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# Which Occupations Do Jobseekers and Firms Look For?

Evidence from Three Public Employment Services[1]

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**Abstract:** This study proposes and applies a new methodology to analyse firms' and workers' occupational preferences. We use microdata covering all 2014-2018 vacancy and jobseeker registrations from the Public Employment Services of Belgium, Morocco, and South Korea. We find that a small number of occupations are responsible for a large share of registrations and may thus deserve particular attention. We also find considerable stability in occupation preferences (especially by jobseekers) but that the correlation between firms' and workers' preferences weakens over time. Finally, we find different responsiveness levels of jobseeker preferences to vacancy gaps. However, young jobseekers do not appear to respond more quickly to such gaps.

**Keywords:** Labour adjustment, Occupations, Job search, Vacancy gaps

**JEL codes:** J24, J62, J68

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## 1. Introduction

Occupations are constantly evolving, especially with the growth of automation and artificial intelligence and the pandemic shock. In this context, academics, practitioners, and policy makers need to pay closer attention to the changing preferences of jobseekers and firms regarding occupations and skills. Indeed, an efficient and equitable labour market needs to be supported by appropriate information systems. Such systems can then provide the required insight to support adequate public policies, including their timely updating and targeting.

Fortunately, several Public Employment Services (PES) around the world have now gained a significant presence in their labour markets, namely in terms of the share of total jobseekers and vacancies that they register. This development means that the data that PES collect can contribute decisively to their countries' labour market information systems and support appropriate policies. However, these contributions from PES have not yet fully materialised in many cases, in part because of the lack of suitable methodologies to process the available data.

This study seeks to contribute to the development of such methodologies by studying detailed and comprehensive micro data from three countries on individuals' career choices and firms' occupational demand. Specifically, we document the trends in firms' and workers' preferences about different job occupations (defined as four-digit ISCO codes or similar) and examine their relationships. Overall, we offer a template for the analysis of these rich data sets that can be extended to additional countries, time periods and new policy directions. We believe this is the first paper to study vocational behaviour from this angle, considering individual decision-making about careers, work transitions, and work adjustment through the universe of registrations with jobcentres over several years.

Our internationally comparative analysis is based on novel data from the PES of Belgium (Wallonia), Morocco and South Korea, covering vacancy and jobseeker registrations during

the period 2014-2018 (2013-2018 in the case of Belgium). The internationally diverse coverage of our analysis – three countries, from three continents, at different levels of economic development – illustrates the scope of our methodology for benchmarking and 'bench-learning' exercises. However, we also note that the data covers a relatively short period, which constrains our ability to establish trends, and PES have different and far from full coverage of their labour markets.

Our main findings are the following: First, we find *high levels of concentration in both jobseeker and vacancy preferred occupations*. In other words, a relatively small number of occupations are responsible for a large share of individual preferences in the labour market. These occupations may therefore deserve particular attention not only from PES but also policy makers in education, training, and economy departments.

Second, we detect a *high degree of stability in occupation preferences over time, although stronger for jobseekers than firms*. This finding suggests that education and training systems tends to lag developments on the labour demand side. We also find that, in some countries, *the correlation between firms' and workers' preferences appears to weaken over time*.

Finally, we document *different degrees of responsiveness of jobseeker preferences to vacancy gaps* across the countries covered. However, there is *little evidence that young jobseekers tend respond more quickly to such gaps* compared to other groups of jobseekers.

Our approach can contribute to several related literatures. These include the provision of information to students and jobseekers regarding career choices (Jensen, 2010; Oreopoulos and Dunn, 2013; McGuigan et al, 2016; Lergetporer et al, 2018; Basler and Kriesi, 2019; Belot et al, 2019; Pekkala Kerr et al, 2020), labour market mismatch, the Beveridge curve, and job-occupation fit (Béduwé and Giret, 2011; Ford, 2012; Reis, 2018; Consolo and Da Silva, 2019; Ghetta et al, 2020), occupational mobility in individuals' careers (Dlouhy and Biemann, 2018),

and the labour market effects of PES (Launov and Wälde, 2016; Stephan, 2016). We also mention studies focused on practitioners, PES and career guidance, such as ETF, CEDEFOP and ILO, 2015a and 2015b; IADB, WAPES and OECD, 2015; Mazza, 2016; and Martins, 2019.

The remaining of the paper is organised as follows: the next Section presents the data sets used, as well as a number of descriptive statistics; Section 3 describes the main occupations identified in each country and their correlations over time; Section 4 presents our findings regarding the relationships between vacancies and jobseeker preferences; finally, Section 5 concludes. See also Appendix 1 for a brief comparison of the labour market systems of Belgium, Morocco and South Korea.

## 2. Methods

The data sets used in this quantitative study were made available by the PES of Belgium (Wallonia) – Le Forem –, Morocco – ANAPEC –, and South Korea – Korea Employment Information Service. Each PES provided at least two data sets, one covering jobseeker registrations and the other vacancy registrations. All data sets cover the period 2014-2018, except for the Belgian data sets, which cover the period 2013-2018.

The South Korean data sets provide information at the individual (jobseeker or vacancy) level – one observation per each jobseeker (or jobseeker-year) registration and one observation per each distinct vacancy registration. In contrast, the Belgium data sets provide information at the cell level, defined by a specific combination of occupation, year, schooling, sector and location variables (vacancies) or occupation, year, schooling, gender and age groups (jobseekers). In both cases of vacancies and jobseekers, the cells are very detailed, leading to average sizes of about only two vacancies or jobseekers per cell. Finally, in the case of Morocco, while the

jobseeker data is defined at the individual (or individual-year) level, the vacancy data is defined at a cell level, defined in a similar way as the case of the Belgium vacancy data.

As indicated in Table 1, in total, the data sets cover between more than half a million individual vacancies (Morocco) and over five million vacancies (South Korea); and between nearly one million individual jobseekers (Morocco) and over twenty million individual jobseekers (South Korea). These figures reflect different characteristics, in particular the size of the labour market of each country, its degree of formalisation, the penetration of each country's PES in the registration of jobseekers and vacancies, and the degree of turnover or churning in the labour market (shorter employment spells will tend to lead to higher numbers of potential registrations).

It is also interesting to note that, in all three cases, the number of jobseekers exceeds that of vacancies. However, the relationship between the two figures differs across countries: vacancies represent 63% of jobseekers in Belgium, 57% in Morocco and 28% in South Korea. These ratios can however change over time, as indicated in Figures 1a, 1b, and 1c, which present the number of jobseekers and vacancies per year in Belgium, Morocco and South Korea, respectively. These changes are particularly important in Belgium, where vacancies exceed registrations in 2018, unlike in previous years.[2]

Table 1 also presents descriptive statistics from a comparable subset of the available variables, focusing on the jobseeker's age, gender, and university degree status. The average age of the jobseekers is 25.5 in the case of Morocco, 42 in South Korea, while in Belgium 34% of

[2] Each data set from each country makes available information along many dimensions, such as those variables used to construct the cells in the case of Belgium (jobseeker and vacancies) and Morocco (vacancies) and described above. The same variables are also available in the case of South Korea. Each data set also includes many other variables (particularly in the case of South Korea) which are not used in the present study.

jobseekers are 29 or younger (age information in Belgian data is available in age categories). 48% (42%) of jobseekers are women in Belgium and South Korea (Morocco). As to schooling, 13% of Belgium's jobseekers have university degrees, 38% in Morocco and 48% in South Korea. Again, these differences across countries may reflect not only the differences in the underlying economic structures (and education) but also in the penetration of their PES amongst jobseekers. The average year of the registrations of the jobseekers and of the vacanciesis 2016 in the cases of Morocco and South Korea and 2015 in the case of Belgium.

## 3. Results

### A. Key occupations

This Section examines the changes in jobseekers and vacancies over time, focusing on their occupational dimension. Our analysis is motivated by the many developments that may have affected careers and labour markets over the last years – economic crises, globalisation, automation, digitalisation, artificial intelligence (and a pandemic and the growth of remote work that it may provoke). To what extent have workers and firms been changing their preferences regarding occupations in this context?

#### *3.1 Jobseeker's preferences*

In a first analysis of this question, we consider, in Tables 2a, 2b, and 2c, the top 10 occupations sought by jobseekers, in both 2014 and 2018 (2013 and 2018 in Belgium). In Belgium (Table 2a), these ten occupations represent about 42% of all preferences in both years, indicating a significant level of concentration across the 310 different four-digit ISCO occupation codes adopted by the Belgium PES. The top three occupations are the same in the two years, namely

Salespersons in Shops, Office Clerks, and Cleaners. Moreover, six of the remaining seven occupations are also present in both years, the only difference being that Cashiers drops from the 2013 list and are replaced by Kitchen Helpers in 2018.

In Morocco, the coverage of the top-10 occupations is much larger than in the case of Belgium, as they correspond to about 66% of all jobseeker preferences (Table 2b). This may be driven by the smaller number of total occupational categories (124) adopted by the Moroccan PES. (As far as we know, these codes are not compatible with ISCO.) Another explanation may concern the contribution of two major categories that stand out in both years' top-10 list: Transversal and Without Speciality. The former case may correspond to individuals with preferences that cannot be placed in a straightforward manner in the existing occupation codes, leading to a larger degree of occupational concentration. As to the remaining eight occupations, seven of them are again present in both years, the only exception being Production in IT (in 2014 but not in 2018) and Outsourcing (in 2018 but not 2014).

In South Korea (Table 2c), we find that the top ten occupations account for a smaller percentage (32%) of all jobseeker preferences. The data has the largest range of different occupations (450 four-digit KECO codes, which correspond to an extended version of ISCO). However, it turns out that out of the top-10 occupations in 2018, only two were not in the same list for 2014, namely Caregiving Service Workers and Accounting Clerks. Their places in the top-10 list were taken by Korean Food Cooks and Electrical, Electronic Parts and Products Assemblers.

We conclude from this analysis of jobseeker occupation preferences in the three countries that there is a significant level of stability in top-10 preferences across the five- (or even six-) year period considered. However, the countries consider occupation codes with different levels of

detail (different numbers of occupations) and in which the top-10 ranking represents very different percentages of jobseeker preferences (from 66% in Morocco to 32% in South Korea).

*3.2 Firm's preferences*

We extend our descriptive analysis to the case of vacancies – see Tables 3a, 3b and 3c – and examine the top 10 occupations sought by firms in the vacancies registered with PES, in both 2014 (or 2013) and 2018. In Belgium (Table 3a), we find a higher degree of turnover in the top occupations compared to the case of jobseeker preferences. While in that case, nine of ten occupations made it to both lists (2013 and 2018), in the present case of vacancies only four of ten occupations appear in both years. In other words, six of the ten occupations that are the top in 2013 are not present in the 2018 list. Moreover, we also observe less concentration as measured by the share of top-10 occupations in all occupations, of about 30% (compared to 42% in jobseeker preferences).

However, in Morocco (Table 3b), we find again a strong degree of stability in the list of top-10 occupations: only two occupations drop from the 2014 list (Commercial Management, and Sales). These are replaced by two new occupations in the 2018 list, Firm Management and Mechanical Maintenance. On the other hand, their share is again smaller in the case of vacancies than in the previous case of jobseekers (33% to 41% compared to 66%)

The case of South Korea (Table 3c) is an intermediate one - three occupations are replaced in the top-10 list of vacancy preferences (compared to four and two in Belgium and Morocco). On the other hand, these ten occupations represent approximately 35% of all vacancy preferences, a figure in line with those of Belgium and Morocco, despite the greater level of detail (and larger number of categories) of the South Korean occupation codes.

We conclude from this analysis of firm's occupation preferences in the three countries that while there is still a significant level of stability in top-10 preferences across the five- or six-year period considered, there are more changes than in the cases of jobseeker preferences. This may reflect the fact that a larger number of jobseekers in the data sets will have had jobs before and may want to pursue or may be registered with that same occupation. This phenomenon will induce a high degree of stability in jobseeker preferences, compared to the cases of firms that may be more able and interested in changing their occupation profiles over time. Market turnover induced by firm openings and closures will enhance these differences.

*3.3 High-growth occupations*

After describing the top occupations, both from the jobseeker's and the firm's perspectives, we now turn out attention to the identification of occupations that are experiencing higher rates of growth over time. This analysis complements our previous focus on top-10 occupations by considering occupations that may still be small in terms of overall preferences of jobseekers or firms (and, therefore, not make it to the top-10 lists) but that are growing at the fastest rates.

Our measure of growth is constructed both for jobseeker and vacancy numbers. In the case of the former, the growth in the number of jobseekers between 2014 (2013 in Belgium) and 2018, it is defined as ($Jobseekers_{o,\ 2018}$ - $Jobseekers_{o,\ 2014}$) / (($Jobseekers_{o,\ 2018}$ + $Jobseekers_{o,\ 2014}$)/2), in which 'o' denotes each specific occupation. Under this growth measure, commonly used in the job creation literature (Davis & Haltiwanger, 1992), growth rates are bound between -2 (when the occupation has zero jobseekers in 2018, i.e. when the occupation disappears from

preferences) and +2 (when the occupation has zero jobseekers in 2014, i.e. when the occupation appears for the first time).[3]

Our results are presented in Tables 4a, 4b and 4c - Belgium, Morocco, and South Korea, respectively. Each Table includes two panels, the first about jobseekers and the second about vacancies. Each panel lists the top occupations, their relative growth using the measurement above, as well as the number of occupations in both the first and last year.

Several results follow from the analysis of these three tables. First, we find that, in Belgium and Morocco, the fastest-growing vacancies exhibit higher growth than the fastest-growing jobseeker occupations, while in South Korea we observe the opposite. Second, the first two countries have little or no overlap in the top growth occupations for firms and jobseekers. In contrast, in South Korea there is a good overlap between the demand and the supply of fast-growth occupations with five (out of ten) occupations present in both panels. Of course, this result does not necessarily imply a close matching in the numbers (as opposed to the growth rates) of jobseekers and vacancies.

### *3.4 Correlations*

After having described several specific occupations that may be of greater importance, we now provide a more comprehensive analysis of the stability or volatility of occupation figures over

[3] We also disregard occupations that do not appear at least 20 times in the first year or at least 100 times in the last year (200 in the case of jobseekers, and 500 and 1,000, respectively, in South Korea), to ensure again that these occupations are relatively important in the labour market. This measurement method and its restrictions that we impose are useful here as some occupations can experience very high growth from a low baseline and still be relatively small in the labour market, leading to potentially distorted results in our analysis.

time. Specifically, we consider the numbers of jobseekers and vacancies across occupations in 2014 (or 2013) and 2018 for each country and then calculate their correlations (both the standard correlation and the Spearman correlation).

The results, presented in Table 5, indicate generally high correlations across the different variables considered (over 0.8 in most cases). However, the correlations over time in jobseeker preferences tend to be stronger than the same correlations in vacancy preferences. In other words, according to these statistics, we observe somewhat larger time changes in vacancy preferences than in jobseeker preferences.

On the other hand, we find that, in Belgium and Morocco, there is a (moderate or significant) weakening of the correlation between jobseeker and vacancy preferences over time. In these two countries, the correlations drop from .76 to .53 (Belgium) and from .32 to .15 (Morocco). However, this is not apparent in the case of South Korea, where the same correlation increases moderately, from .82 to .84.

## B. Occupational dynamics

In this Section, we examine the adjustment process in the three labour markets in greater detail, focusing on the changes in jobseeker preferences and vacancies in each occupation over time. Our goal is to shed light on the extent to which the occupational demand and supply sides of the market evolve in a balanced manner, which would make it more efficient and equitable.

Indeed, one may argue that in a well-functioning skills and labour market, changes in labour demand, for instance involving increases in demand in particular occupations, would lead or be associated to similar changes in labour supply of the same occupations. This would apply particularly if the original situation were already characterised by some degree of equilibrium. Of course, this perspective assumes that wage differentials across occupations also move in

line with changes in labour demand and that there is sufficient time for the education and training sectors to respond. This assumption may tend to apply in the relatively low-skill ranges of the labour market in which PES tend to have greater penetration, both in labour supply and labour demand.[4] On the other hand, if such adjustments in labour supply (or demand) do not take place, this may have important implications in terms of career guidance and education policy, namely regarding the supply of qualifications by the education and training system, including the PES.

Alternatively, a lack of responsiveness in the labour and occupational market between the supply and demand sides – at the level of specific occupations as we consider here (not to mention the regional or local dimensions) – may lead to several problems. These will include higher levels of (mismatch) unemployment, as jobseekers must wait longer until they find a suitable vacancy. Over-education, when jobseekers eventually accept jobs in which they do not fully use their skills, would also increase. Worse working conditions and lower economic growth, as firms wait longer until they can fill their vacancies (and will tend to fill them with workers that may not have the required skills), may also follow.

Our analysis of this important question is based on two simple and original econometric models of occupational adjustment that we propose here. In the first, we estimate jobseeker-vacancy elasticity effects, by regressing the log of the number of jobseekers in a given occupation on the log of the number of vacancies in the same occupation. This analysis provides evidence about the extent to which jobseeker numbers (in a particular occupation) tend to evolve in a commensurate way to changes in vacancy numbers (in the same specific occupation).

Of course, several caveats apply in this analysis. These have to do with the potential lack of representativeness of the PES data, with respect to the full labour market, as we discussed

[4] An alternative perspective would involve changes stemming from labour supply towards labour demand following educational reforms (e.g., Carneiro et al, 2018).

above. In many countries, PES have greater penetration in particular occupations, typically of lower skill levels. PES may also attract a relatively higher share of registrations from jobseekers than from firms (and all jobseekers that are collecting unemployment benefits but not necessarily many jobseekers that are not eligible for that type of social protection).[5] Some specific occupations may also be more exposed to unemployment leading to a selected sample of jobseeker registrations. While PES activities, including labour market information and training, can change jobseekers' preferences, the latter may exhibit a great degree of rigidity over time. On the other hand, PES data such as the one used in this study is typically the most detailed available for the analysis of flows (hires) of occupations. Other data sets, namely labour force surveys, typically do not have the requisite detail to study changes in demand and supply of occupations over time, for instance because sample sizes are too small to generate meaningful comparisons.

The caveats above notwithstanding, we expect to find one of two possible major qualitative cases in each country. The first case would involve no relationship between the two variables (a zero elasticity), indicating that, on average, jobseeker numbers (in a specific occupation) do not increase when vacancy numbers (in the same occupation) also increase. In contrast, the second case would be when jobseeker occupational numbers tend to increase when vacancy occupational numbers also increase (a positive elasticity). According to the discussion above, the latter case would be more consistent with an efficient labour market, indicating greater responsiveness between jobseekers and vacancies in terms of occupations.

More specifically, we estimate the following equation:

$$\log \text{Jobseekers}_{o,t} = \alpha + \beta.\log \text{Vacancies}_{o,t} + \theta_o + \tau_t + \varepsilon_{o,t},$$

5 The rules regarding access to unemployment benefits may also influence both unemployment and employment spells (see Martins, 2021).

in which log $Jobseekers_{o,t}$ indicates the logarithm of the number of jobseekers in occupation o in year t (and similarly for Log $Vacancies_{o,t}$). $\theta_o$ are occupation fixed effects and $\tau_t$ are year fixed effects: the former ensure that we focus on 'within-occupation' deviations over time (rather than cross-occupation differences), as indicated above, while the latter ensure we take into account systematic differences across years. $\beta$ is the key parameter we are interested in, which indicates the elasticity of jobseekers with respect to vacancies. Given the large differences across occupations in terms of their labour market relevance, we also conduct weighted estimations, using the number of vacancies as the weight of each observation in the full regression. Our estimations should therefore be regarded as representative at the level of the entire labour market covered by each PES: occupations that lead to more vacancies are given greater weight compared to others, namely occupations that represent only a small share of the labour market.

Note that, while this analysis bears some similarities to that of Beveridge curves, as in its matching efficiency component, there are important differences as well. For instance, here we are analysing the relationship between vacancies and jobseekers within (and not across) occupations. In other words, issues of occupational mismatch do not apply in our case, at least not to the same extent. Our data is also measured in terms of flows over each year and not stocks – matches that may be established over the year are not subtracted from the jobseeker and vacancy registrations from which such matches are derived. These factors explain why we do not necessarily expect a negative relationship between the two variables as in the standard Beveridge curve.

The second simple econometric model of labour market adjustment that we propose here involves the estimation of what we term as 'jobseeker growth-relative gap' effects. In this case, we analyse the extent to which the number of jobseekers responds over time to *baseline gaps* between jobseeker and vacancy numbers in each occupation. For instance, in the case of an efficient labour market, we would expect that jobseeker growth would be smaller or even negative in occupations that exhibit larger mismatches (namely a number of jobseekers that greatly exceeds the number of vacancies – 'excess supply') in the initial, baseline period. In other words, if there are already many more jobseekers than vacancies in a given occupation, for instance, then we would expect that the number of jobseekers in that occupation would tend to decrease. This would require information about the imbalances to be disseminated to jobseekers and also other stakeholders, including education and training providers. On the other hand, if jobseeker numbers happen to be smaller than vacancies ('excess demand'), then the number of jobseekers would be expected to increase.

Of course, these adjustments in the number of jobseekers would also depend on the changes that were taking place in the labour market in terms of the wages and other working conditions of each occupation. These changes could potentially accelerate the adjustment, especially if (entry) wages responded symmetrically to the existing imbalances. We ignore this aspect in the analysis as we do not have information on remuneration levels, but we keep it in mind in the interpretation of the results. We also ignore changes regarding the potentially evolving composition of tasks within each occupation or the potentially changing profiles of applicants for the same reason of lack of suitable data on these hard-to-measure dimensions.

Given the discussion above, we estimate the following equation in this second model:

$$\Delta WJobseekers_o = \alpha + \gamma.W(Jobseekers_{o,2014} - Vacancies_{o,2014}) + \varepsilon_o.$$

Our dependent variable, $\Delta WJobseekers_o$, indicates the growth in the number of jobseekers in occupation o between 2014 and 2018 and is defined as before as $(Jobseekers_{o,\,2018} - Jobseekers_{o,\,2014}) / ((Jobseekers_{o,\,2018} + Jobseekers_{o,\,2014})/2)$, so that growth rates are bound between -2 (when the occupation has zero jobseekers in 2018) and +2 (when the occupation has zero jobseekers in 2014). This is equal to the measure computed in Section 3.3 above but considering only the case of jobseeker's preferences. The explanatory variable, $W(Jobseekers_{o,2014} - Vacancies_{o,2014})$, is defined in a similar way, $(Jobseekers_{o,\,2014} - Vacancies_{o,2014}) / ((Jobseekers_{o,\,2014} + Vacancies_{o,\,2014})/2$, as in Tables 4, so that it is again bound between -2 and +2. In other words, we take the difference between the numbers of jobseekers and vacancies in a given occupation ('o') and then weight it by the average of those two numbers. Positive (negative) figures will correspond to occupations in which the number of jobseekers exceeds (is less than) that of vacancies, i.e. 'excess supply (demand)'.

Finally, $\gamma$ is the key parameter we are interested in, which expresses the relationship between jobseeker-vacancy gaps in a given occupation and the growth of jobseeker numbers in that same occupation. If the number of jobseekers tends to increase more in occupations in which vacancies are initially greater than jobseekers (and vice-versa), then our estimate of $\beta$ would be statistically significantly negative. In this case, the higher the excess number of jobseekers with respect to vacancies, the lower the growth in jobseekers in that same occupation.

For the purposes of robustness and heterogeneity analysis, we estimate the two models above sequentially in the following samples: all jobseekers, young jobseekers only (those aged 29 or younger), and graduate jobseekers only. Note that the number of vacancies per occupation is

unchanged from sample to sample, while the number of jobseekers will be different (both in the left- and right-hand sides). This allows us to assess whether the occupational labour market exhibits greater responsiveness for those two specific groups of jobseekers compared to the full sample of all jobseekers (regardless of age or schooling). We are particularly interested in the case of young workers – their more recent participation in the education and training system may allow them to have occupations that are more in line with labour market demand. Of course, this assumes that the education and training system are responding adequately to changes in labour demand as indicated by the country's labour market information system. (In contrast, older jobseekers may be interested in similar occupations to those they may have had for many years, which may no longer be in line with current labour demand.) In this case, the $\beta$ and $\gamma$ coefficients of young workers would be larger (in absolute terms) than when considering the general population, indicating greater responsiveness.

Before presenting the econometric results, we also display visually the underpinning data (jobseeker-vacancy gaps and jobseeker growth, considering all jobseekers) – Figures 2a, 2b, and 2c, depicting the cases of Belgium, Morocco, and South Korea, respectively. Except for Morocco, the graphs suggest a tentative negative relationship between the two variables above, whereby occupations with larger jobseeker-vacancy gaps (excess supply) tend to be associated to lower relative increases in jobseeker numbers.

After this visual analysis, Tables 6a, 6b and 6c present the econometric results for the three countries. The top panel considers the specification of equation 1 and the bottom panel that of equation 2. In Belgium, we find some support for our hypothesis about jobseeker-vacancy responsiveness, but only in terms of equation 2. While the top panel indicates that there is no systematic relationship between jobseeker and vacancy numbers – the elasticity is insignificant

or even has a negative sign in the case of young workers –, there is evidence of the expected responsiveness to imbalances at least in the case of the full sample (first coefficient, bottom panel). According to the latter result, occupations that exhibit excess supply (more jobseekers compared to vacancies) in 2013 also tend to be occupations that see a lower growth rate in terms of jobseeker numbers.

In contrast, in the case of Morocco, we do not find evidence of significant levels of responsiveness between jobseekers and vacancies. This may reflect the more aggregated definition of occupations used in the data as well as the lower degree of PES labour market penetration.

Finally, in the case of South Korea, we find, for all samples, significantly positive estimates of the jobseeker-vacancy elasticities (top panel of Table 6c). These coefficients range between 0.36 (young jobseekers) and 0.54 (graduates), with a figure of 0.43 for the full sample. These results indicate that changes within-occupation in their number of vacancies tend to correspond to changes in the same direction in their number of jobseekers.

When turning to the bottom panel, which considers equation 2, we find again significant evidence of a link between the variables of interest (jobseeker growth and 'excess jobseekers' compared to vacancies). In all cases, the coefficients are statistically significant and negative, ranging between -0.12 (young jobseekers) and -0.18 (graduates), with a figure of -0.15 for the full sample. In the other words, the higher the excess number of jobseekers (compared to vacancies) in 2014, the lower the growth of jobseekers over the following four years.

While the main result of a negative coefficient is in line with our expectations, we do not find evidence that the responsiveness of young jobseekers is greater than that of the full sample. This may reflect issues in the matching of the education and training system with respect to changes in vacancy profiles. Alternative or complementary explanations may include the more targeted nature of some vacancies – namely towards older jobseekers. On the other hand, it is interesting to notice that the responsiveness is highest in the case of graduates (many of whom will be young workers as well). This result may indicate that universities and their students are better informed and more responsive to labour market demand trends than secondary schools and their students.

## 4. Discussion

Occupations and labour markets are evolving more rapidly and are subject to novel forces and shocks (including the ongoing pandemic). It is therefore increasingly important to understand their trajectories and propose methods to develop the most appropriate policies. This study contributes to this goal by documenting and examining trends in workers' and firms' preferences about different job occupations. Moreover, note that our empirical analysis is focused exclusively on the labour markets covered by Public Employment Services, in terms of jobseeker and vacation registrations – while these labour markets may be more actionable from a policy perspective they are not necessarily representative of the overall labour market.

Two key novelties of our analysis are our focus on comparable micro data sets from the PES of three different countries (in three different continents) – namely Belgium (Wallonia), Morocco, and South Korea – and our proposal of a new empirical methodology to use these data sets. In a nutshell, our approach is based on the econometric analysis of both vacancy and

jobseeker registrations in each occupation and their changing distributions during a given period of time (from 2013 or 2014 until 2018).

We find a high degree of concentration in the distribution of jobseekers' and firms' occupational preferences: a relatively small number of occupations represents a large share of total preferences, when considering both the jobseekers' and the firms' perspectives. There is also a high degree of time stability in the list of the most sought-after occupations, especially in the case of jobseekers. In other words, preferences by firms regarding the occupations of their new hires appear to evolve more quickly (or be subject to greater volatility) than the equivalent preferences by jobseekers.

Moreover, we also find very limited matching or overlap between the highest growing occupations from the demand and supply perspectives, with the partial exception of South Korea. These results may speak to the importance of life-long learning, so that unemployed workers can acquire new skills and or move to new occupations that exhibit greater opportunities of employment.

Finally, we also examine the time adjustment process in jobseeker occupational preferences with respect to vacancies. Here we find varying levels of responsiveness across countries and jobseeker profiles. This analysis is based on the econometric estimation of novel equations that: 1) relate the number of vacancies and jobseekers across occupations and years; and 2) relate the change in jobseeker occupational preferences over time with respect to the degree of jobseeker-vacancy mismatch in an initial period.

In this second type of approach, we find some potentially important differences across countries. While in Morocco we do not find evidence of statistically significant relationships between occupational jobseeker and vacancy numbers, perhaps because the occupational data is relatively aggregated, in Belgium and, in particular, South Korea, jobseeker preferences

(regarding different occupations) appear to evolve closely and positively in line with vacancies and negatively with respect to jobseeker-vacancy gaps. The latter result indicates that jobseekers appear to become less interested in occupations that exhibit greater 'excess supply' (many more jobseekers than vacancies) at a given period, which is likely to contribute to a smoother adjustment process in the labour market.

However, even in South Korea, the preferences of young jobseekers do not appear to respond more strongly to jobseeker/vacancy imbalances than that of graduate jobseekers (regardless of age) or, more generally, than that of the entire set of jobseekers. This latter result may hint at potential gains in labour market efficiency and equity from further improvements in the provision of labour market information to young individuals. Better matching between the education and training system and the labour market may also be important.

An additional policy recommendation that follows from our analysis concerns the relevance of a detailed and up-to-date occupational code, as used in the registrations of jobseekers and vacancies that we use in this paper. This can be very useful for PES for the purposes of monitoring trends in their labour markets and in providing greater support for the matching between jobseekers and vacancies across different occupations.

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## Appendix 1 - The labour market systems of Belgium, Morocco and South Korea

The three countries covered in this study exhibit important differences in their labour market characteristics. These follow from their different levels of economic development – according to the latest World Bank data available, Belgium has a value of GDP per capita (in PPP USD) of 54,693.4, while this figure is 42,728.0 in South Korea, and only 7,296.2 in Morocco.

Considering specific labour market variables, we see from Table A1 that labour force participation is higher in Korea and lower in Morocco. As to the distribution of employment across sectors, Morocco still exhibits a large share in agriculture (37.2%), while this is not greater than 5% in Belgium and Korea.

Unemployment rates are always lower than 10% for the general labour force (and as low as 3.9% in the case of Korea). However, youth unemployment rates can be as high as 22.2% in Morocco. Note also that the shares of employment with advanced education are very high in Belgium and Korea, at 48% and 53%, respectively.

Hours worked tend to be much higher in Morocco, while the lowest levels can be found in Belgium. As to industrial relations, collective bargaining coverage and trade union density are much higher in Belgium than in South Korea, while data is not available on these indicators in the case of Morocco. Social protection coverage is much more extensive in Belgium than in Korea, while this information is again not available for Morocco. However, all countries provide unemployment benefits to their citizens, including Morocco.

We also consider several dimensions more specific to each country's PES. In these areas, we find that there is greater similarity across countries. For instance, in all countries the registration of job seekers and vacancies is not compulsory. The exception concerns jobseekers that are collecting unemployment benefits, who need to be registered in that case. In all countries, there other important (private) employment services that are responsible for labor market placement, including temporary work agencies, sometimes in partnership with the PES. Also note that, in all countries, jobseekers and firms can search for more than one occupation. Our data registers only the main occupation indicated by each firm and jobseekers regarding each registration.

**Table A1 – Comparative labour market statistics**

| Indicator | Belgium | | Korea, Republic of | | Morocco | |
|---|---|---|---|---|---|---|
| Labour force participation rate (%) | 53.8 | 2020 | 62.8 | 2020 | 45.5 | 2017 |
| Employment-population ratio (%) | 50.8 | 2020 | 60.3 | 2020 | 42.2 | 2016 |
| Share of agriculture (%) | 0.9 | 2020 | 5.3 | 2020 | 37.2 | 2014 |
| Share of industry (%) | 20.4 | 2020 | 24.5 | 2020 | 17.7 | 2014 |
| Share of services (%) | 78.7 | 2020 | 69.7 | 2020 | 44.9 | 2014 |
| Share of managers, professionals (incl. associates) and technicians (%) | 49.3 | 2020 | 39.1 | 2020 | | |
| Share with less than basic education (%) | 0.9 | 2020 | 1 | 2020 | | |
| Share with advanced education (%) | 48.5 | 2020 | 53.3 | 2020 | | |
| Unemployment rate (%) | 5.6 | 2020 | 3.9 | 2020 | 9.3 | 2016 |
| Unemployment rate, youth (%) | 15.3 | 2020 | 10.3 | 2020 | 22.2 | 2016 |
| LU3: Combined rate of unemployment and potential labour force (%) | 9.1 | 2020 | 9.1 | 2020 | | |
| LU4: Composite rate of labour underutilization (%) | 13.6 | 2020 | 12.7 | 2020 | | |
| Average monthly earnings of employees, local currency | 3212 | 2018 | 3757000 | 2020 | | |
| Monthly minimum wage, local currency | 1625.7 | 2021 | 1795310 | 2020 | 2334 | 2013 |
| Average weekly hours actually worked per employed person | 35.7 | 2020 | 38.7 | 2020 | 44.9 | 2012 |
| Share of employed working more than 48 hours per week (%) | 7 | 2020 | 19.5 | 2020 | 41.7 | 2012 |
| Collective bargaining coverage rate (%) | 96 | 2016 | 11.8 | 2015 | | |
| Trade union density rate (%) | 54.2 | 2015 | 10.1 | 2015 | | |
| Population covered by at least one social protection benefit (%) | 100 | 2020 | 77.3 | 2020 | | |

Source: ILO statistics regarding latest year available; not all variables are available for Morocco.

## Figures

(Note: All figures are computed by the author based on micro data on jobseekers and vacancies provided by the Public Employment Services of Belgium, Morocco and South Korea.)

**Figure 1a –** Number of jobseekers and vacancies per year, Belgium

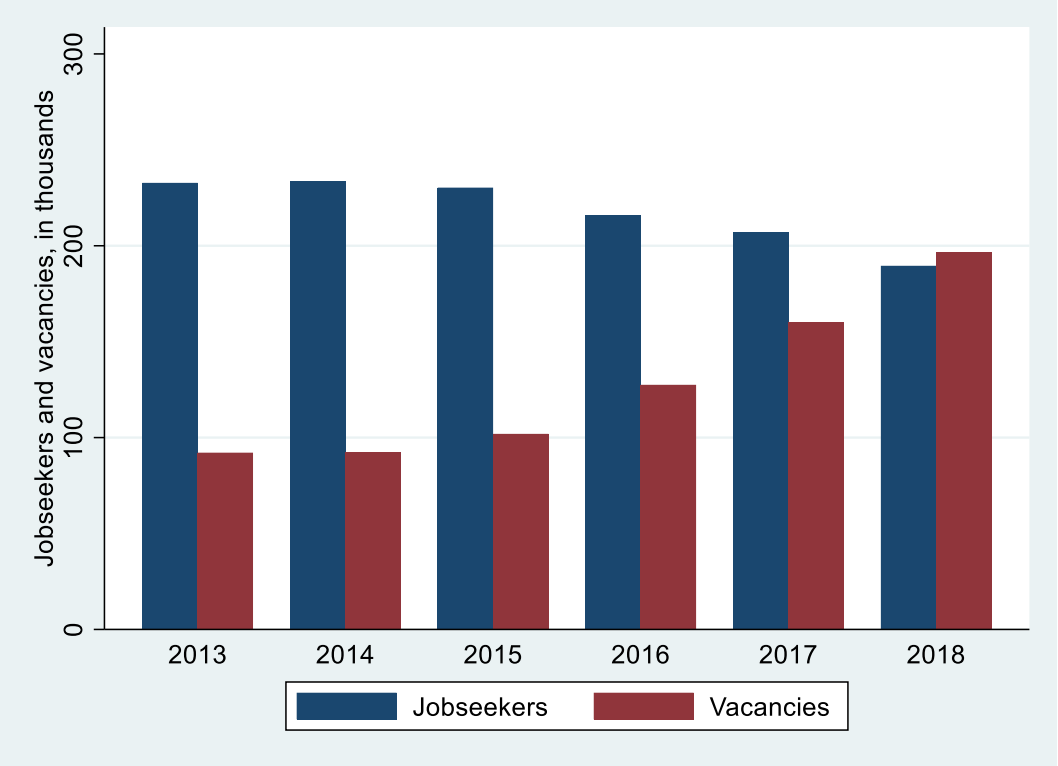


**Figure 1b –** Number of jobseekers and vacancies per year, Morocco

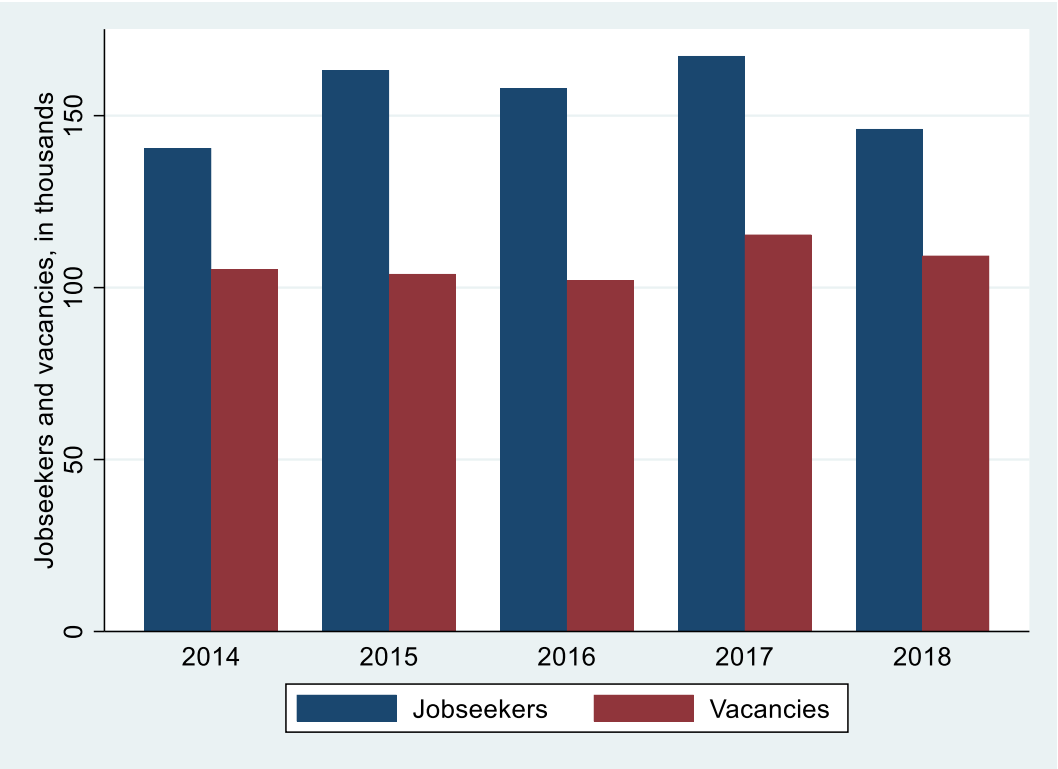



**Figure 1c –** Number of jobseekers and vacancies per year, South Korea

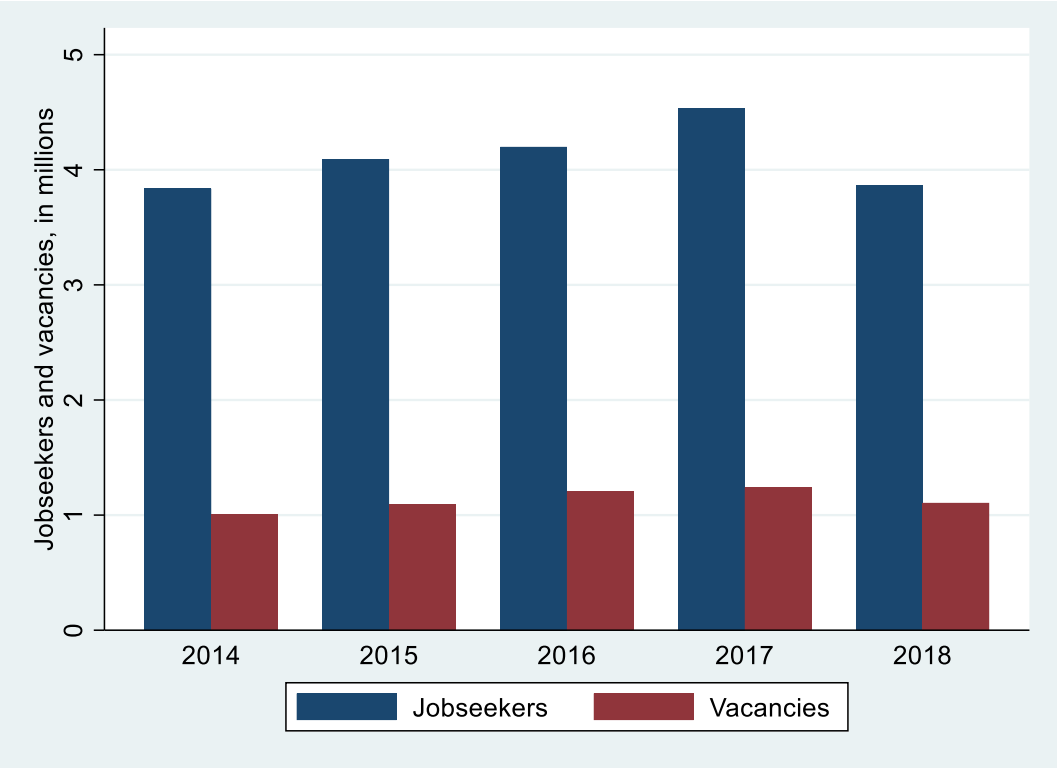
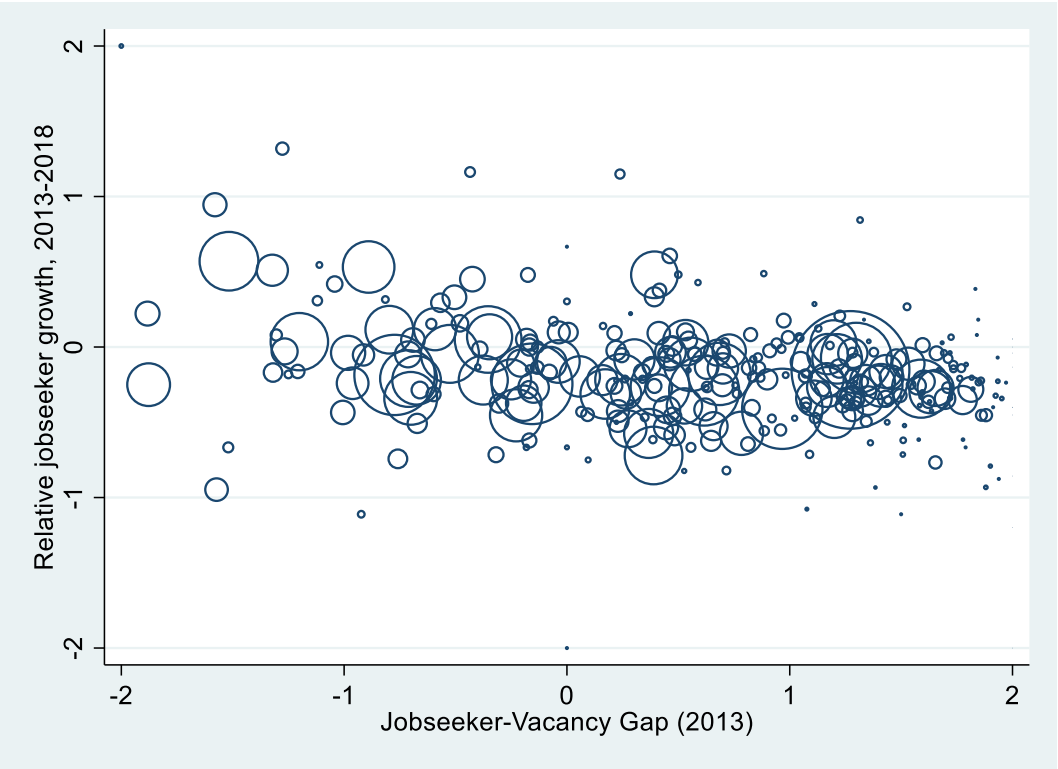


**Figure 2a –** Jobseeker-vacancy gaps and relative jobseeker growth, Belgium




**Notes:** The size of each circle is proportional to the number of vacancies in 2013. Similar notes apply to the next two figures.

**Figure 2b –** Jobseeker-vacancy gaps and relative jobseeker growth, Morocco

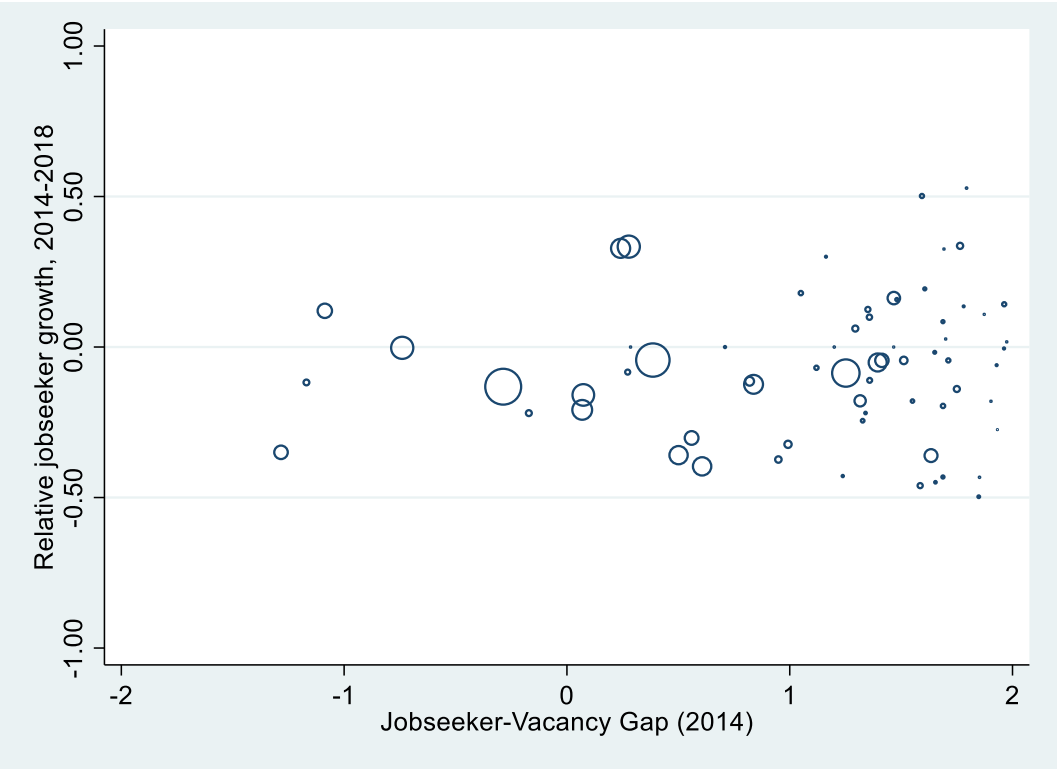
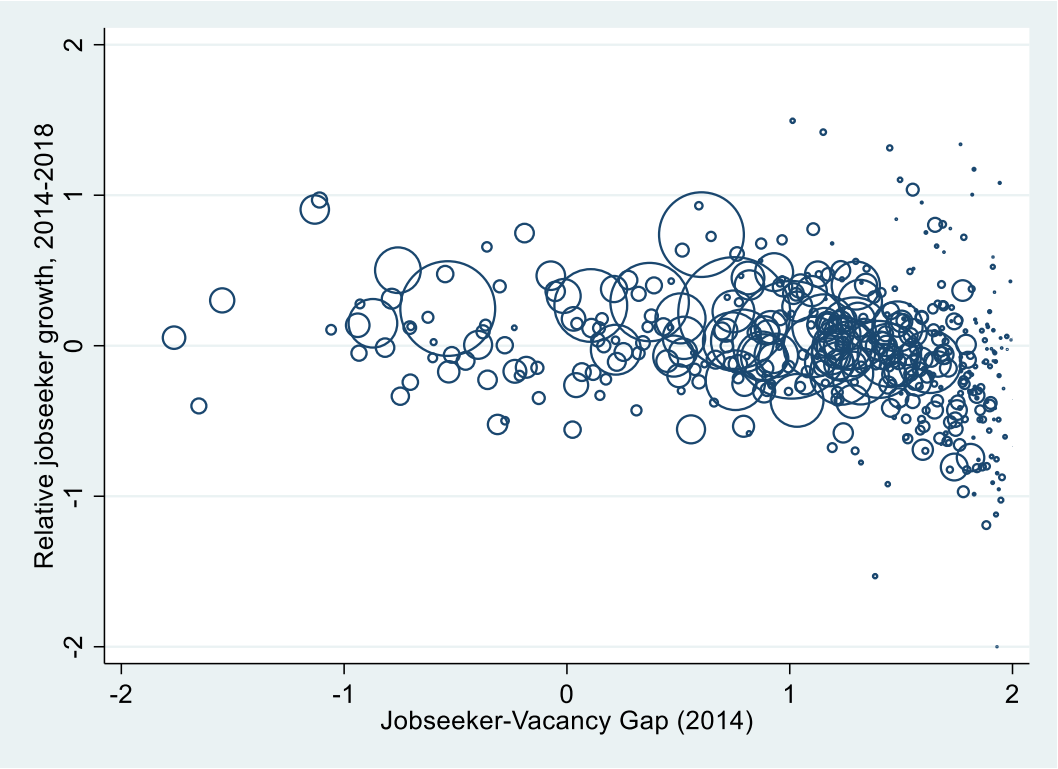



**Figure 2c –** Jobseeker-vacancy gaps and relative jobseeker growth, South Korea



## Tables

(Note: All tables are computed by the author based on micro data on jobseekers and vacancies provided by the Public Employment Services of Belgium, Morocco and South Korea.)

**Table 1 –** Descriptive statistics, full samples, Belgium (Wallonia), Morocco and South Korea

| Country | Registrations | Variable | Obs | Mean | SD | Min | Max |
|---|---|---|---|---|---|---|---|
| **Belgium (Wallonia)** | **Jobseekers** | **Year** | 1317187 | 2015.37 | 1.69 | 2013 | 2018 |
| | | **Age<30** | 1317187 | 0.34 | 0.47 | 0 | 1 |
| | | **Degree** | 1317187 | 0.13 | 0.34 | 0 | 1 |
| | | **Female** | 1317187 | 0.48 | 0.50 | 0 | 1 |
| | **Vacancies** | **Year** | 827909 | 2016.05 | 1.71 | 2013 | 2018 |
| **Morocco** | **Jobseekers** | **Year** | 942781 | 2016.12 | 1.39 | 2014 | 2018 |
| | | **Age** | 903044 | 25.55 | 6.91 | 15 | 64 |
| | | **Degree** | 942781 | 0.38 | 0.49 | 0 | 1 |
| | | **Female** | 942781 | 0.42 | 0.49 | 0 | 1 |
| | **Vacancies** | **Year** | 536163 | 2016.04 | 1.42 | 2014 | 2018 |
| **South Korea** | **Jobseekers** | **Year** | 20525906 | 2016.02 | 1.39 | 2014 | 2018 |
| | | **Age** | 20292344 | 41.54 | 14.45 | 15 | 75 |
| | | **Degree** | 20525906 | 0.48 | 0.50 | 0 | 1 |
| | **Vacancies** | **Year** | 5650768 | 2016.06 | 1.38 | 2014 | 2018 |

**Notes:** This table describes the six main data sets at the individual jobseeker or individual vacancy level (after taking into account the cell weights when applicable). The variable Year indicates the year of the registration (jobseeker or vacancy), Age corresponds to the age of the jobseeker at the time of registration (or a dummy or dichotomous variable for workers below 30 years old in the case of Belgium), Degree is a dummy variable equal to one for workers that hold a university degree, and Female is a dummy variable for workers that are women (not available in the case of South Korea). 'SD' denotes the standard deviation of each variable.

**Table 2a** – Main (top 10) jobseeker preferences (occupations), Belgium, 2013 and 2018

| Year | Occupation | ISCO | Jobseekers |
|---|---|---|---|
| **2013** | Vendeurs, magasin | 5223 | 29406 |
| | Employés de bureau, fonctions générales | 4110 | 13861 |
| | Agents d'entretien dans les bureaux, les hôtels et autres | 9112 | 11005 |
| | Aides de ménage à domicile | 9111 | 8719 |
| | Manoeuvres de chantier de travaux publics | 9312 | 8245 |
| | Chauffeurs de taxi et conducteurs d'automobiles et de camion | 8322 | 6424 |
| | Manutentionnaires | 9333 | 6234 |
| | Emballeurs à la main et autres manoeuvres des industries ma | 9321 | 5850 |
| | Caissiers et billettistes | 5230 | 4946 |
| | Spécialistes du travail social | 2635 | 4683 |
| **2018** | Vendeurs, magasin | 5223 | 25252 |
| | Employés de bureau, fonctions générales | 4110 | 10492 |
| | Agents d'entretien dans les bureaux, les hôtels et autres | 9112 | 10229 |
| | Manoeuvres de chantier de travaux publics | 9312 | 6096 |
| | Aides de ménage à domicile | 9111 | 5750 |
| | Chauffeurs de taxi et conducteurs d'automobiles et de camion | 8322 | 4886 |
| | Emballeurs à la main et autres manoeuvres des industries ma | 9321 | 4407 |
| | Manutentionnaires | 9333 | 4367 |
| | Spécialistes du travail social | 2635 | 4329 |
| | Aides de cuisine | 9412 | 4029 |

**Notes:** This table lists in descending order the ten most sought occupations by jobseekers in Belgium (Wallonia) in 2013 and in 2018 (most preferred occupation of each jobseeker). The total number of jobseekers is 232770 in 2013 and 190168 in 2018. Each top-ten list accounts for approximately 42% of all preferences for all jobseekers in each year, across 310 different occupations (ISCO codes).

**Table 2b** – Main (top 10) jobseeker preferences (occupations), Morocco, 2014 and 2018

| Year | Occupation | Jobseekers |
|---|---|---|
| **2014** | Transversale | 30441 |
| | Sans spécialité | 15879 |
| | Comptabilité, gestion et statistiques | 11006 |
| | Maintenance mécanique des équipements | 6054 |
| | Fabrication électrique et électronique | 5594 |
| | Développement et intégration informatique | 5466 |
| | Sciences de l'homme | 5406 |
| | Maintenance d'équipements électriques et électronique | 4072 |
| | Production/exploitation/maintenance en informatique | 3507 |
| | Gestion des ressources financieres | 3435 |
| **2018** | Transversale | 40559 |
| | Sans spécialité | 17049 |
| | Comptabilité, gestion et statistiques | 10094 |
| | Sciences de l'homme | 6233 |
| | Maintenance mécanique des équipements | 5751 |
| | Fabrication électrique et électronique | 5357 |
| | Second œuvres | 3923 |
| | Développement et intégration informatique | 3796 |
| | Maintenance d'équipements électriques et électronique | 3379 |
| | Gestion des ressources financieres | 3286 |

**Notes:** This table lists in descending order the ten most sought occupations by jobseekers in Morocco in 2014 and in 2018 (most preferred occupation of each jobseeker). The total number of jobseekers is 140577 in 2014 and 146133 in 2018. Each top-ten list accounts for approximately 66% of all preferences for all jobseekers in each year, across 124 different occupations.

**Table 2c** – Main (top 10) jobseeker preferences (occupations), South Korea, 2014 and 2018

| Year | Occupation | KECO | Jobseekers |
|---|---|---|---|
| **2014** | Book-keeping Clerks | 272 | 195775 |
| | General Affairs Clerks and College Administrative Assistants | 263 | 177118 |
| | Cleaners | 5611 | 156531 |
| | Production Related Elementary Workers | 8900 | 128419 |
| | Building Concierges | 5420 | 116219 |
| | Computer Data Entry Clerks and Administrative Assistants | 295 | 111276 |
| | Planning and Marketing Clerks | 261 | 80309 |
| | Nursing Assistants | 3075 | 78686 |
| | Korean Food Cooks | 5312 | 77848 |
| | Electrical, Electronic Parts and Products Assemblers | 8360 | 71812 |
| **2018** | Book-keeping Clerks | 272 | 203620 |
| | Production Related Elementary Workers | 8900 | 159713 |
| | General Affairs Clerks and College Administrative Assistants | 263 | 159153 |
| | Cleaners | 5611 | 142913 |
| | Caregiving Service Workers | 5501 | 135136 |
| | Computer Data Entry Clerks and Administrative Assistants | 295 | 120793 |
| | Building Concierges | 5420 | 109091 |
| | Nursing Assistants | 3075 | 89436 |
| | Accounting Clerks | 271 | 78984 |
| | Planning and Marketing Clerks | 261 | 78452 |

**Notes:** This table lists in descending order the ten most sought occupations by jobseekers in South Korea in 2014 and in 2018 (most preferred occupation of each jobseeker). The total number of jobseekers is 3835641 in 2014 and 3862968 in 2018. Each top-ten list accounts for approximately 32% of all preferences for all jobseekers in each year, across 450 different occupations (KECO codes).

**Table 3a** – Main (top 10) vacancy occupations, Belgium, 2013 and 2018

| Year | Occupation | KECO | Vacancies |
|---|---|---|---|
| **2013** | Vendeurs, magasin | 5223 | 6536 |
| | Représentants et techniciens commerciaux | 3322 | 3060 |
| | Professeurs, enseignement secondaire | 2330 | 3039 |
| | Aides de ménage à domicile | 9111 | 3037 |
| | Agents d'entretien dans les bureaux, les hôtels et autres | 9112 | 2340 |
| | Employés du service des stocks | 4321 | 2294 |
| | Managers, ventes et commercialisation | 1221 | 2083 |
| | Serveurs | 5131 | 1827 |
| | Mécaniciens et réparateurs de véhicules à moteur | 7231 | 1621 |
| | Personnel infirmier (niveau intermédiaire) | 3221 | 1616 |
| **2018** | Conducteurs de poids lourds et de camions | 8332 | 8352 |
| | Mécaniciens et ajusteurs d'appareils électriques | 7412 | 8228 |
| | Manoeuvres de chantier de travaux publics | 9312 | 7708 |
| | Managers, ventes et commercialisation | 1221 | 6831 |
| | Vendeurs, magasin | 5223 | 6649 |
| | Maçons | 7112 | 4812 |
| | Mécaniciens et réparateurs de machines agricoles et indust | 7233 | 4590 |
| | Couvreurs et zingueurs | 7121 | 4157 |
| | Mécaniciens et réparateurs de véhicules à moteur | 7231 | 4145 |
| | Employés du service des stocks | 4321 | 3827 |

**Notes:** This table lists in descending order the ten most sought occupations by firms (vacancies) in Belgium (Wallonia) in 2013 and 2018. The total number of vacancies is 92132 in 2013 and 196602 in 2018. Each top-ten list accounts for approximately 30% of all vacancies in each year, across 310 different occupations (ISCO codes).

**Table 3b** – Main (top 10) vacancy occupations, Morocco, 2014 and 2018

| Year | Occupation | Vacancies |
|---|---|---|
| **2014** | Transversale | 19872 |
| | Sans spécialité | 4729 |
| | Restauration, café, bar, brasserie | 4380 |
| | Fabrication électrique et électronique | 3785 |
| | Comptabilité, gestion et statistiques | 2532 |
| | Maintenance d'équipements électriques et électroniques | 1727 |
| | Habillement | 1653 |
| | Intermédiation commerciale | 1647 |
| | Direction de la gestion commerciale | 1569 |
| | Vente | 1309 |
| **2018** | Transversale | 10755 |
| | Sans spécialité | 7120 |
| | Fabrication électrique et électronique | 3666 |
| | Restauration, café, bar, brasserie | 3025 |
| | Direction d'entreprise | 2334 |
| | Comptabilité, gestion et statistiques | 2063 |
| | Habillement | 1967 |
| | Maintenance d'équipements électriques et électroniques | 1848 |
| | Intermédiation commerciale | 1742 |
| | Maintenance mécanique des équipements | 1452 |

**Notes:** This table lists in descending order the ten most sought occupations by firms (vacancies) in Morocco in 2014 and in 2018. The total number of vacancies is 105344 in 2014 and 109289 in 2018. Each top-ten list accounts for approximately 33% to 41% of all vacancies in each year, across 124 different occupations.

**Table 3c** – Main (top 10) vacancy occupations, South Korea, 2014 and 2018

| Year | Occupation | KECO | Vacancies |
|---|---|---|---|
| **2014** | Book-keeping Clerks | 272 | 64585 |
| | Production Related Elementary Workers | 8900 | 58307 |
| | Metal Work Machinery Operators | 8132 | 41822 |
| | Caregiving Service Workers | 5501 | 33390 |
| | Production and Quality Management Clerks | 284 | 28569 |
| | Cleaners | 5611 | 27585 |
| | Door to Door Deliverers | 6241 | 24593 |
| | Computer Data Entry Clerks and Administrative Assistants | 295 | 24030 |
| | Planning and Marketing Clerks | 261 | 18749 |
| | Building Concierges | 5420 | 18625 |
| **2018** | Caregiving Service Workers | 5501 | 81953 |
| | Production Related Elementary Workers | 8900 | 75971 |
| | Book-keeping Clerks | 272 | 54790 |
| | Metal Work Machinery Operators | 8132 | 43758 |
| | Cleaners | 5611 | 35876 |
| | Door to Door Deliverers | 6241 | 32367 |
| | Production and Quality Management Clerks | 284 | 26341 |
| | Korean Food Cooks | 5312 | 23927 |
| | Inventory Clerks | 283 | 21627 |
| | General Affairs Clerks and College Administrative Assistants | 263 | 21002 |

**Notes:** This table lists in descending order the ten most sought occupations by firms (vacancies) in South Korea in 2014 and 2018. The total number of vacancies is 1005537 in 2014 and 1106498 in 2018. Each top-ten list accounts for approximately 35% of all vacancies in each year, across 447 different occupations (KECO codes).

**Table 4a** – Main (top 10) growth occupations (jobseekers and vacancies), Belgium (2018 vs 2013)

| | | | Jobseekers | |
|---|---|---|---|---|
| **Occupation** | **ISCO** | **Rel. Growth** | **2013** | **2018** |
| Messagers, porteurs de bagages et livreurs de colis | 9621 | 1.16 | 27 | 102 |
| Laveurs de véhicules | 9122 | 1.15 | 47 | 174 |
| Spécialistes, sciences techniques de la production | 2141 | 0.95 | 29 | 81 |
| Techniciens et assistants vétérinaires | 3240 | 0.84 | 63 | 155 |
| Spécialistes des ventes, secteurs médical et technique | 2433 | 0.61 | 152 | 284 |
| Personnel infirmier (niveau intermédiaire) | 3221 | 0.57 | 222 | 399 |
| Mécaniciens et ajusteurs d'appareils électriques | 7412 | 0.53 | 479 | 826 |
| Cadres infirmiers | 2221 | 0.51 | 92 | 155 |
| Sages-femmes | 2222 | 0.49 | 31 | 51 |
| Directeurs et gérants, hôtellerie | 1411 | 0.48 | 30 | 49 |

| | | | Vacancies | |
|---|---|---|---|---|
| **Occupation** | **ISCO** | **Rel. Growth** | **2013** | **2018** |
| Commis, service de paie | 4313 | 2.00 | 0 | 180 |
| Artistes plasticiens | 2651 | 1.96 | 7 | 629 |
| Agents de police | 5412 | 1.94 | 4 | 271 |
| Décorateurs et designers d'intérieurs | 3432 | 1.89 | 68 | 2332 |
| Spécialistes des ventes, secteurs médical et technique | 2433 | 1.82 | 95 | 2006 |
| Médecins spécialistes | 2212 | 1.70 | 10 | 124 |
| Responsables des prêts | 3312 | 1.65 | 11 | 116 |
| Concepteurs modélistes de produits et de vêtements | 2163 | 1.65 | 33 | 340 |
| Manoeuvres de chantier de travaux publics | 9312 | 1.61 | 834 | 7708 |
| Meuleurs, polisseurs et affûteurs | 7224 | 1.60 | 89 | 806 |

**Notes:** This table lists in descending order the ten most occupations that experienced greater growth as far as jobseekers (top panel) and firms (bottom panel) in Belgium between 2013 and 2018. Relative growth is computed as the change in preferences (2018 minus 2013) divided by the mean of preferences ((2013 + 2018)/2), a measure that is bound between -2 and +2. The occupations considered had to exhibit at least 20 jobseekers (vacancies) in 2013 or at least 200 jobseekers (100 vacancies) in 2018.

**Table 4b** – Main (top 10) growth occupations (jobseekers and vacancies), Morocco (2018 vs 2014)

| | | Jobseekers | |
|---|---|---|---|
| **Occupation** | **Rel. Growth** | **2014** | **2018** |
| Action socio-culturelle et socio-éducative | 0.53 | 92 | 158 |
| Techniques médicales | 0.50 | 442 | 738 |
| Publicité | 0.38 | 36 | 53 |
| Stockage, manutention, routage et manœuvre | 0.35 | 28 | 40 |
| Gestion juridique | 0.34 | 1903 | 2672 |
| Habillement | 0.33 | 2186 | 3061 |
| Soins médicaux | 0.33 | 1553 | 2162 |
| Immobilier | 0.33 | 36 | 50 |
| Distribution | 0.30 | 34 | 46 |
| Transversale | 0.29 | 30441 | 40559 |

| | | Vacancies | |
|---|---|---|---|
| **Occupation** | **Rel. Growth** | **2014** | **2018** |
| Production animale | 1.80 | 16 | 297 |
| Encadrement de la production agricole et animale | 1.56 | 26 | 213 |
| Installation d'équipements | 1.34 | 80 | 407 |
| Encadrement et études techniques de la production électrique ou électronique | 1.24 | 26 | 110 |
| Industries chimiques et production d'énergie et eau | 1.18 | 73 | 281 |
| Services aux personnes et autres services. | 0.91 | 76 | 204 |
| Préparation de la production | 0.90 | 22 | 58 |
| Usinage par formage des métaux | 0.88 | 71 | 182 |
| Techniques de rééducation et appareillage | 0.82 | 25 | 60 |
| Environnement, Hygiène et sécurité | 0.72 | 103 | 218 |

**Notes:** This table lists in descending order the ten most occupations that experienced greater growth as far as jobseekers (top panel) and firms (bottom panel) in Morocco between 2014 and 2018. Relative growth is computed as the change in preferences (2018 minus 2014) divided by the mean of preferences ((2014 + 2018)/2), a measure that is bound between -2 and +2. The occupations considered had to exhibit at least 20 jobseekers (vacancies) in 2014 or at least 200 jobseekers (100 vacancies) in 2018.

**Table 4c** – Main (top 10) growth occupations (jobseekers and vacancies), South Korea (2018 vs 2014)

| | | | Jobseekers | |
|---|---|---|---|---|
| **Occupation** | **KECO** | **Rel. Growth** | **2014** | **2018** |
| Other Computer System and Application Software Developers | 1339 | 2.00 | 0 | 1091 |
| Other Information and Communications Technology Equipment Fitters | 8419 | 2.00 | 0 | 1577 |
| Other Food Processing Related Workers | 8729 | 1.49 | 232 | 1604 |
| Entertainment Facilities Service Workers | 5240 | 1.42 | 471 | 2772 |
| Inspection Clerks | 264 | 1.34 | 113 | 570 |
| Performance, Film, and Record Promoters | 4171 | 1.31 | 701 | 3388 |
| Chefs and Culinary Development Professionals | 5311 | 1.17 | 620 | 2377 |
| Power Generation and Distribution Equipment Operators | 8330 | 1.10 | 554 | 1915 |
| Aircraft Mechanics | 8121 | 1.08 | 895 | 3004 |
| Other Clerks | 299 | 1.04 | 4997 | 15757 |

| | | | Vacancies | |
|---|---|---|---|---|
| **Occupation** | **KECO** | **Rel. Growth** | **2014** | **2018** |
| Other Food Processing Related Workers | 8729 | 1.61 | 76 | 707 |
| Chefs and Culinary Development Professionals | 5311 | 1.40 | 28 | 160 |
| Other Clerks | 299 | 1.12 | 630 | 2229 |
| Power Generation and Distribution Equipment Operators | 8330 | 1.05 | 80 | 256 |
| Product Planning Specialists | 243 | 0.96 | 387 | 1097 |
| Forestation and Forest Management Workers and Loggers | 9031 | 0.88 | 43 | 110 |
| Forest Products Pickers and Other Forestry Related Workers | 9039 | 0.87 | 24 | 61 |
| Pet Care Service workers | 5115 | 0.84 | 65 | 160 |
| Caregiving Service Workers | 5501 | 0.84 | 33390 | 81953 |
| Entertainment Facilities Service Workers | 5240 | 0.83 | 127 | 306 |

**Notes:** This table lists in descending order the ten most occupations that experienced greater growth as far as jobseekers (top panel) and firms (bottom panel) in South Korea between 2014 and 2018. Relative growth is computed as the change in preferences (2018 minus 2014) divided by the mean of preferences ((2014 + 2018)/2), a measure that is bound between -2 and +2. The occupations considered had to exhibit at least 20 jobseekers (vacancies) in 2014 or at least 1000 jobseekers (500 vacancies) in 2018.

**Table 5 –** Correlations between jobseekers and vacancies in 2014 and 2018

| **Belgium (N=309)** | Jobseekers 2013 | Vacancies 2013 | Jobseekers 2018 |
|---|---|---|---|
| Vacancies 2013 | 0.7558 | 1 | |
| Jobseekers 2018 | 0.9938 | 0.7607 | 1 |
| Vacancies 2018 | 0.5396 | 0.7526 | 0.5289 |
| | | | |
| Vacancies 2013 | 0.7907 | 1 | |
| Jobseekers 2018 | 0.9802 | 0.805 | 1 |
| Vacancies 2018 | 0.7659 | 0.9093 | 0.7876 |
| | | | |
| **Morocco (N=60)** | Jobseekers 2014 | Vacancies 2014 | Jobseekers 2018 |
| Vacancies 2014 | 0.3175 | 1 | |
| Jobseekers 2018 | 0.9888 | 0.3381 | 1 |
| Vacancies 2018 | 0.1469 | 0.9744 | 0.1545 |
| | | | |
| Vacancies 2014 | 0.6731 | 1 | |
| Jobseekers 2018 | 0.9855 | 0.6659 | 1 |
| Vacancies 2018 | 0.5967 | 0.8415 | 0.5901 |
| | | | |
| **South Korea (N=447)** | Jobseekers 2014 | Vacancies 2014 | Jobseekers 2018 |
| Vacancies 2014 | 0.8155 | 1 | |
| Jobseekers 2018 | 0.9677 | 0.8672 | 1 |
| Vacancies 2018 | 0.7375 | 0.9363 | 0.8406 |
| | | | |
| Vacancies 2014 | 0.7673 | 1 | |
| Jobseekers 2018 | 0.9558 | 0.7681 | 1 |
| Vacancies 2018 | 0.7196 | 0.9621 | 0.772 |

**Notes:** This table presents the correlation – first panel of each country - and the rank correlation – in the second panel - between jobseeker and vacancy numbers across occupations in the first and last year of the period covered (2013 or 2014 and 2018). The number indicated next to the country name denotes the number of occupations used in the computation of the correlations.

**Table 6a** – Relative growth and jobseeker equations, Belgium

Jobseeker-vacancy elasticity effects
Dependent variable: Log jobseekers (all, young and graduates)

| | All | Young | Graduates |
|---|---|---|---|
| Log vacancies | -0.019 | -0.050** | -0.026 |
| | [0.011] | [0.019] | [0.018] |
| Occupation FE | X | X | X |
| Year FE | X | X | X |
| R-squared | 0.993 | 0.987 | 0.989 |
| N | 1757 | 1669 | 1594 |

Jobseeker growth-relative gap effects
Dependent variable: Jobseeker growth (all, young and graduates), between 2013 and 2018

| | All | Young | Graduates |
|---|---|---|---|
| Jobseeker-vacancy gap | -0.099*** | -0.046 | -0.034 |
| | [0.016] | [0.025] | [0.032] |
| Constant | -0.133*** | -0.267*** | -0.01 |
| | [0.015] | [0.028] | [0.050] |
| R-squared | 0.108 | 0.008 | 0 |
| N | 293 | 287 | 277 |

**Notes:** This table presents two sets of regressions at the occupation level considering Belgium data only. The top panel uses occupation-year data (six occupations per occupation, corresponding to each year between 2013 and 2018) and the bottom panel only one observation per occupation. The top panel presents estimates of a regression of the log of jobseekers (of an occupation in a year) on the log of vacancies (in the same occupation and year), including occupation and year fixed effects and weighting for the number of vacancies in that occupation. The bottom panel presents estimates of a regression of jobseeker growth between 2013 and 2018 on the jobseeker-vacancy gap of the same occupation in 2014. Significance levels: *: significant at the 10%; **: significant at the 5%; ***: significant at the 1%.

**Table 6b** – Relative growth and jobseeker equations, Morocco

Jobseeker-vacancy elasticity effects
Dependent variable: Log jobseekers (all, young and graduates)

| | All | Young | Graduates |
|---|---|---|---|
| Log vacancies | 0.002 | 0 | 0.049 |
| | [0.018] | [0.018] | [0.027] |
| Occupation FE | X | X | X |
| Year FE | X | X | X |
| R-squared | 0.992 | 0.992 | 0.995 |
| N | 306 | 306 | 253 |

Jobseeker growth-relative gap effects
Dependent variable: Jobseeker growth (all, young and graduates), between 2014 and 2018

| | All | Young | Graduates |
|---|---|---|---|
| Jobseeker-vacancy gap | -0.007 | 0.002 | 0.014 |
| | [0.032] | [0.033] | [0.033] |
| Constant | -0.077** | -0.106*** | -0.04 |
| | [0.027] | [0.026] | [0.043] |
| R-squared | -0.015 | -0.016 | -0.016 |
| N | 66 | 66 | 54 |

**Notes:** This table presents two sets of regressions at the occupation level considering Moroccan data only. The top panel uses occupation-year data (five occupations per occupation, corresponding to each year between 2014 and 2018) and the bottom panel only one observation per occupation. The top panel presents estimates of a regression of the log of jobseekers (of an occupation in a year) on the log of vacancies (in the same occupation and year), including occupation and year fixed effects and weighting for the number of vacancies in that occupation. The bottom panel presents estimates of a regression of jobseeker growth between 2014 and 2018 on the jobseeker-vacancy gap of the same occupation in 2014. Significance levels: *: significant at the 10%; **: significant at the 5%; ***: significant at the 1%.

**Table 6c** – Relative growth and jobseeker equations, South Korea

Jobseeker-vacancy elasticity effects
Dependent variable: Log jobseekers (all, young and graduates)

| | All | Young | Graduates |
|---|---|---|---|
| Log vacancies | 0.438*** | 0.365*** | 0.543*** |
| | [0.018] | [0.027] | [0.022] |
| Occupation FE | X | X | X |
| Year FE | X | X | X |
| R-squared | 0.995 | 0.992 | 0.994 |
| N | 2161 | 2160 | 2159 |

Jobseeker growth-relative gap effects
Dependent variable: Jobseeker growth (all, young and graduates), between 2014 and 2018

| | All | Young | Graduates |
|---|---|---|---|
| Jobseeker-vacancy gap | -0.151*** | -0.124*** | -0.189*** |
| | [0.018] | [0.016] | [0.013] |
| Constant | 0.193*** | 0.022 | 0.244*** |
| | [0.019] | [0.018] | [0.013] |
| R-squared | 0.134 | 0.124 | 0.338 |
| N | 432 | 432 | 432 |

**Notes:** This table presents two sets of regressions at the occupation level considering South Korean data only. The top panel uses occupation-year data (five occupations per occupation, corresponding to each year between 2014 and 2018) and the bottom panel only one observation per occupation. The top panel presents estimates of a regression of the log of jobseekers (of an occupation in a year) on the log of vacancies (in the same occupation and year), including occupation and year fixed effects and weighting for the number of vacancies in that occupation. The bottom panel presents estimates of a regression of jobseeker growth between 2014 and 2018 on the jobseeker-vacancy gap of the same occupation in 2014. Significance levels: *: significant at the 10%; **: significant at the 5%; ***: significant at the 1%.