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ORIGINAL ARTICLE

Determinants of Country-Level Employee Overqualification: A Configurational Approach

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Abstract

We build on the configurational approach to identify patterns of macro contextual factors leading to high country-level employee overqualification. We differentiate between subjective and objective employee overqualification and establish that each is caused by different configurations of macro factors. We also identify country-level overqualification archetypes and link specific countries with respective archetypes. We find that a country's non-vocational education system is a necessary condition for high objective overqualification, while objective overqualification itself is not a necessary condition for perceived overqualification. We discuss theoretical implications and offer policy implications.

Keywords: Objective overqualification, Perceived overqualification, Context, QCA, Configurations, Archetypes

JEL classification: J2

Introduction

Employee overqualification is a pervasive global phenomenon and a growing problem, as many countries will face shortages of qualified workers in 2030 (Starck et al., 2014). Already today more than 21% of workers in many OECD countries are overqualified for their current occupations (OECD, 2013c).

Overqualification has many negative consequences at the level of the individual employee and the organization. At the employee level, overqualification has been associated with low job satisfaction (Alfes et al., 2016; Maltarich et al., 2011; Zhang et al., 2015), effects on wages such as inequality (Handel, 2003; Di Pietro & Urwin, 2006; OECD, 2013a) or a wage penalty relative to qualification level (Brynin, 2002), increased turnover intentions (Allen, 2001; Erdogan & Bauer, 2009; McKee-Ryan & Harvey, 2011), increased on-the-job search (Quintini, 2011) and psychological stress (CEDEFOP, 2010). At the organizational level, overqualification increases turnover rates and reduces employee productivity (Allen & van der Velden, 2007). It also has a mediating effect on reducing competitive advantage (Quintini, 2011), because it reduces cumulative learning (Lazonick et al., 2014).

With so many negative effects, it is understandable that most of the literature on overqualification (OQ) focuses on mitigating these effects. There are, however, fewer studies on how OQ actually occurs, which leads to a need to address the antecedents of OQ. While antecedents of employee OQ can be addressed at multiple levels, in this paper we focus on antecedents at the macro level. We can easily observe significant differences in country-specific levels of employee overqualification (see OECD, 2013b), but previous research does not seem to be able to explain why this happens. In particular, there is a lack of research addressing this issue at the cross-country level and including countries outside the Western world (Erdogan & Bauer, 2009; Zhang et al., 2015).

Instead of addressing the antecedents in isolation, we adopt the configurational logic and examine configurations of macro factors instead (Furnari

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et al., 2021). Our central research question is *what configurations of macro conditions determine employee overqualification at a country level.* Accordingly, the ultimate goal of this study is to connect the inferred knowledge of individual causal conditions with the causal complexity underlying employee overqualification. Configurational theorizing (Furnari et al., 2021) allows us determine the configurations of macro factors that lead to the occurrence of OQ by country and type.

The originality of this study also lies in its contribution to the emerging overqualification literature by acknowledging the existence of two types of OQ: objective and perceived. In this study, these are not just two different operationalizations of overqualification, but independent concepts with their own theoretical domains, antecedents, and separate literature (Erdogan et al., 2011a; Maltarich et al., 2011). Because of their interdependence, we treat both with the intention of providing a way to integrate the related yet so far disparate literatures.

For these purposes, the study adopted the configurational or set-theoretical approach (Dul, 2015; Furnari et al., 2021; Ragin, 2006; Rihoux & Ragin, 2009) to represent the macro factors as conditions under which the objective or perceived overqualification of employees at the country level actually occur. In this research, the multitude of causal mechanisms that could explain OQ denotes a context or propriety space from which we select theoretically plausible macro factors and determine the configurational patterns that link them and lead to country-level employee OQ. To do this, we use Qualitative Comparative Analysis (QCA).

This study considers OQ as a form of competence mismatch resulting from imbalances between the supply and demand of human capital in the labor market (Handel, 2003) and derived from macro factors of the labor market, education, and culture. Thereby, it includes the stances from assignment theory, career mobility theory and institutionalism, which referred to employee overqualification as temporary or permanent (Quintini, 2011) or both (Kiersztyn, 2013) or as an exclusively individual phenomenon (Budría, 2010; Duncan & Hoffman, 1981). We continue by introducing and integrating these aspects in our theoretical framework in the next section.

1 Theoretical framework

1.1 Objective and perceived overqualification

Overqualification is traditionally defined as education, skills and work experience that exceed those required by the job post or by the employer (Erdogan et al., 2017; Feldman & Maynard, 2011; Khan & Morrow, 1991; Kuhn & Shen, 2012). Acknowledging this general definition for this study, we define objective overqualification (OOQ) following the OECD's qualification mismatch approach where an employee is mismatched when s/he is employed in a job that requires a lower or higher level of qualification/education than s/he has (Zhang et al., 2015). When the difference between the employee's qualification level and the qualification level required in her/his job is positive, s/he is overqualified (OECD, 2016b; Quintini, 2011).

A complete analysis of the antecedents of overqualification should consider both objective and subjective overqualification. In the literature, OOQ has typically been operationalized as over-education (Liu & Wang, 2012), while the subjective, "perceived" overqualification (POQ) concerned employee awareness (Alfes et al., 2016), feelings (Erdogan et al., 2011b; Maynard et al., 2006; Liu et al., 2014) or perceptions (Harari et al., 2017; Johnson & Johnson, 1996) that her/his qualifications exceed his job requirements. Management and organization literature, in particular, has relied extensively on POQ as antecedent. In this study, we differentiate between objective and perceived OQ by acknowledging that the two constructs are linked, yet different (Liu & Wang, 2012).

Very few studies have addressed objective and perceived overqualification simultaneously (Chevalier & Lindley, 2009; Maltarich et al., 2011; Liu & Wang, 2012), although such integration is necessary to provide a full understanding of the phenomenon. Namely, many OQ negative effects are a consequence of the perception of overqualification by employees and are not due to the actual state of being objectively overqualified. While OOQ may seem to be a more accurate representation of overqualification, the employees' perceptions of overqualification do not necessarily reflect an accurate assessment of reality (Alfes et al., 2016), as individuals may easily overstate the requirements of their job to inflate the status of their position (Flisi et al., 2016). The OOQ, on the other hand, does not take into account that people with the same qualifications working in comparable positions often experience diverse levels of POQ (Erdogan et al., 2011b), possibly due to variation in actual job content and the differences in the quality and type of their education and experience (Hu et al., 2015).

1.2 Antecedents of overqualification

The configurational approach proposed in this study was operationalized based on a scarce literature on OQ antecedents. Moreover, it is not always

clear from this literature whether it refers to employee overqualification as OOQ or as POQ. Therefore, antecedents derived from theory will be considered for both types of OQ, unless a clear distinction is made in the respective literature.

Fig. 1 depicts a theoretical model, an actual intersection of relevant theoretical antecedents. It first represents the temporal nature of OQ through frictions between the education system and the state of the labor market, leading to OQ vulnerability of young (tertiary educated) workers or the re-employment of prime-age workers during economic downturns. Second, the regulatory perspective sets OQ as an outcome when rigid employment protection structures the demand for human capital in the labor market. Finally, the cultural antecedents combine to create a double-headed appearance of OQ: from one point of view, set as the norm by employers and to be accepted in weak labor markets; from another, resulting from aggregate and cognitive individual trade-offs between cultural, social, and human capital in the same market.

1.2.1 Labor market aspects of OQ occurrence: the theory of career mobility, assignment theory and workforce dynamism during economic downturns

The OQ is designated as a temporary phenomenon by the theory of career mobility (Sicherman & Galor, 1990), as schooling increases the probability of occupational upgrading by means of higher wages or of higher chances of promotion to occupations with higher wages. Thus, OQ usually affects inexperienced labor market entrants, such as young employees in early career stages (Abraham, 2015; Erdogan et al., 2011a), the low-level jobs taken by students to pay for their studies in time and money (Erdogan et al., 2017) or tide-over jobs that are taken by older workers to earn a sufficient pension income (Erdogan & Bauer, 2009).

Further, during economic downturns the size of labor markets deflates and unemployment grows (ECB, 2014), limiting the availability of jobs, which may lead to higher OQ (Erdogan et al., 2011b). Namely, workers left or dismissed from unionized jobs in manufacturing, many working in shrinking industries and experiencing re-employment after dismissal for lower-paid, less skilled service jobs (Abraham, 2015; Liu & Wang, 2012; McKee-Ryan & Harvey, 2011) are likely to become overqualified. As a consequence, the structure of the economy changes and there is certain mobility between industrial and service sectors leading to OOQ.

In addition, according to assignment theory (Sattinger, 1995), objective OQ is a function of labor market responses to the problem of assigning newcomers to less demanding jobs, which could be attributed to the increasing number of college graduates entering the labor market (Liu & Wang, 2012). Here, we emphasize the rapid population growth in developing and transition countries,

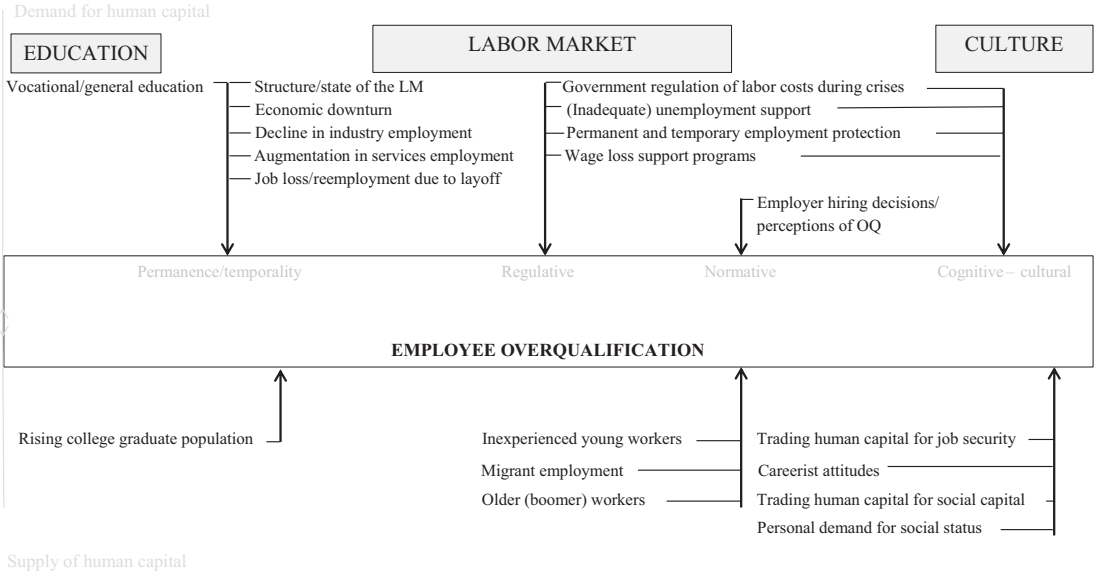

Fig. 1. Theoretical model of overqualification antecedents. Source: Own work.

reflecting an oversupply of educated young employees, which is also reflected in their lower bargaining power and high wage dispersion (Liu & Wang, 2012).

1.2.2 Overprotective labor legislation and OQ occurrence

Given the imbalance between employees' earnings and productivity even before the 2009 recession (Eichhorst et al., 2010), these employees have suffered a further decline in their negotiated wages and incomes (ECB, 2014). To tackle this problem, governments addressed labor costs (McKee-Ryan & Harvey, 2011) and regulated inactivity and employment through unemployment and wage loss support programs and staffed retraining programs to meet the new demands of the labor market (Eichhorst et al., 2010).

Next, in segmented labor markets, where a permanent contract is a particularly valuable asset for employees, human capital can be traded for job security, and paradoxically, OQ is more likely to occur among permanent than temporary workers (Ortiz, 2010). Nonetheless, OQ also likely occurs among directly hired temporary workers (Liu & Wang, 2012), suggesting that during an economic crisis, this kind of work arrangements can also lead to OQ. The rigidity of labor legislation relates to both permanent and temporary employment relationships, as there are measures to protect each of them, as well as measures against mass dismissals. However, this may have exacerbated OQ, as the initial rigidity of laws against the dismissal of employees and the hiring of temporary workers could increase the unemployment rate in crisis times.

Diamond (2011) stressed that the question of whether a person who is considered qualified for a particular job may depend on the situation on the labor market. For example, employers who may not consider a candidate for a particular job in a weak labor market would hire him and provide him with the necessary training in a tight labor market. Although employers consider qualifications and value OQ (Akkoyunlu et al., 2012), managers often question why candidates apply for jobs for which they are overqualified (Maynard et al., 2006). Paradoxically, employers who expect layoffs to be curtailed may be reluctant to hire at all, even in good times, given overly protective legislation, by reducing hiring rates, although, in a weak labor market, the unemployed could reject job offers that they would otherwise find acceptable (Tasci & Zenker, 2011).

To sum up, the OQ results due to rigidity as differences between labor market institutions and the policies that regulate the interactions between labor markets. Flexible labor markets keep unemployment lower in the long run (Tasci & Zenker, 2011), but also act as a deterrent for employers who anticipate labor market conditions and its rigidity in hiring. Indeed, since the mismatch between education and skills is pervasive (Kulkarni et al., 2015), persistent (CEDEFOP, 2010) and linked to labor market structure (Brynin, 2002), the policies that focus only on the current employment situation ignore the dynamics of growing economies (Hampf & Woesman, 2017).

1.2.3 Institutionalism, normative and educational perspectives on OQ occurrence

The institutionalist stance on OQ (Scott, 2014) considers qualification (mis)match occurring when its antecedents cumulate in both human systems and organizational contexts of organizations. This approach stresses that organizational practices achieve legitimacy through social processes by which individuals come to accept shared definitions of reality (Swiss, 1982) or which take on rule-like status in social thought and action (Meyer & Rowan, 1977).

Correspondingly, OQ could also be such an accumulation of employees' beliefs and values resulting from such common way of thinking (Palthe, 2014). Thus, labor market rigidity could affect OOQ through employers' perceptions and hiring decisions, and it could influence POQ through employees' perceptions of quality through which they choose a job for which they are overqualified. Employers' requirements may have risen faster than graduation trends (Handel, 2003), they may have re-categorized jobs that require a degree (Di Pietro & Urwin, 2006), or they may ultimately not hire workers, because of job search and withdrawal. In all of these cases, employers set overqualification as the norm that must be accepted by jobseekers and employees.

The literature which pays attention to the extent to which the mismatch between employees in general varies according to the type of education (Allen & van der Velden, 2007) adds to this argument. Namely, vocational training is seen as improving the transition from school to work and an initial employment advantage, but it becomes a disadvantage later in life compared to people with general education (Hanushek et al., 2016). It also reduces the adaptability of older employees to

economic change (Hampf & Woessmann, 2017). Also, while general education only ensures good horizontal match, vocational qualifications reduce vertical or horizontal mismatch (Allen & van der Velden, 2007). Therefore, the classification of a country's education system as general or less vocational seems to precede OOQ.

1.2.4 Cultural macro-factors preceding the OQ

The cultural antecedents designate the OQ occurrence due to co-occurrence of multiple individual characteristics such as belongingness to a particular population group (Erdogan et al., 2011a) or discrimination on grounds of demography (Alfes et al., 2016) as are migrant workers and older people (OECD, 2013a). Migrant employees, for example, are prone to OQ due to the extent to which their foreign education is recognized or to the existing language barriers (Allen & van der Velden, 2007; OECD, 2016a, b), while older employees rarely benefit from HR practices across organizations (Dychtwald et al., 2004).

Individual characteristics can aggregate and reflect OQ at the macro level from a cultural and cognitive point of view. From a cultural perspective, OQ arises at macro-level from pent-up individual personalities (Zhang et al., 2015), particularly careerist attitudes (De Vos et al., 2009) or narcissism (Liu & Wang, 2012). These lead the personal desire for social status to override the rational calculus of the value of education (Brynin, 2002) or to the achievement of an individual psychological contract (Erdogan et al., 2017) by adopting OQ jobs based on individual career history (Alfes et al., 2016) or personal work preferences (McKee-Ryan & Harvey, 2011).

From a cognitive perspective, OQ often occurs in aggregation due to imperfect information about job requirements (Erdogan & Bauer, 2009). OQ in particular may also be due to multiple individual trade-offs between benefits and costs (Stojanov, 2012), such as the degree of freedom of choice of the OQ candidate (Erdogan et al., 2011b) to tradeoff between the attractiveness of a current job and the availability of alternatives (Shaw et al., 1998). Also, POQ is generally believed to be caused by OOQ (Feldman et al., 2002; Liu & Wang, 2012).

Finally, we stress the employee' gender as an ambiguous OQ antecedent (Liu & Wang, 2012; McKee-Ryan & Harvey, 2011). It is initially considered that women are more likely to be more often overqualified than men (Luksyte et al., 2011) by settling for low salary to balance family duties (McKee-Ryan & Harvey, 2011), which exemplifies the "trading" human capital for social benefits and social capital (Erdogan et al., 2011a). Inversely, Erdogan and Bauer (2009) and Maynard et al. (2006) stressed that male employees actually perceived higher levels of OQ. This paradox also ranges from both genders being equally prone to OQ (OECD, 2016b), up to a near−zero correlation between gender and POQ (Johnson & Johnson, 1996; Luksyte et al., 2011).

1.3 Configurational approach to country-level employee overqualification

1.3.1 Configurational view on overqualification antecedents

According to Cress and Snow (2000, p.1077), it is important to establish the general context of OQ occurrence: "One of the main difficulties in assessing the factors that theoretically influence the achievement of outcomes is to operationalize them in a way that is consistent with the literature and yet relevant to the local context".

Employee overqualification (as OOQ and POQ) occurs in different countries (OECD, 2015c) and affects the way individuals experience their work in organizations (Oldham & Hackman, 2010). According to Selznick (1948, p. 256−257) "all organizational action is driven by cultural-cognitive, normative, and regulatory elements of institutions". Action is a product of the institutional context and not context-free, but constrained (bounded) and shaped by the setting in which it occurs. This is also in line with Johns' (2006) definition of context. If we apply his definition to our specific case, macro context can be seen as a set of situational opportunities and constraints that influence the occurrence and meaning of employee overqualification (objective, subjective).

If one sees country context in this way, set-theoretic logic along with configurational approach are well suited to explain such a causally complex phenomenon (Furnnari et al., 2021). Using this approach, we can build on a preselected set of theoretically plausible factors (see previous section and Fig. 1 as a summary) to explain the occurrence of OQ by examining the role of combinations of macro factors or configurations. The configurational (set-theoretic) approach seems to be superior to the correlational approach in accomplishing this. Indeed, while the net effects/correlation statistics approach focuses on the independent effects of causal conditions on the outcome and cannot unravel the causally complex nature (Pustovrh & Jaklič, 2014), the configurational approach establishes clear links between specific combinations of conditions and the outcome (Ragin, 2009).

1.3.2 Qualitative comparative analysis (QCA)

QCA starts from the premise that causation is not easily unraveled, because outcomes of interest rarely have any single cause, rarely operate in isolation, and a specific causal attribute may have different and even opposite effects depending on the other factors (Greckhammer et al., 2007). Developed by Charles Ragin (2009) QCA seeks to identify the common causal conditions underlying a particular outcome by examining the attributes of cases exhibiting that outcome.

The causality in QCA is complex, equifinal, asymmetric and conjectural and it is based on set-theoretic relationships, making use of the concepts of necessary and sufficient conditions. It uses combinatorial logic relying on Boolean algebra and considers only the relations of necessity and sufficiency between antecedents and an outcome. With necessity, the outcome is a subset of the causal condition; with sufficiency, the causal condition is a subset of the outcome. A causal condition is necessary if it appears in all the configurational patterns producing the outcome, but cannot predict the outcome by itself. Alternatively, the sufficient conditions are able to solely predict the outcome, but might not be the only ones with this propriety (Legewie, 2013).

To assess necessity and sufficiency, QCA uses two parameters. Consistency refers to the degree to which a relation of necessity or sufficiency between a causal condition and an outcome is met within a given data set (Ragin, 2006) or the degree to which solution terms and the solution as a whole are subsets of the outcome. Coverage, on the other hand, assesses the degree to which a cause or causal combination "accounts for'' instances of an outcome (Ragin, 2006; Rihoux & Ragin, 2009) or how much of the outcome is covered (or explained) by each solution term and by the solution as a whole.

2 Methodology

2.1 The data and the sources

We build on the OECD and international labor organization (ILO) data, primarily PIAAC (Program for international assessment of adult competencies, OECD, 2013a), but also resorted to national reports where needed. In the two rounds of PIAAC (2013 and 2015), more than 255,000 respondents from 33 countries provided rich data adults' proficiency in key information-processing skills and in various "generic" skills (OECD, 2013a). They also provided individual socio-economic data, among which they reported whether their qualifications match their work requirements. For this study, we considered working age population (aged 15–64) from 27 participating countries. We excluded six countries due to the unavailability of data on key causal conditions. In addition, country-level data was queried from the ILO and annual OECD reports on education (OECD, 2017; OECD, 2018), migration (OECD, 2015a), employment protection legislation for the year 2013 or the nearest available.

2.2 Variables

The theoretical antecedents of the overqualification from Fig. 1 were streamlined into a new, macro-configurational model (Fig. 2) of employee OQ, considering apart six causal conditions for the OOQ and five for the POQ as outcomes.

2.2.1 Outcomes

The outcome POQ is created from the PIAAC questionnaire as a sum of the cross-tabulations of the respondent's stated (perceived) necessity of his/her highest level of education in order to satisfactorily do his/her current job. To put it differently, all the respondents who stated that a lower qualification than the one they have is necessary for doing their job satisfactorily were set as "perceiving themselves as overqualified".

The OOQ was operationalized as any positive difference between the highest acquired level of education and the job-required educational level, both measured on the ISCED scale (OECD, 1999; UNESCO, 1976). For the purpose, all the formal education levels were collapsed into four clusters: lower- and upper-secondary, post-secondary (non-tertiary) and tertiary education (see Appendix, *Table A1*).

2.2.2 Causal conditions

2.2.2.1 Labor market. The Risk categories causal condition (causal condition RISK) embeds the employees prone to overqualification due to labor market discrimination. It is computed as a sum, a cumulative percent of labor force participation (LFP) of the labor market categories: young workers aged 15–24, "boomer" workers aged 55–64 and migrant (or foreign-born) workers (OECD, 2015b).

The LFP migrant percent was firstly counted as number (in 1000s) of foreign population share in total population from the ILOSTAT databases and then multiplied by its LFP rate from the OECD database (LFP rate/100). The migrant LFP rate along with other secondary data were sourced for the year 2013, except Chile with 2014 data (OECD, 2015a), France (2014), Israel (2014), Lithuania (2014), Ireland (2012), Poland and Turkey as in 2005. In Japan, the labor force

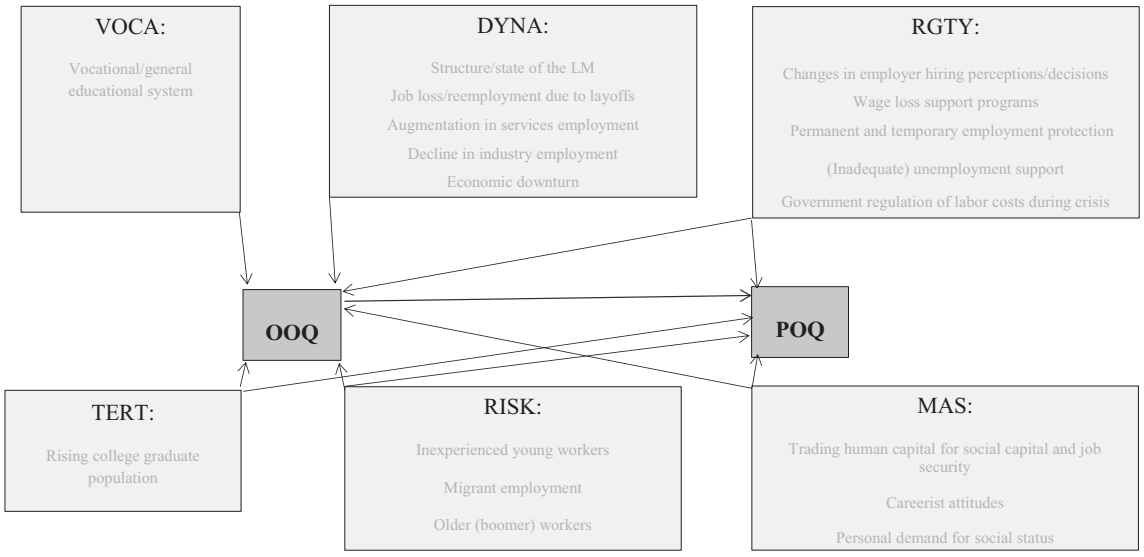

Fig. 2. Macro-configurational model on overqualification antecedents. Source: own work. Note: Legend: VOCA = country's education system is vocational; DYNA = workforce turnover between industrial and services sectors; RGTY = Rigid employment protection legislature; TERT = augmentation of tertiary educated workers on the labor market; RISK = labor force participation rate of oldest, youngest, and migrant workers, combined; MAS = country's masculinity index.

participation rate of foreign population was not known, so their LFP is calculated from the aged 15–64 working population overall LFP rate in the country.

Next, the OECD publishes an Employment protection legislation (EPL) index that categorizes countries as rigid or flexible in terms of measures against individual or collective dismissal (OECD, 2013b). This Rigidness of employment protection legislation (RGTY) considers the rigidity against individual dismissal of permanent and temporary workers, with accenting rigidity against temporary employment or collective dismissal, again for the year 2013. The exceptions years are for Slovenia (2014), Great Britain (2014) and Lithuania (2015).

The Dynamism (causal condition DYNA) or workforce turnover from industry to services sector between 2007 (the Economic crisis debut) and 2013 (the crisis end), is the next causal condition. In a general pattern, besides Turkey, during the Crisis, all other countries from the sample had a decline in industry employment and an augmentation in services employment. For Estonia, the data for the constituting causal condition are taken for 2012 and as for Lithuania, the data are drawn from The World bank database.

2.2.2.2 *Education*. Two causal conditions were created for education. The first one is the rising labor force participation rate as LFP of tertiary educated population entering the labor market for the period 2007–2013 (OECD, 2018) (TERT). The second causal condition is the vocational or general nature of a country's educational system (VOCA). However, as the definition of vocational education differs across countries, the Hanushek et al. (2016) approach was implemented. If a country's educational system has a score of at least 50 in vocational EAG scores (OECD, 2017) or if it's apprenticeship programs score was substantively high (like for Germany and Denmark), the country's education system was designated as "vocational". Also, the OOQ was used as a causal condition for the POQ. The causal conditions DYNA and VOCA were used solely in the configurations for the OOQ.

2.2.2.3 *Culture*. The culture itself is a candidate for the precursors of overqualification levels and types; here is the emphasized masculinity versus femininity index (MAS) or the aggregated emotional implications of being born as a girl or boy (Schooler & Hofstede, 1983). It is the index of a country's preference for performance, heroism, assertiveness and material rewards for success rather than cooperation, modesty, caring for the weak and quality of life.

It is primarily concerned with gender differences in the propensity to over-qualify, the trade-off between human and social capital/benefits or discrimination against older people and migrants in the labor market. Reference is also made to the personal psychological contract when faced with work or the search for a job for which one is overqualified. MAS also includes the trade-off between personal costs and benefits, or individual work preferences embedded in quality perceptions.

Table 1. Descriptive overview of the dataset.

COUNTRY	OOQ	POQ	RISK	RGTY	DYNA	VOCA	TERT	MAS
AUT	20.979	16.502	31.729	2.369	7.511	70	4.65	79
BEL	15.798	23.514	24.276	1.892	7.062	60	3.44	54
CAN	26.841	21.061	44.643	0.920	5.958	8	4.79	52
CHI	16.345	15.794	15.657	2.626	21.447	29	3.97	28
CZE	20.623	25.686	13.038	2.924	5.959	73	6.73	57
DNK	18.386	15.455	25.371	2.198	5.550	50	4.53	16
EST	26.507	17.290	37.079	1.809	6.600	36	4.20	30
FIN	16.762	23.874	17.823	2.166	5.454	71	4.19	26
FRA	31.330	24.256	19.208	2.384	4.997	41	5.46	43
GBR	25.733	26.855	24.296	1.095	8.361	40	6.36	66
GER	23.165	21.808	24.513	2.678	6.822	51	4.17	66
GRE	20.954	15.548	19.109	2.119	22.177	30	4.53	57
IRL	27.172	20.554	30.680	1.396	11.787	27	9.08	68
ISR	32.489	19.304	62.313	2.035	28.262	41	3.83	47
ITA	13.265	15.852	19.923	2.678	6.219	56	2.71	70
JPN	31.069	22.301	10.198	1.369	3.718	23	6.29	95
KOR	21.221	28.176	8.822	2.369	7.965	18	8.50	39
LTU	26.473	23.933	10.337	2.448	35.040	27	6.27	19
NDL	14.848	15.448	21.935	2.821	6.300	69	3.07	14
NZL	33.823	28.626	53.456	1.392	5.949	32	4.80	58
NOR	19.756	18.466	27.875	2.333	6.844	50	5.57	8
POL	16.370	26.856	10.026	2.230	4.845	50	7.07	64
SVK	18.034	21.173	8.656	1.841	7.694	69	5.44	100
SVN	11.752	14.188	16.356	2.603	6.882	67	5.65	19
SPA	21.741	17.792	27.548	2.047	16.055	35	4.46	42
SWE	18.741	23.466	22.336	2.607	7.351	38	5.71	5
TUR	11.587	13.100	15.934	2.309	18.151	49	4.62	45
mean	21.547	20.625	23.820	2.068	10.406	44.815	5.188	46.926
QCA threshold	**21.698**	**20.625**	**23.820**	**2.044**	**10.406**	**≥50**	**5.188**	**50.166**

Note: * Legend: VOCA = country's education system is vocational; DYNA = workforce turnover between industrial and services sectors; RGTY = Rigid EPL; TERT = augmentation of tertiary educated workers on the labor market; RISK = LFP rate of oldest, youngest, and migrant workers, combined; MAS = country's masculinity index.
OOQ, POQ, RISK, DYNA and TERT are expressed as a percentage, RGTY, VOCA and MAS are index numbers.
Source: Own work.

2.3 The procedure and analysis

The purpose of crisp-set QCA (hereafter csQCA) was to identify the necessary or sufficient subset conditions between our data set and the attributes relying on the theoretical background of the over-qualification antecedents. All the causal conditions' values were dummy-coded or dichotomized upon a conservative threshold value (mainly an OECD average was used, see Table 1) or upon the mean values of the data set for the causal condition we have created.

The causal condition with values below the set QCA threshold value were coded as "0" (or in Boolean logic as "missing", "not member" of a configuration), and those with values above the threshold value were coded as "1". The result is the "truth table" (Table 2), in which 15 countries had high POQ (low POQ was referred to as ~ POQ), while 11 countries had high OOQ (low OOQ was referred to as ~ OOQ). Once the causal conditions were entered, the data were analyzed as a crisp-set (cs) QCA (Ragin, 2009). There, in a three stage process of csQCA, the first step considered the causal conditions (macro factors) for the both outcomes OOQ and POQ to be present or absent. The threshold for the factors to be included into the analysis is a coverage benchmark of $\geq$0.5 and a consistency benchmark of $\geq$0.9 (Ragin, 2006).

In a second stage, as the csQCA software generally assesses relations of sufficiency, it unveils necessity relations in very peculiar circumstances. Furthermore, for all the outcomes (OOQ, ~OOQ, POQ and ~POQ) there exist "remainder" and "contradictory" rows (Appendix, Tables A2–A5.1), which signal that the respective truth tables are not fully specified. Therefore, not all the causal conditions are to be designated in QCA as "necessary" and a necessity analysis is by rule the first one to be manned (Schneider & Wagemann, 2010). In result, it was established that solely ~ VOCA is the necessary condition for high OOQ (~VOCA ← OOQ, Table 3).

In a third stage, csQCA performs a truth table and counterfactual analyses and then selects the

Table 2. Overview of the csQCA truth table.

COUNTRY	OOQ	POQ	RISK	RGTY	DYNA	VOCA	TERT	MAS
AUT	0	0	1	1	0	1	0	1
BEL	0	1	0	0	0	1	0	1
CAN	1	1	1	0	0	0	0	1
CHI	0	0	0	1	1	0	0	0
CZE	0	1	0	1	0	1	1	1
DNK	0	0	0	1	0	1	0	0
EST	1	0	1	0	0	0	0	0
FIN	0	1	0	1	0	1	0	0
FRA	1	1	0	1	0	0	1	0
GBR	1	1	0	0	0	0	1	1
GER	1	1	0	1	0	1	0	1
GRE	0	0	0	1	1	0	0	1
IRL	1	1	1	0	1	0	1	1
ISR	1	0	1	0	1	0	0	0
ITA	0	0	0	1	0	1	0	1
JPN	1	1	0	0	0	0	1	1
KOR	0	1	0	1	0	0	1	0
LTU	1	1	0	1	1	0	1	0
NDL	0	0	0	1	0	1	0	0
NZL	1	1	1	0	0	0	1	1
NOR	0	0	1	1	0	1	1	0
POL	0	1	0	1	0	1	1	1
SVK	0	1	0	0	0	1	1	1
SVN	0	0	0	1	0	1	1	0
SPA	1	0	1	1	1	0	0	0
SWE	0	1	0	1	0	0	1	0
TUR	0	0	0	1	1	0	0	0

Table 3. Necessity relationship analysis.

Causal condition	Outcome							
	OOQ		~ OOQ		POQ		~ POQ	
	consistency	coverage	consistency	coverage	consistency	coverage	consistency	coverage
OOQ	/	/	/	/	0.533333	0.727273	0.250000	0.272727
~ OOQ	/	/	/	/	0.466667	0.437500	0.750000	0.562500
TERT	0.454545	0.416667	0.437500	0.583333	0.666667	0.833333	0.166667	0.166667
~ TERT	0.545455	0.400000	0.562500	0.600000	0.333333	0.333333	0.833333	0.66666
RISK	0.727273	0.666667	0.250000	0.333333	0.400000	0.500000	0.500000	0.500000
~ RISK	0.272727	0.200000	0.750000	0.800000	0.600000	0.600000	0.500000	0.400000
RGTY	0.363636	0.222222	0.875000	0.777778	0.533333	0.444444	0.833333	0.555556
~ RGTY	0.636364	0.777778	0.125000	0.222222	0.466667	0.777778	0.166667	0.222222
MAS	0.545455	0.461538	0.437500	0.538462	0.666667	0.769231	0.250000	0.230769
~ MAS	0.454545	0.357143	0.562500	0.642857	0.333333	0.357143	0.750000	0.642857
DYNA	0.363636	0.571429	0.187500	0.428571	/	/	/	/
~ DYNA	0.636364	0.350000	0.812500	0.650000	/	/	/	/
VOCA	0.090909	0.083333	0.687500	0.916667	/	/	/	/
~ VOCA	0.909091	0.666667	0.312500	0.333333	/	/	/	/

smallest number of combinations that will cover all the positive instances of the outcome (Boolean minimization). This minimization provided certain "primitive expressions" leading to a final configuration-patterns that explain OOQ and POQ. During minimization, however, discrepancies arose between the primitive expressions of a final solution-configuration. For this reason, by relying on the extant literature, the causal conditions were set both as "present" and absent for the POQ/~POQ as outcomes. This was done in order to isolate "prime implicants" that are logically redundant. As for the high OOQ, we inputted only the causal condition VOCA to be absent.

Table 4. Configurations for OOQ.

Causal conditions	**High objective overqualification (OOQ)**			**Low objective overqualification (~ OOQ) ***				
	a	b	c	a	b	c	d	e
risk categories	■					□	■	□
rigidity		□	■	■		■	□	■
dynamism			■			○		●
vocational education	□	□	□	■	■	■	■	□
tertiary education LFP		■	■		■			□
masculinity		●	○	□	■		■	
raw coverage	0.636364	0.272727	0.090909	0.3125	0.1875	0.375	0.0625	0.1875
unique coverage	0.454545	0.090909	0.090909	0.125	0.0625	0.0625	0.0625	0.1875
consistency	1	1	1	1	1	1	1	1
solution coverage		0.818182				0.8125		
solution consistency		1				1		

■ Core condition present ● Complementary condition present

□ Core condition absent ○ Complementary condition absent

* The "~" sign denotes a negated, absent causal condition or a causal condition having a value lower than its threshold in csQCA.

Finally, csQCA presents three[1] solutions to each truth table analysis: "complex" solution (Appendix, Tables A2–A5.1), a "parsimonious" solution and an "intermediate" solution. The latter was used for dealing with logical remainders and for interpreting the resulting configurations patterns.

All causal conditions appearing in both the parsimonious and intermediate solutions were designated as "core" conditions, whereas the causal conditions appearing only in intermediate solutions are "complementary" conditions (Ragin, 2009). The conditions appearing in all the configurations leading to the same outcome were designated as necessary conditions.

3 Results

The configurational patterns (Table 4) for the high OOQ and low OOQ (~OOQ) relied on configurations which cover 9 of the OOQ countries and 13 of the low (~) OOQ countries. These respective configurations relied incorporated 3 and 5 configuration patterns respectively (named "a" to "c" and "a" to "e"), which are showed in detail in Tables 5 and 6.

The high OOQ at the country level is coherently explained by three configuration patterns (a, b and c, Table 4. This illustrates equifinality as a feature of QCA when multiple configurations (patterns) lead to the same result. Among them, configuration

[1] The "complex" solution avoids using any rows without cases – "remainders" (counterfactual cases were eliminated upon our own input), a "parsimonious" solution, uses only the remainders that will yield simpler (or fewer) patterns and an "intermediate" solution, which uses only the remainders that survive counterfactual analysis (Legewie, 2013).

Table 5. Configurations for high OOQ.

Model: OOQ = f(RISK, RGTY, DYNA, VOCA, TERT, MAS)
INTERMEDIATE SOLUTION: frequency cutoff: 1.0000 consistency cutoff: 1.0000
Assumptions: RISK (present) RGTY (present) DYNA (present) ~VOCA (absent) TERT (present)
RISK*~VOCA + ~RGTY*~VOCA*TERT*MAS + RGTY*DYNA*~VOCA*TERT*~MAS → OOQ

	Raw coverage	Unique coverage	Consistency	Cases with greater than 0.5 membership in term
RISK*~VOCA	0.636364	0.454545	1	CAN, EST, GBR, IRL, ISR, NZL, SPA
~RGTY*~VOCA*TERT*MAS	0.272727	0.090909	1	GBR, IRL, JPN
RGTY*DYNA*~VOCA*TERT*~MAS	0.090909	0.090909	1	LTU
solution coverage: 0.818182				
solution consistency: 1				

pattern "a" (Table 5) has the highest raw/unique coverage and covers five countries and designates the high OOQ as occurring in countries with high LFP of risk categories and non-vocational education systems.

The ~ OOQ at the country level is explained by five configuration patterns (a–e, Table 4). Among these equifinal patterns, the configuration pattern "c" (Table 6) has the highest raw/unique coverage and covers seven country relationships and denotes the low OOQ to occur in countries with low risk categories LFP, low dynamism of intersectoral workforce turnover, rigid EPL and vocational education system.

As for the POQ, the configurational patterns (Table 7) relied on configurations which cover 11 of the high POQ countries and 8 of the low (~) POQ countries. These configurations incorporated 4 and 3 configuration patters respectively (a to c and a–e), which are shown in detail in Tables 7 and 8 Before proceeding to the standard QCA analyses, prime implicants emerged for the high POQ, according to which a decision in the prime implicants chart was made (Appendix, *Table A6*).

The high POQ is explained by four configuration patterns (a–d, Table 7). Among them, the configuration pattern "a" (Table 8) has the highest raw/unique coverage value and covers seven countries by designating for the high POQ to occur in countries having high augmentation of LFP of tertiary educated workers and strong masculinity index.

The ~ POQ is explained by three configuration patterns (a–c, Table 7). Among them, the configuration pattern "c" (Table 9) has the highest fit parameter values and covers three countries by designating for the low POQ to occur in countries having low share of overeducated employees, rigid EPL, low augmentation of LFP of tertiary educated workers and strong masculinity index.

From this section, it is evident that the resulting QCA configurations made a distinction on OQ configurations of antecedents in three ways: between high and low OOQ and POQ, on a country level and between countries.

4 Discussion

In this paper, we aimed to identify configurational patterns composed of macro factors that lead to the occurrence of employee overqualification at the country level. Our study was based on a macro factorial, contextual and set-theoretic approach in

Table 6. Configurations for low OOQ.

Model: ~OOQ* = f (RISK, RGTY, DYNA, VOCA, TERT, MAS)
INTERMEDIATE SOLUTION: frequency cutoff: 1.000000 consistency cutoff: 1.000000
Assumptions: TERT (present) ~VOCA (absent) DYNA (present) RGTY (present) RISK (present)
RGTY*VOCA*~MAS + VOCA*TERT*MAS + ~RISK*RGTY*~DYNA*VOCA + RISK*~RGTY*VOCA*MAS + ~RISK*RGTY*DYNA*~VOCA*~TERT → ~OOQ

	Raw coverage	Unique coverage	Consistency	Cases with greater than 0.5 membership in term
RGTY*VOCA*~MAS	0.3125	0.125	1	DNK, FIN, NDL, NOR, SVN
VOCA*TERT*MAS	0.1875	0.0625	1	CZE, POL, SVK
~RISK*RGTY*~DYNA*VOCA	0.375	0.0625	1	CZE FIN, ITA, NDL, POL, SVN
RISK*~RGTY*VOCA*MAS	0.0625	0.0625	1	BEL
~RISK*RGTY*DYNA*~VOCA*~TERT	0.1875	0.1875	1	CHI, GRE, TUR
solution coverage: 0.8125				
solution consistency: 1.000000				

Table 7. Configurations for perceived overqualification (POQ).

Causal conditions	**High perceived overqualification (POQ)**				**Low perceived overqualification (~ POQ)***		
	a	b	c	d	a	b	c
objective overqualification			■	■	■		□
rigidity		□	■			■	■
tertiary education LFP	■		■				□
risk categories		●		●	■	■	
masculinity	■	■		■	□	□	■
raw coverage	0.4	0.333333	0.133333	0.333333	0.25	0.25	0.25
unique coverage	0.266667	0.0666667	0.133333	0.0666667	0.166667	0.166667	0.25
consistency	1	1	1	1	1	1	1
solution coverage	0.8				0.666667		
solution consistency	1				1		

■ Core condition present ● Complementary condition present

□ Core condition absent ○ Complementary condition absent

* The "~" sign denotes a negated, absent causal condition or a causal condition having a value lower than its threshold in csQCA.

consideration of the sparse existing literature on country-level employee overqualification. Using configurational logic and QCA procedures, we showed how antecedents embedded in the labor market, education, and culture act as causal conditions that explain the occurrence and absence of overqualification, both objectively and as perceived by employees.

Considering the configurational patterns leading to high OOQ, we observed that it is specific for the countries with general educational systems. This causal condition appears in all the configurations and in all the solutions (complex, intermediary, parsimonious), and it was also confirmed during the initial necessity analysis. Hence, a first key proposition from of our research is that *non-vocational or*

Table 8. Configurations for high POQ.

Model: POQ = f (MAS, TERT, RGTY, RISK, OOQ)
INTERMEDIATE SOLUTION: frequency cutoff: 1 consistency cutoff: 1
Assumptions: OOQ (present) RISK (present) RGTY (present) TERT (present)
TERT*MAS + RISK*~RGTY*MAS + OOQ*RGTY*TERT + OOQ*RISK*MAS → POQ

Causal conditions	Raw coverage	Unique coverage	Consistency	Cases with greater than 0.5 membership in term
TERT*MAS	0.4	0.266667	1	CZE, GBR, IRL, JPN, POL, SVK
RISK*~RGTY*MAS	0.333333	0.0666667	1	BEL, CAN, GBR, IRL, NZL
OOQ*RGTY*TERT	0.1333333	0.133333	1	FRA, LTU,
OOQ*RISK*MAS	0.333333	0.0666667	1	CAN, GBR, GER, IRL, NZL
solution coverage: 0.8				
solution consistency: 1				

Table 9. Configurations for low POQ.

Model: ~POQ = f (OOQ, RISK, RGTY, TERT, MAS) COMPLEX SOLUTION: frequency cutoff: 1 consistency cutoff: 1				
	Raw coverage	Unique coverage	Consistency	Cases with greater than 0.5 membership in term
OOQ*RISK*~MAS	0.25	0.166667	1	EST, ISR, SPA
RISK*RGTY*~MAS	0.25	0.166667	1	DNK, NOR, SPA
~OOQ*RGTY*~TERT*MAS	0.25	0.25	1	AUT, GRE, ITA
solution coverage: 0.666667 solution consistency: 1				

Table 10. Cross-country overview of objective and perceived overqualification.

		Objective overqualification	
		High	Low
Perceived overqualification	High	**CAN, GBR, IRL, JPN, LTU, NZL** (RISK*~VOCA*MAS + RISK*~VOCA*~RGTY*MAS + RGTY*~VOCA*OOQ*RGTY*TERT + RISK*~VOCA *OOQ*MAS + ~VOCA*TERT*MAS*DYNA + ~VOCA *TERT*MAS*~RGTY)	**CZE, POL, SVK** (RGTY*VOCA*~MAS*OOQ*TERT + VOCA*TERT*MAS + ~RISK*RGTY*~DYNA *VOCA*PPQ*TERT + RISK ~ RGTY*VOCA*MAS)
	Low	**EST, ISR, SPA** (RISK*~VOCA*OOQ*~MAS + RISK*~VOCA* RGTY*~MAS + RISK*~VOCA*~OOQ*~TERT*MAS)	**DNK, GRE, ITA, NOR** (RGTY*VOCA*~MAS*RISK + RISK ~ RGTY *VOCA*MAS*~OOQ*~TERT)

general education system is a necessary condition for high country-level objective overqualification. For the low OOQ, the high dynamism of inter-sectoral workforce turnover was established as a complementary condition, which on its hand, led to fewer and simpler configurational patterns.

The configurations for high POQ do not feature a joint necessary condition. However, the high share of risk categories LFP is a core condition for the low POQ and a complementary one for high POQ. This means that this high share of risk categories LFP appears every time when there is at least one low POQ country explained by our configurations. As for the high POQ, the high risk categories LFP led to fewer and simpler configurational patterns.

What is also evident is that although OOQ is a factor included in configurations predicting POQ, *high country-level objective overqualification is not a necessary condition for high perceived overqualification* (our second key proposition). Put differently, the POQ can take high or low values without being conditioned by a high or low value of the OOQ at the country level or even without its membership in the configurations explaining POQ. This also exemplifies the asymmetrical nature of the configurational approach, where the causal conditions generating a presence of certain outcome, do not generate its absence, if they take opposite values. If configurational approach was not used, we would probably not be able to establish this pattern.

4.1 Overqualification archetypes at a county level

By juxtaposing the configurations leading to high and low OOQ and POQ, we distinguish four types of countries: two "genuine" and two "apparent" archetypes (Table 10).

Genuine Archetype 1 countries that have high overall country-level overqualification (high OOQ and high POQ). Prototypical countries include Canada, Great Britain, Ireland, Japan, Lithuania and New Zealand. By applying the rules of Boolean algebra,[2] we found that a common configuration leading to Genuine Archetype 1 includes macro factors: non-vocational education system and masculinity.

Genuine Archetype 2 includes countries with low overall country-level overqualification, where both OOQ and POQ are low. Prototypical countries are Denmark, Greece, Italy and Norway. Again, by applying common Boolean algebra rules, their common configuration was found to include risk categories and vocational education systems in all its patterns.

Apparent Archetype 1 countries are characterized by low OOQ and high POQ. Prototypical countries include Czech Republic, Poland and Slovakia. The additional algebra of the sets computation revealed that the common configuration for this archetype envelops vocational education and almost always contains a high augmentation of tertiary educated entrants to the labor market. All countries adhering to this

[2] Combining the configurations leading to the occurrence of presence and absence of OOQ/POQ as presented in results section.

archetype are characterized by low dynamics of mobility from industrial to service sectors.

Apparent Archetype 2 envelops countries with high OOQ and low POQ. Prototypical countries are Estonia, Israel and Spain. The common configuration for this archetype contains a high proportion of risk categories in the labor market and non-vocational education system. In general, all apparent archetype 2 countries are characterized by high LFP of migrants, young and "boomer" workers, general education systems, low increase in LFP of tertiary educated workers and a strong feminine culture.

4.2 Theoretical implications

This research contributes to the existing knowledge base by adopting a configurational approach to bridge the knowledge of antecedents of objective and perceived overqualification at a country level. Indeed, the simultaneous consideration of OOQ and POQ in the elaboration of employee overqualification is worth highlighting. We showed that these two concepts envelop different nomological networks and accumulate different predictors. The challenging work of isolating theoretical antecedents from the sparse literature was empirically supported by our reference to higher-level, contextual causal conditions that surround them. We encourage such a set-theoretic approach and recourse to QCA when addressing theoretical scarcities and inconsistencies in the other areas of existing management literature too.

The contribution of this study is reflected in the fact that the OOQ and the POQ have been linked and paired, although one does not imply the other. Nevertheless, when both were considered, it became clear that among the macro factors, some of them were common to the specific archetypes in the selected countries, although no necessity relationship was generally established between them.

The originality of this study also lies in the fact that it puts the term "contextual conditions" in a positive light; here were the macro factors that did not bound, but actually caused the occurrence of the OQ, by level and type, within a country, allowing an analysis between countries on the same ground. It is certainly important to highlight the new proposed aspect of genuine and apparent overqualification as it was previously related to OOQ and one's satisfaction with the job (Chevalier & Lindley, 2009).

Next, a benefit of this study is to illustrate a normative approach (Flisi et al., 2016) to measuring worker country-level overqualification by establishing the OOQ score (Appendix, *Table A1*). We also stress that the present study was conducted at the cross-national level and outside the Western world (Erdogan & Bauer, 2009), unlike the previous studies which were seen as less diversified (Erdogan & Bauer, 2009), case-oriented and based on a smaller sample (Alfes et al., 2016; Zhang et al., 2015; Erdogan et al., 2011a).

In addition to the positions from the assignment theory, occupational mobility theory and institutionalism, this research shows that OQ is not just individual or temporal. This is equally due to the new "theorizing tool" of the configuration theory as proposed by Furnari et al. (2021) which has also made clear that overqualification does not only arise at the managerial level, because there are macro-contextual patterns that imply it (Abraham, 2015; Hu et al., 2015; Zhang et al., 2015). Thereby, it also matters to address this issue at a county level.

4.3 Implications for practice

The differences between the patterns explaining objective and perceived overqualification suggest that the concepts of "being" and "feeling" overqualified are different for actual work. This could be essential for understanding skill mismatch (Alfes et al., 2016), as qualification has been used as a proxy for skills, another core element of skill mismatch.

Another advantage is that the identified configurations capture the contextual embeddedness of POQ, which in turn is seen as a major factor in lower job satisfaction leading to voluntary turnover (Shaw et al., 1998), a basis for other negative employee outcomes.

We emphasize that national policies to address objective and perceived overqualification at a country level should focus on its nomological diversity. In our first main proposition derived from this study, we emphasize that high level of OOQ necessarily occurs in countries with general education systems, although we do not arbitrarily assume that the return to vocational education could reduce it. What is in its favor is that the rigid EPL legislation is observed at lower levels for both OOQ and POQ when compared among the OECD countries.

Next, the typology of genuine and apparent archetypes provides policy makers with a tool to identify the macro conditions that contribute to the context of high levels of OQ across countries.

Seemingly, within these archetypes there are common labels for the causal conditions – macro factors that characterize or cluster high and low levels of OOQ and POQ, overall and vice versa, but are not attributable to propositions derived.

The configuration patterns of causal conditions that generate OQ have labels that characterize them and that might shed light on many of the OQ-related problems that practitioners are trying to

solve. For example, in genuine archetype 1 countries there are observed high OOQ and high POQ levels are high in all but three countries, whereas among the countries with high POQ, only half of them have high OOQ as well. Seemingly, on a country-level, the overeducation is more often accompanied by the perceived OQ, unlike vice-versa.

Nevertheless, these high levels of both OOQ and POQ are observed in countries with general educational system (all but one of the high POQ countries). To sum up, the general context of high OQ is often described by non-vocational educations system; on the opposite end, the low OQ is evident in countries clustered by rigid EPL. From this stance, for the policy makers, the recurrence to measures against mass dismissal might be beneficial in tackling the high OQ.

As for the apparent type 1 country (low OOQ, high POQ), the low dynamics of the mobility of employees from industrial to service sector after the economic crisis of 2009 is common. Moreover, in the apparent archetype 2, high OOQ and low POQ is common to countries that have a strong LFP of risk categories, along with non-vocational education systems, a low increase in the LFP of workers with tertiary education, and a weak masculine culture. In summary, there is one factor that simultaneously keeps OOQ at a low level and POQ at a high level, while there are several factors that lead to the occurrence of the reverse case.

5 Limitations and future research

As any other study, this study also has its downsides. The first is that, contrary to what was suggested by Liu and Wang (2012), the design of the OOQ result grouped all academic education levels together rather than separating them as master's, doctoral and bachelor's degrees. We proceeded in this way because of the differences in country-specific levels of education in terms of duration and level of secondary education. Secondly, the UK has more than 2400 respondents in the individual PIAAC data that do not belong to any specific category of higher academic education, as do 18 respondents from France. This can be seen as problematic from two perspectives. First, because although the 1997 ISCED manual gives a clear picture of educational levels (*Table A1*, Appendix), such a distinction between academic levels of education brings with it the challenge of dealing in the same way with lower/secondary levels of education. Although this can be dealt with at the individual country level (see Domadenik et al., 2015), it is virtually impossible across countries.

Second is the use of crisp-set QCA, which relies on dichotomizing variables, but such a designation for a variable as "fully in" or "fully out" of a set leads to the risk of losing more complex information. We adopted csQCA to avoid problems with calibration of more nuanced variables in fuzzy sets (fsQCA). With even less empirical data on these OQ' macro-level outcomes, this prompted us to use more conservative thresholds for dichotomizing causal conditions.

For example, as can be debatable, which exact country levels of OOQ or POQ actually reduce worker productivity at the country level to use later as a calibrated measure, as they are not always well suited to be dichotomized. Hence, the key question might be what level of employee overqualification should be considered relevant at the country level. Therefore, once such data are available, we encourage future research to calibrate the causal condition into a fuzzy set QCA; or set its values as the degree of belonging to such a specific OOQ/POQ threshold that should provide more fine-grained, diversified results. Perhaps the net effects resulting from the regression analysis of the incidence of overqualification could respond and complement our results, as QCA did to them, in return.

Conducting this study relied on a caution to ecological fallacy which can be observed in the manner of streamlining causal conditions and outcomes and in the analysis and interpretation sections. The resulting conclusions bear on country and cross-country aspects of OQ occurrence, by level and type, where these relationships observed for countries do not necessarily hold for individuals, what is more, neither did this study imply it.

Nevertheless, our macro-configurational approach to OQ occurrence did not explain all the OOQ/POQ levels. Known as "limited diversity" (typical of QCA), our solution consistencies have values below one, and the existence of the "remainder" rows indicates that our theoretical and configurational models are not able to explain all the diversity of the cases in the dataset (Legewie, 2013). Furthermore, not all configurations cover the entire 27 countries in our sample either. High OOQ is not explained for Germany and France, low OOQ is not explained for four other countries; same goes for four high POQ and four low POQ countries. Moreover, Austria, France, Korea and Sweden are not explained by any pattern in any configuration. In conclusion, the ecological fallacy and limited diversity left room for additional theoretically plausible configurations leading to the occurrence of overqualification, possibly based on individual or organizational factors or with the addition of other countries outside the OECD sample.

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Appendix

Table A1. Detailed overview of the measure of objective overqualification.

ISCED (1997 levels) *	EDCAT 7	Value labels	D_Q12a	Chapter 1	Chapters 2,3 and 4 (as in Domadenik et al., 2015)	
No formal education (ISCED 0, less than ISCED 1)	1	Primary or less	1	Lower secondary	Primary or less	No formal education + Incomplete basic education
1	2	Lower secondary	2		Lower secondary	Completed basic education
2	2		3			Secondary short-term vocational education (1−2 years)
3C short or less	2		4			
3C long	3	Upper secondary	5	Upper secondary		Secondary vocational education (2−3 years)
3 A-B	3		6			
3 A-B, C long (without distinction)	3		7			Technical and professional secondary education (4 years) General secondary education (gymnasium) (4 years) Master craftsman courses and further vocational education courses, such as foreman and sales manager courses
4C	4	Postsecondary, non-tertiary	8	Postsecondary,		Short-term higher education
4 A-B	4		9	non-tertiary		(former) + professional higher
4 A-B, C (without distinction)	4		10			education
5 B	5	Tertiary-professional	11	Tertiary/professional	Tertiary/professional	Academic higher education
5 A (bachelor)	6		12	/bachelor	/bachelor	Tertiary-bachelor
5 A (master)	7	Tertiary-master/research	13	master PhD	Tertiary master/research	Specialization after professional higher education, specialization after academic higher education + Master degree, 2nd level professional degree
6	7		14			Doctorate of science and similar education

Source: Own work.

Table A2. Truth table for high OOQ.

RISK	RGTY	DYNA	VOCA	TERT	MAS	number	OOQ	cases	raw consist.	PRI consist.	SYM consist.
1	0	0	0	0	1	2	1		1	1	1
1	0	0	0	0	0	1	1		1	1	1
1	0	1	0	0	0	1	1		1	1	1
1	1	1	0	0	0	1	1		1	1	1
0	1	1	0	1	0	1	1		1	1	1
0	0	0	0	1	1	1	1		1	1	1
1	0	0	0	1	1	1	1		1	1	1
1	0	1	0	1	1	1	1		1	1	1
1	1	0	1	0	1	2	0		0.5	0.5	0.5
0	1	0	0	1	0	3	0		0.333333	0.333333	0.333333
0	1	1	0	0	0	2	0		0	0	0
0	1	0	1	0	0	2	0		0	0	0
0	1	0	1	1	1	2	0		0	0	0
1	1	0	1	0	0	1	0		0	0	0
0	1	0	1	1	0	1	0		0	0	0
1	1	0	1	1	0	1	0		0	0	0
0	1	1	0	0	1	1	0		0	0	0
1	0	0	1	0	1	1	0		0	0	0
0	1	0	1	0	1	1	0		0	0	0
0	0	0	1	1	1	1	0		0	0	0

Source: Own work.

Table A2.1. Configurations for high OOQ, complex solution.

Model: OOQ = f (RISK, RGTY, DYNA, VOCA, TERT, MAS)
COMPLEX SOLUTION: frequency cutoff: 1 consistency cutoff: 1

	Raw coverage	**Unique coverage**	**Consistency**	**Cases with greater than 0.5 membership in term**
RISK*~RGTY*~DYNA*~VOCA*~TERT	0.272727	0.272727	1	CAN, EST
RISK*DYNA*~VOCA*~TERT*~MAS	0.181818	0.181818	1	ISR, SPA
~RGTY*~DYNA*~VOCA*TERT*MAS	0.181818	0.0909091	1	GBR, JPN
RISK*~RGTY*~VOCA*TERT*MAS	0.181818	0.0909091	1	GBR, IRL
~RISK*RGTY*DYNA*~VOCA*TERT*~MAS	0.0909091	0.0909091	1	LTU
solution coverage: 0.818182				
solution consistency: 1				

Source: Own work.

Table A3. Truth table for low OOQ.

RISK	RGTY	DYNA	VOCA	TERT	MAS	number	~OOQ	cases	raw consist.	PRI consist.	SYM consist.
0	1	1	0	0	0	2	1		1	1	1
0	1	0	1	0	0	2	1		1	1	1
0	1	0	1	1	1	2	1		1	1	1
1	1	0	1	0	0	1	1		1	1	1
0	1	0	1	1	0	1	1		1	1	1
1	1	0	1	1	0	1	1		1	1	1
0	1	1	0	0	1	1	1		1	1	1
1	0	0	1	0	1	1	1		1	1	1
0	1	0	1	0	1	1	1		1	1	1
0	0	0	1	1	1	1	1		1	1	1
0	1	0	0	1	0	3	0		0.666667	0.666667	0.666667
1	1	0	1	0	1	2	0		0.5	0.5	0.5
1	0	0	0	0	1	2	0		0	0	0
1	0	0	0	0	0	1	0		0	0	0
1	0	1	0	0	0	1	0		0	0	0
1	1	1	0	0	0	1	0		0	0	0
0	1	1	0	1	0	1	0		0	0	0
0	0	0	0	1	1	1	0		0	0	0
1	0	0	0	1	1	1	0		0	0	0
1	0	1	0	1	1	1	0		0	0	0

Source: Own work.

Table A3.1. Configurations for low OOQ, complex solution.

Model: OOQ = f (RISK, RGTY, DYNA, VOCA, TERT, MAS)
COMPLEX SOLUTION: frequency cutoff: 1 consistency cutoff: 1

	Raw coverage	Unique coverage	Consistency	Cases with greater than 0.5 membership in term
RGTY*~DYNA*VOCA*~MAS	0.3125	0.125	1	DNK, FIN, NDL, NOR, SVN
~RISK*RGTY*~DYNA*VOCA	0.375	0.0625	1	CZE, FIN, ITA, NDL, POL, SVN
~RISK*RGTY*DYNA*~VOCA*~TERT	0.1875	0.1875	1	CHI, GRE, TUR
~RISK*~DYNA*VOCA*TERT*MAS	0.1875	0.0625	1	CZE, POL, SVK
RISK*~RGTY*~DYNA*VOCA*~TERT*MAS	0.0625	0.0625	1	BEL
solution coverage: 0.8125				
solution consistency: 1				

Source: Own work.

Table A4. Truth table for high POQ.

OOQ	RISK	RGTY	TERT	MAS	number	POQ	cases	raw consist.	PRI consist.	SYM consist.
1	0	1	1	0	2	1		1	1	1
1	1	0	0	1	2	1		1	1	1
1	1	0	1	1	2	1		1	1	1
0	0	1	1	1	2	1		1	1	1
0	1	0	0	1	1	1		1	1	1
1	1	1	0	1	1	1		1	1	1
0	0	0	1	1	1	1		1	1	1
1	0	0	1	1	1	1		1	1	1
0	0	1	1	0	3	0		0.666667	0.666667	0.666667
0	0	1	0	0	4	0		0.25	0.25	0.25
1	1	0	0	0	2	0		0	0	0
0	0	1	0	1	2	0		0	0	0
0	1	1	0	0	1	0		0	0	0
1	1	1	0	0	1	0		0	0	0
0	1	1	1	0	1	0		0	0	0
0	1	1	0	1	1	0		0	0	0

Source: Own work.

Table A4.1. Configurations for high POQ, complex solution.

Model: POQ = f (OOQ, RISK, RGTY, TERT, MAS)
COMPLEX SOLUTION: frequency cutoff: 1 consistency cutoff: 1

	Raw coverage	Unique coverage	Consistency	Cases with greater than 0.5 membership in term
RISK*~RGTY*~TERT*MAS	0.2	0.0666667	1	BEL, CAN, NZL
~OOQ*~RISK*TERT*MAS	0.2	0.2	1	CZE, POL, SVK
OOQ*RISK*~TERT*MAS	0.2	0.0666667	1	CAN, GER, NZL
OOQ*~RGTY*TERT*MAS	0.2	.0.2	1	GBR, IRL, JPN
OOQ*~RISK*RGTY*TERT*~MAS	0.13333	0.13333	1	FRA, LTU
solution coverage: 0.8				
solution consistency: 1				

Source: Own work.

Table A5. Truth table for low POQ.

OOQ	RISK	RGTY	TERT	MAS	number	~POQ	cases	raw consist.	PRI consist.	SYM consist
1	1	0	0	0	2	1		1	1	1
0	0	1	0	1	2	1		1	1	1
0	1	1	0	0	1	1		1	1	1
1	1	1	0	0	1	1		1	1	1
0	1	1	1	0	1	1		1	1	1
0	1	1	0	1	1	1		1	1	1
0	0	1	0	0	4	0		0.75	0.75	0.75
0	0	1	1	0	3	0		0.333333	0.333333	0.333333
1	0	1	1	0	2	0		0	0	0
1	1	0	0	1	2	0		0	0	0
1	1	0	1	1	2	0		0	0	0
0	0	1	1	1	2	0		0	0	0
0	1	0	0	1	1	0		0	0	0
1	1	1	0	1	1	0		0	0	0
0	0	0	1	1	1	0		0	0	0
1	0	0	1	1	1	0		0	0	0

Source: Own work.

Table A5.1. Configurations for low POQ, complex solution.

Model: ~POQ = f (OOQ, RISK, RGTY, TERT, MAS) COMPLEX SOLUTION: frequency cutoff: 1 consistency cutoff: 1				
	Raw coverage	**Unique coverage**	**Consistency**	**Cases with greater than 0.5 membership in term**
OOQ*RISK*~MAS	0.25	0.166667	1	EST, ISR, SPA
RISK*RGTY*~MAS	0.25	0.166667	1	DNK, NOR, SPA
~OOQ*RGTY*~TERT*MAS	0.25	0.25	1	AUT, GRE, ITA
solution coverage: 0.666667 solution consistency: 1				

Source: Own work.

Table A6. Prime implicants chart.

	OOQ* ~RISK* RGTY* TERT* ~MAS	~OOQ* RISK *~RGTY* ~TERT* MAS
~~OOQ*~RGTY~~ ~~OOQ*~RISK~~		
~ RGTY * MAS		√
OOQ * TERT	√	

Source: Own work.