

Deliverable D5.1 Database with measurements of national and regional automation in Europe Version 1.0 01-07-2020





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Title	:	Database with national and regional automation in Europe
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TECHNEQUALITY partners

UOXF University of Oxford

Document change log

Version	Date	Comments

Verification and approval

Name	Date	Comments

Description of deliverable (100 words)

Deliverable 5.1 is a database including data on robot penetration at a disaggregated industrynational level in the EU (from in Task 1.3) and supplemented with data on relevant regional predictors. It builds on data from administrative offices, proprietary firm-level databases (Orbis Europe) and the International Federation of Robotics (IFR). The data is aggregated at the industry-national level, merged with the AI related adoption rate data gathered in Task 1.1, and matched with compatible industry classification level (likely NACE Rev. 2). EU KLEMS



is used to provide data on the number of employees by industry. Full database is available in the Excel documents D5.1_Task13 and D5.1_Task51.

Comparing D5.1 with the original DOA we have some changes in the variables that are described below:

- Task 1.3 delivers all the variables discussed in the DOA
- Task 5.1 delivers the following variables
- -

Variables	Status	Notes
industry-national level data on payroll tax (aggregated from firm level data from ORBIS or Amadeus)		Payroll tax is not reported in Orbis Europe
industry-national level data on capital gains tax	Done	
industry-national level data on investment into robots	Done	Total Capital and R&D available
industry-national level data on other forms of automation (ditto)	Done	Total Capital and R&D available
industry classification level indicator (NACE Rev. 2/ 2-digit ISIC)	Done	
estimates on number of employees by industry (from business surveys)	Done	Source: Orbis Europe
employee wages	Done	Generated by the division of Wagebill by # employees in Orbis
employment by industry	Done	
Government data on fiscal revenue, differentiated by type of tax receipt	Done	Corporate taxes only available from Orbis Europe



1. Description of indicators

Tables 1 and 2 provide a description of indicators collected from Task 1.3 and Task 5.1 that will be used in WP1 and WP5 deliverables accordingly.

The level of regional disaggregation for Task 1.3 is at the NUTS3 level for the variables described (separate by each country) in Table 1. For Task 5.1 the level of disaggregation is at the country-industry-year level. To produce regional estimates, the automation estimates from Task 1.3 can be matched to regional firm-level characteristics (employment, output, corporate taxes, wages) from Orbis Europe. These estimates are provided separately in the database document D5.1_Task51 in the NUTS3_Employment regression results tab for the fixed effects (FE) and instrumental variable (IV) regressions results.

Given the proprietary nature of some data (IFR and Orbis Europe) we only provide the matching codes (country, year, region, industry) in these tabs so that the data can be matched with the full databased. This is done in D5.1_Task13 tab EUKLEMS_ROBOTS and D5.1_Task51 Orbis CountryXSector and EU_KLEMS CountryXSect tabs.

Table 1. Description of regional (municipality) indicators related to employmentcharacteristics and automation

Variable description	Note	Data source	ees
Denmark			
Demark municipality code		Statistics	https://www.statbank.dk/statba
2007		Denmark	nk5a/default.asp?w=1344
		Statistics	https://www.statbank.dk/statba
Demark region		Denmark	nk5a/default.asp?w=1345
		Statistics	https://www.statbank.dk/statba
Denmark province		Denmark	nk5a/default.asp?w=1346
		Statistics	https://www.statbank.dk/statba
female population		Denmark	nk5a/default.asp?w=1347
		Statistics	https://www.statbank.dk/statba
male population		Denmark	nk5a/default.asp?w=1348
		Statistics	https://www.statbank.dk/statba
total population		Denmark	nk5a/default.asp?w=1349
		Statistics	https://www.statbank.dk/statba
population over 65 years old		Denmark	nk5a/default.asp?w=1350
foreign born		Statistics	https://www.statbank.dk/statba

		Denmark	nk5a/default.asp?w=1351
population between 15 and 69		Statistics	https://www.statbank.dk/statba
years old		Denmark	nk5a/default.asp?w=1352
education attainment less than		Statistics	https://www.statbank.dk/statba
high school completed		Denmark	nk5a/default.asp?w=1353
education attainment high		Statistics	https://www.statbank.dk/statba
school		Denmark	nk5a/default.asp?w=1354
education attainment college		Statistics	https://www.statbank.dk/statba
and above		Denmark	nk5a/default.asp?w=1355
		Statistics	https://www.statbank.dk/statba
natural log of total population		Denmark	nk5a/default.asp?w=1356
		Statistics	https://www.statbank.dk/statba
employed persons		Denmark	nk5a/default.asp?w=1357
employment in manufacturing		Statistics	https://www.statbank.dk/statba
industries		Denmark	nk5a/default.asp?w=1358
female employment in		Statistics	https://www.statbank.dk/statba
manufacturing industries		Denmark	nk5a/default.asp?w=1359
	ISIC V.4 2-		
employment in light	digit: 13-15, 17-	Statistics	https://www.statbank.dk/statba
manufacturing industries	18	Denmark	nk5a/default.asp?w=1360
employment in mining		Statistics	https://www.statbank.dk/statba
industries		Denmark	nk5a/default.asp?w=1361
employment in construction		Statistics	https://www.statbank.dk/statba
industries		Denmark	nk5a/default.asp?w=1362
		Statistics	https://www.statbank.dk/statba
share of male population	pop_male/pop	Denmark	nk5a/default.asp?w=1363
share of population over 65		Statistics	https://www.statbank.dk/statba
years old	pop_65over/pop	Denmark	nk5a/default.asp?w=1364
		Statistics	https://www.statbank.dk/statba
share of foreign born	foreign/pop	Denmark	nk5a/default.asp?w=1365
share of education attainment	edu_lesshigh/po	Statistics	https://www.statbank.dk/statba
less than high school	р	Denmark	nk5a/default.asp?w=1366
share of education attainment		Statistics	https://www.statbank.dk/statba
high school	edu_high/pop	Denmark	nk5a/default.asp?w=1367
share of education attainment		Statistics	https://www.statbank.dk/statba
college and above	edu_coll/pop	Denmark	nk5a/default.asp?w=1368
share of employment in	empe_manu/em	Statistics	https://www.statbank.dk/statba
manufacturing	pe	Denmark	nk5a/default.asp?w=1369
share of female employment in	empe_manu_fe/	Statistics	https://www.statbank.dk/statba
manufacturing	empe_manu	Denmark	nk5a/default.asp?w=1370
share of employment in light	empe_lightmanu	Statistics	https://www.statbank.dk/statba
manufacturing	/empe	Denmark	nk5a/default.asp?w=1371
share of employment in	empe_cons/emp	Statistics	https://www.statbank.dk/statba
construction	e ,	Denmark	nk5a/default.asp?w=1372
	empe_mining/e	Statistics	https://www.statbank.dk/statba
share of employment in mining	mpe	Denmark	nk5a/default.asp?w=1373
Denmark chinese import		UN Constant	
competition exposure between	author's	Comtrad	https://sometricile.com
1993 and 2007	calculation	e	https://comtrade.un.org/



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Denmark chinese import		Comtrad	
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1993 and 2000	calculation	Database	https://comtrade.un.org/
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Finland sub region name 2019		Finland	ml
		Statistics	https://www.stat.fi/index_en.ht
Finland region code 2019		Finland	ml
		Statistics	https://www.stat.fi/index_en.ht
female population		Finland	ml
		Statistics	https://www.stat.fi/index_en.ht
male population		Finland	ml
male population		Statistics	https://www.stat.fi/index_en.ht
total population		Finland	ml
		Statistics	https://www.stat.fi/index_en.ht
population over 65 years old		Finland	ml
population over 05 years old		Statistics	https://www.stat.fi/index_en.ht
foreign born		Finland	ml
education attainment less than		Statistics	https://www.stat.fi/index_en.ht
high school completed		Finland	ml
education attainment high		Statistics	https://www.stat.fi/index_en.ht
school		Finland	ml
education attainment college		Statistics	https://www.stat.fi/index_en.ht
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employed persons		Finland	ml
employment in manufacturing		Statistics	https://www.stat.fi/index_en.ht
industries famale ampleument in		Finland	ml
female employment in		Statistics	https://www.stat.fi/index_en.ht
manufacturing industries	ISIC V.4 2-	Finland	ml
employment in light	digit: 13-15, 17-	Statistics	https://www.stat.fi/index_en.ht
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share of male population	pop_male/pop	Finland	ml
share of population over 65		Statistics	https://www.stat.fi/index_en.ht
years old	pop_65over/pop	Finland	ml
		Statistics	https://www.stat.fi/index_en.ht
share of foreign born	foreign/pop	Finland	ml
share of education attainment	edu_lesshigh/po	Statistics	https://www.stat.fi/index_en.ht
less than high school	р	Finland	ml
share of education attainment		Statistics	https://www.stat.fi/index_en.ht
high school	edu_high/pop	Finland	ml
share of education attainment		Statistics	https://www.stat.fi/index_en.ht
college and above	edu_coll/pop	Finland	ml
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share of female employment in	empe_manu_fe/	Statistics	https://www.stat.fi/index_en.ht
manufacturing	empe_manu	Finland	ml
share of employment in light	empe_lightmanu	Statistics	https://www.stat.fi/index_en.ht
manufacturing	/empe	Finland	ml
share of employment in	empe_cons/emp	Statistics	https://www.stat.fi/index_en.ht
construction	e	Finland	ml
construction	empe_mining/e	Statistics	https://www.stat.fi/index_en.ht
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share of foreign born	foreign/pop	onal	nternational/index.shtml
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share of education attainment		Internati	https://international.ipums.org/i
university or above	edu_uni/pop	onal	nternational/index.shtml
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manufacturing	empe_manu	onal	nternational/index.shtml
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share of employment in light	empe_lightmanu	Internati	https://international.ipums.org/i
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construction	e	onal	nternational/index.shtml
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UK chinese import competition		Comtrad	
exposure between 1993 and	author's	е	
2011	calculation	Database	https://comtrade.un.org/
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UK chinese import competition		Comtrad	
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2001	calculation		https://comtrade.un.org/
		UN	
UK chinese import competition		Comtrad	
exposure between 2001 and	author's	e	
2011	calculation	Database	https://comtrade.un.org/
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Sweden local labour market		Statistics	
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Sweden county code		Sweden	https://www.scb.se/en/
		Statistics	
male population		Sweden	https://www.scb.se/en/

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total population		Sweden	https://www.scb.se/en/
		Statistics	
population over 65 years old		Sweden	https://www.scb.se/en/
population over 05 years old		Statistics	
foreign born		Sweden	https://www.scb.se/en/
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foreign born, male			https://www.scb.se/en/
education attainment less than		Statistics	
high school completed		Sweden	https://www.scb.se/en/
education attainment high		Statistics	
school		Sweden	https://www.scb.se/en/
education attainment college		Statistics	
and above		Sweden	https://www.scb.se/en/
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natural log of total population		Sweden	https://www.scb.se/en/
gainfully employed 16+ years		Statistics	
by region of work		Sweden	https://www.scb.se/en/
	gainfully		
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employment in manufacturing	years by region	Statistics	
industries	of work	Sweden	https://www.scb.se/en/
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	employed 16+		
female employment in	years by region	Statistics	
manufacturing industries	of work	Sweden	https://www.scb.se/en/
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employment in light	years by region	Statistics	
manufacturing industries	of work	Sweden	https://www.scb.se/en/
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employment in mining	years by region	Statistics	
industries	of work	Sweden	https://www.scb.se/en/
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	gainfully		
	employed 16+	Chatter!	
employment in construction	years by region	Statistics	h
industries	of work	Sweden	https://www.scb.se/en/
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share of male population	pop_male/pop	Sweden	https://www.scb.se/en/
share of population over 65		Statistics	
years old	pop_65over/pop	Sweden	https://www.scb.se/en/
		Statistics	
share of foreign born	foreign/pop	Sweden	https://www.scb.se/en/
share of education attainment	edu_lesshigh/po	Statistics	https://www.scb.se/en/
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less than high school	р	Sweden	
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high school	edu_high/pop	Sweden	https://www.scb.se/en/
share of education attainment	cuu_iiigii/pop	Statistics	
college and above	edu_coll/pop	Sweden	https://www.scb.se/en/
share of employment in	empe_manu/em	Statistics	
manufacturing	pe	Sweden	https://www.scb.se/en/
share of female employment in	empe_manu_fe/	Statistics	
manufacturing	empe_manu	Sweden	https://www.scb.se/en/
share of employment in light	empe_lightmanu	Statistics	https://www.sco.se/en/
manufacturing	/empe	Sweden	https://www.scb.se/en/
share of employment in	empe_cons/emp	Statistics	https://www.sco.se/en/
	1 1	Sweden	https://www.ach.ac/an/
construction	e		https://www.scb.se/en/
	empe_mining/e	Statistics	
share of employment in mining	mpe	Sweden	https://www.scb.se/en/
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Sweden chinese import		Comtrad	
competition exposure between	author's	e	
1993 and 2007	calculation	Database	https://comtrade.un.org/
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Sweden chinese import		Comtrad	
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1993 and 2000	calculation	Database	https://comtrade.un.org/
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2000 and 2007	calculation	Database	https://comtrade.un.org/
United Kingdom	1		
	London		
	boroughs are	NOMIS	
	grouped into	&	
UK local authority district	NUTS3 2003	Scotland'	
code, prior to April 2015	version	s Census	https://www.nomisweb.co.uk/
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		&	
UK local authority district		Scotland'	
name, prior to April 2015		s Census	https://www.nomisweb.co.uk/
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		Scotland'	
UK region code		s Census	https://www.nomisweb.co.uk/
		NOMIS	
		&	
		Scotland'	
male population		s Census	https://www.nomisweb.co.uk/
		NOMIS	
total population		&	https://www.nomisweb.co.uk/



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population over 65 years old	s Census https://www.nomisweb.co.uk/
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foreign born	s Census https://www.nomisweb.co.uk/
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education with qualification	s Census https://www.nomisweb.co.uk/
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ethnic groups: white	s Census https://www.nomisweb.co.uk/
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employment in light	digit: 13-15, 17-	Scotland'	
manufacturing industries	18	s Census	https://www.nomisweb.co.uk/
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employment in mining		Scotland'	
industries		s Census	https://www.nomisweb.co.uk/
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employment in construction		Scotland'	
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employment in nondurable		Scotland'	
industries		s Census	https://www.nomisweb.co.uk/
Industries		NOMIS	https://www.honnsweb.eo.uk/
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	1 /	Scotland'	
share of male population	pop_male/pop	s Census	https://www.nomisweb.co.uk/
		NOMIS	
		&	
share of population over 65		Scotland'	
years old	pop_65over/pop	s Census	https://www.nomisweb.co.uk/
		NOMIS	
		&	
		Scotland'	
share of foreign born	foreign/pop	s Census	https://www.nomisweb.co.uk/
		NOMIS	
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share of education with	edu_qualified/po	Scotland'	
qualification	p	s Census	https://www.nomisweb.co.uk/
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Table 2. Description of indicators related to firm-level characteristics and automation

Variable description	Variable	Data sources
Economic Variables (region)		

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Gross output	Gross Output	EU KLEMS 2019
k	Employment	
Employees	share	EU KLEMS 2019
Percentage point difference of Total Factor		
Productivity levels relative to base year		
(2010)	TFP	EU KLEMS 2019
Value Added	Value Added	EU KLEMS 2019
Economic Variables (firm-level)		
Number of employees	Nemployees	Orbis Europe
Total Corporate Tax Paid by firms	Tax	Orbis Europe
Total Operating Revenues of firms	OpRev	Orbis Europe
Total Sales of firms	Sales	Orbis Europe
Value Added	VA	Orbis Europe
Total Factor Productivity	logTFP	Orbis Europe
Total wagebill of firms	Wagebill	Orbis Europe
Total capital of firms	Capital	Orbis Europe
R&D expenditures of firms	RD	Orbis Europe
Mean age of firms	age	Orbis Europe
Automation variables (country-sector)		
		International
industrial robot operational stock	robots	Federation of Robotics
industrial robot operational stock in other EU		International
countries	ivrobots	Federation of Robotics
industrial robot operational stock in Germany,		International
France, Italy, Spain and the UK	iv5robots	Federation of Robotics