WORK-LIFE BALANCE AND LABOUR PRODUCTIVITY:

EVIDENCE FROM EU COUNTRIES

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1. Introduction

We have been always used to the idea that work must be the main priority, and that our life should somehow be built around it.

In recent years, however, employees and employers have developed awareness about the importance of physical and psychological well-being, together with sustainability of the interaction between working and private life.

The awareness about such issues, that can be generally summarized in the term "work-life balance", constitutes an increasingly relevant topic in our socio-economic context.

Being able to obtain that balance could help people (and workers, in particular) to be more satisfied, less stressed, and thus more productive; as a consequence, there can be an opportunity to improve the labour market, potentially leading to a supply-side economic growth.

Policymakers could thus be interested in assessing if an effort in such a direction is worth to be pursued.

In the present work, we try indeed to measure work-life balance ("WLB", from now on) at the EU country level through a composite index, and then we estimate which is its impact on the productivity of a country relying on a simple regression analysis using panel data.

The structure of the work is the following. Section Data serves as an explanation of the variables used, along with some summary statistics. Section Methods describes in detail how we computed the index for WLB. Section Analysis and Results contains the model and the estimates with their respective comments. Finally, we draw some conclusions.

2. Data

To address the research question, we needed to quantify Work-Life Balance in EU countries.

In doing so, we were inspired by Fernandez-Crehuet et al. (2016); in their paper, exploiting a cross-sectional dataset of EU countries, they created a composite index for WLB through a Principal Component Analysis that combined variables coming from five dimensions they identified connected to WLB.

Instead, we decided to use a panel of 21 EU countries from 2014 to 2019, focusing on a set of variables belonging to 3 areas: work, policy and health & life (Abendroth and Den Dulk, 2011). Then we resorted to some control variables to reduce the issue of omitted variable bias; for the complete list of the variables, see Table I (for this and all the tables, see the Appendix).

Before moving to the analysis, we provide a brief descriptive analysis (see Table II.a and Table II.b) of the variables used.

Over the period considered, labour productivity increased over time, with GDP per worker that moved from 37249 euros in 2014 to 41764 in 2019. Variables belonging to *work* mostly experienced a decreasing or a stationary trend, with the exception of work life duration that passed from an average of 35.21 years in the EU countries to 36.64. A possible explanation for this phenomenon is the need of governments to force people to remain in the labour market in order to guarantee the sustainability of the retirement system.

As concerns variable from *policy*, it is worth to notice how in the last years both father and mother leaves benefit from more weeks, and also the percapita social expenditure increased.

Variables included in *health & life* show an overall improvement; it is to highlight the relevant increase in the average number of hours dedicated to formal care, and moreover is smaller and smaller the percentage of people that cannot afford leisure activities.

Under the assumption that the variables in those categories are actually good in representing WLB, we can see that in general the situation in the last years have improved considerably.

3. Methods

As previously said, we build a composite index (Saisana and Tarantola, 2002) to measure WLB that take as a basis Fernandez-Crehuet et al. (2016).

The approach they used can be summarized in three steps: in the very first step they normalized the variables to bring them on the same scale; in the second step they performed a PCA within each of the five dimension they identified, and retained the first principal component (thus creating a set of five principal components, each of them representative of the different dimensions); finally, in the third step they performed a second PCA on that set of principal components.

The WLB index is then computed as the first principal component obtained from this second PCA.

We followed a similar approach. As already mentioned in section Data, we defined 3 dimensions for WLB:

- Work
- Policy
- Health & Life

The first step concerns the normalization of the variables. Actually, we did not use the usual standardization (centering the variable and dividing by its standard deviation) and neither the normalization used in the original paper, but instead we used the so called “min-max normalization” which formula is:

$$\frac{X - \min(X)}{\max(X) - \min(X)}$$

We chose this normalization and not others because, when creating a composite index, we need all the variables to contribute in the same direction; in our framework, this means we cannot have variables that affect WLB positively and other variables that affect it negatively. In other terms, for this last type of variables we must do a "polarity switch".

With the min-max normalization, this thing is straightforward to do; since this normalization returns values for the variables that range from 0 to 1, the polarity switch is obtained as

$$1 - \text{norm}(X)$$

Where norm(X) is of course the normalized value of the variable obtained following the formula above. We performed this polarity switch on the variables that have intuitively a negative impact on WLB, and thus on *unrate*, *unrate_f*, *worklife_duration*, *avg_weekworkh*, *longweekworkh*, *noleis*, *households_3children* and *households_2children*.

As a second step, we performed a PCA on all the variables, and we took the first principal component; this is our composite index for WLB.

All the procedure above has been done separately for each year from 2014 to 2019.

As it can be seen, apart from the normalization and the polarity switch, the main methodological difference with respect to Fernandez-Crehuet et al. (2016) is that they computed PCA a first time within the dimensions and a second time on the set of principal components obtained, while we directly applied PCA on all the variables we chose initially.

We proceeded in this way because we had less dimensions and because doing multiple PCA as author did could perhaps produce a composite index that is too artificial (Saisana and Tarantola, 2002).

In Table III, we display the resulting index for each country. In particular, the ranking is based on the time averaged WLB scores across countries; Denmark presents the highest value of WLB, 1.54, instead the lowest one shows up in Greece with a value equal to –2.58.

Given the ranking it is likely that the countries in the first positions, mainly the north-european ones, present a better work-life integration. Conversely, the countries in the lower positions seem to not have an institutional framework that benefit WLB.

4. Analysis and Results

We specify our baseline model as follows:

$$Y_{it} = \alpha + \beta X_{it} + \Pi_{it}\delta + \tau_t + \theta_i + \varepsilon_{it}$$

Where:

Y_{it} = logarithm of the labour productivity (*ln_prod*)

X_{it} = WLB index (*wlb*)

Π_{it} = vector of time-varying control variables (*GDP, median_age, life_exp, suicide_rate*)

τ_t = common time fixed effects

θ_i = state-specific fixed effects

ε_{it} = error term

Table IV shows the results of the five different regressions we performed to analyse the impact of WLB on the productivity. In all the specifications, standard errors are clustered at the country level.

Model (1) is a parsimonious specification in which we include only the WLB index.

Model (2) includes, along with WLB, time and country fixed effects.

Model (3) introduces as single control GDP per capita.

Model (4) removes GDP and insert all the other controls: median age, suicide rate and life expectancy.

Model (5) is the most complete model, in which we include all the controls.

At a first glance we can see that the coefficient of WLB, the one of interest, has always a positive sign, as expected by our beliefs. This implies at least a positive correlation between WLB and labour productivity. In addition, it is worth to observe that the WLB coefficient is statistically significant in almost every specification.

In Model (1) the estimated coefficient is 0.427, so an increase by one point in the WLB index is expected to increase the labour productivity by approximately 42.7%. However, it is likely that we are in presence of omitted variable bias.

We have to take into account that WLB could be considered as a part of a broader concept, that is the general well-being of a country. Hence, we would have a persistent source of bias in our coefficient of interest if we don't control for some of the determinants of general well-being, because they are probably correlated with WLB and can impact the labour productivity.

In Model (2) we start to attenuate this issue by including country and time fixed effects, so controlling for space and time invariant unobserved heterogeneity. Indeed, now our estimates suggest that a unit increase in the WLB index would increase labour productivity by 9%, thus here there is already a large change in magnitude in the coefficient.

In Model (3) we introduce as control (real) GDP per capita, that is a classical proxy for the general well-being of a country. Surprisingly, its coefficient is basically zero in magnitude, and also the coefficient of WLB doesn't present a significant change.

Given that result, in Model (4) we don't include GDP per capita but we add other controls: median age, suicide rate and life expectancy, all at the country level. In particular, we expect that different age structures

could lead to different levels of productivity, and it can be also correlated with WLB, even though we are not so sure about the sign of its influence: younger individuals may tend to search for more equilibrium between work and life, and on the contrary older workers may be more capable of reaching a better integration between the two aspects, but we cannot exclude the opposite. As regards suicide rate and life expectancy, they are respectively proxies for the level of depression and life standards, that are together factors representing the healthiness of a country that can be correlated with WLB as well as be a determinant of labour productivity.

After adding those controls, WLB coefficient decreases even more and goes to 0.053, but now it is not statistically different from zero.

In Model (5), we re-introduce GDP per capita, keeping all the other controls, and now the coefficient of WLB returns to be statistically significant (at the 5% level). This shows the importance of including GDP per capita as control, indeed even though the coefficient of WLB is roughly equal to the one of Model (4), its lower standard error allows to accomplish significance.

From this analysis, considering the controls included, we can state that one point change in the WLB is associated with a 5.5% percent increase in the labour productivity.

To give an idea on how the main components of the WLB change across countries, in Table V we offer three parallels of some time averaged variables in order to somehow facilitate WLB interpretation.

- *A comparison between Netherlands and France,* which time-averaged values for WLB are respectively 1.27 and 0.27, to understand better what a one-unit difference in the WLB coefficient implies. Clearly, the values of the variables that influence negatively the WLB are higher in France with respect to Netherlands, e.g. the unemployment rate differs by roughly 3 pp, and the percentage of people unable to participate in leisure activities presents a 4 pp difference; it is also worth to mention how more weekly working hours tends to be associated with a lower WLB. Instead, among the variables affecting positively the WLB, it is evident that the average night spent on holidays is higher (4 more) for Netherlands. To note that, while the number of weeks of job-protected leave for mothers is the same, the one that refers to the father is a lot higher in France, that is the country with the highest value of this variable.
- *A comparison between Austria and Ireland,* that have the same value for the index. As expected, the values here are quite similar, except for the variables related to the paid father/mother leave. In fact, in Austria the number of paid weeks of the father is higher by 8 weeks with respect to Ireland. On the contrary, the same variable associated to the mother is more than double compared to the other country. Moreover, we can observe that the unemployment rate is a bit higher in Ireland.

- *A comparison between Denmark and Greece,* that are the countries that open and close the rankings. It is evident the existence of huge differences. In particular, the unemployment rate gap is around 15 pp, the average nights spent in holidays are almost the triple, and the percentage of people who cannot afford to regularly participate in leisure activities is 20 pp different. However, not everything is as expected: it exists a pattern, not only between Denmark and Greece but in a lot of countries, that highlights how a longer work life duration is associated with higher WLB scores: the citizens in Denmark seem to work more in comparison to Greece. Also, another interesting aspect is the number of weeks of job-protected leave available for mothers, a lot higher in Greece.

In Table IV we reported also Italy, to give a brief view on a comparison between it and the other countries taken into account.

4. Conclusions

The aim of the work was to assess whether, and to which extent, a good work-life balance can affect the labour productivity of a country. The problem is that work-life balance is a wide concept that involves several aspects, and a strict definition does not exist.

Focusing on a panel of EU countries between 2014 and 2019, we tried to build a representative WLB index by combining, through PCA, variables that catch different dimensions related to work-life balance.

According to this index, we got that, over the period considered, North-Europe countries perform better in terms of work-life balance, while at the bottom of the ranking we find part East and South Europe countries.

Then we regressed the labour productivity of the countries on the index, trying different specifications to see how WLB coefficient changed.

The most interesting and reliable results of the analysis came with the last regression, where we saturated the model including as controls GDP, median age, life expectancy and suicide rates.

Here, the estimation suggests that an increase of our WLB index by one unit would increase labour productivity by approximately 5.5%, with a coefficient that is statistically significant at the 5% level but especially it is economically significant if we focus on the magnitude.

In conclusion, our index could be not comprehensive of all the possible aspects of WLB and the results we obtained could be somehow influenced by the choice of the variables used to compute it; however, we think to have found some evidence on the relationship between work-life balance and productivity that is worth to investigate deeper and to be considered by policymakers.

References

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APPENDIX

Table I: list of the variables

	Variable name	Variable	Source
	prod	labour productivity, measured as the ratio between GDP and the number of people in the workforce	own elaboration from Eurostat
work	*unrate*	unemployment rate	Eurostat
	unrate_f	female unemployment rate	Eurostat
	pt_share	share of part-time workers	Eurostat
	selfempl	share of self-employed people in the employed workforce	Eurostat
	worklife_duration	worklife duration in years	Eurostat
	homeworking	share of people that worked remotely in the last 4 weeks	Eurostat
	avg_weekworkh	average hours worked per week	Eurostat
	longweekworkh	percentage of employed who work more than 49 hours per week	Eurostat
policy	*lenpaid_fathleave*	number of paid weeks reserved for the exclusive use of fathers	OECD
	lenpaid_mathleave	number of weeks of job-protected leave available for mothers just before and after childbirth	OECD
	mothleave_prot	number of weeks of parental leave for mothers with job protection, disregarding payment conditions	OECD
	tot_lenpaid_leave	total number of weeks for which a woman can be on paid leave after the birth of a child combining both maternity, parental and home care leave	OECD
	soc_ben	euro percapita expenditure for sickness, disability, old age, family, children, unemployment, housing, and social exclusion	Eurostat
health & life	*socsupp*	share of people who report having friends or relatives whom they can count on (country average)	OECD
	avg_holidays	number of individual nights of holiday	own elaboration from Eurostat
	avg_wh_formalcare02	average number of weekly hours of formal care for children aged 0-2	OECD
	avg_wh_formalcare3	average number of weekly hours of formal care for children aged 3+	OECD

	households_3children	percentage of households with 3 children	Eurostat
	households_2children	percentage of households with 2 children	Eurostat
	noleis	percentage of people who cannot afford to regularly participate in leisure activities	Eurostat
control variables	*GDP_percapita*	real GDP per capita in euros	Eurostat
	median_age	median age of the population	Eurostat
	suicide_rate	death rate due to suicide	Eurostat
	life_exp	life expectancy at birth	Eurostat

Table IIa: mean and standard deviation for the dependent variable (prod) and the variable used for computed the index, by year

	T					
	2014	2015	2016	2017	2018	2019
prod	37248.93	38396.48	39094.92	40061.14	41007.27	41763.67
	(23384.37)	(23780.25)	(24126.89)	(23918.83)	(24117.03)	(24233.75)
unrate	10.79	9.98	9.15	8.11	7.13	6.57
	(5.53)	(5.01)	(4.68)	(4.28)	(3.91)	(3.60)
unrate_f	10.88	10.18	9.34	8.35	7.45	6.87
	(6.33)	(5.91)	(5.75)	(5.33)	(4.99)	(4.60)
pt_share	13.70	13.70	13.46	13.24	12.89	12.46
	(7.92)	(7.94)	(7.82)	(7.78)	(7.75)	(7.69)
selfempl	14.17	14.12	14.04	13.69	13.52	13.61
	(5.57)	(5.31)	(5.11)	(5.14)	(5.12)	(4.81)
worklife_duration	35.21	35.44	35.70	36.07	36.38	36.64
	(2.72)	(2.72)	(2.69)	(2.70)	(2.74)	(2.78)
homeworking	9.62	10.10	10.60	10.70	10.95	11.58
	(6.59)	(6.88)	(7.52)	(7.59)	(7.60)	(8.19)
avg_weekworkh	37.60	37.58	37.54	37.54	37.56	37.53
	(2.64)	(2.63)	(2.59)	(2.54)	(2.53)	(2.51)
lenpaid_fathleave	9.67	8.43	8.73	8.96	9.09	9.30
	(10.48)	(9.93)	(10.04)	(9.88)	(9.99)	(9.90)
lenpaid_mothleave	19.96	19.94	19.86	19.86	20.05	20.05
	(9.42)	(9.45)	(9.14)	(9.14)	(9.10)	(9.10)
mothleave_prot	89.87	89.89	89.97	89.97	89.97	89.97
	(57.91)	(57.92)	(58.47)	(58.47)	(58.47)	(58.47)
tot_lenpaid_leave	69.82	68.58	68.09	68.09	68.28	68.28
	(49.53)	(50.58)	(50.03)	(50.03)	(49.94)	(49.94)
soc_ben	662.73	671.18	681.51	690.67	708.72	723.65
	(655.92)	(646.61)	(630.74)	(628.56)	(640.61)	(642.07)
socsupp	89.65	89.78	91.08	89.98	90.51	91.20
	(4.40)	(4.16)	(3.48)	(4.56)	(3.98)	(3.76)
avg_holidays	7.01	7.07	7.21	7.66	7.97	8.19
	(3.67)	(3.62)	(3.53)	(3.91)	(3.70)	(3.96)
avg_wh_formalcare02	10.53	10.95	11.16	11.06	11.37	12.24
	(7.13)	(7.91)	(7.07)	(6.15)	(5.81)	(5.80)

avg_wh_formalcare3	27.81	28.02	28.69	28.86	29.10	29.66
	(6.39)	(6.18)	(5.20)	(5.37)	(5.30)	(4.51)
households_2children	10.18	10.09	10.21	10.20	10.02	9.98
	(1.56)	(1.63)	(1.60)	(1.55)	(1.52)	(1.48)
households_3children	3.50	3.30	3.35	3.34	3.28	3.25
	(1.59)	(1.61)	(1.52)	(1.50)	(1.44)	(1.37)
noleis	16.03	14.11	13.50	13.55	12.76	12.33
	(8.93)	(7.46)	(7.67)	(7.80)	(7.47)	(7.12)

Table IIb: mean and standard deviation for the variables used as controls, by year

	T					
	2014	2015	2016	2017	2018	2019
GDP_percapita	27840.48	28688.57	29192.38	29926.19	30557.62	31086.19
	(17203.50)	(17626.42)	(17926.15)	(17966.75)	(18008.39)	(18101.28)
median_age	41.54	41.80	42.03	42.26	42.50	42.73
	(2.12)	(2.12)	(2.13)	(2.13)	(2.17)	(2.19)
suicide_rate	14.12	13.58	12.61	12.52	12.12	11.89
	(5.66)	(5.70)	(5.37)	(5.11)	(4.47)	(4.34)
life_exp	80.23	80.09	80.39	80.45	80.56	80.91
	(2.76)	(2.68)	(2.68)	(2.59)	(2.59)	(2.54)

Table III: ranking of the countries according to the average WLB score in 2014-2019 and its standard deviation

Rank	Country	Mean	S.D.
1°	**Denmark**	1.54	0.09
2°	**Sweden**	1.31	0.07
3°	**Luxembourg**	1.28	0.07
4°	Netherlands	1.27	0.13
5°	Finland	0.81	0.15
6°	Germany	0.64	0.06
7°	Austria	0.35	0.06
8°	Ireland	0.35	0.09
9°	Belgium	0.34	0.09
10°	France	0.27	0.08
11°	Estonia	0.14	0.11
12°	Slovenia	-0.03	0.13
13°	Portugal	-0.39	0.16
14°	Latvia	-0.56	0.09
15°	Hungary	-0.67	0.19
16°	Spain	-0.71	0.05
17°	Lithuania	-0.73	0.08
18°	Slovak Republic	-0.76	0.04
19°	**Poland**	-0.92	0.08
20°	**Italy**	-0.95	0.15
21°	**Greece**	-2.58	0.23

Table IV: regression table

VARIABLES	(1) ln_prod	(2) ln_prod	(3) ln_prod	(4) ln_prod	(5) ln_prod
wlb	0.427***	0.090***	0.088***	0.053	0.055**
	(0.115)	(0.024)	(0.022)	(0.033)	(0.021)
GDP_percapita			0.000***		0.000***
			(0.000)		(0.000)
median_age				0.044**	0.033**
				(0.018)	(0.012)
life_exp				0.058**	0.028
				(0.025)	(0.020)
suicide_rate				-0.004	-0.007
				(0.004)	(0.004)
Constant	24.240***	24.170***	23.708***	17.727***	20.224***
	(0.086)	(0.011)	(0.031)	(2.446)	(1.774)
R-squared	0.536	0.717	0.847	0.821	0.903
Adj. R2	0.532	0.703	0.838	0.807	0.895
F-test	13.89	44.73	318	39.25	397.1
State FE	NO	YES	YES	YES	YES
Year FE	NO	YES	YES	YES	YES
Number of N		21	21	21	21
Observations	126	126	126	126	126

State-clustered standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.10

Table V: Comparison between Netherlands, France, Austria, Ireland, Denmark, Greece and Italy

Country	WLB	unrate	worklife_duration	avg_weekworkh	lenpaid_fathleave	lenpaid_mothleave	avg_holidays	noleis
Netherlands	1.27	6.4	40.2	30.3	4.8	16.0	13.5	9.2
France	0.27	9.6	35.1	37.3	28.0	16.0	9.5	13.0
Austria	0.35	5.8	37.1	36.5	8.7	16.0	8.5	10.0
Ireland	0.35	8.0	36.6	36.1	1.0	42.0	8.4	13.3
Denmark	1.54	5.9	39.18	33.5	2.0	18.0	11.6	7.8
Greece	-2.58	22.5	32.6	42.0	0.4	43.0	4.2	28.1
Italy	-0.95	11.4	31.4	37.1	0.5	21.7	3.3	14.9