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IZA DP No. 11374

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ABSTRACT

Are Apprenticeships Business Cycle Proof?*

Although there is evidence that apprenticeship training can ease the transition of youth into the labour market and thereby reduce youth unemployment, many policy makers fear that firms will cut their apprenticeship expenditures during economic crises, thus exacerbating the problem of youth unemployment. Using recent panel data of Swiss cantons and dynamic regression models, we examine the relationship between new apprenticeships and the business cycle. The empirical results suggest that economic shocks induce a rather small, pro-cyclical immediate response in the apprenticeship market. However, within a year after the shock, firms compensate for their immediate reaction, with the result that no permanent effect is observable.

JEL Classification: E24, E32, I21, J18, J44

Keywords: apprenticeship training, VET, education, business cycle, error correction model

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1 Introduction

In the aftermath of the 2008 financial and economic crisis, many governments and international agencies have been advocating for apprenticeship training, which could be a promising answer to soaring youth unemployment (cf. Heyes, 2013; OECD, 2010; Quintini & Manfredi, 2009; Steedman, 2014). Some even argue that, during a recession, apprenticeships 'could pay a "double dividend": securing the transition towards employment and lowering labour costs' (Scarpetta, Manfredi, & Sonnet, 2010, p.4). However, as a market-driven type of education, apprenticeships are not uncontroversial in the context of economic crises. Since firms are free to decide whether to train or not, policy makers fear that, while struggling to survive in times of recessions, many firms might either cut training expenditures or even close businesses and that the number of apprenticeships might respond to business cycles in a pro-cyclical fashion (Brunello, 2009). Whereas general education provided by schools does not react to economic cycles (Muehlemann, Wolter, & Wueest, 2009), a large apprenticeship training sector in the educational system might therefore rather aggravate than alleviate an economic crisis for youth.

The objective of this paper is to empirically examine the relationship between the number of apprenticeships and the business cycle. For this purpose, this we used panel data from Swiss cantons between 1988 and 2015 to regress the number of new apprenticeships on economic changes (i.e. the GDP per capita and the unemployment rate) as well as demographic trends (the number of school-leavers). Using an earlier contribution by Muehlemann et al. (2009), we extended the analysis by increasing the time frame by 11 years and thereby including the most recent economic fluctuations, thus increasing the robustness of the result. Following the 'Great Recession' of 2008/09, the Swiss economy, which was heavily relying on exports, was affected by several negative effects simultaneously: the worldwide recession, the European debt crisis, and the overvaluation of the Swiss Franc — all effects potentially reduce the incentive of firms to invest in training and provide apprenticeships.

Our contribution to the existing literature is as follows. First, by estimating dynamic models, we allowed for short- and long-term effects. While apprentices usually start in autumn (after compulsory school finished), the recruitment by firms takes place earlier and throughout the year. Therefore, the economic situation during both the same and previous year might affect the firm's decisions, and the timing of a potential response to economic cycles is unclear. Furthermore,

in case of economic uncertainty, firms might only postpone initial training plans rather than cut expenditures permanently. The mere looking at immediate reactions would therefore not capture such behaviour. As a consequence, static models, as found in previous literature, might only reflect part of the firm's response.

Additionally, we analysed whether the behaviour of firms differs during booming periods and recessions. For several reasons, bigger firms usually prefer having apprentices simultaneously at different stages of their training period (3 to 4 years). If the economy is growing, such firms thus tend to hire a stable number of apprentices every year, independently of the growth rates, unless the firms expect an exceptional increase in employment. In contrast, if an unexpected recession forces firms to cut expenses or reduce over-capacities and deviate from the business-as-usual strategy regarding training efforts, the same firms may temporarily stop hiring new apprentices. Hence, the number of apprenticeships might respond stronger to business cycles during recessions than in periods of economic growth.

Our results show that apprenticeship numbers do respond to business cycles (i.e., the unemployment rate), but the magnitude of the effect is rather small: Holding other factors constant, a 1 percentage point increase of unemployment relates to roughly 1.5% less apprenticeships. We found a much stronger influence with respect to demographic changes, namely fluctuations of school-leavers. Furthermore, the effect of business cycles reverses in the following period, suggesting that a number of firms only postpone (or advance) their recruitment, but do not change the number of apprenticeships over a longer time horizon. In the long run, therefore, the permanent, total effect of business cycles is not significantly different from zero.

Previous Literature

Although there is abundant literature on training decisions of firms (see Wolter & Ryan, 2011, with a particular focus on apprenticeship training), the number of studies analysing these decisions in the context of economic fluctuations is rather small. An earlier review of the theoretical and empirical literature on the effect of business cycles on the provision of apprenticeship training was provided by Brunello (2009). The general finding in this review was that the number of apprentices responds in a pro-cyclical manner to economic fluctuations. However, the magnitude of the impact is unclear, as only few studies discuss the effect's size. Westergaard-Nielsen and Rue Rasmussen (1999) and Müller and Schweri (2012), for instance, reported only a relatively small impact of business cycles.

Muehlemann et al. (2009) confirmed a significant, but small pro-cyclical relationship using panel data of Swiss cantons from 1988 to 2004. They estimated that a 1%-point decrease of unemployment relates to 0.6% more apprenticeships. A much stronger reaction was found in relation to demographic fluctuations: a standard deviation of school-leavers is associated with 32% of new apprenticeships.

In a more recent study, Baldi, Brüggemann-Borck, and Schlaak (2014) examined the short-run relationship between business cycles and the number of apprentices in Germany between 1999 and 2012 and found no robust relationship for both the unemployment rate and (lagged) GDP, except for small effects in West Germany, and only for the period after 2007. Hence, they concluded that 'the apprenticeship system seems to have dampened the volatility of youth unemployment in Germany'.

In addition to analysing panel-data, a number of studies also used cross-sectional or survey data of individuals or firms. Weßling, Hartung, and Hillmert (2015) used a German household survey and found that a 1%-point increase of the unemployment rate in the district of residence and in neighbouring districts reduces the trainee's probability of entering an apprenticeship by roughly 1%. Using the IAB firm-level survey, Bellmann, Gerner, and Leber (2016) reported that in 2009, German firms decreased the incidence of apprenticeship training by 1.5% (those affected by the crisis) or 0.21% (unaffected firms), compared to 2008.

In sum, the existing literature points to a pro-cyclical reaction in the number of apprenticeships to economic cycles, but most studies report rather small effect sizes.

2 Institutional background and empirical strategy

Switzerland provides an ideal environment for examining the effect of business cycles on apprenticeship training for at least two reasons. First, the federal structure of the country allows applying a panel data analysis. The country consists of 26 states (cantons), each with its own government and parliament. Although cantons vary in respect to economic and demographic characteristics, the apprenticeship training system is regulated at the national level, ensuring the comparability of the regulatory framework for apprenticeships across all cantons.

Second, vocational education and training (VET) are quantitatively the backbone of Swiss upper-secondary education and not just a niche offered in the education system. Almost two thirds of school-leavers from compulsory schooling opt for VET, and less than 30% opt for general education (BFS, 2016). Successful

graduates from VET receive a nation-wide recognised diploma, which not only certifies their work-related skills but also entitles them to further education in professional schools or colleges. Only about 10% of the VET programs are fully school based, and the rest of the students enrol in apprenticeships that combine work-based learning with school-based education (therefore also called dual education). The apprentice signs a binding, temporary (either 3 or 4 years) valid contract offered by a (private) firm for one of the over 200 different training occupations. The firm provides on-the-job training during 3 to 4 days of the week, so that the apprentice receives an occupation-specific training program. For the rest of the time, the apprentice attends one of the cantonal VET centres where he/she receives further vocational and general training.

The 'dual' approach to workplace training and school-based training implies that the public and the firms share the costs for education and training. While the training in some occupations leaves firms with net-costs after training, most firms in Switzerland break even or have a net-benefit at the end of the training period, when apprentices are free to leave the firm (Muehlemann & Wolter, 2014). The net-benefit arises because the productive contribution of apprentices during the training period exceeds the costs, which are mainly the apprentice's pay and the expenses for trainers. Previous research has shown that the expected net-costs or the net-benefit has an impact on the training decision of firms (Muehlemann, Schweri, Winkelmann, & Wolter, 2007). Therefore, one would expect that factors that have an impact on the potential productive contribution of apprentices should also affect the number of apprenticeships.

Data

We tested the empirical relationship between the number of new apprenticeships and the business cycle, using the cantonal unemployment rate and the cantonal income (GDP per capita) as measures for the business cycle. We estimated linear regressions using a panel dataset for all Swiss cantons from 1988 to 2015. The dependent variables are the newly created apprenticeships in a year and a canton. In four cantons, the definition of apprenticeship changed during the analysed period, leading to structural breaks. We corrected for those breaks by including dummies for those individual cantons and years. Likewise, the definition of the cantonal GDP (income) changed four times. Therefore, we imputed the national GDP growth for the years between changing definitions and then recalculated the cantonal GDP per capita backwards using the level of 2015 as the starting point.

To control for demographic effects, we used the numbers of the population aged 16, which is the typical school leaving age in Switzerland. Furthermore, we

controlled for additional effects that could impact the number of offered apprenticeships, such as the number students entering academic (baccalaureate schools) institutions instead of VET, assuming that these numbers are exogenous effects for potential training firms and the size of the total population of the canton.[1]

Table 1: Descriptive statistics

	Mean	St.Dev			Min	Max
		overall	between	within		
Apprentices, entrants	2'407	2'499	2'522	345	95	11'332
Population 16	3'248	3'155	3'201	291	181	13'540
Unemployment rate in %	2.63	1.65	1.16	1.19	0.05	7.81
GDP per capita in CHF	62'407	22'221	19'713	10'937	31'595	167'884

Table 1 provides the descriptive statistics for the variables used. The absolute number of new apprentices varies largely between cantons because of the differences in size of the cantons. Variations over time within cantons are smaller, mainly reflecting the variation of the youth population. Interestingly, the latter varies less within cantons than the number of apprentices and might indicate that further factors have an influence on apprenticeship numbers.

Econometrics

Both the number of apprentices and the population of 16 year olds are non-stationary or trend stationary.[2] This factor potentially leads to a violation of the Gauss-Markov assumption of strict exogeneity (Wooldridge, 2013). For this reason, we preferred using first difference (FD) models, which require a weaker assumption: $E\left[(\varepsilon_{it} - \varepsilon_{it-1}) \mid (\mathbf{x}_{it} - \mathbf{x}_{it-1})\right] = 0$ for a model of the form

$$\Delta A_{i,t} = \alpha_0 + \Delta \mathbf{x}'_{i,t}\boldsymbol{\beta} + \varepsilon_{it}$$

where Δ is the first difference operator, A_{it} the number of new apprenticeships for each canton and year, $\mathbf{x}_{it}$ the matrix of independent variables, and ε_{it} the error term. To avoid a bias due to spatial correlation[3], we use panel corrected standard error (PCSE) as proposed by Beck and Katz (1995).

[1] Since the effect of business cycles is the focus of this study, we do not present the coefficients for these additional variables separately. Detailed results are available on request from the authors.

[2] Im-Pesaran-Shin unit-root tests suggest that the number of apprentices is trend-stationary, while the number of school leavers is an I(1) process.

[3] A Pesaran, Fees, and Friedman test strongly rejects the null hypothesis of cross-sectional independence.

While FD models are comparable to previous estimations in literature, the main disadvantage is that the estimation only captures immediate effects. Since we are also interested in long-run effects, and as a robustness test regarding the serial correlation in our data, we additionally estimated an ADL model in error correction form (ECM) in section 3.2. Following De Boef and Keele (2008), we estimated

$$\Delta A_{i,t} = \alpha_0 + \alpha_1 A_{i,t-1} + \Delta \mathbf{x}'_{i,t} \boldsymbol{\beta}_1 + \mathbf{x}'_{i,t-1} \boldsymbol{\beta}_2 + \beta_3 c_i + \varepsilon_{it}$$

where α_1 is the speed of the error correction, $\boldsymbol{\beta}_1$ captures the immediate, transitory effects and $\boldsymbol{\beta}_2$ the permanent impact resulting from a deviation of the equilibrium relationship, and c_i are cantonal dummies. The long run, permanent effect equals to $\boldsymbol{\beta}_2 / -\alpha_1$. By including fixed effects and the lagged dependent variable (LDV), we risked that the coefficients would be biased due to a correlation between the LDV and the error term (Nickell, 1981). However, this bias decreased with increasing T, and Beck and Katz (1996) showed that such an approach is likely to outperform alternative approaches for panels with more than 20 periods.

3 Results

3.1 Static models: Immediate effects

In the beginning, we regressed the number of new apprenticeships on the population aged 16 (ΔSchool leavers), the unemployment rate (ΔUnemployed), and the GDP per capita (logarithmic, $\Delta log\,(\text{GDP})$), all in the first difference (Specification 1 in Table 2). In addition, we included two trend variables, one for the period from 1988 to 1991 and another for the period afterwards. Since the beginning of 1992, the number of apprentices has grown in all cantons simultaneously, as F-tests reveal.

For the interpretation of the results, it is important to keep in mind that the regressions only capture the effects of changes over time within each canton. On average, a standard deviation within cantons of both the number of apprenticeships and the population aged 16 represent only 14.35% and 8.97%, respectively, of the corresponding mean. Hence, regularly offered apprenticeships absorb the bulk of school leavers and fluctuations around the mean are rather small.

About a third of the pupils' fluctuations translate into more or less apprenticeships (see the corresponding coefficient in Table 2). That is, for every 10 additional school leavers, we can expect approximately 3.5 to start an apprenticeship the same year. A standard deviation change in the number of school leavers

Table 2: Static regression table (immediate effects only), 1988–2014

	(1)	(2)	(3)	(4)
ΔSchool leavers$_{t,t-1}$	0.358***	0.364***	0.359***	0.348***
	(0.088)	(0.091)	(0.088)	(0.089)
ΔUnemployed$_{t,t-1}$	−35.847***	−34.757***	−29.871***	−37.878***
	(9.582)	(9.784)	(11.566)	(10.415)
ΔUnemployed$_{t,t-1}^{\Delta>0}$			−3.331	
			(3.670)	
ΔUnemployed$_{t,t-1} \times \delta_{2009}$				12.331
				(29.564)
$\Delta log\,(\text{GDP})_{t,t-1}$	185.136*		211.506*	190.345*
	(102.599)		(116.265)	(103.995)
$\Delta log\,(\text{GDP})_{t-1,t-2}$		91.608		
		(104.101)		
$\Delta log\,(\text{GDP})_{t,t-1}^{\Delta<0}$			0.547	
			(0.948)	
$\Delta log\,(\text{GDP})_{t,t-1} \times \delta_{2009}$				−134.496
				(525.632)
$\Delta Trend_{t,t-1}^{1988-1991}$	0.520	1.784	1.374	0.863
	(9.170)	(9.237)	(9.081)	(9.259)
$\Delta Trend_{t,t-1}^{1992-2015}$	63.721***	89.740***	64.489***	68.993***
	(23.744)	(28.122)	(23.420)	(23.986)
δ_{2009}				−13.257
				(18.012)
Constant	−48.399**	−72.949***	−49.522**	−49.578**
	(21.740)	(26.487)	(21.439)	(21.347)
Observations	702	676	702	702
R-squared	0.301	0.299	0.303	0.303
Number of regions	26	26	26	26

Dependent variable: $\Delta Apprenticeships_{t,t-1}$. First difference model with panel-corrected standard errors (PCSE, in brackets). P-values ***<0.01, **<0.05, *<0.1

within cantons (291 youngsters) relates to a 4.3% change in the average number of apprenticeships in a canton.

Regarding unemployment, the results suggest that changing labour market conditions imply a considerably weaker, yet statistically significant, effect. On average, a 1%-point increase of the unemployment rate relates to approximately 1.49% of fewer apprentices. A standard deviation in the unemployment rate within cantons (1.19%-points) thus relates — *ceteris paribus* — to a change in the mean of the number of apprentices in 1.78%. Compared to Muehlemann et al. (2009), our estimation results in a slightly larger effect, mainly due to the methodology (allowing for spatial correlation).

In case of the second proxy of the business cycle (per capita income), the positive coefficient also suggests a pro-cyclical effect, but the p-value of 0.071 is significant on a 10% level only. Furthermore, the estimated effect is rather weak: a 1% increase in GDP per capita translates only into 0.08% of new apprenticeships (level-log model). Since the GDP per capita fluctuates considerably within cantons, a standard deviation within cantons of the GDP (per capita) growth relates to ±0.33% of apprenticeships on average.

Instead of assuming an immediate effect of the GDP on apprenticeships, Specification (2) tests whether previous year's income changes affect the hiring decision of firms (Baldi et al., 2014; Muehlemann et al., 2009). The coefficients, however, are not significant. We will discuss dynamic effects in section 3.2.

In Specification (3), we test the hypothesis on whether the firms react to booms and recessions in an asymmetric way: To test this possibility, we used two additional variables: $\Delta\text{Unemployed}_{t,t-1}^{\Delta>0}$, which is 0 in periods when the unemployment rates declined and equals $\Delta\text{Unemployed}_{t,t-1}$ if the rates increased, and $\Delta log\,(\text{GDP p.c.})_{t,t-1}^{\Delta<0}$, with only the observations during recessions. The result suggests that the reaction to rising unemployment numbers is slightly stronger, but the differences in the reactions are not significant. In case of the GDP, there is no asymmetric effect observable.

Finally, in Specification (4), we examined whether the economic effects changed after the crisis in 2008. To do so, we interacted both the unemployment rate and the GDP with a dummy, δ_{2009}, which is 1 from 2009[4] onwards. We cannot find evidence for a changed behaviour in the aftermath of the crisis, since both interaction terms together with the corresponding coefficients are insignificant.[5]

3.2 Dynamic models

The intertemporal ambiguity of potential business cycle effects (cf. chapter 1) motivates the analysis of dynamics between the business cycle and apprenticeships. As mentioned in section 2, we estimated ADL models in EC form with one lag.[6] Table 3 shows the results.

In Specification (1), we examined the short- and long-run effects of the GDP per capita and the population aged 16. For the latter, the immediate effect (within the same year) is similar to the stationary coefficient: For every additional school

[4] As the crisis started in late 2008, most firms had already hired trainees and could have responded at earliest in 2009.

[5] P-value of $H_0 : \Delta\text{Unemployed}_{t,t-1} = \Delta\text{Unemployed}_{t,t-1} \times \delta_{2009} = 0$ is 0.355, and p-value of $H_0 : \Delta log\,(\text{GDP p.c.})_{t,t-1} = \Delta log\,(\text{GDP p.c.})_{t,t-1} \times \delta_{2009} = 0$ is 0.914

[6] We also tested all variables including those with two lags. Yet, since the F-test that all the corresponding coefficients equal to zero cannot be rejected, we report only one lag.

Table 3: Dynamic regression table, 1988–2014

	(1)	(2)	(3)
$\text{Apprenticeships}_{t-1}$	−0.313***	−0.311***	−0.310***
	(0.060)	(0.057)	(0.057)
Immediate, transitory effects			
$\Delta\text{School leavers}_{t,t-1}$	0.362***	0.335***	0.332***
	(0.089)	(0.081)	(0.081)
$\Delta log\,(\text{GDP})_{t,t-1}$	124.541	40.044	−35.349
	(124.490)	(106.699)	(128.261)
$\Delta log\,(\text{GDP})^{\Delta<0}_{t,t-1}$			−1.105
			(1.466)
$\Delta\text{Unemployed}_{t,t-1}$		−33.455***	−35.144**
		(9.742)	(14.925)
$\Delta\text{Unemployed}^{\Delta>0}_{t,t-1}$			1.156
			(5.787)
Permanent effects			
$\text{School leavers}_{t-1}$	0.269***	0.262***	0.259***
	(0.052)	(0.048)	(0.048)
$log\,(\text{GDP})_{t-1}$	−30.212	−23.548	−29.861
	(66.964)	(58.193)	(58.846)
$log\,(\text{GDP})^{\Delta<0}_{t-1}$			−1.820
			(1.978)
Unemployed_{t-1}		3.580	0.223
		(7.102)	(8.757)
$\text{Unemployed}^{\Delta>0}_{t-1}$			3.482
			(7.067)
$Trend^{1988-1991}$	−5.932	−6.890	−7.211
	(9.881)	(9.127)	(9.163)
$Trend^{1992-2015}$	4.840**	4.229**	4.241**
	(2.109)	(1.917)	(1.918)
Observations	702	702	702
R-squared	0.318	0.345	0.346
Number of regions	26	26	26
Regional fixed effects	Yes	Yes	Yes

Dependent variable: $\Delta Apprenticeships_{t,t-1}$. ADL model in EC form, with panel-corrected standard errors (PCSE, in brackets). P-values ***<0.01, **<0.05, *<0.1

leaver, firms hire 0.36 new apprentices. Furthermore, the variable has a positive, highly significant coefficient in the subsequent year, resulting in a long-term effect of $0.269/-(-0.313) = 0.860$. This reflects the fact that, although the majority of school leavers start an apprenticeship immediately, a fraction does so only after an interim year (see e.g. Jaik & Wolter, 2016).

Although the immediate effect of the GDP is, as in the static model, pro-cyclical, neither the immediate nor the long-term coefficient is statistically significant. This remains the same after we add the unemployment rate in Specification (2). Thus, we cannot confirm the rather weak, but on a 10% level significant relationship suggested by the static regressions (Table 2).

The immediate, transitory effect of a change in the unemployment rate is similar to the static short-time models. One percentage-point of more unemployed people in an average canton relates to 1.39% less apprentices in the same year, confirming that the fluctuations on the labour market have a pro-cyclical immediate effect on VET. However, the positive permanent coefficient of the unemployment rate suggests that, in the subsequent year, the effect reverses.[7] The total long-term effect is estimated by $3.580/-(-0.311) = 11.52$, and statistically is not significantly different from zero. Hence, we cannot reject the hypothesis that in the long run, the unemployment rate (as well as GDP) has no effect on apprenticeships. To illustrate those dynamics, we plotted the impulse response function (IRF, effect of one-time shock of the independent variable at $t = 0$) and unit response function (URF, effect of a permanently changed independent variable starting at $t = 0$) for a change of one standard deviation within cantons in Figure 1.

The final specification (3) in Table 3 tests whether the effects of the GDP and unemployment differ during booms and recessions. As in model (3) of the static estimations, we include two additional variables, $\Delta\text{Unemployed}^{\Delta>0}$ and $\Delta log(\text{GDP p.c.})^{\Delta<0}$, both in first difference as well as with one lag, capturing the deviation from the main variable in case of a 'recession' (for years with rising unemployment rate or declining income, respectively). Since all four additional coefficients (first difference and lagged unemployment and GDP) are statistically not significant at the 10% level, the short-term effects do not differ between booms and recessions. However, the total (permanent) deviation for a decreasing GDP[8] is significant on a 1% level, suggesting that in the long run, the effect of GDP per

[7] Although the permanent coefficient in EC form is not statistically significant, the corresponding coefficient is highly significant in an ADL model, suggesting that the *change* between the two years is different from zero.

[8] The permanent deviation is given by $-1.82/-(-0.310) = -5.871$ and has a standard error of 2.003. The standard errors of permanent effects are estimated by applying the Bewley transformation (cf. De Boef & Keele, 2008).

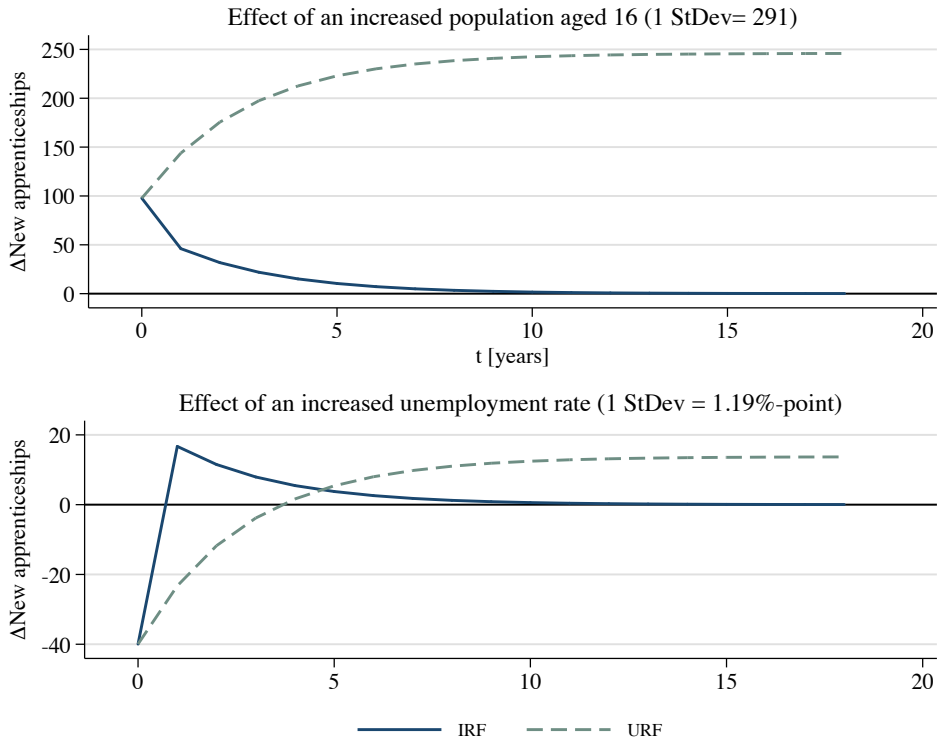

Figure 1: Dynamic effects of population aged 16 and unemployment in model (2)

capita does differ during a recession compared to an upswing. The overall effect during recessions equals to -102.215[9] and is significant on a 10% level (P-value = 0.083). Surprisingly, the coefficient is negative, suggesting a counter-cyclical effect. We interpret this as weak evidence for a substitution effect (Lindley, 1975) in the aftermath of a recession: As uncertainty increases, firms might even prefer hiring apprentices instead of skilled workers, since the former are less expensive and employed on temporary contracts. In any case, the magnitude is barely of economic significance: The crisis after 2008, for instance, caused the average cantonal income to decrease by 2.18%, which relates to only 0.093% of additional traineeships per canton in all subsequent years accumulated.

[9]Permanent effect of $log(\text{GDP p.c.})_{t-1}$ and $\Delta log(\text{GDP p.c.})_{t-1}^{\Delta<0}$, given by $\frac{-29.861}{-(-0.310)} + \frac{-1.820}{-(-0.310)} = -96.345 - 5.871 = -102.215$ with a standard error of 58.917.

4 Conclusions

In line with Baldi et al. (2014), our analysis suggests the provision of apprenticeships in countries with well-established and quantitatively important apprenticeship training systems do not react strongly to business cycles. Once a firm has decided to be active in apprenticeship training, it offers apprenticeships on a regular basis (Muehlemann et al., 2007) and although recessions impact the number of apprenticeships by forcing some of the training firms out of the market, fluctuations in the number of apprentices in the market mainly follow changes in the number of school-leavers.

Nevertheless, we observe a small, pro-cyclical effect of business cycles, suggesting that some firms do adjust their training strategy to the economic climate or that the number of firms that cease to exist in a recession is not substituted by more training activities of the remaining firms and vice versa in the short run. This effect, however, is only transitory and is reversed in the following years. Our interpretation is that the majority of firms only postpone (or advance) their initial training decisions. That is, in the case of tightening labour market, where the unemployment rate falls, some firms hire additional apprentices, for instance, if they cannot find suitable professionals. In turn, some of those firms forgo offering the same apprenticeship in the following year. Conversely, some firms will delay their planned hires in the situation of a loosening labour market.

From a policy perspective, the youth's situation in the apprenticeship training market thus depends mainly on demographic fluctuations and not on economic cycles. In years of smaller school-leaving cohorts, the offers for apprenticeships from the firms do not fall proportionally, making it easier for the school-leavers to find a position. This helped the youth in the economically difficult period between 2008 and 2014, when the population aged 16 decreased on average by 1% yearly. On the other side, the impact of an economically difficult environment would impact the apprenticeship market much stronger if the recession would coincidence with years of expanding school-leaver cohorts.

Our empirical findings, however, are limited to advanced VET systems, where apprenticeships are offered across almost all economic sectors and cover a wide range of occupations. This diversity increases the robustness in case of downturns, which usually affects industries to a varying degree. In countries where apprenticeships are concentrated in particular industries and occupations, the overall impact of economic cycles on the provision of apprenticeships might therefore be much stronger.

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