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# Job security and labor productivity: An inverse U-shaped relationship

**M. Machek<sup>†</sup>**

**Purpose** – to investigate the relationship between job security and labor productivity among 45,506 companies from the Czech Republic, Slovakia, Croatia, Slovenia, and Latvia.

**Design/Method/Approach.** This article uses linear regression analysis based on data from the period of 2013-2017.

**Findings.** The study indicates an inverse U-shaped relationship between employment volatility, as measured by the coefficient of variation, and labor productivity. Labor productivity increases along with employment fluctuation up to a certain point; however, when employees feel insecure, their labor productivity deteriorates. Surprisingly, for most companies, the relationship between employment fluctuation and labor productivity remains positive. Labor productivity gets affected positively by the security feeling rather than by guaranteeing the job position.

**Originality/Value.** The results are consistent within the subsamples of the five individual countries in the sample and robust to two alternative measures of fluctuation, the mean absolute deviation, and the studentized range.

**Paper type** – empirical.

**Keywords:** employment volatility; job security; inverse U-shaped relationship.

<sup>†</sup>Martin Machek,  
Faculty of Business Administration,  
University of Economics,  
Prague, Czech Republic,  
E-mail: [martin.machek@vse.cz](mailto:martin.machek@vse.cz)

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## Безпека роботи та продуктивність праці: зворотна U-образна залежність

Мартін Мачек<sup>‡</sup>

<sup>‡</sup> Університет економіки,  
Прага, Чехія

**Мета роботи** – дослідити взаємозв'язок між безпекою роботи та продуктивністю праці між 45506 компаніями з Чехії, Словаччини, Хорватії, Словенії та Латвії. сформувані

**Дизайн/Метод/Підхід дослідження.** Застосовано лінійний регресійний аналіз на основі даних періоду 2013-2017 рр.

**Результати дослідження.** Дослідження вказує на зворотну U-подібну залежність між мінливістю зайнятості, виміряною коефіцієнтом коливання та продуктивністю праці. Виявлено, що продуктивність праці збільшується разом із коливанням зайнятості до певного моменту; однак, коли працівники відчувають себе невпевнено, продуктивність їх праці знижується. Дивно, але для більшості компаній зв'язок між коливанням зайнятості та продуктивністю праці залишається позитивним. На продуктивність праці впливає позитивно почуття безпеки, а не гарантія робочого місця.

**Оригінальність/Цінність/Наукова новизна дослідження.** Отримані результати узгоджуються в підвибірках п'яти окремих країн у вибірці та надійні до двох альтернативних мір коливань, середнього абсолютного відхилення та ступінчастого діапазону.

**Тип статті** – емпіричний.

**Ключові слова:** мінливість зайнятості; безпека роботи; обернене U-подібне відношення.

## Безопасность работы и производительность труда: обратная U-образная зависимость

Мартин Мачек<sup>‡</sup>

<sup>‡</sup> Экономический университет,  
Прага, Чехия

**Факультет делового администрирования,**

**Цель работы** – исследовать взаимосвязь между гарантией занятости и производительностью труда среди 45 506 компаний из Чешской Республики, Словакии, Хорватии, Словении и Латвии.

**Дизайн/Метод/План исследования.** Использован линейный регрессионный анализ на основе данных за период 2013-2017 гг.

**Результаты.** Исследование указывает на обратную U-образную связь между волатильностью занятости, измеряемой коэффициентом вариации, и производительностью труда. Виявлено, что производительность труда увеличивается вместе с колебаниями занятости до определенной точки; однако, когда работники чувствуют себя неуверенно, их производительность труда ухудшается. Удивительно, но для большинства компаний связь между колебаниями занятости и производительностью труда остается положительной. На производительность труда положительно влияет чувство безопасности, а не гарантия рабочего места.

**Оригинальность/Ценность/Научная новизна исследования.** Результаты согласуются в подвыборках пяти отдельных стран в выборке и устойчивы к двум альтернативным мерам флуктуации, среднему абсолютному отклонению и изучаемому диапазону.

**Тип статьи** – эмпирический.

**Ключевые слова:** волатильность занятости; безопасность труда; обратные U-образные отношения.

## 1. Introduction

Job security is frequently mentioned among basic methods for improving employee satisfaction at work and their performance. Job security belongs to the “hygiene” of efficient systems which aim is to increase productivity (Katzell, Yankelovich, Fein, Ornati, & Nash, 1975). On the other hand, under poor economic conditions, executives often seek to increase labor productivity by downsizing. Even though the aim of downsizing could include the increase of productivity, job changes that threaten job security are perceived employees negatively, and often are likely to fail in their intent (Katzell et al., 1975). Therefore, business professionals have long been preoccupied with the question of how to simultaneously ensure job security and productivity, which are sometimes viewed as contradictory, but in fact, they are not antithetical (Gutchess, 1985).

Companies can affect job security directly by hiring or discharging employees. The probability of not being fired is sometimes referred to as “microeconomic job security”, which should be distinguished from “macroeconomic job security”, meaning the probability of finding a job on the job market (Lindbeck & Snower, 1988). Regarding the microeconomic job security, other possible definitions of job security include “the extent to which companies offer long-term employment to their employees” (De Meulenaere, Boone, & Buyl, 2016). Alternatively, “positive actions taken by companies and/or unions to assure that the people associated with them have an opportunity to have a productive job as long as they want” (Gutchess, 1985), or “the perceived stability and continuance of one’s job as one knows it” (Probst, 2003). This paper focuses on the microeconomic meaning of employment security.

There is evidence in the management literature that job insecurity deteriorates productivity. Huselid (1995) found evidence of a strong negative correlation between labor productivity and turnover among US companies. In a sample of 2001 Australian companies, Frenkel and Orlitzky (2005) considered job stability to be a component of supportive employment practice (SEP), finding a strong relationship between SEP and the two-year changes in labor productivity. Likewise, using an analysis of 204 ethnographic cases, Hodson (2004) revealed that the supportive employment practices are essential for the highest levels of citizenship behavior, i.e., productive behaviors of employees being beyond organizational requirements. Sun, Aryee, and Law (2007) discovered that in China, high-performance HR practices, including job security, positively affected organizational citizenship behavior, which, in turn, increased labor productivity.

On the other hand, some studies reveal that job security reduces employee performance (Ichino & Riphahn, 2005; Leung, 2009; Olsson, 2009), which may negatively affect labor productivity.

The research question in this paper is: is the relationship between job security and labor productivity linear, or there are non-linear components of this relationship? To address the gap, we use a large multinational sample to test whether the volatility of employment affects the labor productivity of companies. It provides an empirical contribution and complements previous studies, which mostly employed smaller samples or focused on single countries.

The rest of this paper has the following structure. First, we present the relevant theoretical background. Subsequently, we describe the data and methodology. Then, we present results and discussion. Finally, we provide concluding remarks.

## 2. Theoretical background

Generally, two approaches to explain why job security affects labor productivity can be found in the literature: the microeconomic and psychological foundations.

From the microeconomic point of view, investment in human capital, including the promotion of job security, will be justified when they are offset by future returns in the form of increased

productivity (Guthrie, 2001). While job security may be interpreted as a nonfinancial form of compensation (Noble, 2008) associated with costs to the company, according to Ghoshal, Moran, and Bartlett (1996), secure employment relationships help reduce the uncertainty related to economic transactions. Lindbeck and Snower (1988) argue that the fall of the rate at which a company replaces its workers by new ones has a substitution and income effect. The substitution effect is positive; when a worker can expect the reward for the performance, he/she is likely to work more productively. The income effect is negative, as it has a lower risk of being fired; his/her expected income increases, which reduces the work performance. The two effects act in the opposite direction; should the substitution effect prevail, job security will have positive effects on productivity; when the income effect prevails, there will be a negative relationship between job security and productivity.

Another factor in the job security-productivity relationship is based on the social exchange theory (Blau, 1964). Unlike organizations that consider employee relationship as a short-term monetary exchange, organizations which adopt a social exchange approach establish a mutual psychological contract with employees. Hence, the employment relationship may be viewed as a relational contract (Galunic & Anderson, 2000), where inducements to employees are reciprocated by commitment and motivation of employees (Iverson & Zatzick, 2011). Job security can also be considered as a component of this social exchange relationship (Frenkel & Orlitzky, 2005; Tsui, Pearce, Porter, & Tripoli, 1997).

By promoting relationships among organization members, the organization is building its social capital; however, the social capital may easily be broken by violating the contract terms and conditions. Under such circumstances, employees are not able to form meaningful relationships at work (Leana & Van Buren, 1999), and they invest their time in the knowledge valued by the external labor market rather than in the company-specific knowledge (Ghoshal et al., 1996). Hence, job insecurity negatively affects the internal knowledge market of the company (Chadwick, Hunter, & Walston, 2004).

It can also be expected that job security positively affects commitment, motivation, and mutual trust (Frenkel & Orlitzky, 2005). Generally, the job security can be seen as a factor that contributes to the organizational trustworthiness, a concept which has been reported to be positively associated with labor productivity (Hodson, 2004; Frenkel & Orlitzky, 2005). The feeling of security is a necessary prerequisite if employees need to take risks on the organization's behalf (Leana & Van Buren, 1999), and mutual trust enhances co-worker support and information sharing (Frenkel & Orlitzky, 2005). As a result, according to the social exchange theory, employees will exchange job security for commitment and loyalty (even beyond their secured wages), which will further increase individual performance, cooperation, and teamwork (Galunic & Anderson, 2000).

However, there are also studies suggesting that job security reduces the performance of employees. Using a large sample of white-collar workers from the banking sector, Ichino and Riphahn (2005) uncovered that employment protection caused an increase in absenteeism.

Likewise, Olsson (2009) came across that when employees in small companies perceive higher job insecurity, their short-term calls-in-sick get reduced. Leung (2009) suggests that in academia, productivity drops in the year immediately after tenure.

The conflicting results may occur due to non-linear effects in the job security-labor productivity relationship. Based on the literature review, we assume that when job security is low, labor productivity deteriorates.

On the other hand, with the ensured job security the employee performance gets reduced, which will also negatively affect labor productivity. Hence, our expectation is that:

*H1: There is an inverse U-shaped relationship between job security and labor productivity.*

### 3. Methods and data

For our empirical investigation, we used the Bureau van Dijk's Amadeus database. We selected five Central and Eastern European countries: the Czech Republic, Slovakia, Croatia, Slovenia, and Latvia. Subsequently, we extracted all limited liability companies with available relevant financial data throughout 2013-2017. To exclude foreign subsidiaries from the sample, we limit our analysis to companies owned by one or more individuals or families originating in the individual countries. The companies in our sample with a change in the number of employees occurred throughout the 2013-2017 encounters to 45,506.

To investigate the non-monotonic relationship between employment fluctuation and labor productivity, we use linear regression analysis. Following the approach used by most management-related papers (Haans, Pieters, & He, 2016), we test the significance of both the quadratic and linear terms and find the turning point; if the quadratic term is statistically significant and the turning point lies within the data range, we consider that a quadratic relationship exists between the dependent and the independent variables. To test whether the turning point lies within the data range, we applied the delta method presented by Rao (1973) to estimate the 95% confidence interval for the turning point (see also Lind & Mehlum, 2010).

The dependent variable is labor productivity, which is measured as the natural sales' logarithm per employee (Guthrie, 2001; Sun et al., 2007). Following multiple authors (e.g., Cappelli & Keller, 2013; Lee, 2006), we quantify employment volatility by the standard deviations of the number of employees throughout 2013-2017, which are standardized by the absolute value of the mean (hence, we apply the variation coefficient to measure the employment fluctuation).

The meta-analysis of Hancock, Allen, Bosco, McDaniel, and Pierce (2013) provide evidence that the employee turnover-performance relationship is moderated by context factors, such as geographical location or industry. Hence, in our analysis, we control both

country-level effects and industry effects<sup>1</sup> by including five-country dummies and thirteen industry dummies. It can also be expected that labor productivity is affected by the company's size and age since more substantial and older companies may enjoy learning curve advantages in productivity owing to the adoption of high-performance HR practices (Guthrie, 2001). In larger companies, better and more sophisticated HR practices can be expected (Jackson & Schuler, 1995). Hence, we also control the company's size (natural logarithm of total assets) and age.

### 4. Results

Table 1 presents the descriptive statistics for the model variables. Due to robustness checks performed after the analysis, we also include the descriptive statistics for two alternative measures of employment volatility.

Table 2 displays the correlation matrix for the model variables. All Pearson correlation coefficients are statistically significant at the 0.001 level. Labor productivity is strongly and negatively correlated with the company's age and size and positively correlated with measures of job volatility. As expected, the company's size is significantly correlated with its age, and larger and older companies tend to have lower levels of employment volatility (i.e., they offer more stable employment). Moreover, the three measures of job volatility are strongly correlated with each other.

Fig. 1 depicts the scatter plot of labor productivity and employment volatility, together with the histogram of employment volatility values.

A graphical inspection reveals that the relationship between labor productivity and job insecurity is not linear and negative, as predicted by some earlier studies; instead, it resembles a concave function. Furthermore, the graph suggests that for most companies, the rate of change (derivative) of the function remains positive; in other words, increasing employment volatility positively affects labor productivity.

Table 1

Descriptive statistics\*

Variable	Mean	Median	Minimum	Maximum
Labor productivity	2.280	1.780	0.003	11.400
Var(employment)**	0.282	0.248	0.003	2.160
Mean absolute deviation	0.218	0.191	0.002	1.550
Studentized range	0.608	0.556	0.007	4.850
Age	17.600	17.000	5.000	115.000
Size	3.860	3.860	0.711	7.010

\*Source: compiled based on Authors' calculations.

\*\*Note: Var(...) denotes the coefficient of variation.

Table 2

Pearson correlation coefficients\*

Variable	LP**	VAR	MAD	SR	Age	Size
LP	1.000	0.428	0.440	0.351	-0.255	-0.478
VAR		1.000	0.988	0.977	-0.237	-0.203
MAD			1.000	0.941	-0.236	-0.206
SR				1.000	-0.227	-0.168
Age					1.000	0.355
Size						1.000

\*Source: compiled based on Authors' calculations.

\*\*Note: LP = Labor productivity; VAR = coefficient of variation; MAD = mean absolute deviation; SR = studentized range. All coefficients are significant at 0.001.

<sup>1</sup> Industries are classified by four-digit NACE codes (sections A-N).

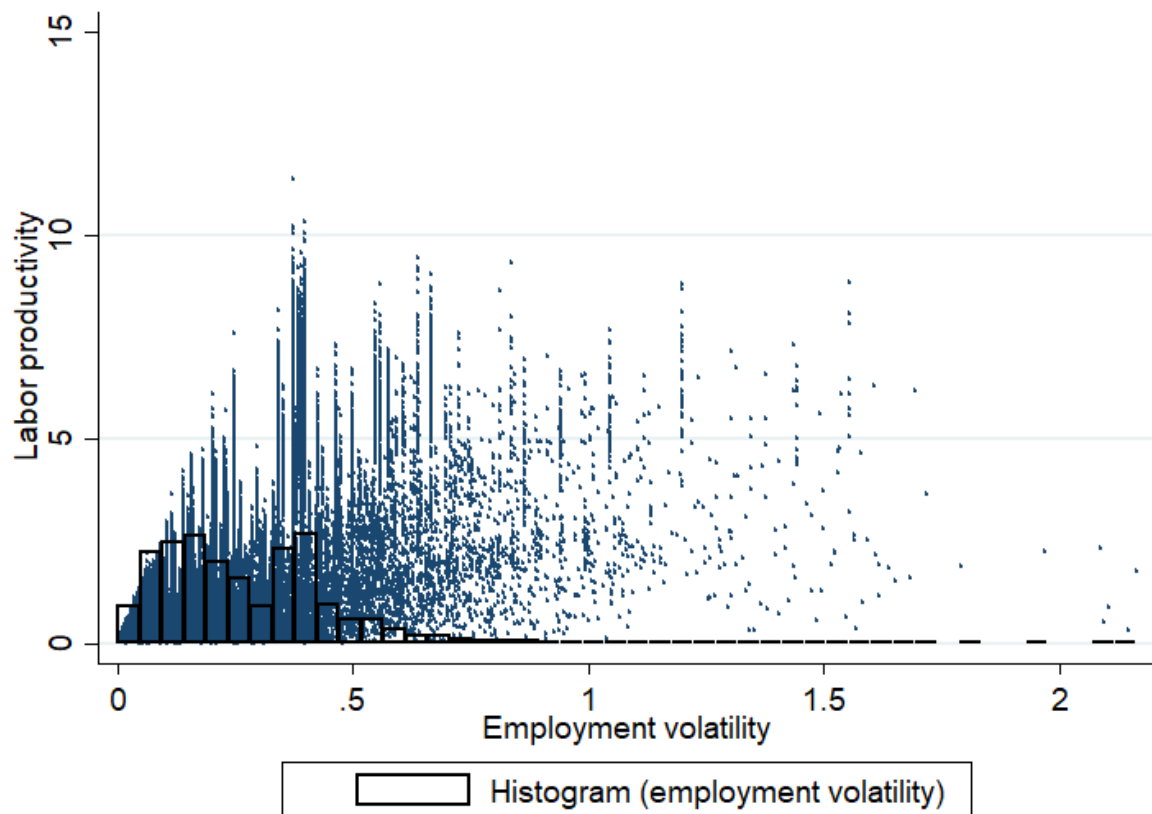


Fig. 1. Scatter plot of labor productivity and employment volatility\*

\*Source: compiled based on Authors' calculations.

The regression results are illustrated in Table 3. We verified the severity of multicollinearity using variance inflation factors (VIF). The maximum VIF was 6.17 due to the inclusion of the quadratic term in the regression. The mean VIF is 1.80. When using the cutoff of 10 (Kutner, Nachtsheim, & Neter, 2004), we conclude that multicollinearity is not an issue in the analysis. To deal with heteroskedasticity, we used robust standard errors in Stata 14.

Both the quadratic and linear terms are significant at the 0.001 level. First, the sign of the quadratic term is negative. The turning point occurs at employment volatility of 0.913, while the lower

bound of the 95% confidence interval is 0.907, and the upper bound is 0.921 (by the delta method). Thus, the turning point lies within the data range (0.003-2.160).

Based on the above, we conclude that evidence of an inverse U-shaped relationship between labor productivity and employment volatility was found. Table 3 demonstrates that when employment volatility is low, job security is high, which negatively affects labor productivity. However, when employment volatility is very high, labor productivity is also likely to remain low.

Table 3

Regression results: the dependent variable is labor productivity\*

Variable	$\beta$	SE	t	p
Intercept	4.674	0.048	98.330	< 0.001
Var(employment)	6.553	0.105	62.48	< 0.001
Var(employment)**	-3.585	0.124	-28.770	< 0.001
Company's age	-0.005	0.001	-5.440	< 0.001
Company's size	-0.885	0.010	-87.480	< 0.001
R-squared	0.404			
N	45,506			
95% CI for the turning point	(0.907, 0.921)			

\*Source: compiled based on Authors' calculations.

\*\*Note: Var(...) denotes the coefficient of variation; For clarity, industry and country dummies are not displayed; All coefficients are significant at 0.001.

To perform robustness checks, we first employed two alternative measures of employment volatility: the mean absolute deviation (i.e., the mean of the absolute values of the differences between the number of employees and the mean throughout 2013-2017), and the studentized range (i.e., the difference between the maximum and the minimum number of employees throughout 2013-2017, divided by the standard deviation). Both measures of employment volatility provide the same findings (Table 4): there is a curvilinear relationship between employment volatility and labor

productivity. As suggested by the 95% confidence intervals, the turning points lie within the data range (see Table 1 and Table 4).

To show that the results are also valid at the national levels, we performed regressions in the subsamples of the five countries. Table 5 illustrates the results. We arrive at the same conclusion: we find evidence of an inverse U-shaped relationship between employment volatility and labor productivity.

Table 4

## Robustness checks: two other measures of employment volatility\*

Variable	$\theta$	SE	t	p
Intercept	4.641	0.047	98.98	< 0.001
Mean absolute deviation	8.540	0.134	63.630	< 0.001
(Mean absolute deviation) <sup>2</sup>	-6.210	0.210	-29.570	< 0.001
Company's age	-0.006	0.001	-5.840	< 0.001
Company's size	-0.883	0.010	-87.370	< 0.001
R-squared	0.409			
N	45,506			
95% CI for the turning point	(0.682, 0.693)			
Intercept	5.124	0.049	103.520	< 0.001
Studentized range	2.708	0.053	51.480	< 0.001
(Studentized range)**	-0.732	0.028	-25.690	< 0.001
Company's age	-0.008	0.001	-7.930	< 0.001
Company's size	-0.927	0.010	-89.430	< 0.001
R-squared	0.369			
N	45,506			
95% CI for the turning point	(1.835, 1.864)			

\*Source: compiled based on Author's calculations.

\*\*Note: All coefficients are significant at 0.001.

Table 5

## Robustness checks: regressions in the individual countries' subsamples\*

Variable	Czech Republic	Slovakia	Croatia	Slovenia	Latvia
Intercept	5.003 (0.049)	7.573 (0.165)	4.263 (0.134)	6.445 (0.199)	2.866 (0.076)
Var(employment)	1.298 (0.082)	6.661 (0.349)	6.983 (0.287)	8.361 (0.451)	6.872 (0.231)
Var(employment)**	-0.779 (0.091)	-3.311 (0.316)	-3.978 (0.337)	-4.679 (0.619)	-4.039 (0.273)
Company's age	-0.15 (0.001)	-0.028 (0.004)	0.008 (0.001)	0.014 (0.002)	-0.023 (0.001)
Company's size	-0.904 (0.011)	-1.450 (0.037)	-1.006 (0.024)	-1.444 (0.002)	-0.635 (0.017)
R-squared	0.449	0.314	0.522	0.532	0.460
N	13,546	8,013	5,509	6,780	11,658

\*Source: compiled based on Authors' calculations.

\*\*Note: Robust standard errors are reported in Stata 14. All coefficients are significant at 0.001.

## 5. Discussion

In our research, we discovered the inverse U-shaped relationship employment volatility and labor productivity.

When job security is very high, the employment is too secure, and employees may lose incentives to work productively. This phenomenon may be typical for government bodies, but also academic institutions, as suggested by *Leung (2009)*; however, the results of *Ichino and Riphahn (2005)* and *Olsson (2009)* suggest that the phenomenon may also be observed in the private sector. From the microeconomics point of view, this situation occurs when the income effect of employee turnover prevails. When the probability of being fired is low or close to zero, the expected income of employees increases, which enables employees to work less productively; job security is negatively related to work performance. When employment becomes less secure, labor productivity is likely to be increasing, since workers need to exert themselves in their job to maintain their expected wealth.

However, at a certain point, job insecurity will stop improving labor productivity; the adverse effects of job insecurity shall prevail. Based on the management literature, we may argue that the job insecurity negatively affects the internal knowledge market of a company (*Chadwick et al., 2004*), trust (*Frenkel & Orlitzky, 2005*),

and teamwork (*Galunic & Anderson, 2000*). Employees will no longer be motivated to invest their time and performances to the company, and they will lose their commitment. As a result, their labor productivity will get decreased with employment fluctuation.

While the turning point lies within the data range, the vast majority of the companies (98%) in the sample had a lower employment fluctuation. In other words, for most companies, the relationship between labor productivity and employment fluctuation will be concave and positive. Only for a small fraction of companies, the adverse effects of employee fluctuation shall prevail.

These findings seemingly contradict multiple past studies (e.g., *Chadwick et al., 2004*; *Frenkel & Orlitzky, 2005*; *Galunic & Anderson, 2000*). In this context, we argue the need for clarifying the meaning of "job stability" in the management literature. It seems that unilaterally "guaranteeing" a job is rarely beneficial to labor productivity. Instead, companies may invest in employee's skill and management training, which enhances the security feeling as well as employees' marketability (*Chadwick et al., 2004*), and simultaneously, provides the potential for productivity improvements. Hence, when using job security as a form of employee compensation, executives should carefully consider how to enhance it without threatening the performance of employees. Productivity effects and the costs should be taken into account.

Despite our best performances, this research also has limitations. Data issues cause the first limitation. Our research sample does not contain all companies operating in the individual countries; especially for small companies, the data on the number of employees are not always available. Thus, we had to rely on the credibility of Bureau van Dijk's Amadeus database. However, the database has been used by previous authors as well (e.g., Obeng, 2017; Tepperová & Helman, 2019). Second, our analysis does not differentiate between dismissal rates and "voluntary turnover." When the employees get fired, the effects on labor productivity will undoubtedly be different rather than when they leave the company voluntarily. Third, we restricted our analysis to a limited timeframe of five years period.

## 6. Conclusions

This paper investigates the relationship between job security and labor productivity among 45,506 Central and Eastern European companies. We discovered an inverse U-shaped relationship between employment volatility and labor productivity while controlling the company-level, country-level, and industry effect. However, for most companies, the relationship between employment volatility and labor productivity will be increasing. The results are consistent when using alternative measures of employment volatility and within the subsamples of the five individual countries.

The results present managerial implications. When employees have a very low probability of being dismissed for any reason, they perform deficient work. Conversely, when the threat of being fired is imminent, employee motivation will also remain low. Improving organizational trustworthiness by increasing job security, or at least its feeling, might have positive effects on work performance. However, it seems that it will only be beneficial to increase the "feeling" of job security rather than guaranteeing a job, which might be the source of rigidity and harm productivity. Experts could use this finding when formulating the strategies of human resources management and carefully evaluate the fluctuation of employment and observe how labor productivity gets changed over time.

Future research could be oriented in multiple directions. The dynamics and long-term effects on job security on labor productivity are scarcely highlighted in the literature. A longitudinal study testing the lagged effects of employee turnover on productivity would allow obtaining a more accurate insight. Future studies should also distinguish the voluntary turnover from the involuntary one, since their effect on employee performance may vary.

Finally, future studies may also deal with the issue of reverse causality. Low labor productivity may be one of the potential predictors of a company's distress, which may then lead to downsizing.

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