

APPENDIX

Linear specification of VAR model

We consider the following VAR model to investigate the relationship between female (male) employment rate (ER) and GDP growth in different economic sectors (construction, education and accommodation & food services) in the three chosen countries (Germany, Poland and Portugal):

$$Y_{j,t} = c + \sum_{i=1}^p A_{j,i} Y_{j,t-i} + \eta_t \quad (1)$$

where Y_t is a $n \times 1$ vector of endogenous variables, c is an $n \times 1$ vector of constants, A is a $n \times n$ matrix of coefficients, and $i = 1, \dots, p$ is the number of lags, η_t is $n \times 1$ vector of error terms with zero mean and the variance Ω . Subscript j refers to the particular gender group, i.e. female and male.

In order to account for the existence of asymmetric responses where the effects of upward and downward changes in GDP may not be the same, we consider the non-linear (asymmetric) specification in which upward and downward changes of GDP are included into the model as separate variables

$$Y'_t = [\Delta ER_t \quad \Delta GDP_t^{up} \quad \Delta GDP_t^{down}]$$

which are defined as follows:

$$\Delta GDP_t^{up} = \begin{cases} \Delta GDP_t & \text{if } I^{rec.} = 0 \\ 0 & \text{if } I^{rec.} = 1 \end{cases} \text{ and } \Delta GDP_t^{down} = \begin{cases} 0 & \text{if } I^{rec.} = 0 \\ \Delta GDP_t & \text{if } I^{rec.} = 1 \end{cases}$$

where $I^{rec.}$ is the recession index (or dummy variable) obtained as an interpretation of the OECD

Composite Leading Indicators (www.oecd.org/std/leading-indicators); it takes a value of 1 in a

recessionary period, while a value of 0 in an expansionary period. The contraction periods identified

by this index match reasonably well the periods of low or negative growth of GDP, i.e. for Germany:

2008Q2–2009Q2, 2011Q4–2013Q1, 2014Q2–2015Q2, for Portugal: 2008Q2–2009Q3, 2010Q4–

2013Q2, for Poland: 2008Q2–2009Q2, 2011Q4–2013Q4, 2015Q4–2016Q2.

Table A4. Residual diagnostics for VAR models (asymmetric specification of VAR models)

GERMANY								
	Construction		Education		Accomodation			
	Female	Male	Female	Male	Female	Male		
<i>order of VAR model</i>		3	3	5	5	4		4
autocorrelation	1.05	1.11	0.3	0.33	1.22	1.24		
LM test(1-4)	(0.45)	(0.38)	(0.99)	(0.99)	(0.32)	(0.30)		
normality	4.05	6.76	11.06	11.7	11.5	10.1		
JB test	(0.67)	(0.34)	(0.09)	(0.07)	(0.07)	(0.10)		
heteroscedasticity	107.9	107.5	188.1	188.1	141.1			
(White -chi-sq)	(0.43)	(0.50)	(0.32)	(0.32)	(0.55)	141.1 (0.55)		
POLAND								
<i>order of VAR model</i>		2	2	1	1	2		2
autocorrelation	1.08	1.14	1.22	1.18	1.29	1.27		
LM test(1-4)	(0.40)	(0.34)	(0.24)	(0.28)	(0.21)	(0.22)		
normality	8.1	9.6	11.4	11.3	8.95	8.56		
JB test	(0.23)	(0.14)	(0.08)	(0.08)	(0.18)	(0.20)		
heteroscedasticity	71.6	66.2	31.6	33.1	82.5	82.6		
(White -chi-sq)	(0.49)	(0.67)	(0.68)	(0.61)	(0.10)	(0.10)		
PORTUGAL								
<i>order of VAR model</i>		3	3	3	3	4		4
autocorrelation	1.08	0.95	0.68	0.94	1.08	0.95		
LM test(1-4)	(0.43)	(0.57)	(0.87)	(0.57)	(0.43)	(0.57)		
normality	2.39	1.43	4.51	3.1	2.39	1.43		
JB test	(0.88)	(0.96)	(0.61)	(0.79)	(0.88)	(0.96)		
heteroscedasticity	155.2	152.9	138.3	131.2	155.2	152.9		
(White -chi-sq)	(0.25)	(0.29)	(0.03)	(0.06)	(0.25)	(0.29)		

Note: in parentheses are given p-values.