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The quality-weighted matching function: Did the German labour market reforms trade off efficiency against job quality?

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IAB-DISCUSSION PAPER

Articles on labour market issues

24|2019 The Quality-Weighted Matching Function: Did the German Labour Market Reforms Trade off Efficiency against Job Quality?

Hermann Gartner, Thomas Rothe, Enzo Weber



The Quality-Weighted Matching Function: Did the German Labour Market Reforms Trade off Efficiency against Job Quality?

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Mit der Reihe „IAB-Discussion Paper“ will das Forschungsinstitut der Bundesagentur für Arbeit den Dialog mit der externen Wissenschaft intensivieren. Durch die rasche Verbreitung von Forschungsergebnissen über das Internet soll noch vor Drucklegung Kritik angeregt und Qualität gesichert werden.

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Abstract

We evaluate the quantity-quality trade-off on the labor market by estimating an augmented matching function weighting the matches by quality measures. We use the approach to evaluate the German labor market reforms conducted between 2003 and 2005. Indeed, we find a significant quantity-quality trade-off. However, even after controlling for job quality, a good half of the positive effect of reforms on the matching efficiency remains.

Zusammenfassung

Wir analysieren den Zielkonflikt zwischen Umfang und Qualität der Beschäftigung, indem wir eine erweiterte Matching-Funktion schätzen, worin die Zahl der neue Beschäftigungsverhältnisse (Matches) mit deren Qualität gewichtet wird. Diesen Ansatz verwenden wir, um die Auswirkungen der Hartz-Reformen der Jahre 2003 bis 2005 auf den Arbeitsmarkt zu bewerten. In der Tat bestätigt sich, dass ein Teil der zusätzlichen Beschäftigungsverhältnisse durch schlechtere Qualität erkaufte war. Auch bei konstanter Qualität der neuen Matches wäre aber gut die Hälfte des positiven Effektes auf die Matchingeffizienz infolge der Hartz-Reformen verblieben.

JEL

J11, E02, J65

Keywords

matching approach, quantity-quality trade-off, labor market reforms, Germany

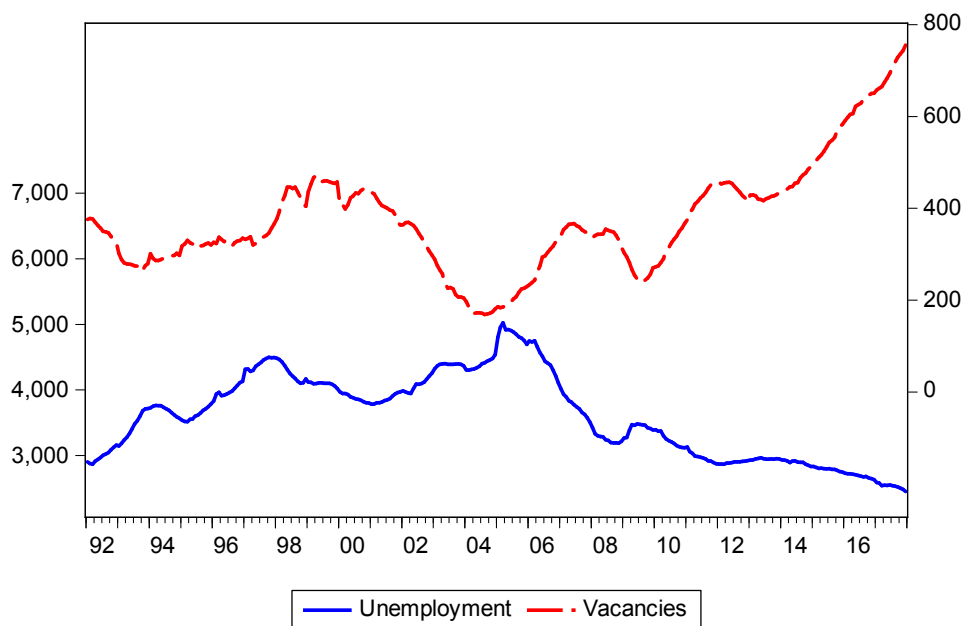
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1 Introduction

While many countries have suffered from considerable labour market slack since the late 2000s, unemployment in Germany has fallen considerably (see Figure 1 for the development of unemployment and vacancies). Many see an important role of the 2003-2005 Hartz reforms in this context. At the same time, the quality of the labour market upswing is intensely discussed. In particular, this concerns phenomena such as weak wage development, rising wage inequality and potentially decreasing job duration. The debate includes the question whether the success of the reforms – by increasing pressure on the unemployed and giving additional opportunities to the employers – only came at the cost of blowing up a low-wage sector with unfavourable working conditions.

Figure 1: Unemployment and Vacancies in Thousands, 1992-2017



Source: Federal Labour Office.

Several studies show that job finding rates and matching efficiency considerably increased following the reforms (e.g., Klinger/Weber (2016); Launov/Wälde (2016)). In the underlying paper, we augment a typical matching function approach by a quality perspective, introducing the concept of the *quality-weighted matching function*, where regarding the notion or quality we take the perspective of the workers welfare. I.e., we weight matches by their quality by including measures of wage, wage inequality and job duration into a matching function.

The weights are determined empirically, thus reflecting the relevance of the different variables in a matching context. Then, we analyse to what extent matching efficiency still increased with the reforms once controlling for quality changes. Thus, we can address two key questions: Did the reforms lead to real improvements in the functioning of the labour market (e.g. by increasing institutional efficiency as in Launov/Wälde (2016))? Or did they only shift the position in a trade-off between quantity and quality?

If the reforms achieved the goal of integrating also low qualified and long-term unemployed job seekers into employment, this is likely to be accompanied by worsening quality measures, e.g. the wage. We avoid blaming such effects on the reforms by correcting the quality indices for changes of individual worker characteristics using comprehensive micro data.

Our study contributes to the literature that considers negative side-effects of reforms at the micro level, for example van Ours/Vodopivec (2006); van den Berg/Vikström (2014) and Nekoei/Weber (2017). Many of these papers find a trade-off between the quantity and the quality of the jobs, where the quality is typically measured by wages or job stability.

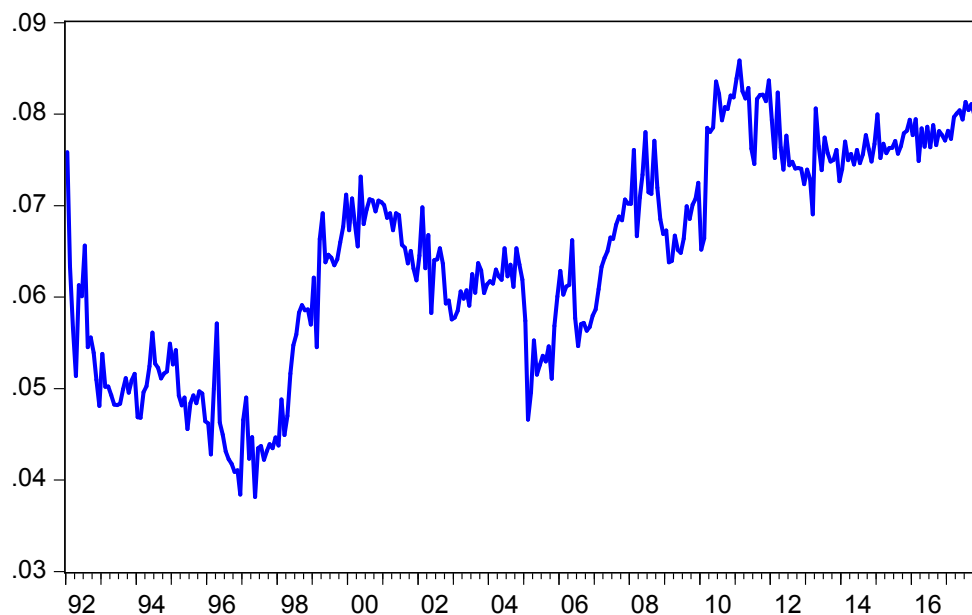
However, estimates on micro level may be biased. They rely on the assumption that the job finding probability of a treated person is not affected by the treatment of others. This ignores equilibrium effects. Yet, as Cahuc/Le Barbanchon (2010) point out, equilibrium effects are important for assessing the effects of reforms. For example, the increase of search effort of a treated worker will produce congestion externalities that may reduce the job finding probability of other workers. We care for this by using aggregate measures of the reform effects.

Thus, our study is also related to the macroeconomic literature on reform effects. Studies in this strand are Krause/Uhlig (2012); Krebs/Scheffel (2013) and more recently Hartung/Jung/Kuhn (2018) and Hochmuth et al. (2019). They work with calibrated models to evaluate the employment as well as wage effects of the reforms, however they do not explicitly assess the quantity-quality trade-off. Furthermore, while these models help understand possible mechanism of reform effects, they rely on strong model assumptions. Our approach estimates an augmented matching function and exploits the variation of time series that are constructed with detailed micro data information. Thus, the contribution of our study lies in evaluating the overall quantity-quality trade-off from a macro perspective, proposing a labour market matching approach.

2 Data

To calculate stocks and worker flows on the individual level, we use a 2 percent random sample of the Integrated Employment Biographies (IEB, V13.01), provided by the German Institute for Employment Research (IAB). IEB data are also used e.g. by Bauer/King (2018) to calculate wages and aggregated job findings or by Schmieder/von Wachter/Bender (2012) to analyse effects of a change of unemployment benefit duration on employment. The data cover the universe of German employed and registered unemployed workers from 1980 to 2017 (see Antoni/Ganzer/vom Berge (2016)). Employment is defined as employment subject to social security, in full-time or part-time, including apprentices, marginal and subsidized employment. We observe the number of spells of registered unemployment u_t and employment e_t as well as flows between both states until December 2017. We allow a lag of not more than 30 days between u and e to count the transition as match m_t . The job finding rate is calculated as $jfr_t = m_t/u_{t-1}$ (see Figure 2).

Figure 2: Job Finding Rate, 1992-2017

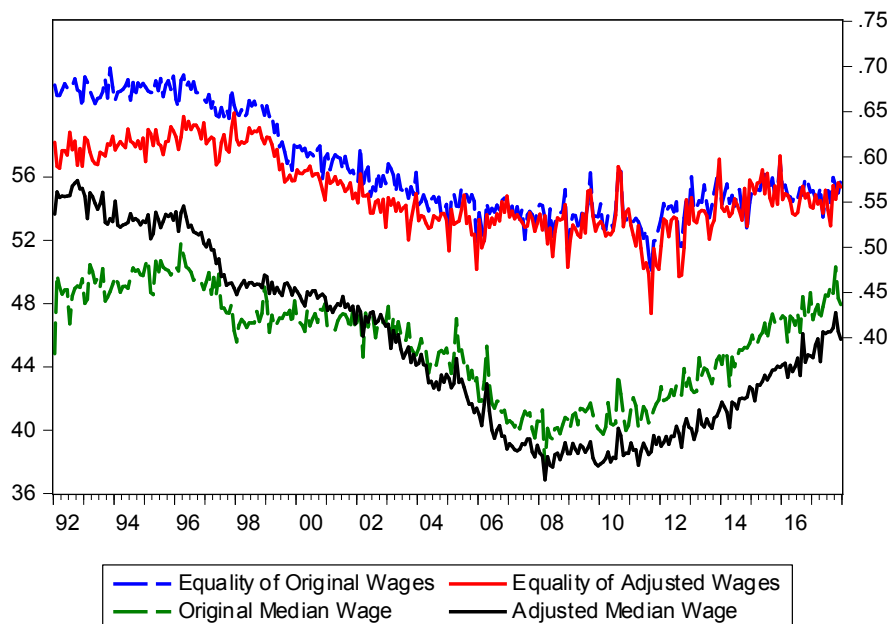


Source: IAB Employment Biographies. Own calculations.

As noted above, we concentrate on two quality aspects: wages and job stability (see Nekoei/Weber (2017); Giannelli/Jaenichen/Rothe (2016)). Both dimensions are available in our dataset. We calculate median daily wages and the lowest decile of wages in a new full-time job after unemployment. Part-time workers are excluded in the analysis of wages, because our data do not contain information on hours worked. The wages are deflated by the consumer

price index. While 0.64 percent of wages are right-censored at the threshold for social security contributions, this is unproblematic for median lower percentile wages. The ratio of the lower decile wage to the median wage is used as a measure of wage equality $equal_t$ in the lower half of the wage distribution. We also use the median entry wages w_t and the log-wage difference $wdif_t$ between the jobs before and after a given unemployment spell as further dimensions of match quality. For job stability s_t , we calculate the share of newly started full- and part-time jobs with a duration of one year or more. The median wage and the wage equality are the measures used later in the final regression and are shown in Figure 3. Quality reductions over the period after the Hartz reforms, but also before, are evident.

Figure 3: Median Wage and Wage Equality, 1992-2017



Source: IAB Employment Biographies. Own calculations.

3 Economic Concept

A typical labour market matching function (see Pissarides (2000)) is given by

$$m_t = \mu + au_{t-1} + bv_{t-1} + \epsilon_t \quad (3.1)$$

where m is the number of matches, u the number of unemployed, v the number of vacancies and ϵ the error (variables in lower-case letters are in logs). Thus, (3.1) mirrors a production function with matching efficiency μ as the equivalent of total factor productivity. We estimate the model for the period 1992 to 2017 with monthly seasonally adjusted data and control for the structure of the pool of unemployed (as Kohlbrecher/Merkl/Nordmeier (2016)) by including the shares of low-skilled, of young (< 25 years), old (> 55 years), female and foreigner workers among the unemployed (on a monthly basis taken from the official statistics of the Federal Employment Agency).

As Fahr/Sunde (2009) or Klinger/Rothe (2012), we include shift dummies in the beginning of 2003, 2004 and 2005 taking into account the three steps of the Hartz reforms. These dummies capture changes in matching efficiency at the time of the reforms.

We extend this matching function approach by weighting the matches M by their quality Q , i.e. $M^* = MQ$. Thereby, $M \cdot Q$ becomes a sum in the log version and we use asterisks for the new coefficients:

$$m_t + q_t = \mu^* + au_{t-1} + bv_{t-1} + \epsilon_t^* \quad (3.2)$$

We represent q by measures of job quality. For estimating sensible weights for these measures in our framework we bring q_t to the right hand side. Then we empirically determine the weights in a regression that chooses the weights such that the explanatory power for the matches is maximized.

These quality variables are likely to play a role for matching efficiency due to the behaviour of both market sides: On the one hand, employers – facing a lower wage – might become less demanding and selective; compare Sedlaček (2014) or Hochmuth et al. (2019) for the connection of firms' hiring standards and matching efficiency. On the other hand, the quality variables can be seen as indicators for jobseekers' willingness to compromise, as in Acemoglu/Shimer (2000).

We experimented with several quality measures: The median wage of new jobs, the relation of the lowest wage percentile to the median as an inequality measure, the wage difference of

the jobs before and after unemployment and as stability measures the duration of the new jobs and the share of jobs that exist longer than a year.

All these quality measures might be influenced by characteristics like gender, age, nationality, education, working experience and regional factors. The composition of these characteristics changes over time, partly as an effect of the reform. However, we ask whether the job quality is lower for given personal characteristics. Therefore, we calculate the quality indices under the condition of a constant composition of the hired workers. As we take the perspective from the worker side, we did not control for firm characteristics.

Accordingly, we apply a standard log-wage regression with a sample of all new matches over the whole period. The regressors are dummies for gender, nationality (German or other), working in east Germany, three categories of educational level and the variables age, potential experience and the duration of unemployment before the match. Furthermore we include a fixed period effect for each month. The index is then calculated as the predicted mean wage that includes the fixed time effects but holding the controls on their average values. The same is done for the match duration and the log wage difference referred to the previous job. The wage inequality index is defined as relation of the 10th to the 50th percentile of the predicted wages.

4 Results

The estimated baseline matching function results as:

$$\hat{jfr}_t = 0.17 - 0.38u_{t-1} + 0.50v_{t-1} + 0.004d03_t + 0.14d04_t + 0.10d05_t + controls$$

(1.09) (0.05) (0.05) (0.04) (0.04) (0.04)

with $R^2 = 0.827$. In sum, the reform dummies ($d03_t$, $d04_t$ and $d05_t$) stand for an increase in matching efficiency of 24 percent. When taking into account the quality variables, we get the extended estimation:

$$\hat{jfr}_t = 1.96 - 0.42u_{t-1} + 0.43v_{t-1} + 0.01d03_t + 0.11d04_t + 0.01d05_t$$

(1.36) (0.05) (0.05) (0.04) (0.04) (0.05)

$$- 0.47w_t - 0.34equal_t + controls$$

(0.19) (0.13)

A likelihood ratio test of the relevance of the additional quality variables leads to a highly significant test statistic of 16.5. Both a high wage level and a more equal wage distribution – controlled for personal characteristics at the micro level – have significantly negative coefficients, which shows a trade-off between job quality and the job finding rate.¹ The coefficients are to be read as elasticities. Job stability and the wage difference of the jobs before and after unemployment were left out due to clear insignificance in a general-to-specific approach.

The quality variables clearly reduce the measured Hartz effect: The sum of the reform dummies shrinks to 13 percent. In a Wald-test, this sum is significantly different from the sum in the baseline model above. Especially the effect in 2005 nearly vanishes. In this year Hartz IV, the reform of unemployment assistance and welfare benefits, was implemented.

This reform part was especially controversial and blamed for exerting pressure on job seekers. Indeed, following our results, in this regard the Hartz reforms came along with trading off quantity against quality. However, the reforms as a whole also led to real improvements in the functioning of the labour market, which represent a good half of the overall effect on matching efficiency.

¹ One may object that both wage measures are correlated and the effects may be a spurious relation that cancels each other out. Therefore, we estimate versions with only one of the variables. The effect of the indices are robust.

5 Conclusion

We evaluated whether the speed-up of matches after the German labor market reforms was paid by worse quality of new jobs. To estimate this possible quantity-quality trade-off we introduce an augmented matching function where the matches are weighted by quality measures. Using rich micro data for the labor market, we correct the quality measures for shifts in the composition of the newly matched worker. Even if we control for job quality, the reforms still have increased the matching efficiency. However, nearly half of the overall effect on matching efficiency turns out to be due to a quantity-quality trade-off.

Enabling such assessments is a major merit of the concept of the quality-weighted matching function. Future research could explore additional fields of application and develop further the definition and measurement of match quality.

References

- Acemoglu, Daron; Shimer, Robert (2000): Productivity gains from unemployment insurance. In: *European Economic Review*, Vol. 44, No. 7, p. 1195–1224.
- Antoni, Manfred; Ganzer, Andreas; vom Berge, Philipp (2016): Sample of integrated labour market biographies (SIAB) 1975-2014. FDZ Datenreport. Documentation on Labour Market Data 201604, Institut für Arbeitsmarkt- und Berufsforschung (IAB), Nürnberg.
- Bauer, Anja; King, Ian (2018): The Hartz Reforms, the German Miracle, and Labor Reallocation. In: *European Economic Review*, Vol. 103, No. C, p. 1–17.
- Cahuc, Pierre; Le Barbanchon, Thomas (2010): Labor Market Policy Evaluation in Equilibrium: Some Lessons of the Job Search and Matching Model. In: *Labour Economics*, Vol. 17, No. 1, p. 196–205.
- Fahr, Rene; Sunde, Uwe (2009): Did the Hartz Reforms Speed-Up the Matching Process? A Macro-Evaluation Using Empirical Matching Functions. In: *German Economic Review*, Vol. 10, p. 284–316.
- Giannelli, Gianna C.; Jaenichen, Ursula; Rothe, Thomas (2016): The evolution of job stability and wages after the implementation of the Hartz reforms. In: *Journal for Labour Market Research*, Vol. 49, No. 3, p. 269–294.
- Hartung, Benjamin; Jung, Philip; Kuhn, Moritz (2018): What Hides Behind the German Labor Market Miracle? Unemployment Insurance Reforms and Labor Market Dynamics. IZA Discussion Paper 12001, IZA Institute of Labor Economics.
- Hochmuth, Brigitte; Kohlbrecher, Britta; Merkl, Christian; Gartner, Hermann (2019): Hartz IV and the decline of German unemployment: A macroeconomic evaluation. FAU Discussion Papers in Economics 01/2019, Friedrich-Alexander University Erlangen-Nuremberg, Institute for Economics.
- Klinger, Sabine; Rothe, Thomas (2012): The Impact of Labour Market Reforms and Economic Performance on the Matching of the Short-term and the Long-term Unemployed. In: *Scottish Journal of Political Economy*, Vol. 59, No. 1, p. 90–114.
- Klinger, Sabine; Weber, Enzo (2016): Decomposing Beveridge Curve Dynamics By Correlated Unobserved Components. In: *Oxford Bulletin of Economics and Statistics*, Vol. 78, No. 6, p. 877–894.
- Kohlbrecher, Britta; Merkl, Christian; Nordmeier, Daniela (2016): Revisiting the Matching Function. In: *Journal of Economic Dynamics and Control*, Vol. 69, p. 350–374.
- Krause, Michael; Uhlig, Harald (2012): Transitions in the German Labor Market: Structure and Crisis. In: *Journal of Monetary Economics*, Vol. 59, No. 1, p. 64–79.

- Krebs, Tom; Scheffel, Martin (2013): Macroeconomic Evaluation of Labor Market Reform in Germany. In: *IMF Economic Review*, Vol. 61, No. 4, p. 664–701.
- Launov, Andrey; Wälde, Klaus (2016): The Employment Effect of Reforming a Public Employment Agency. In: *European Economic Review*, Vol. 84, No. C, p. 140–164.
- Nekoei, Arash; Weber, Andrea (2017): Does Extending Unemployment Benefits Improve Job Quality? In: *American Economic Review*, Vol. 107, No. 2, p. 527–561.
- Pissarides, Christopher A. (2000): *Equilibrium Unemployment Theory*, 2nd Edition. The MIT Press.
- Schmieder, Johannes F.; von Wachter, Till; Bender, Stefan (2012): The Long-Term Effects of UI Extensions on Employment. In: *American Economic Review*, Vol. 102, No. 3, p. 514–519.
- Sedláček, Petr (2014): Match Efficiency and Firms' Hiring Standards. In: *Journal of Monetary Economics*, Vol. 62, No. C, p. 123–133.
- van den Berg, Gerard J.; Vikström, Johan (2014): Monitoring Job Offer Decisions, Punishments, Exit to Work, and Job Quality. In: *The Scandinavian Journal of Economics*, Vol. 116, No. 2, p. 284–334.
- van Ours, Jan C.; Vodopivec, Milan (2006): How Shortening the Potential Duration of Unemployment Benefits Affects the Duration of Unemployment: Evidence from a Natural Experiment. In: *Journal of Labor Economics*, Vol. 24, No. 2, p. 351–378.

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