The Effect of Temporary Help Jobs on Employment Volatility

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Abstract

This study investigates the impact of temporary agency employment on employment volatility outside the sector. Making use of econometric volatility models we find that enhancing numerical flexibility by temporary agency employment decreases employment volatility of incumbent workers. However, not all subgroups are benefitting equally. While prime-age permanent workers considerably gain from higher flexibility, young workers, migrants and low-skilled workers are not only overrepresented among the temps but also do not gain when employed outside the sector.
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JEL-Classification: C22, J21, J41

Keywords: temporary agency employment, employment volatility, Germany

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1 Introduction

In most European countries relaxing regulations for temporary agency employment (TAE) has been an important policy tool to increase labour market flexibility. At the same time employment protection of permanent contracts has been left essentially unaltered (OECD, 1999). It is therefore not surprising that there has been an impressive growth of the temporary help service sector in virtually all European countries during the past two decades (CIETT, 2012).

The central idea of TAE is that agencies assign workers to short-term jobs at various user firms. That way temporary work agencies are able to meet the flexibility needs of the client firms (e.g. Booth et al., 2002; Houseman et al., 2003). User firms thus become not only able to buffer their core workforce over the business cycle and to sustain firm-specific human capital but, by falling back to temporary agency workers, they might also increase their productivity (e.g. Bryson, 2013; Hirsch and Mueller, 2012). As a consequence of the increasing use of agency employment one would therefore expect that the volatility of employment in the remaining sectors should have decreased.

It is the aim of this study to investigate empirically whether the rise of TAE has dampened employment volatility of workers employed outside the sector. To the best of our knowledge the effect of TAE on the employment volatility of non-temp workers (NTAE) has not been studied yet.

However, the dampening effect of easing the use of agency work is important to investigate as there is a substantial controversy about the consequences of two-tier labor market reforms (see e.g. Boeri (2011), Jahn et al. (2012) and Section 2 for an overview). The reason is that the adjustment costs of creating labor market dualism is not equally distributed over the labor force. Instead it shifts the burden to young people, low-skilled and vulnerable workers who increasingly have difficulties finding stable jobs (Kahn, 2010; OECD, 1999). We therefore also investigate whether the effect on employment volatility differs by subgroups.

We focus on Germany which is one of the biggest markets for temporary agency work along with Japan, the UK, and the US and among the countries with the largest growth rates of TAE since the 1990s (CIETT, 2012): while in 1990 only about 0.5 percent of the wage and salary workforce was employed
in this sector, by mid of 2012 about 3 percent were employed as temps. In most countries data on the number of temporary agency workers for a long time span are still sparse. In contrast, in Germany there is a long tradition in collecting administrative data on the use of TAE on a high frequency level. This enables us to empirically investigate the effects of TAE on employment volatility. For that purpose, we make use of econometric volatility models treating the variance of NTAE as an unobserved variable. This enables a direct estimation of the linkage with TAE.

The paper is organised as follows: Section 2 gives a brief overview of the related literature. Section 3 informs about the temporary help service sector in Germany. Section 4 presents the data used. Section 5 describes the methodological approach. The results and robustness checks are shown in Section 6, Section 7 concludes.

2 Background and related literature

Reforms designed to increase labour market flexibility were carried out in most European countries during the 1980s and early 1990s. At first particular regulations for fixed-term contracts were relaxed. Only in the late 1990s the use of TAE has gained attention by policy makers to increase labour market flexibility.\(^1\) The superiority of temporary agency work compared to direct hire fixed-term contracts derives from the agencies’ role as matching intermediaries, improving matching quality and enabling quick personnel adjustments (Booth et al., 2002; Houseman et al., 2003).

That said it is not surprising that meanwhile the temporary help service sector is paramount in increasing labour market flexibility (European Commission, 2010). For example, during the recent financial and economic crisis about one third of temporary agency workers have lost their jobs in Germany (Federal Employment Agency, 2012) and the US (Houseman and Heinrich, 2013). Similar trends were seen in Japan, Spain and France (Voss et al., 2013). After the crisis, TAE played an important role in total job creation in many countries: For example in Germany, more than one out of two new jobs was created in this sector in 2010.

\(^1\) For example in Spain TAE was not allowed before 1994, in Italy before 1997, and in Greece before 2001 and the new Eastern European member states of the EU have just recently started to legislate TAE, (e.g. Voss et al., 2013, for an overview).
The high volatility of this flexible employment form combined with poor working conditions in this sector are the main reasons why recently TAE has become the heart of the debate on two-tier labor markets (Boeri, 2011; Jahn et al., 2012; OECD, 2013). Previous research has mainly looked on the determinants of the demand for temporary agency workers (Neugart and Storrie, 2006; Houseman et al., 2003), whether TAE is a bridge into regular employment (e.g., Autor and Houseman, 2010; Ichino et al., 2008; Kvasnicka, 2009), the size of the wage gap between TAE and workers outside the sector (NTAE) (e.g., Hamersma et al., 2014; Andersson-Joona and Wadensjö, 2011; Segal and Sullivan, 1998) the substitution effect of TAE (Jahn and Weber, 2012) and the impact of TAE on firm’s productivity (e.g. Bryson, 2013; Hirsch and Mueller, 2012). However, so far there is no study investigating empirically whether TAE dampens the employment volatility of permanent jobs.

The early theoretical literature on the effects of employment protection legislation (EPL) has documented that the volatility of labor demand declines and labour market dynamics slows down if EPL is introduced (e.g., Bentolila and Bertola, 1990; Bentolila and Saint-Paul, 1992; Blanchard and Portugal, 2001; Gomez-Salvador et al., 2004; Saint-Paul, 1996). At the same time, liberalizing the use of flexible employment forms decreases the costs of flexible labor in terms of firing costs and therefore has the same effect as decreasing employment protection legislation for the subset of the temporary working population. Saint-Paul (1996) was among the first, who modeled a two-tier labor market where only insiders with permanent contracts are protected by employment protection legislation while firms can dismiss workers on temporary (agency) contracts at no costs. The model predicts that asymmetric reforms that relax regulations for the flexible working population increase the demand for flexible workers over the business cycle. Consequently, employment volatility in this labour market segment rises. At the same time permanent jobs are to benefit from labour market duality. Their employment volatility declines. This effect is, of course, particularly pronounced in countries where the majority of the permanent working population enjoys strong employment protection, whereas the small segment of temp workers remain vulnerable to dismissal decisions by firms.

The employment and unemployment effects of relaxing the use of fixed-term contracts have been abundantly investigated during the past two decades.
both, empirically and theoretically. Most studies rely on matching models and accordingly simulate their impact on job creation and destruction, job turnover and unemployment. Particularly the Spanish two-tier labor market reform in the early 1980s, which considerably set incentives to firms to hire workers on temporary contracts, have been extensively investigated by Cabrales and Hopenhayn (1997), Dolado et al. (2002), Sala and Silva (2009) among others. Overall the literature on relaxing the use of fixed-term contracts does not find sizable employment effects (e.g., Bentolila and Bertola, 1990; Blanchard and Landier, 2002; Cahuc and Postel-Vinay, 2002; Saint-Paul, 1996, see Boeri, 2011 for an overview). Even if there might be a transitional increase in employment directly after liberalizing the use of fixed-term contracts, in the long run introducing two-tier labour market flexibility may foster unemployment (Boeri and Garibaldi, 2007). There is also ample empirical evidence that an ever smaller proportion of the workforce are benefiting from stable jobs and that the probability that workers start their career in or are trapped in temporary jobs has considerably grown (Kahn, 2007; OECD, 2013). However, to the best of our knowledge so far there are no studies investigating the macroeconomic consequences of TAE.

3 Institutional setting

In Germany all temporary agency workers are eligible for social benefits, have access to health insurance, holiday leave, and statutory pension plans. Agency workers who have been employed for more than six months with the agency are covered by employment protection legislation. Nevertheless, agency jobs are spot-market jobs which tend to be rather short: The median duration of an agency job is about 12 weeks.

TAE is regulated by national legal statutes since 1972 which governs the sector with specific regulations. Since the 1980s they have been amended in total seven times while EPL for regular workers remained by and large the same. This can be easily seen when looking at the EPL indicators provided by the OECD (2013) ranging from (0 to 6), with 6 being the most stringent legislation: While the strictness of EPL for regular contracts slightly increased from 2.6 in 1985 to 2.9 in 2012, the EPL indicator for temporary agency contracts decreased over the same time span from 4.0 to
Most reforms in the 1980s and 1990s aimed to increase the flexibility of the user firms by prolonging the maximum period of assignment. The major purpose of the reforms after 2000 was to decrease the sizable wage gap between temporary agency workers and workers employed outside the sector (e.g. Kvasnicka, 2005). However, the effect of these reforms were small. Although Antoni and Jahn (2009) find that the prolongation of the maximum period of assignment increased slightly the employment duration of temps, Jahn (2010) could not find any impact on the size of the pay gap. Moreover, it seems that the reforms had no significant effect on the growth of the temporary help service sector (Jahn and Bentzen, 2012).

Apart from the liberalisation of the temporary help service sector likely reasons for the surge in TAE was the improvement of it’s reputation in the 1990s, the increasing matching efficiency of the temporary help service sector (Neugart and Storrie, 2006), and considerable productivity gains for firms complementing their permanent workforce with TAE (Hirsch and Mueller, 2012). These explanations are also in line with the perception that the extensive regulation of fixed-term contracts along with the strict employment protection legislation makes is attractive for user firms to adjust their workforce through TAE (Miltacher, 2007; Venn, 2009). In contrast to countries like Spain or France (e.g. Bentolila et al., 2012) fixed-term contracts only play a minor role for the flexibility of the firms. The share of workers with fixed-term contracts has only slightly increased since 1999 (Destatis, 2013) and about 56 percent of them were converted to permanent contracts in 2011 (IAB, 2012). This is important to bear in mind when investigating the likely impact of TAE on employment volatility in Germany.

4 Data and descriptives

For our empirical approach, we need detailed data on the entire workforce over a long period of time and at a rather high frequency. For that purpose we use the universe of all wage and salary employees registered with the German social security system. Self-employed and civil servants are exempted from paying social security contributions and thus are not covered by the

\[\text{Own calculations based on the items and weighting scheme provided by the OECD (2013).}\]
Notes: The data set used is the universe of the German social security data for the period 1999:Q2 - 2012:Q4. The level values of the variables are seasonally adjusted (source: Datawarehouse, Federal Employment Agency).

Figure 1: Development of TAE and NTAE

data set.\(^3\) Compared to the stock of all employees this is a more adequate measure for our purpose since temporary agency workers are usually wage and salaried workers and might therefore primarily affect the volatility of other dependent employees.

The data set is provided by the Federal Employment Agency from 1999 on. Since the information contained in the data set is used to calculate social security contributions, the data set is highly reliable. It is unique in the sense that it allows not only to split the time series by socio-economic characteristics but also enables us to calculate the total number of wage and salary temporary agency workers on a quarterly basis. From the quarterly stock of wage and salary workers we subtract TAE to receive the number of workers employed outside the sector (NTAE).\(^4\)

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\(^3\) About 80 per cent of all workers in Germany are covered by the social security system, for details, see Dorner et al. (2010).

\(^4\) Note that the Labour Placement Statistics of the Federal Employment Agency also contains information on the number of TAE at a high frequency level. However, the Labour Placement Statistics relies on biannual reports of the agencies instead of contributions to social security system and cannot be split by socio-economic characteristics. Consequently, this data set is not suitable for the purpose of this analysis.
Figure 1 shows that during our observation period, which covers the time span from 1999 to 2012, TAE increased rapidly, from 249,000 to 715,000 workers. Although TAE still accounts for a relatively small share of paid employment (2.7 percent in 2012), agency employment has grown by nine per cent per year on average. During the same period NTAE increased only by about 1,105,000 or by 0.2 per cent per year.

Due to the severe slump after the dot-com boom in 2000 NTAE decreased tremendously by about 2 million workers. Also the number of temporary agency workers dropped by about 15 percent. However, in contrast to all other sectors TAE recovered instantaneously.

The buffer function of TAE can be easily seen in Figure 1: During the recent economic crisis there has been a substantial drop in the number of temporary agency workers. The Federal Employment Agency estimates that around 70 percent of the total job loss during the Great Recession was due to the mass lay-offs in the TAE sector (Federal Employment Agency, 2012). After the crisis TAE played an important role in total job creation: in 2010 more than one out of two new jobs was created in this sector. By 2010 the temporary help service sector has again fully recovered and reached its historical peak. The dynamic nature of TAE is also reflected by its volatility. The sample standard deviation of the quarterly TAE growth rate amounts to 0.047 (i.e., 4.7%), more than ten times the NTAE value of 0.004.

Table 1 displays the group specific incidence of TAE and documents that the TAE market is highly segmented by gender. While in 2012 about 3.5 per cent of the male workers were employed in the sector only 1.7 percent of the female workers were employed at temporary work agencies. The concentration of male workers in TAE can be explained by the fact that particularly the manufacturing sector requests agency workers on a regular basis. Male agency workers are predominantly employed in blue-collar occupations, manual labour, and other low-skilled jobs while female temps are most often employed in service and clerical occupations.

Regarding the remaining socio-economic characteristics Table 1 shows also that a considerable part of the young workers aged 15-24 (about 4 percent) and foreign workers (about 6 percent) were tempting in 2012. The high share of foreign workers in the temp workforce might be explained by the fact that most foreign workers in Germany are low-qualified and that
Table 1: Group-specific incidence of TAE

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>All workers</td>
<td>0.9</td>
<td>1.4</td>
<td>2.7</td>
<td>1.8</td>
</tr>
<tr>
<td>Male</td>
<td>1.2</td>
<td>1.9</td>
<td>3.5</td>
<td>2.3</td>
</tr>
<tr>
<td>Female</td>
<td>0.5</td>
<td>0.9</td>
<td>1.7</td>
<td>1.1</td>
</tr>
<tr>
<td>Native</td>
<td>0.8</td>
<td>1.3</td>
<td>2.4</td>
<td>1.6</td>
</tr>
<tr>
<td>Foreign</td>
<td>2.1</td>
<td>2.7</td>
<td>5.7</td>
<td>3.5</td>
</tr>
<tr>
<td>Low qualified</td>
<td>1.5</td>
<td>2.5</td>
<td>5.8</td>
<td>3.0</td>
</tr>
<tr>
<td>Medium qualified</td>
<td>0.8</td>
<td>1.3</td>
<td>2.4</td>
<td>1.5</td>
</tr>
<tr>
<td>High qualified</td>
<td>0.4</td>
<td>0.5</td>
<td>0.8</td>
<td>0.5</td>
</tr>
<tr>
<td>Age 15-24</td>
<td>1.4</td>
<td>2.5</td>
<td>3.9</td>
<td>2.8</td>
</tr>
<tr>
<td>Age 25-49</td>
<td>0.9</td>
<td>1.4</td>
<td>2.9</td>
<td>1.8</td>
</tr>
<tr>
<td>Age 50+</td>
<td>0.4</td>
<td>0.7</td>
<td>1.8</td>
<td>1.1</td>
</tr>
</tbody>
</table>

Notes: The data set used is the universe of the German social security data for the period 1999:Q2 - 2012:Q4. The level values of the variables are seasonally adjusted (source: Datawarehouse, Federal Employment Agency).

Low-qualified workers are clearly overrepresented among the agency workers. For foreigners TAE might also be a port of entry into the German labour market. High-skilled workers are rarely tempting. Only about 0.8 percent of the agency workers hold a university degree. Table 1 also makes clear that this pattern has been stable since the late 1990s.

5 Methodology

In this section, we develop a model that allows us to estimate the effect of TAE directly on labour market (NTAE) volatility. An evident problem is that the variance does not represent an observed variable. In order to address volatility, the second moment of NTAE must be modelled along with the first moment, i.e. we consider both conditional mean and variance.

We begin by specifying an equation for the conditional mean dynamics of employment. The task of this equation is to filter out the unpredictable component (shock) which can be affected by variance changes. For that purpose we consider a standard time series model appropriate. Let NTAE growth rates $y_t$ follow the autoregressive process
\[ y_t = \mu + a_1y_{t-1} + \cdots + a_p y_{t-p} + u_t, \quad (1) \]

where \( \mu \) is a constant term, \( a_i, i = 1, \ldots, p \), are the coefficients of the AR\((p)\) process and \( u_t \) denotes serially uncorrelated – but possibly heteroscedastic – innovations to NTAE. This specification should ensure that systematic conditional mean developments are adequately modelled before we address the variance domain.

Next we address the volatility dynamics of NTAE, the actual subject of interest in the underlying paper. For that purpose, we denote the logarithmic conditional variance by

\[ \log \text{Var}(y_t|\Omega_{t-1}) = \log \text{Var}(u_t|\Omega_{t-1}) = h_t, \quad (2) \]

where \( \Omega_{t-1} \) stands for the whole set of available information at time \( t - 1 \). The innovations \( u_t \) follow the process

\[ u_t = \epsilon_t e^{h_t/2}. \quad (3) \]

Here, \( \epsilon_t \) are the shocks to the conditional mean following a standard normal distribution. The exponential term equals the conditional standard deviation.

Our key equation models the influence of TAE on the conditional variance of NTAE, i.e. \( h_t \). The model contains the TAE level as a regressor, lagged by one period to avoid simultaneity problems, if any. Particularly, we take the coefficient of this regressor in the \( h_t \)-equation as a measure for the dampening effect of TAE. Thereby, we should assure that the TAE regressor does not simply pick up secular trends in labour market volatility, which are driven by other factors such as employment protection legislation, trade openness or labour shortages. To achieve that, we consider a linear time trend in the volatility equation. Robustness checks regarding the model specification are provided in the end of the subsequent section.

Our specification for volatility is the following:

\[ h_t = c_0 + c_1(t-1) + c_2 TAE_{t-1}. \quad (4) \]

Here, \( c_0 \) is a baseline level of volatility, \( c_1 \) denotes an exogenous trend
slope and $c_2$ is the effect of TAE. The logarithmic formulation excludes artificial impacts that would push the model-implied conditional variance below zero. This could easily happen in presence of regressors like TAE or time trends but would obviously not be adequate for an economic model of volatility. The mean and volatility equations are simultaneously estimated by maximum likelihood (ML). Our conjecture is that the level of TAE dampens NTAE volatility, i.e. $c_2 < 0$.

6 Results

First we estimate the mean equation (1). Regarding model specification, the lag length $p$ must be chosen. In general, we find that $p = 1$ is sufficient to eliminate the residual autocorrelation. One lag is also the choice of the Bayesian information criterion. With the resulting residuals, we estimate the variance equation (4). On average the number of temp workers increased by about 11,500 per quarter. In order to ease the interpretation we multiplied the coefficients of the impact of TAE in equation (4) by 10,000.

In a first step we estimate the impact of the entire agency workforce on the volatility of overall NTAE and divided by demographic groups. The purpose is to investigate if TAE, irrespective of its demographic characteristics, buffers employed insiders. In a second step we measure the impact of group-specific TAE on the respective demographic group implicitly presuming that temps might have a stronger effect on employment volatility if they belong to the same group.\footnote{One minor drawback of all administrative data sets in Germany is that fixed-term workers cannot be identified and thus not excluded from the analysis. As mentioned in section 3, the share of fixed-term contracts is low, has not increased over time, and conversion rates of fixed-term contracts are rather high. Consequently, this should not affect our results. If at all the effect on employment volatility should be more pronounced.}

The first entry in Table 2 shows that TAE decreases the employment volatility of all workers by about 10 percent. The size of the effect seems to be plausible if one takes into account the dynamic nature of TAE. For instance the median duration of a temp job in 2002 was only about 11 weeks and in 2012 14 weeks. Also the labour turnover, which relates the sum of hirings and separations to the stock of employees (OECD, 1996), was five times higher in the temp sector compared to all other sectors (3.0 vs 0.6
Table 2: Effect of TAE on the employment volatility of NTAE

<table>
<thead>
<tr>
<th></th>
<th>All TAE</th>
<th></th>
<th>Group-specific TAE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coeff</td>
<td>SE</td>
<td>Coeff</td>
<td>SE</td>
</tr>
<tr>
<td>All workers</td>
<td>-0.101</td>
<td>0.030</td>
<td>-0.161</td>
<td>0.029</td>
</tr>
<tr>
<td>Male</td>
<td>-0.131</td>
<td>0.025</td>
<td>-0.225</td>
<td>0.082</td>
</tr>
<tr>
<td>Female</td>
<td>-0.068</td>
<td>0.021</td>
<td>-0.399</td>
<td>0.159</td>
</tr>
<tr>
<td>Native</td>
<td>-0.116</td>
<td>0.031</td>
<td>-0.131</td>
<td>0.031</td>
</tr>
<tr>
<td>Foreign</td>
<td>-0.056</td>
<td>0.026</td>
<td>-0.225</td>
<td>0.082</td>
</tr>
<tr>
<td>Low qualified</td>
<td>-0.004</td>
<td>0.037</td>
<td>-0.001</td>
<td>0.114</td>
</tr>
<tr>
<td>Medium qualified</td>
<td>-0.082</td>
<td>0.022</td>
<td>-0.019</td>
<td>0.080</td>
</tr>
<tr>
<td>High qualified</td>
<td>-0.009</td>
<td>0.019</td>
<td>-0.593</td>
<td>0.565</td>
</tr>
<tr>
<td>15-24</td>
<td>0.009</td>
<td>0.017</td>
<td>0.057</td>
<td>0.113</td>
</tr>
<tr>
<td>25-49</td>
<td>-0.091</td>
<td>0.026</td>
<td>-0.149</td>
<td>0.028</td>
</tr>
<tr>
<td>50+</td>
<td>-0.068</td>
<td>0.026</td>
<td>-0.443</td>
<td>0.052</td>
</tr>
</tbody>
</table>

Notes: The data set used is the universe of the German social security data for the period 1999:Q2 - 2012:Q4. The level values of the variables are seasonally adjusted (source: Datawarehouse, Federal Employment Agency).

in 2002 and 2.4 vs 0.5 in 2012). Thus temps can be repeatedly assigned to different jobs over the year they are able to buffer even several jobs.

Furthermore, we find that the linear trend counteracts the effect of TAE. For instance, the trend coefficient $c_1 = 0.14$ for the case of all workers. Thus, while the rise of TAE has reduced NTAE volatility, at the same time further factors increased it. Such factors are often seen in globalisation, structural change or deregulation of temporary contracts and employment protection legislation (e.g. Giannelli *et al.*, 2013; Hyatt and Spletzer, 2013). In this context, TAE to a certain extent shelters core workers from the impact of shocks hitting the labour market.

Table 2 also strongly supports our surmise that TAE affects demographic groups differently. Male permanent workers gain most by an increase in flexibility. Their employment volatility decreases by about 13 per cent while female insiders only benefit by a drop in volatility of about 7 per cent.

The OECD (1999) already pointed out that primarily prime-age workers might benefit from the introduction of two-tier labour markets. Among the three age groups investigated the effect is indeed strongest for workers
aged 25-49. Foreigners, despite being clearly overrepresented among the
temp workers benefited least. As Table 1 has shown, young workers are
overrepresented among the temps as well. However, we could not find any
effect on the volatility of that group. Thus, the deregulation of TAE may
have encouraged the use of temporary agency contracts for young workers,
but due to their short employment duration employment protection might
less protect this group, i.e. firms might dismiss young workers in a recession
first, even if they are employed outside the temporary help service sector.

Turning to the impact of group-specific TAE, Table 2 shows again a
negative relationship between TAE and employment volatility. The group-
specific impact should be more pronounced if temp workers primarily buffer
workers belonging to the same socio-economic group. In this case the ef-
flect is much more concentrated within the group. We find a quite strong
effect on the employment volatility of female, foreign and older employ-
ees. This indicates that regarding the use of flexible employment forms the
labour markets might be separated for these groups. Agency workers seem
to primarily buffer perms with the same characteristics. Again, the effect
on young workers and the low-skilled workers is not significant confirming
our surmise that these workers might be the first to be dismissed once firms
have to lay off.

For the interpretation of the TAE regressor to be valid, a crucial task is
to ensure that it does not simply pick up other influences and developments
not considered in the equation. We already included a deterministic time
trend in order to prevent a potential exogenous secular trend in general
volatility to be confounded with the steady growth of TAE. Of course, in
a time series context, including a large set of control variables is not an
option. Nonetheless, we consider two further potentially important drivers
of time series processes. First, we control for persistence in volatility. For
this purpose, an autoregressive lag of the conditional variance is included.
Otherwise, the TAE influence might become significant only because TAE
itself is persistent. Moreover, volatility should be able to adjust to stochastic
shocks that are not covered by observed regressors, and particularly that are
not due to TAE. Therefore, besides the shock to the mean \( \varepsilon_t \), we take into
account a specific variance innovation \( \eta_t \). This could be due to a multitude
of unobserved factors influencing labour market volatility.

These features can well be captured by a stochastic volatility (SV) pro-
cess. Here, the variance is treated as a latent variable. An overview of the relevant models and methods is provided, e.g., by Ghysels et al. (1996). Extending equation (4), we specify the NTAE log conditional variance as

\[ h_t = c_0 + c_1 h_{t-1} + c_2 TAE_{t-1} + c_3 (t - 1) + \eta_t, \]

where \( c_0 \) is the constant term, \( c_1 \) is the persistence parameter, \( c_2 \) gives the impact of TAE, \( c_3 \) represents the trend slope, and the volatility shock \( \eta_t \) is normally distributed. The stochastic volatility \( h_t \) is non-observable, thus represents a latent process. Logically, filtering is needed to estimate the model. We employ the Kalman filter to construct the likelihood function and estimate the volatility model by quasi maximum likelihood (QML) using numerical methods. QML for SV models is treated in Ruiz (1994). Starting values are set at the sample moments; details can be obtained upon request. The mean equation (1) is estimated in a first step by OLS.

We find that the significant volatility impact of TAE survives in the extended model. It even becomes stronger with a total effect of \( \frac{c_2}{1 - c_1} = -0.187 \) (likelihood ratio \( p \)-values = 0.008) for all workers. It should be noted that the SV model is usually applied to long time series of e.g. daily financial data. Since we have only rather short quarterly data available, one should treat the SV result with caution. Still, it is reassuring that the volatility dampening of TAE is highly significant also in a more complex model setup.

In order to investigate whether our results are robust to the methodological approach we ran several further model variants. First, we considered the specification of the mean equation. Particularly, we increased the lag length to \( p = 2 \), the choice of the Akaike information criterion in contrast to the more parsimonious version above. Second, we allowed for an additional lag of TAE in the variance equation and thus for a more flexible TAE effect. Third, we eliminated the period of the Great Recession, which might influence the results due to the sharp decline of TAE. Technically, impulse dummies were added to the variance equation for 2008:3 until 2010:1 (i.e., starting with the first relevant TAE reduction and ending when TAE reached the pre-crisis level). As Table 3 shows, these robustness checks lead only to marginal changes of our estimate. Fourth, we logged the TAE regressor in the variance equation. Such a non-linear specification would be preferable if
the effect of additional TAE increases was dampened on higher TAE levels. However, the model fit is clearly worse with the likelihood falling by 3.2.

Table 3: Robustness checks of the TAE effect (all workers)

<table>
<thead>
<tr>
<th></th>
<th>Coeff</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>main result</td>
<td>-0.101</td>
<td>0.030</td>
</tr>
<tr>
<td>2 AR lags</td>
<td>-0.102</td>
<td>0.036</td>
</tr>
<tr>
<td>2 TAE lags</td>
<td>-0.110</td>
<td>0.038</td>
</tr>
<tr>
<td>no crisis</td>
<td>-0.116</td>
<td>0.038</td>
</tr>
</tbody>
</table>

Notes: With 2 TAE lags, "Coeff" denotes the sum of both coefficients.

7 Conclusion

As a consequence of the liberalisation of temporary agency employment during the last decade the temporary help service sector has grown steadily worldwide. While the aim of easing the use of fixed-term contracts during the 1980s was to give firms incentives to create temporary jobs which might ultimatively be transformed into regular ones, the purpose of introducing temporary agency employment in the late 1990s was primarily to meet the flexibility needs of the user firms. The idea was to create a buffer zone allowing firms to retain core workers and their firm-specific human capital during an economic downturn.

And indeed, firms usually report as main motives to fall back on temporary agency workers for seasonal needs, peaks in demand, to fill gaps during periods of recruitment, or to replace workers which are temporarily absent. In contrast, firms only rarely report using temporary agency employment as a screening device (Voss et al., 2013).

That said, one would expect that temporary agency employment should lower employment volatility of workers employed outside the sector. We find that even if the sector is still relatively small in size, temporary agency employment seems to buffer workers employed outside the sector. Moreover, the effect on employment volatility of core workers is sizable. Our results also show that not all workers benefit from the buffer function of agency employment. Particularly, those groups who are overrepresented among the agency workers like young workers and low skilled workers do not gain in
terms of higher job stability, even if they are employed on a regular contract. This suggests that these groups not only carry the adjustment burden if they work as temps but are also the first to be dismissed once the economy slows down.
References


URL: [http://dx.doi.org/10.1007/11123-012-0282-2](http://dx.doi.org/10.1007/11123-012-0282-2)


OECD (1996), Employment Outlook, OECD.


