

IZA DP No. 2470

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A Macro-Evaluation Using Empirical Matching Functions**

René Fahr  
Uwe Sunde

November 2006

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**René Fahr**

*University of Cologne  
and IZA Bonn*

**Uwe Sunde**

*IZA Bonn  
and University of Bonn*

Discussion Paper No. 2470  
November 2006

IZA

P.O. Box 7240  
53072 Bonn  
Germany

Phone: +49-228-3894-0  
Fax: +49-228-3894-180  
E-mail: [iza@iza.org](mailto:iza@iza.org)

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## ABSTRACT

### **Did the Hartz Reforms Speed-Up Job Creation? A Macro-Evaluation Using Empirical Matching Functions<sup>\*</sup>**

Starting in January 2003, Germany implemented the first two so-called Hartz reforms, followed by the third and fourth packages of Hartz reforms in January 2004 and January 2005, respectively. The aim of these reforms was to accelerate labor market flows and reduce unemployment duration. Without attempting to evaluate the specific components of these Hartz reforms, this paper provides a first attempt to evaluate the overall effectiveness of the first two reform waves, Hartz I/II and III, in speeding up the matching process between unemployed and vacant jobs. The analysis is conceptually rooted in the flow-based view underlying the reforms, estimating the structural features of the matching process. The results indicate that the reforms indeed had an impact in making the labor market more dynamic and accelerating the matching process.

JEL Classification: J6, J63, J64, J65

Keywords: empirical matching function, stock-flow matching, Hartz reform

Corresponding author:

Uwe Sunde  
IZA  
P.O. Box 7240  
D-53072 Bonn  
Germany  
E-mail: [sunde@iza.org](mailto:sunde@iza.org)

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<sup>\*</sup> The authors wish to thank Hilmar Schneider, Jan van Ours and Josef Zweimüller for helpful discussions. All errors are those of the authors.

# 1 Introduction

This paper provides a first attempt to evaluate the overall effectiveness of the largest labor market reform in Germany in the post-war period in terms of speeding up the matching process between unemployed and vacant jobs. In spring 2002, the German federal government under chancellor Gerhard Schröder issued a request for a commission consisting of politicians and business professionals to come forward with suggestions for policy reforms that would lead to full employment. In its report, the commission led by Peter Hartz, at the time personnel manager at Volkswagen, emphasized unemployment as the paramount problem for society. To overcome this problem the commission proposed a program of 13 modules, see Hartz *et al.* (2002). All of the modules proposed by the Hartz-commission share the view that policy intervention should provide both assistance and incentives for successful integration in the labor market (the principle “assist and demand”, “*Fördern und Fordern*”). The Hartz-suggestions mark a paradigm shift in German labor market policy in the sense that they are based on a dynamic, flow-based view of the labor market. The aim of the reforms was to accelerate labor market flows and reduce unemployment duration, and thereby reduce the number of people detached from the labor market.

In the meantime, some of these modules have been implemented in form of four “Laws for a modern provision of services on the labor market” (*Gesetze für moderne Dienstleistungen am Arbeitsmarkt*), the so-called “Hartz-Laws” (Hartz I-IV). The first two of these laws became effective on January 1, 2003. Hartz I was mainly concerned with implementing occupational training programs, subsistence payments on behalf of the employment agency, and the facilitation of new forms of employment for elderly or temporary employment. Hartz II introduced the so-called mini- and midi-jobs, low-paid or part-time employment that are (partly) exempt from taxation and social security contributions or have different rules applying than regular jobs, special programs for self-employment, and the implementation of so-called Job-Centers, agencies to improve the matching between unemployed and firms with vacancies. Hartz III followed on January 1, 2004, implement-

ing a reorganization of the federal employment agency and its local employment offices. The most debated package of laws was Hartz IV, which became effective on January 1, 2005 and modified the rules for entitlement to unemployment assistance and social assistance as well as the administrative responsibilities. This reform also changed the rules for eligibility to unemployment benefits, and consequently the definition of the status of being unemployed. While the public debate about the pros and cons of the Hartz reforms is still ongoing, first attempts are being made to scientifically evaluate the effectiveness of the reforms. For a detailed description of the background of the reforms as well as first evaluation results see Jacobi and Kluve (2006).<sup>1</sup> The results indicate by and large that the effectiveness of occupational training programs seems to have improved as consequence of the Hartz I reform (see Bonin and Schneider, 2006, and Jacobi and Kluve, 2006), whereas other reform packages like the “mini jobs” show no significant employment effects (see Caliendo and Wrolich, 2006).

Instead of evaluating any of the specific components of the Hartz reforms, this paper takes an entirely different, complementary approach and provides a first look at the overall effectiveness of the reforms. The analysis is motivated by the primary aim of the reforms, the acceleration of the speed of matching between unemployed and vacant jobs, and therefore analyzes the reforms from a macroeconomic perspective. To do that, we apply the workhorse of modern macroeconomic labor economics, the matching function. In particular, we estimate the structure of the matching technology and the changes that occurred in the aftermath of the implementation of the Hartz reforms. The matching function describes a functional relationship between the inflow into new jobs and its determinants, in particular the available stocks of job searchers and vacancies and the inflows to these stocks, in a parsimonious but nevertheless empirically relevant way, see the survey by Petrongolo and Pissarides (2001). Given the Hartz-commission’s emphasis of improving the matching between unemployed and worker-searching firms and the goal to reduce un-

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<sup>1</sup> An evaluation of the Hartz reforms commissioned by the Federal Labor Ministry is coordinated by Bruno Kaltenborn, see also <http://www.wipol.de/hartz/evaluierung.htm> for the preliminary reports. One report for the evaluation commission addresses macroeconomic aspects of the Hartz reform, but focuses on the effectiveness of expenditures in particular active labor market programs, see Fertig *et al.* (2005).

employment duration, the matching framework with its focus on frictional unemployment seems the natural starting point for a macroeconomic evaluation.

To our knowledge, there are only two studies that evaluate the macroeconomic effectiveness of active labor market policies in Germany, namely the studies by Fertig, Schmidt, and Schneider (2006) and by Hujer *et al.* (2006). However, in contrast to our approach, none of these studies applies a methodology based on the matching framework. Moreover, these studies refer to the effectiveness of active labor market policy *before* the implementation of the Hartz reforms using regional data. For example, Fertig, Schmidt, and Schneider (2006) use regional data on basis of employment agency districts for the years 1998 to 2000 to evaluate the effectiveness of expenditures for different particular policy measures on gross and net labor market flows.

In our analysis we use panel data for 40 occupational groups over the period March 2000 until December 2004 with a monthly frequency. While the data used in this study allow for a first evaluation of the effects of the Hartz laws both on the aggregate level as well as on the level of occupational groups, our analysis is the first estimation of the matching technology for Germany using data with monthly frequency. Empirical matching functions have been estimated for Germany before, see e.g. Gross (1997), Entorf (1998), Fahr and Sunde (2004, 2005, 2006a, 2006b). However, all these estimates for Germany have used data on a quarterly or even annual basis, and the most recent estimates date back to the late 1990s. The high data frequency used in this study helps to circumvent some technical problems with the estimation of matching functions encountered by the previous contributions. In particular, data with high frequency avoid time aggregation problems that lead to downward-biased coefficient estimates.

From a more technical point of view, this paper makes several contributions to the empirical matching literature. Besides being the first paper that uses German data on a monthly basis to estimate a empirical matching functions, we present the first estimates of the matching function following the stock-flow approach for German data. The stock-flow approach emphasizes the relevance not only of the pools of unemployed and vacancies

at the beginning of a observation period for job creation, but also of the inflows into these pools during the observation period (see Coles and Smith, 1998, Petrongolo and Pissarides, 2001, Coles and Petrongolo, 2002, and Gregg and Petrongolo, 2005). While delivering different estimates of the elasticities of the matching process with respect to unemployed and vacancies, we find that the results of central interest, namely the changes in the speed of matching as consequence of the Hartz reforms, are fairly robust to the underlying parametrization of the matching function.

According to our estimates, the implementation of the Hartz I and II reforms on January 1, 2003, had significant positive effects on the speed of the matching process between unemployed and vacancies on German labor markets. This finding is robust to corrections for autocorrelated error structures, or time aggregation, and cannot be explained by business cycle effects. The findings also show that the positive effect was slightly delayed after the implementation and favored manufacturing and crafts occupations. The Hartz III reforms appear to have had an even stronger effect on the speed of matching. Contrary to the previous reform wave, however, this effect is strongest right at the beginning of the implementation period. Again, manufacturing occupations appear to have benefitted most from the reform that implied changes in the intermediation process through employment agencies. Overall, the results point at a strong and significant macroeconomic impact of the first two waves of Hartz reforms.

The remainder of the paper proceeds as follows. Section 2 presents the econometric framework, the specifications we estimate and the identification assumptions. In section 3 we describe our data sources and the sample, and in section 4 we discuss data limitations that affect our identification strategy. The central results of our study are presented in section 5. Section 6 concludes.

## **2 Econometric Framework and Specification**

The matching function is the center piece of most macroeconomic models of frictional unemployment. It reflects the notion that matches between unemployed workers looking for



























































