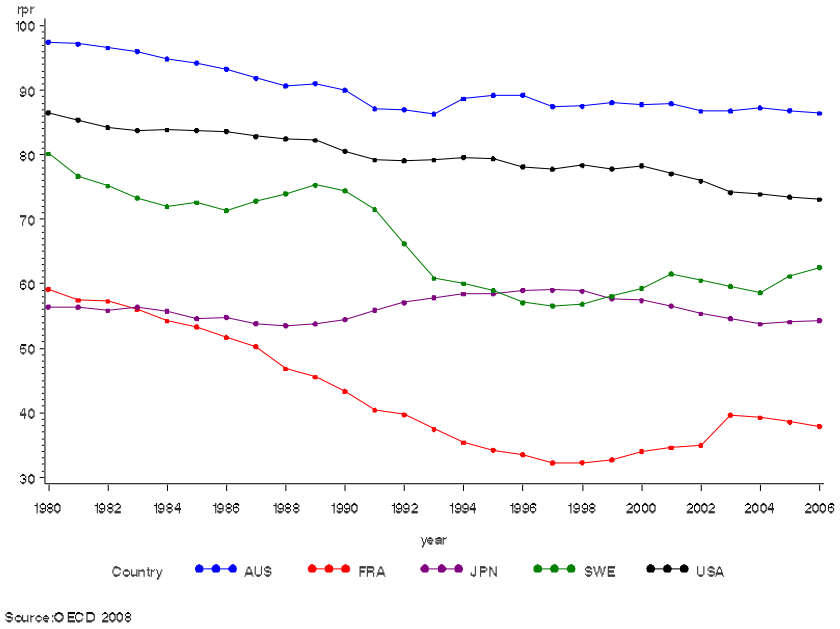
Figure 4. Evolution of the share of youth in the labour force with regards to adults[a] (*rL*).



Source: OECD 2008

a) Reference group (i.e. adults) are individuals/workers aged 2554.

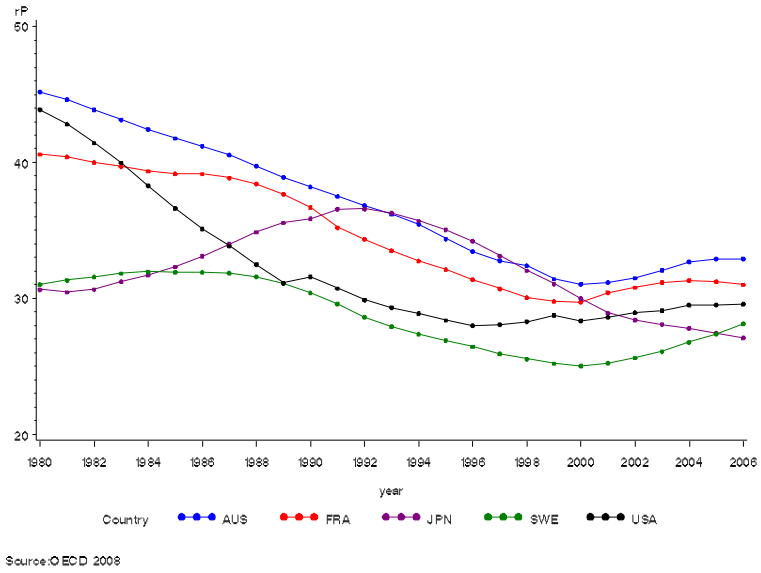
Figure 5. Evolution of the participation of youth in the labour force with regards to adults[a] (*rPr*).



Source: OECD 2008

a) Reference group (i.e. adults) are individuals/workers aged 2554.

Figure 6. Evolution of the youth cohort size with regards to that of adults[a] (*rC*).



Source: OECD 2008

a) Reference group (i.e. adults) are individuals/workers aged 2554.

2. The causes of youth unemployment

Is youth unemployment affected by the overall demand for labour? The reply is an unequivocal "yes", as will be confirmed by our econometrics analysis in Section 2.1 below. But the more interesting and relevant questions are: *i)* what is the specific role of lower supply of youth labour, in particular lower demographics, in addition to what must be ascribed to the overall labour demand (Section 2.2), and *ii)* are there countries (synonymous of specific institutions or policies), where the relationship between aggregate demand and youth unemployment display specificities (Section 2.3)?

2.1 The overall labour demand or "mirror" image effect

A way to analytically assess the role of the overall demand is to consider the following (common-intercept and common-slope) model explaining the level of youth unemployment $YU_{i,t}$. in country *i*, during period *t* , primarily as a function of the contemporaneous adult unemployment rate $AU_{i,t}$.

$$YU_{i,t} = \alpha + \beta\, AU_{i,t} + \varepsilon_{i,t} \qquad [1]$$

where

- α reflects the level of youth unemployment when there is no adult unemployment (as this is unrealistic, it makes more sense to consider an adult unemployment rate centered around 5%; the estimated *a* then corresponds to the expected youth unemployment when the adult rate is 5%).

- and β captures the sensitivity of the youth unemployment to unit (here a percentage point) changes of the adult unemployment;

Results of model [1] are reported in column 2 of Table 2.

For the intercept α we get an estimate of 12.97. This suggests that, on average across the OECD countries considered here, the youth unemployment rate is 13% when the adult rate is 5 %. It validates the stylised fact mentioned above (Figure 2) that the level youth unemployment is more than double that of the adult unemployment rate.

The estimated β is 1.9, meaning that a 1 percentage point increase (decrease) of the adult rate translates into a 1.9 percentage point increment (reduction) of the youth unemployment rate. And this is a verification that, along the business cycle, the level of youth unemployment rates vary *more* than the leve of adult unemployment rates. Column 3 reports a fairly similar value for β at 1.74. This is when country fixed effects (*i.e.* countries dummies) are introduced in model [1], implying that the reported β is estimated using the centred youth and adult unemployment data – meaning that only the *within country* variance of unemployment rates is used.

$$YU_{i,t} = \alpha_i + \beta\, AU_{i,t} + \varepsilon_{i,t} \qquad [2]$$

Table 2. Sensitivity of the youth unemployment rate to a percentage point change of the overall (adult) unemployment rate. OLS anlaysis. 1980 – 2006, men and women pooled

	Model 1		Model 2	
Parameter	**Estimate**	**Probt**	**Estimate**	**Probt**
Intercept	12.97	0.0000		
ur_ragex	1.91	0.0000	1.74	0.0000
R-square	0.65		0.93	
Nobs	403		403	
Controls	-		country fixed-effect	

There are a number of reasons why one expects youth unemployment rates to be higher and more sensitive than adult unemployment rates to changes in aggregate demand.

First, young people are more likely to voluntarily quit their jobs than older workers. Their initial experiences in the labour market are likely to involve a certain amount of "shopping around" in so far as circumstances permit, so as to find an appropriate occupation. The opportunity cost of doing so is lower for young people. They will tend to have fewer skills and lower wages, and are less likely to "need" a job to support a family. Blanchflower and Freeman (1996) report that, in the USA, young people between the ages of 16 and 25 typically hold 7-8 different jobs

If such voluntary quitting or behaviour or “shopping around” is less cyclically sensitive than job availability, one consequence will be that when job opportunities become scarce, unemployment will rise more amongst those groups with a higher likelihood of quitting their jobs. Moser (1986) shows indeed that, in the USA, voluntary quits fall off manifestly with age and are less cyclically volatile than dismissals by firms. The implication is that young people are more likely to quit their jobs than adults and will continue to do so during recessions and therefore will be disproportionately affected by recession-induced reductions in new hires (O'Higgins, 1997).

Second, much research has shown that the first reaction of firms to a recession is to cease hiring before commencing on the more expensive procedure of redundancies. It is evident that young people will comprise a disproportionate segment of job-seekers and thus will be more heavily affected by a freeze in new recruitments. For example, Pissarides (1986) has demonstrated that, at the aggregate level, increased unemployment in Britain in the late 1970s and 1980s was essentially attributable to a reduction in the outflow from unemployment rather than any variations in the inflow which varied to a much smaller degree. In other words, falling unemployment was accompanied by an increase in the inflow rate rather than the reverse.

Third, for employers, the cost to firms of firing young people is lower than for older workers. Being less skilled (then the long-term insiders), they embody lower levels of investment by firms in training and consequently involve a smaller loss to firms making them redundant. Moreover, young people are less likely to be subject to employment protection legislation (EPL). Almost invariably, such legislation requires a qualifying period before it can be invoked and typically compensation for redundancy increases with tenure/seniority. Thus, also for these reasons, the more recently taken on employees will be cheaper to fire. Obviously, this will disproportionately affect young people.

Note finally that the .65 *Rsquare* at the bottom of column 2 suggests that this very simple (linear) model – with adult unemployment rate as sole determinant of the youth unemployment rate -– accounts for 65% of the total youth employment variance recorded between 1980 and 2006 across 15 OECD countries. In combination with large -- and high significant partial correlations β – these results support a "mirror- image" assumption: a fall/rise in aggregate demand leads to a fall/rise in the demand for labour in general and

consequently for young labour as well as adult workers. Although fairly uncontroversial and almost self-evident (given what was already visible in Figure 3) this result is important for policymakers who need to identify the most appropriate way of reducing youth unemployment.

2.2. A lower demographic dividend?

Section 1 contains evidence that many OECD countries have witnessed changes in the age structure of their population. Since 1980 (and probably before that in some countries), cohorts of youth declined in size due to lowers demographics. The large cohorts of post World-War-Two baby boomers have been replaced by smaller ones, born after 1960. In most OECD countries, since the mid-1970s the demographic consequences of a "baby bust" translated into smaller cohorts entering the labour market.

If wages where perfectly flexible more or less labour supply by youth would not affect the level of the youth unemployment rate. In contrast, if wages are rigid (at least in the short-to-medium term) then one should observe rising (declining) youth unemployment rates due to higher(lower) youth labour supply.

At the end of 1980s, labour economists accumulated evidence that the larger cohorts of boomers that entered the labour market in the 1970s faced more economic problems. A paper by Bloom and Freeman (1986), using OECD time series, shows that larger cohorts of "boomers"s resulted in *higher* unemployment rates. In this section asks whether, *ceteris paribus*, the "busters" are now enjoying rosier labour market outcomes, particularly if they are facing a lower risk of being unemployed.

In econometric terms, a first step to address this question is to estimate an augmented version of equation [1]. That means estimating one [3] that includes the youth (relative) labour supply $rL \equiv YL/AL$.that is known to have declined considerably in many OECD countries (Figure 4).

In economic terms, equation [3] can be interpreteda s a reduced-form unemployment equation, with the adults unemployment rate AU capturing aggregate demand influences and rL youth labour supply influences. Note that, as we are interested by the relative importance or contribution of demand vs.

supply, some normalization is desirable. We get it here by applying a log transformation (*yu=log(YU), au=log(AU)…*) which implies that estimates coefficients become *elasticities*.

$$yu_{i,t} = \alpha_i + \beta\, au_{i,t} + \gamma\, rl_{i,t} + \varepsilon_{i,t} \qquad [3]$$

But (log of) youth unemployment *yu* and (log of) youth labour supply *rl* are likely to vary simultaneously. In fact the level of youth unemployment is likely to affect the decision by young individuals to enter the labour force, creating reverse causality or a simultaneity bias. And this simultaneity problem may lead to endogeneity ($E(\varepsilon_{i,t})\neq 0$) and thus biased OLS estimates.

Replacing the labour supply by its constituents (*i.e.* participation *rpr* and cohort size *rc* knowing that *rl=rpr +rc*), makes sense from an economic point of view but does not eliminate the endogeneity problem. The evolution of the participation rate *rpr* (due to higher educational attendance for instance) may also be "caused" by the level of unemployment[3]. The inclusion of *rpr* in the equation may thus also considerably biase the OLS estimates.

It may be more sensible to focus on youth labour supply changes that are purely driven by more exogenous demographic shocks. One first way of achieving this is to *instrument* the youth labour supply *rl* with the youth (relative) cohort size *rc≡yc-ac,* and estimate a two-stage least square model(2SLS). In the first stage, *rl* is regressed on *rc*. And in the second stage equation, only the part of the youth labour supply that is predicted by the cohort variable *rc* is retained and used as a regressor.

Stage 1 : $rl_{i,t} = \eta_i + \theta rc_{i,t} + \mu_{i,t}$

Stage 2: $yu_{i,t} = \alpha_i + \beta\, au_{i,t} + \delta\, pred(rl_{i,t}) + \varepsilon_{i,t}$ [4]

[3] It cannot be excluded that depressed economic conditions (higher unemployment rates), by lower the opportunity cost of education, persuade more youth to stay on and prolong their studies.

Results are reported in column 2 and 3 of Table 3. They show an elasticity of youth unemployment with regard to adult unemployment of 0.79 which is in line with what we have observed so far. The elasticity of interest is the one of youth unemployment with regard to (exogenous) changes in the share of youth in the labour force. It is of .19 in the standard OLS model [3]. With the IV method [4] using youth population share as an instrument , one get very similar value of .17.

However, some authors, like Korenman, S. & Neumark (1996) would argue that our cohort variable is also potentially affected by the simultaneity and endogeneity problem. The main reason for this are migrations, singularly of young adults. Higher/lower youth unemployment rates my indeed influence immigration flows. If we expect the number of young current-resident individuals to be positively influenced by the current level of unemployment, then the estimated δ of model [3] will be biased downwards. It would be lower if we were able to control for the positive of effect of labour inflows of the youth unemployment rate. One solution, following Korenman and Neumark(1996) is to adopt another instrument for the youth labour supply variable: an (index of) births levels *b* as recorded in the country during the years in which the cohorts of youth considered here were born.

Results are reported in column 4, second row of Table 5. They show that the expected effect of demographics (as captured by variations of birth rates) on youth unemployment become a bit more positive, consistent with the endogeneity bias mentioned earlier. The elasticity is now 0.21, but still low in magnitude compared to the 0.8 elasticity of youth unemployment with respect to the overall (adult) unemployment rate.

In a variant of model [5], we include a time (year) control variable to control for possible general time-related trend. But the coefficients of interest remain unaffected at about 0.20. The tentative conclusion is thus that youth unemployment remains predominantly determined by the overall level of unemployment and its determinants, but that there is robust evidence that countries with lower demographics have enjoyed, *ceteris paribus*, a lower level of youth unemployment.

Stage 1 : $rd_{i,t} = \eta_i + \theta b_{i,t} + \mu_{i,t}$

Stage 2: $yu_{i,t} = \alpha_i + \beta\, au_{i,t} + \rho\, pred(rd_{i,t}) + \varepsilon_{i,t}$ [5]

Table 3. Overall unemployment and youth labour supply. OLS and IV analysis. 1980 – 2006, men and women pooled

	Model 3		Model 4 (IV) Inst= pop. Share		Model 5 (IV) Inst=birth			
Parameter	**Estimate**	**Probt**	**Estimate**	**Probt**	**Estimate**	**Probt**	**Estimate**	**Probt**
lnur_rage	0.79	0.0000	0.77	0.0000	0.80	0.0000	0.80	0.0000
lnrL	0.19	0.0000	0.17	0.0000	0.21	0.0000	0.20	0.0000
R-square	0.95		0.95		0.95		0.95	
Nobs	403		403		377		377	
Controls	Country fixed effect		Country fixed effect		Country fixed effect		Country + year fixed effects	

2.3. Atypical countries ?

Our main objective in this section is to try to identify countries *i* where the level of youth unemployment $yu_{i,t}$ is more than the mirror-image of the overall unemployment rate as reflected by the one of adults $au_{i,t}$. while still controlling for supply-side changes (i.e. demographic changes) as we did in the previous section.

The strategy consists of completely in lifting the common-intercept and common-slope assumption of equation [1]. This is after all a strong restriction that does not allow for the relation between the adult rate and the youth rate to vary by country.

Hence, a more interesting model is one that allows for the possibility that countries perform differently in two senses: *i)* by allowing their expected level of youth unemployment (for a certain level of adult unemployment) to differ from what happens elsewhere *ceteris paribus*, and *ii)* by letting the sensitivity of the youth unemployment rate with respect to the adult unemployment rate also to diverge from the international average (or some reference country). In algebraic terms, as we have already introduced the varying intercept idea, the only real modification is that we now also allow is for the coefficient β to be country-specific.

Stage 1 : $rl_{i,t} = \eta + \theta b_{i,t} + \mu_{i,t}$

Stage 2: $yu_{i,t} = \alpha_i + \beta_i\, au_{i,t} + \rho\, pred(rl_{i,t}) + \varepsilon_{i,t}$ [6]

The estimated coefficients for equation [6] are presented in Table 4. They suggest that some countries achieve better (worse) than others. Germany for instance fares better than the United States in terms of it expected level of youth unemployment. It is indeed significantly lower, as indicated by a statistically -1.6 coefficient. But the elasticity of the youth unemployment rate with respect to the adult rate is 59 percentage points higher in Germany than in the United States.

Figure 6 visually summarizes the results. It plots the expected and exponentiated values[4] for the estimated α_i against the estimated $\beta_{i.}$. They confirm the existence of country fixed effects. In economics terms, this means that some countries (Germany, Ireland, Japan) have succeeded in achieving lower levels of youth unemployment *ceteris paribus*. Other countries (Italy, Spain, France) do significantly less well in terms of the (expected) level of youth unemployment.

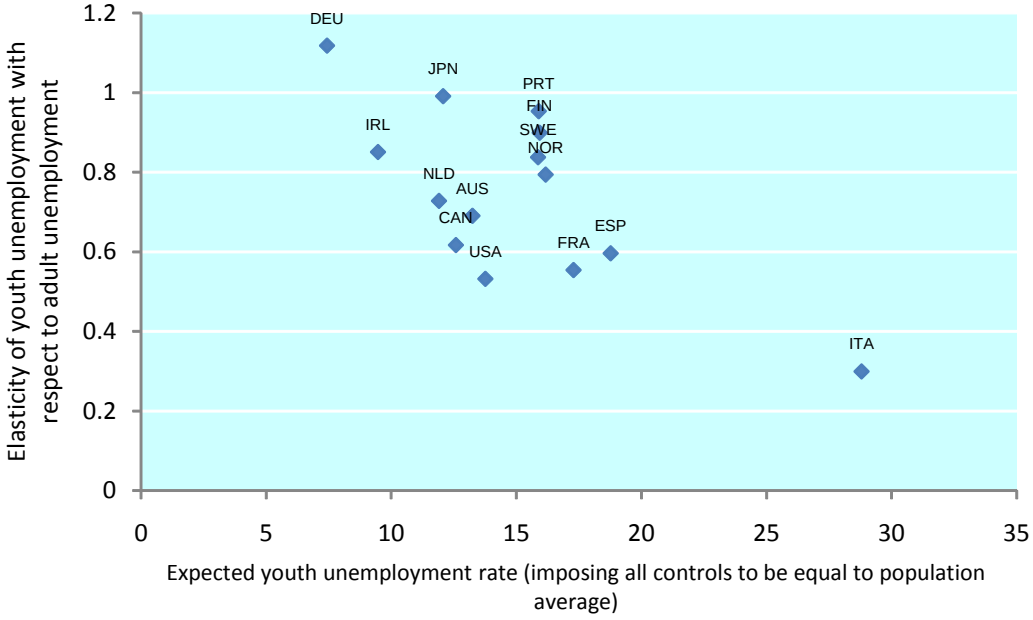
There is also evidence that the elasticity of youth unemployment with respect to adult unemployment differ across countries. Moreover, Figure 6 suggests a deterministic relationship between the elasticity and the level of youth unemployment: the higher the level of youth unemployment, the more the youth unemployment elasticity is inferior to 1. In a sense, this means that only countries with low level of youth unemployment can guarantee that youth and adult unemployment rates changes over the business cycle will be strictly proportional.

[4] Expected (log of) youth unemployment rate when all regressors are set to population averages. These values are then exponentiated to eliminate the effect of the log transformation.

Table 4 . Estimates of country-specific intercepts (differences in levels of youth unemployment) and slopes(differences in sensitivity to adult unemployment changes). United-States of America= reference country)

	Model 6 (IV) birth	
Parameter	**Estimate**	**Probt**
USA_ref	-0.57	0.0502
AUS	-0.31	0.1484
CAN	-0.24	0.3613
DEU	-1.63	0.0000
ESP	0.20	0.3977
FIN	-0.49	0.0032
FRA	0.19	0.4295
IRL	-0.93	0.0000
ITA	1.14	0.0000
JPN	-0.93	0.0000
NLD	-0.48	0.0036
NOR	-0.29	0.0642
PRT	-0.58	0.0047
SWE	-0.39	0.0123
au*USA_ref	0.53	0.0000
au*AUS	0.16	0.2199
au*CAN	0.08	0.5435
au*DEU	0.59	0.0000
au*ESP	0.06	0.5786
au*FIN	0.37	0.0003
au*FRA	0.02	0.8626
au*IRL	0.32	0.0013
au*ITA	-0.23	0.0534
au*JPN	0.46	0.0000
au*NLD	0.20	0.0542
au*NOR	0.26	0.0136
au*PRT	0.42	0.0012
au*SWE	0.31	0.0017
rl	0.73	0.0000
R-square	0.96	
Nobs	377	
Controls	-	

Figure 6 – Country differences regarding expected levels of youth unemployment and elasticity of youth unemployment with respect to adult unemployment.



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