Research Article

The Shortage of Professionals/Skilled Workers: Its Impact on the Inflation Rate in the Eurozone

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The shortness of professionals and/or skilled workers is a widespread phenomenon in industrialized countries, and so it is in the Eurozone. The vacancy ratio, which is defined and explained in its three (respectively four) alternative definitions, may serve both as a measure of labour market tightness and as a proxy for the shortness of professionals and/or skilled workers. We derive, in two variants, a theoretical model which is based on the Phillips and the Beveridge curve. A combination of these two concepts yields a so-called "modified output gap" suitable for explaining the inflation rate of Eurozone member countries, driven, among other things, by the vacancy ratio. This model is successfully tested for about 70% of the Eurozone member countries (2006–2021). We conclude our exposition with suggestions for economic policy on how to sensibly reduce the vacancy ratio, a summary of findings, and a scope for future research.

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1. Introduction

Before, but also after inflation soared in the Eurozone in 2022, the ECB continuously pointed to the transitory/temporal character of its main determinants: the disruption of supply chains in the course of the Covid pandemic, the spikes in the prices of commodities and of key energy sources, and also, last but not least, the Ukrainian war. The shortage of professionals/skilled workers is by far not uniform: the demand for "critical thinking" and "problem solving" is on the rise, while there is a shift away from routine, manual, and towards non-routine cognitive work that cannot be easily automated. In health care

and education, there are currently not enough workers with the right skills to meet demand (FT Reports 25.03.2023, p. 2).

In contrast to other recent papers (for example, Ball et al. 2022), we look at the observed shortage of skilled workers/professionals as a rather permanent European phenomenon – at least within the time horizons an economist can reasonably evaluate – and, consequently, as a more than temporary source of labour market tension which translates into inflation pressure for the ECB. When we say "European", we do not know ex-ante whether this shortage is "equally distributed" over the Eurozone and whether, if not, it gives rise to specific labour mobility within the Eurozone.

The rest of the paper is organized as follows: In the next, second section, we will, at the beginning, define the shortage of skilled workers/professionals and relate it to the notions of vacancies/the vacancy ratio. Thereafter, the third section is dedicated to modeling the relationship between the vacancy ratio and the inflation rate. We call this relationship the "modified output gap," following earlier contributions of Sell/Reidelhuber (2008), Sell/Reinisch (2013), Sell (2016), and Ruesga et al. (2018), who established this kind of supply-side inflation theory in the vein of Ravenna/Walsh (2007). Recent papers such as Ball et al. (2022), Barnichon/Shapiro (2022), and Domash/Summers (2022) seem to point in the same direction.

In the fifth section, we empirically test the "modified output gap" for the full length of the ECB's tenure since 1999, using a sample of the Eurozone member countries. In the fifth section, we will also investigate the above-mentioned labour mobility aspect. This we do after having presented the data and their sources in the fourth section. In the sixth chapter, we will discuss remedies/policy options for relaxing the macroeconomic restriction which is given by the shortage of skilled workers/professionals. This includes the aspect of temporality and the possible involvement of the ECB's monetary policy. We close in the seventh section with a summary and the scope for future research.

2. Methods discussion: shortages on the labour market and the vacancy ratio

Literature on the phenomenon of vacancies is widespread (see, for example, Anastasopoulos et al. 2019, Bossler et al. 2020, and the contributions cited therein, Kudlyak et al. 2022). There exist at least four methodological approaches to make use of the vacancy ratio, v: the first alternative defines:

$$\mathrm{v}/u = V/U$$

as the average ratio of job vacancies to unemployment and is a synonym for labour–market tightness. As Ravenna and Walsh rightly put it, "expectations of labour market tightness increase the incentive of firms to post vacancies" (p. 12). The above definition is shared, for example, by Ball et al. (2022). These authors substitute the unemployment rate by this definition of v in the Phillips curve because they find "the ratio of job vacancies to unemployment (V/U) rather than the unemployment rate as a simple measure of labour market tightness" (Ball et al. 2022, p. 8): "The unemployment rate is U/(labour force), and we define the vacancy rate as V/(labour force), so the ratio of the two rates equals the V/U in our Phillips curve. Many researchers define the vacancy rate as V/(employment + V), but that distinction does not make a material difference for our analysis" (ibid, p. 20). This way of proceeding is pursued by German research institutes like the "Institut der Deutschen Wirtschaft" (IW), too: "Das im IW angesiedelte Kompetenzzentrum Fachkräftesicherung (KOFA) nutzt ähnlich wie die BA und die KfW das Verhältnis von Arbeitslosen (U) und gemeldeten offenen Stellen (V) – wobei U/V auch als Engpassrelation gilt –, jedoch mit einem pauschalen Schwellenwert von 200 für U und 100 für V" (Burstedde et al. 2020, p. 13).

What is the contribution of (V/U) to the measurement of labour market tightness? Consider a situation where V rises, but U remains constant: firms post more open positions (V) without a noticeable change in the number of unemployed, U. As a result, the shortness of skilled labour is higher than before. What if V is unchanged, but the number of unemployed, U, falls? In this case, firms look after skilled labour as before, but those who leave the status of unemployment obviously cannot contribute to lowering the (absolute) shortness of skilled labour as it is reflected in the number of V. Labour market tightness, consequently, rises too.

Notice that the above definition implies (with *LF* = labour force):

$$\text{v}_1 = \frac{V}{U} u, \ with \ u = U/LF$$

or

$$\frac{V}{U}\frac{U}{LF} = \frac{V}{LF} = \frac{\text{vacant job positions}}{\text{unemployed } + \text{ employed}} = \text{v}_1$$

The second approach defines the vacancy ratio as:

$$\text{v}_2 = \frac{\text{vacant job positions}}{\text{vacant job positions } + \text{ number of unemployed}}$$

It is obviously more "complete" than the first definition as it considers the number of vacancies in the numerator as well as in the denominator.

The third approach defines the vacancy ratio, v, in an even more consistent manner. It can be found in EUROSTAT, and it is used, for example, by Sell and Reinisch (2013, p. 193):

$$v_3 = \frac{\text{vacant job positions}}{\text{vacant job positions} + \text{job vacancies filled}}$$

The advantage of this third, obviously different definition for v (ibid) consists of its obvious coherence/consistence as it can be taken as a "full" percentage rate: it lies in the plausible range between 0 and 1. This makes this index superior to the two above introduced.[1] But there are some possible weaknesses too (applying partially also to the second definition): Looking at the numerator, one may doubt whether firms accurately report all their vacant positions to the respective labour market authority. In many organizations and/or firms, there exists a sort of implicit labour market which is not transparent to the public, and therefore, the management does not always submit vacant positions to official labour market statistics. As Bossler et al. (2020, p. 2) report, in Germany the "fraction of registered vacancies ranged between 23 and 49% over the last three decades." Under normal circumstances, the third definition of v ensures that newly employed skilled workers will lower the vacancy ratio: the numerator falls, and the denominator remains unchanged because the now lower number of vacant positions is matched by a higher number of filled job vacancies.[2] This implies that firms not only correctly report their "true need" for skilled workers but are also willing to lower this figure once employment is created. In the case of an extremely high shortage of skilled workers, it may happen that firms leave the number of posted vacant positions unchanged even if some employment has been created. This implies that the official figure of posted vacant positions underestimates and underrepresents the "true needs" of the firm. Whether this happens and to what degree is ultimately an empirical question.

In addition, something different may occur: the HR department does not post certain jobs as vacant because experience showed to him the impossibility of filling these vacancies. Looking at the denominator, the notion of "job vacancies filled" (as opposed to the number of unemployed, if correctly captured by the labour market statistics) is by no means always clear: does it mean that a position is now filled with a person who works full-time or perhaps only part-time? Another, somehow opposite effect, may come into play: a firm loses a long-time employee because he retires and compensates for this by offering the remaining team members the opportunity to work extra hours in exchange for extra

remuneration. Some sort of "hidden vacant positions" emerge. Altogether, there is the possibility of "hidden vacancies" and "hidden employment," which both tend to introduce a bias into any sort of vacancy ratio definition.

Does the vacancy ratio or do other related figures correctly reflect the shortage of skilled workers or of professionals (SOSKOP)? Burstedde et al. (2020, p. 13) put it this way: SOSKOP is there if labour demand exceeds labour supply, that is, when, at a specific point in time, we find more vacant positions than suitably qualified unemployed persons. It is (only) then that a job with SOSKOP becomes a so-called shortage occupation (ibid., p. 31). The same authors offer an alternative measure of SOSKOP: the number of unemployed per 100 vacancies (ibid). The smaller this value is, the higher SOSKOP, ceteris paribus. The possible realizations range from 0 to infinity. Values below 100 signal the presence of SOSKOP (ibid.). Notice that this alternative measure of SOSKOP is identical to the V/U ratio mentioned above. Summing up, the literature is convinced that a shortage of skilled workers/professionals automatically translates into a higher vacancy ratio.

But when and why does a higher vacancy ratio spur inflation? If it is understood as a sort of labour market tightness (see above), empirical findings (such as estimates of the Phillips curve) from the past support the view that indeed a higher vacancy ratio spurs inflation. What is the theory behind this? A higher vacancy ratio signals an increasing mismatch in the labour market (Sell 2016 und Sell/Reinisch 2013, 2015): firms react by offering higher wages (Fuest 2023) and/or by implementing overtime regulations. Both measures tend to increase wage costs, which firms will most likely – dependent on the actual elasticity of demand – pass on to consumers. And: posting additional open positions is costly (Ravenna/Walsh 2007, p. 8).

How is the empirical evidence? The ratio of V/U performed well in the recent past: "The contribution of V/U to the rise in 12-month inflation is 2.0 percentage points, nearly a third of the total inflation increase. However, the rise in V/U explains more—nearly one-half—of the rise in core inflation and, as discussed above, the effect of V/U is rising over time. If we decompose the change in annualized one-month core inflation from December 2020 to September 2022 (a rise of 6.4 percentage points, from 1.9 percent to 8.3 percent), the contribution of V/U is 5.0 percentage points." (Ball et al 2022, pp. 17-18). This finding is not limited to core inflation: "The ratio of unemployed workers to job openings is the best predictor of core Consumer Price Index (CPI) inflation, followed closely by the quits rate and the unemployment rate" (Furman/Powel III 2021, p. 1). Earlier studies (Sell/Reinisch 2013) have also confirmed the significance of

V: "all three estimated regressions indicate a positive and significant relationship between the inflation rate and the vacancy ratio" (ibid., p. 199).

Can immigration relax this connection? According to Goodhart/Pradhan (2020), all depends on the question of whether immigration will stimulate more consumption (production) than production (consumption): in the first case, inflation will be boosted; in the second case, dampened. Following Mundell (1961), labour mobility within a monetary union reduces the observed differences in the unemployment (rate), the inflation rate, and the balances of the current account registered in respective member countries.

What other influences may have disturbed this connection in the past? SOSKOP was not a significant problem in the EMU if the induced labour cost increase was compensated by two factors: cheap energy (like gas from Russia) on the one hand, and extreme low interest rates as part of the CBs' policy stance on the other hand, which accordingly led to artificially low capital costs. In addition, a high elasticity of demand, the fruit of strong globalisation being in force in the first two decades of the new millennium, made it hard for firms to pass on cost-push factors to prices.

3. „The modified output gap": a simple model in 7 equations and in two variants

Though seldom a subject in literature, authors interested in the subject suspect a clear relationship (Ball et al. (2022): „the Beveridge curve determines the relation between the unemployment rate and V/U, and therefore affects the level of unemployment needed to reduce inflation" (p. 20). To see a direct relationship, one needs to specify the Beveridge curve: "The relation between unemployment and core inflation. A log–linear Beveridge curve defines the vacancy rate v as a function of the unemployment rate u (pp. 20/21).[3] An example is given by equation (1):

Beveridge curve

(1) $v = au^b, a > 0, b < 0$

or, as an alternative:

(2) $v = au^{-b}, a > 0, b > 0$

Phillips curve

"A simple Phillips curve captures most of the movements in inflation over the twenty years that the Euro has existed" (Ball/Mazumder 2019, p.1). In this vein, we specify a Phillips curve:

(3) $\pi = -du + \pi^e + (\mu + z)$, $d > 0$ (see Blanchard 2020, Sell 2016)

To capture the direct effect of v on π, we must solve (2) explicitly for the unemployment rate, u, and achieve:

Modified Beveridge curve

(4) $v/u = au^{-b-1}$

The solution for this non-linear equation is:

(5) $u = +/-\ \sqrt[b]{a/v}$

If we now make use of this expression for u and accordingly substitute u within the Phillips curve (3), "we obtain a relation between the core inflation gap (median inflation minus expected inflation) and the vacancy ratio. This relation captures the unemployment-inflation trade-off facing policymakers as they stimulate or restrain demand and thereby move the economy along a stable Beveridge curve" (ibid, p. 21). We shall call hereinafter this expression:

Modified output gap

(6) $\pi = -d\sqrt[b]{a/v} + \pi^e + (\mu + z)$; $\frac{\delta\pi}{\delta v} = -d\frac{1}{b}\frac{1}{\left(\frac{a}{v}\right)^{1-1/b}} > 0$

A slightly different version of the modified output gap is given by (Sell 2016, p. 9):

(7) $\pi = f(v) + \pi^e + (\mu + z)$; $\frac{\delta\pi}{\delta f}\frac{\delta f}{\delta v} > 0$

What does our model claim in terms of endogeneity, reverse causality, and omitted variable bias? As is well known, neither the Phillips curve nor the Beveridge curve exhibits unequivocal exogeneous variables, and some sort of reverse causality can never be excluded either. But even if both may suffer from an omitted variable bias, their combination leads to a new insight into cost-push inflation.

4. Description of available data and materials

The data we use in the following stem from four basic sources: EUROSTAT[4], ILOSTAT, the WORLD BANK, and the EUROPEAN SURVEY OF PROFESSIONAL FORECASTERS. In principle, we were interested in a

complete data set covering all members of the Eurozone and the time span between 1999 and 2022 (yearly observations). Alas, many figures were missing, either for specific countries or for discrete periods. Three types of inflation measurement were at our disposal: the HICP, the index of core inflation[5], and an index of producer price inflation. Inflation expectations were approximated by 5-year forecasts of inflation from the European Survey of Professional Forecasters (https://www.ecb.europa.eu/stats/ecb_surveys/survey_of_professional). To compute the different vacancy ratios (see above), but also "labour tightness," V/U, we collected the absolute numbers of vacancies, employed persons, the unemployed, the labour force, vacancy ratios, and unemployment rates.

5. Empirical strategy, results for the Eurozone (2006-2021), and discussion

Empirical strategy

In light of the above-derived theoretical alternatives, we suggest running the following regressions:

(8) $\pi_{it} = a + bv_{jit} + c\pi^e_{it}$; for i = 1, …19 countries, with j = 1, 2, 3 different concepts of the vacancy ratio, where

$$v_1 = \frac{V}{LF} = \frac{\text{vacant job positions}}{\text{unemployed} + \text{employed}}$$

$$v_2 = \frac{\text{vacant job positions}}{\text{vacant job positions} + \text{number of unemployed}}$$

and

$$v_3 = \frac{\text{vacant job positions}}{\text{vacant job positions} + \text{job vacancies filled}}$$

Alternatively, or better, in addition, we may try a fourth variant:

(9) $\pi_{it} = a + b\left(\frac{V}{U}\right)_{it} + c\pi^e_{it}$

What are we exactly estimating? Given the observable large countrywide differences, we have refrained from replicating a cross-country analysis, as earlier papers did (Sell/Reinisch 2013, for example), and explicitly decided in favour of a country-specific time-series regression exercise (see annex).

Results

From the 19 actual members of the Eurozone, France and Italy had to be left out given the lack of data on vacancies. Out of the 17 remaining countries, no fewer than 12 (or 71%) showed excellent, good, or at least satisfactory results in explaining the inflation rate as measured either by the HICP, the core inflation index (CORE), or the producer price index (PPI). We have grouped single countries together with either excellent/good (i), satisfactory (ii), or rather disappointing results (iii) of estimating equations (8) and (9).[6]

i. Netherlands, Germany, Belgium, Luxemburg, Finland, Austria, Portugal, Slovakia, Estonia, and Malta[7]: Here, the impact of the vacancy ratio (in its different specifications, including V/U) on the current inflation rate is positive[8] and significant. As a rule, the constant[9] and the coefficient of the expected inflation rate are positive[10] and significant. The adjusted R-squared is quite satisfying.

ii. Greece and Ireland: the impact of the vacancy ratio (in its different specifications, including V/U) on the current inflation rate is positive, but to a lesser degree significant. As a rule, the constant and the coefficient of the expected inflation rate are positive and significant. The adjusted R–squared is still satisfying.

iii. Latvia, Lithuania (the other Baltics), Slovenia, Spain, and Cyprus. Here, the impact of the vacancy ratio (in its different specifications, including V/U) on the current inflation rate is either positive but insignificant or even implausibly negative. The constant and the coefficient of the expected inflation rate are not always positive and/or significant. The adjusted R–squared is not always satisfying.

Discussion (cause and effect analysis)

Let us start with the *causes*: Why is it that some of the four measures of shortness of qualified labour function well as explanatory variables for the inflation rate while others do less? If we take the case of V/U, we may presume that in a (still less than) perfect world or labour market, for that matter, any lower (higher) number of vacant jobs should go along one by one with a higher (lower) number of unemployed. Given the convex curvature of the Beveridge curve, this will never happen, though. By contrast: the more volatile the ratio of V/U and the more it correlates with the volatility of prices, the less perfect the match on the labour market and the higher the direct and indirect labour costs the firms must afford.

If it is v_1, what we're talking about, we may presume that in a perfect world or labour market, for that matter, any lower (higher) number of unemployed during the upswing (downswing) of the cycle should go along one by one with an increase (a reduction) in the number of employed. The denominator of v_1, then, does not change; a perfect match would even reduce V to zero. In a less than perfect world, the denominator will vary, and V is always to some degree positive. That is, v_1 in principle would always sway between rising or falling depending on the momentum of the business cycle. The more volatile v_1 is and the more it correlates with the volatility of prices, the less perfect the match on the labour market and the higher the direct and indirect labour costs the firms must afford.

If it is v_2 which performs well as an explanation of inflation, we may presume that in a perfect world or labour market, for that matter, any lower (higher) number of vacant jobs should go along with a higher (lower) number of unemployed (see above). Hence, even if the numerator falls (rises), the denominator may stay constant. That is, also v_2 in principle would always sway between rising or falling depending on the momentum of the business cycle, and it may be as volatile as V itself. But: the more volatile v_2 is and the more it correlates with the volatility of prices, the less perfect the match on the labour market and the higher the direct and indirect labour costs the firms must afford.

If it is v_3 which performs well as an explanation of inflation, we may presume that in a perfect world or labour market, for that matter, any lower (higher) number of vacant jobs should go, almost by definition, along with a higher (lower) number of occupied posts of labour. But the numerator of v_3 (V) would always sway between rising (in the upswing) or falling (in the downswing) depending on the momentum of the business cycle, whereas the denominator would, even in a less than ideal world, stay constant. Hence, the more volatile v_3 is and the more it correlates with the volatility of prices, the less perfect the match on the labour market is, and the higher the direct and indirect labour costs the firms must afford.

What about the *effects*? Which prices are mainly affected by a shortage of skilled labour? This should not be determined a priori but should be left to an empirical analysis that draws on alternative concepts of measuring inflation. To this end, we had at hand, and we made use of, at least three concepts:

HICP: being as it is constructed, this index captures household final monetary consumption expenditures, including food, petrol, consumptive durables, and non-durables, rent for housing, consumer-related services, insurance. Accordingly, a shortage of a qualified labour force in these sectors will be reflected in a higher HICP.

CORE: Core inflation is the change in the costs of goods and services. It does not include those from the food and energy sectors, given that energy prices and those of foodstuffs are highly volatile. This type of inflation index can measure, above all, the impact of a shortage of qualified labour in sectors like durable consumption goods, investment goods, housing, non-tradeables, etc. Core inflation is considered an indicator of underlying long-term inflation.

PPI: Producer price indices in manufacturing measure the rate of change in prices of products sold as they leave the producer. They exclude any taxes, transport, and trade margins that the purchaser may have to pay. PPIs provide measures of the average movements of prices received by the producers of various commodities. They are often seen as advanced indicators of price changes throughout the economy, including changes in the prices of consumer goods and services. Whereas the HICP and the CORE data stem from EUROSTAT, the PPI data comes from the World Bank.

Why is it that in some countries/periods none of the measures of shortness of skilled labour signals and/or has an impact on/causes cost-push inflation? In the first place, it may be that neither any of the vacancy ratios nor V/U correctly captures this shortness. For possible reasons, see section two above. In the second place, it could be that firms adjust their profit margins downwards instead of asking for higher prices in the markets for goods/services in reaction to an effectively present shortness of skilled labour. This often happens when firms face a high elasticity of demand. Thirdly, it may occur that firms do not experience cost increases despite the existence of a shortness of skilled labour. This may well happen whenever the management of the firm is able to enforce a rise in the productivity of skilled labour among the rest of the staff and becomes necessary once, for example, a part of the qualified employees has retired. If this goes along with "weak unions", something captured, for example, by a low union density, the now higher labour productivity does not necessarily translate to the same degree into higher wages. In that case, marginal costs of labour may stay constant or even fall. A low and possibly also insignificant coefficient of the expected inflation rate may also be due to several reasons: the more inflation expectations are anchored, the less their variability and consequently their correlation with an unstable inflation rate. The following Table 1 summarizes our results.

	HICP	PPI		CORE
V/U	GER	FIN	SVK	MLT
	NED	AUT	MLT	SVK
	GRE	POR	LUX	EST
v1	GER	BEL	AUT	MLT
	BEL	LUX	SVK	
	IRL	POR	FIN	
v2	GER	LUX	MLT	SVK
	NED	POR	AUT	MLT
	GRE	FIN	SVK	EST
v3	GER	BEL		MLT
	BEL	LUX		EST
	AUT	POR		AUT
	GRE	FIN		
		MLT		

Table 1. Countries of the Eurozone with good performing results in the estimation process

Source: own estimations[11]

A low and possibly also insignificant coefficient of the expected inflation rate may also be due to several reasons: the more inflation expectations are anchored, the less their variability, and consequently, their correlation with an unstable inflation rate.

6. Conclusions: how to fight the shortage of skills on the labour market?

Is there a scope for monetary policy?

The shortness of skilled labour/professionals obviously cannot be the direct target of any sort of monetary policy. Like in the case of other supply shocks, monetary policy should accommodate these effects (Sell 2022), provided this strategy does not raise higher inflationary expectations.

The role of wage policy

There exists a widespread opinion – shared, for example, by Simon Jäger, head of IZA (Institut zur Zukunft der Arbeit) – according to which there can be no real shortness of skilled labour if entrepreneurs are capable of pulling labour into their firms by raising wages and/or improving their working conditions. This view is supported, for example, by Clemens Fuest, president of the Ifo-Institute: a shortage (of skilled labour) is a situation where agents are willing to pay the price but cannot find any additional good or factor of production (Fuest 2023). This situation will, however, change once firms bid for labour with higher wages. One can indeed argue that higher wages tend to pull skilled labour out of the labour market reserve and/or make part-time jobs turn into full-time jobs. In both cases, labour supply will increase, which furthermore helps to dampen any sort of wage-price spiral.

The role of unique qualifications of the labour force and of hours worked by women

Against this view, one finds the thesis that single qualifications are a sort of unique specimen because labour is definitely not a homogeneous good: a plumber cannot be replaced easily by, say, an economist. Statistics tend to show that certain jobs (such as care for the elderly) are kind of resistant to becoming more numerous because of higher wages. If we expect the unique specimen to raise its output, higher productivity and/or longer working hours offer a solution, though. The Handelsblatt's chief economist, Bert Rürup, suggests that part-time working women extend their weekly/daily workload: every second woman in employment in today's Germany is a part-timer. This comes as a surprise if one recognizes that women's participation in education is above men's participation in Germany. Extending the workload also contributes to stabilizing the pension payments to women at an acceptable level.

Higher labour market participation: a (winning) game changer?

Generalizing, one might discuss whether an overall higher labour market participation (not only of women) is capable of "solving" the problem. The study conducted by Fuchs and Weber (2018) is not too optimistic: "The results show that higher labour participation rates can only partially compensate for the demographic influence, as the working age population will shrink to a greater extent and faster than the participation rates. In addition, some workers might not be able to meet the future job requirements. In this case, the potential labour force would be even smaller" (ibid, p.1).

Training and education of the less skilled

The shortness of skilled labour should in principle not be confounded with an overall deficit of the working force, though both can go in parallel. Notice that there is no such thing as a "given" size of the population that may be qualified. Furthermore, as Kubis (2022, pp. 17-18) puts forward, the high abandonment figures in training, schooling, further education, and studying activities need to be reduced considerably.

The correct view of immigration and emigration

While it is usual and cheap to call for more immigration of the qualified to control the upward trend of the vacancy ratio, the role of emigrants is less well understood. It is not only that the flows of emigrants tend to enhance the number of vacancies. Often, emigrants leave their country of origin only temporarily. But this decision may turn into a permanent one once emigrants miss a sound culture of rereception, which goes along with pecuniary and non-pecuniary incentives.

7. Summary and the scope for future research

In this paper, we have presented and deeply discussed the four existing alternative concepts and definitions of the vacancy ratio. They have been introduced into a simple model of the Beveridge and of the Phillips curves, which, combined with each other, delivers a reduced form equation for the inflation rate ("modified output gap"). The actual inflation rate becomes a dependent of a constant (capturing the impact μ as a standard mark-up factor that signals market imperfections and of z, which symbolizes factors pressuring for higher wages due to the distortionary effects of the income tax, the increasing reservation wage effect of social policy, and the existence of mobility barriers), of the vacancy ratio, and of inflationary expectations. These four variants of the model have been empirically tested in the

following for countries of the Eurozone (2006–2021). 71% of the achieved results are either "fully convincing" or "still satisfactory," and accordingly, only 29% are "disappointing."

What about *policy options*? We briefly discussed the scope for monetary policy, the possible role of wage policy, qualifications of the labour force, hours worked (participation) by (of) women, an overall higher labour market participation, training, and education of the less skilled, and the correct view of immigration and emigration. Immigration may, in fact, become a key to alleviate the shortage of skills on the labour market. To be effective and to be efficient, immigration rules should, however, not only control the size but also steer the quality of immigration. To that end, *future empirical* analysis should first reveal what determined immigration in the past. Emigration flows are important also: it is well known that many of the emigrants from industrialized countries are highly trained people whose decision to leave severely affects (positively) the respective vacancy ratio. In the case of the Eurozone, one can, for example, investigate the elasticity of the vacancy ratio vis-à-vis both the immigration and the emigration flows. If it is zero or less than one (one), new immigrants (emigrants) fail (succeed) to reduce (increase) the vacancy ratio in proportion to their number. Most likely, the coefficient of emigration will exceed the coefficient of immigration as the share of skilled workers/professionals is presumably higher among emigrants in comparison to immigrants.

Statistical Appendix

This material is available from the Supplementary data section and can be downloaded here.

Statements and Declarations

an earlier version of this paper.

Footnotes

[1] Furthermore, v_2 cannot avoid the problem of simultaneity that would arise when regressing, for example, the unemployment rate on the vacancy ratio (Sell/Reinisch 2013, p. 193).

[2] Notice that v_3 is not necessarily signalling "labour market tightness", but the direct and indirect costs of posting vacant positions which firms must afford. As a significant cost factor in times of a shortage of skilled labour, it contributes to the aim of firms to raise prices.

[3] See, for example, Börsch–Supan (1991), for a fundamental substantiation of the Beveridge curve.

[4] We are grateful to the IAB (Nürnberg, Germany), which reports German data on vacancies to Eurostat, and in particular to Alexander Kubis for his special hints.

[5] The inflation rate excluding food and energy prices (Ball/Mazumder 2019, p.2).

[6] The results for groups (i) and (ii) are reported in the statistical annex; all remaining outcomes can be obtained by the authors upon request.

[7] The number of observations was much lower here due to the lack of data.

[8] The sometimes–large size of the coefficients is not a real problem since we are not estimating elasticities.

[9] Notice that the constant in the estimation equations stands for the term (μ + z) in the theoretical model from above. Its components are explained by Sell 2016 (pp. 6-7): μ is a standard mark-up factor which signals market imperfections, and z symbolizes factors pressuring for higher wages due to the distortionary effects of the income tax, the increasing reservation wage effect of social policy, and the existence of mobility barriers.

[10] In several cases, we found negative, albeit significant, coefficients for the constant. This points to the possibility that the term (μ + z) may become negative because of an incomplete specification of the Phillips curve. Notice also that this fact does not alter the positive relationship between the vacancy ratio and the inflation rate. It may only mean that this positive relationship begins on the negative axis of the ordinate.

[11] While it is quite uncommon to present the results in the way it is currently done in Table 1, this way of proceeding visualises a qualitative assessment of our findings.

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Declarations