The German generation internship and the minimum wage introduction: Evidence from big data

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(November 2017)  
LASER Discussion Papers - Paper No. 105  
(edited by A. Abele-Brehm, R.T. Riphahn, K. Moser and C. Schnabel)

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Abstract

Effects of the German minimum wage on internships are widely debated. However, there is a lack of comprehensive data concerning internships in Germany. We pursue an innovative approach by using Google search data and analyze the labor supply side, i.e., how the search intensity for internships changed during the time of the minimum wage introduction. While we do not detect an effect on the search for internship positions in general, the distinction between compulsory and voluntary internships gained in importance. Most impressively, a difference-in-differences comparison with other countries in Europe demonstrates that the minimum wage effectively reduced Google search for "generation internship". This suggests that the underlying societal phenomenon of a generation entering internships without a perspective for regular jobs has lost in relevance.

Copyright statement

The usual disclaimer applies.

Author note

We thank Lisa Feist, Clemens Hetschko and Simeon Schächtele, as well as the IAB working group "minimum wages" and participants of the "Workshop on minimum wages: Lessons from recent experiences and European perspectives" in Paris for helpful comments and suggestions.
1. Introduction

In Germany, employers are often accused of exploiting the possibility to replace regular workers by interns, paying them low wages and offering only temporary contracts. As many people felt affected by this phenomenon, it became known as the generation internship which is prevalent in many policy debates. It describes the sentiment of young graduates who only receive job offers for internships and thereby earn low wages, have no reliable career prospects, and suffer from high insecurity. The German Federal Ministry of Labor and Social Affairs declared the elimination of the generation internship as a major goal of the minimum wage introduction. Because the minimum wage requires a higher wage, it leaves firms less incentives to set up business models which are based on cheap interns (Borstel, Gausele, and Wisdorff 2014). On the other hand, internships are important for young academics during their school and college education to collect some primary work experience, and the empirical literature documents the benefits of internships for the respective individuals’ labor market success (e.g., Nunley et al. 2016; Saniter, Schumann, and Siedler 2015). Correspondingly, an important policy goal has been to preserve the young individuals’ possibilities to conduct internships, and not risking such benefits by imposing a too high minimum wage.

After a discussion between the two governing parties of the grand coalition in Germany, the government agreed to exempt internships of students with a duration of up to three months from the minimum wage. Internships with a duration of more than three months are subject to the minimum wage for their entire contract period. In addition, compulsory internships which are part of an educational program are fully exempted independent of their length. But people who are not enrolled in a university or do not intend to study have to be remunerated at the minimum wage. These regulations could have various consequences for the employers’ incentives to provide internships. First, the overall volume of internship positions may decrease as graduates and voluntary long-term interns have to be paid the minimum wage. Second, firms may rather provide mandatory internships at the expense of voluntary internships. Third, the length of internships may decrease especially when they are voluntary. On the supply side, incentives to conduct internships could also change. More individuals may search for internships as they are now paid better and more students can finance internships, as the alternative option of a regular student job has become relatively less attractive. But individual search may also change in an uncertain direction when less positions are provided.

A number of studies analyze employment effects of the German minimum wage introduction detecting rather small disemployment effects (Bossler and Gerner 2016; Caliendo et al. 2017;
Garloff 2016). However, we are not aware of evidence about the effect on internships simply because official data is not collected on a broad scale. German household surveys such as the SOEP or PASS only cover a very small number of internships, and in administrative employment data internships are not fully represented. Moreover, conventional treatment assignments do not apply, because internships are mostly provided by high-paying firms and in high-paying regions which would typically constitute the control group. Implying that no intuitive counterfactual exists for identification of a minimum wage effect on internships. Therefore, we use Google’s search data to contribute to a research question where little conventional data is available.

We analyze how the search for internship positions using Google changes with the introduction of the statutory minimum wage. In addition to the plain search for internship positions, we can identify changing search patterns for voluntary and compulsory internships, which has policy relevance, and as mentioned above, the respective information is not available in conventional micro data. Finally, we can identify changes in Google search for the term “generation internship”. The generation internship can be interpreted as a latent variable that describes a societal discourse in the German society. It describes the perceived difficulty of young graduates to achieve a permanent position that is adequately paid and not a succession of internships without a promising employment perspective. Similar latent developments exist in Italy (“Generazione 1000”) and Spain (“Mileurista”), which we use as control groups for our analyses. Using conventional micro data, the generation internship could only be described by a combination of several outcome variables. However, the prevalence of the generation internship is a policy relevant phenomenon in itself which is often addressed in political debates.

In empirical research, Google’s search data is mostly used for present-casting of well-defined macroeconomic variables such as the unemployment rate. The respective studies show that certain terms which are associated with job search have a high predictive power for the present unemployment rate or the unemployment rate in the upcoming week(s) (e.g., Askitas and Zimmermann 2009; Simionescu and Zimmermann 2017). By contrast, little research is available that uses these publicly available big data for the identification of a policy effect, although this has been outlined as a promising pathway for future research (Athey 2017). For our analysis of the minimum wage effect on internships, the data allow us to identify a policy relevant effect on the German society that is captured in big data collected by Google’s search

1 The German phrase of the generation internship is „Generation Praktikum“.
engine, which has a market share of roughly 90 percent. I.e., it is widespread among internet users in Germany, which are a policy relevant population for our analysis. Google’s search data come along with the advantage of a high frequency (weekly) which allows us to exploit the development over time while excluding anticipation effects.

The article proceeds as follows: Section 2 summarizes the institutional background of the German minimum wage introduction. Section 3 describes Google’s search data which we use for our analysis. Section 4 presents a descriptive analysis of the search queries of interest. Section 5 describes our empirical identification strategy which is based on a difference-in-differences comparison and Section 6 presents the results. Section 7 concludes.

2. Institutional background

The German statutory minimum wage was introduced on 1 January 2015. Before the minimum wage was in force, only sectoral minimum wages existed in a few sectors such as in construction or among hairdressers and painters. The minimum wage legislation required an initial hourly wage of €8.50. Mid-2016 the German minimum wage commission recommended a rise to €8.84 which came into force on 1 January 2017. Future changes of the minimum wage will be suggested by the minimum wage commission in a biennial mode.

The new minimum wage only allows for very few exemptions. On the employers’ side, it allows firms of sectors that are covered by a sectoral minimum wage to undercut the required wage level until the end of 2017. On the employees’ side the minimum wage excludes individuals under age of 18, apprentices, and long term unemployed for the first six months of their re-employment. Additionally, and most relevant for our analysis, internships are exempted when they are compulsory as part of an educational program. Moreover, internships are exempted when their duration is no longer than three months. If voluntary internships have a duration that is longer than 3 months, they are due to the minimum wage for the entire contract period.

This specific regulation for internships was heavily debated in advance. While both parties of the grand coalition favored an exemption of voluntary internships from the minimum wage, the threshold duration was politically debated. The Social Democrats favored a shorter maximum duration of six weeks for the exemption which theoretically reduces the scope to use internships to circumvent the minimum wage. By contrast the Christian Democratic Union favored a more extensive exemption rule, following the theoretical argument that fewer internships are put at risk.
Table 1 demonstrates that the minimum wage introduction was basically decided with the signing of the coalition agreement in December 2013 following the national election. But the timing of the minimum wage introduction including some of the exemption clauses was decided in a meeting of the heads of the grand coalition on 18 March 2014. It was at this time that the exemption of internships entered the discussion and we will see later that the Google search for internships in combination with the minimum wage started to accelerate from this week onward. The exact exemption clause of internships was not publicly announced before the proposal of the law entered the parliament in June 2014.

3. Google search data

We use data of the search engine Google that is collected from each individual who uses Google for online search. Google has a market share of 94 percent among all online search engines in Germany and the population that uses online search engines in daily life should be relevant also for the search concerning internships.\(^2\) We use data on the frequency of search with Google’s search engine for specific phrases that are relevant to our research question. The queries of interest are listed in Table 2. Our first phrases of interest are the term “minimum wage” itself and “internship” in combination with “minimum wage”. Both queries provide a rough idea when these topics became relevant in public discourse. We also analyze the phrases “internship position”, “compulsory internship”, and “voluntary internship” to get an idea on the search intensity for internships in course of the minimum wage introduction. Most interestingly, we analyze the search for “generation internship”, which is a latent variable for a societal phenomenon describing a generation of graduates who conduct plenty of internships without the prospect of a regular job. The data on these queries are “broad matches” implying that searching for “internship position” enters Google’s search data of the phrases “internship”, “position” as well as for “internship position”.

The data is provided through Google’s online application “Google correlate”, which allows us to download country specific weekly (and monthly) time series with a time lag of six months.

\(^2\) We try to verify the conjecture that the Google search data are relevant for actual economic behavior by a comparison with other data sources in section 4.
This time lag is why our period of analysis ends in March 2017. Google only provides data on search queries that have a certain frequency. Hence, we are not free to download time series on any potential search query. Unfortunately, Google only provides mean-standardized time series but no absolute search frequencies on each search query. As depicted in Table 2, this data structure also implies that all our variables have a mean of zero and a standard deviation that is one. The data provide a very clear interpretation of our regressions on these variables, which are effects in standard deviations in the search for the respective queries.

Using big data such as generated from Google’s search engine is a rather new approach. In 2005, Ettredge, Gerdes, and Karuga (2005) started to evaluate how the US unemployment rate can be predicted using web search data. Since then, the newly established data source has been applied in various research fields, such as epidemiology or political science. Especially in economics, Google search data proves to be a powerful tool. While Choi and Varian (2009, 2012) demonstrate how big data improves the “nowcasting” of the unemployment rate, other studies apply big data to predict consumer behavior (e.g., Goel et al. 2010; Vosen and Schmidt 2011) or electoral outcomes (Gayo-Avello 2013). Askitas and Zimmermann (2009) started to use the data for predictions in countries other than the US and “nowcasted” the unemployment rate in Germany with great success. Others followed and applied the idea to other countries and more labor market outcomes. E.g., Fondeur and Karamé (2013) use the data to improve the forecast of the youth unemployment rate in France, and Vicente, López-Menéndez, and Pérez (2015) predict extreme changes in the Spanish unemployment rate.

A more comprehensive survey of studies that apply big data in social sciences is provided by Simionescu and Zimmermann (2017). They summarize four motives to use this kind of big data: nowcasting, forecasting, identification of health issues, and to measure developments when other data is unavailable or has deficits. Our study falls in the latter category as we analyze social developments, i.e., the prevalence of a generation internship in the German society in course of the minimum wage introduction. So far, only few studies attempt to use big data collected online to estimate the effect of an economic policy. An exception is Baker and Fradkin (2017), who use Google’s search data to estimate an effect of changes in the unemployment insurance on job search behavior. Very closely related to this new line of literature, we estimate how the German minimum wage introduction affected the search for internship positions.

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3 We are not confident to extent this time series as the search frequency could potentially be influenced by our own research which we started in 2017.
4 Kernel densities of the outcome variables of interest are presented in Appendix A.
A concern with these kinds of data is that search queries could be driven by events that are unrelated to the examined outcome. An example is the film “The Internship”, published in early 2013, possibly contaminating the search results for “internship” whenever people search for the movie but not for an internship position. As the data – especially in the Anglo-Saxon countries – shows clear peaks when the movie was released, we decided to not examine the results for “internship” in these countries. In Germany, the film was named “prakti.com”, which does not correspond with the German word for internship (“Praktikum”). Nevertheless, we always combine the respective search query with additional key words to avoid any association. Moreover, we thoroughly checked “Google news” results for our period of analysis for similar pitfalls of this kind.

The advantages, however, outweigh such concerns. Google data precludes sampling errors as every single query is recorded and individuals can only use alternative search engines to circumvent the data collection by Google. Since most individuals are not aware of Google’s data gathering, there is no Hawthorne effect\(^5\), such that search engine users reveal their true interests. Instead, it allows us to reveal the development and relevance of internship-specific search queries that are prevalent in the public discussion. In comparison with administrative or survey data, seasonal patterns can be identified as the data is offered on a weekly basis. This high frequency also enables us to distinct very short-run effects from long-run developments.

![Figure 1 about here](image_url)

Figure 1 Panel (a) shows search queries solely for “minimum wage” in Germany. It illustrates that the topic was permanently discussed during the debate towards the federal election in September 2013. We observe a peak in July 2014 when the minimum wage legislation was approved in parliament and another peak in the first week of 2015 when the minimum wage came in force. We observe another climax in June 2016 when the first report of the minimum wage commission was published and another climax in January 2017 when the minimum wage was raised from €8.50 to €8.84. These time series are plausible in the sense that they reflect the relevance of the policy in the public discussion, suggesting that the queries, which we analyze as outcome variables, also reflect the prevalence of the respective phenomena in the public discussion.

A major assumption of our identification strategy is the absence of anticipation effects before the minimum wage was introduced. Concerning our data, anticipation effects may occur as soon

\(^5\) The Hawthorne effect describes biases that are due to changing behavior when individuals know that they are part of a survey study.
as there was a public debate on how the minimum wage law would deal with internships. From our investigations internships entered the debate on 18 March 2014 when the leaders of the grand coalition met to decide on the timeline of the minimum wage introduction (Dettmer, Gathmann, and Wittrock 2014). This largely corresponds with Figure 1 Panel (b), which illustrates the Google search for the terms “internship” and “minimum wage” in combination. It spikes for the first time in the week starting Sunday 16 March 2014, supporting our conjecture that the discussion started in the respective week. Hence, we define the anticipation period from 16 March 2014 till 31 December 2014 as depicted by vertical lines, and exclude these weeks from our empirical estimations. Figure 1 Panel (b) also demonstrates that internships in combination with the minimum wage was most relevant in the first half of 2015 when the minimum wage was still a relatively new law. But the topic remained important throughout our period of analysis.

4. Descriptive analysis

We first analyze the Google data with respect to labor supply, i.e., individuals’ search for internship positions. Theoretically, the search for internship positions may increase if they are higher paid in course of the minimum wage introduction. Moreover, the search intensity may change if there is an increased competition among applicants for a smaller number of internship positions. But the effect direction of this latter channel is uncertain. The search intensity could increase if a successful application requires higher search effort. On the other hand, the search intensity could decrease if an increased competition discourages individuals from search.

[Figure 2 about here]

The respective time series of the Google search for “internship positions” is illustrated in Figure 2. While Panel (a) indicates of a negative level-difference in the search for internship positions before and after the minimum wage introduction, the time-series clearly depicts a negative time trend. When we include a quadratic trend to our analysis of search for internships (Figure 2 Panel b) the level difference before and after the minimum wage introduction clearly vanishes. To check the robustness of the finding, we also used other commonly used expressions people in Germany might use when they search for internships, e.g., “Praktikumsplatz” (synonym for “internship position”) or “Praktikum Suche” (“searching internship”). In Appendix B, we observe a similar downward sloping trend for these alternative search queries, but no effect when the minimum wage was introduced.
However, the negative trend mirrors descriptive results from two observational data sources, the IAB Establishment Panel and the administrative employment records of the Federal Employment Agency. The IAB Establishment Panel is an annual representative firm survey. In Figure 3, the red line is the respective firm-weighted fraction of interns which were employed at 1 July each year. Unfortunately, the survey does not contain any further information on the length and kinds of internships. Another argument why the establishment level survey data can hardly provide further insights is the provision of internships by high paying firms in high paying regions. Since these plants and regions typically constitute the control group in evaluations of the minimum wage, a causal analysis is virtually infeasible when the effect on internships is of interest. In the administrative data from the Federal Employment Agency, the reporting of internship is very unclear because some types of internships can also be reported as so-called “mini-jobs”\(^6\) or short-term employment. Nevertheless, all variables in Figure 3 including the Google search for “internship position” show a similar downward sloping development regarding internships. This finding supports our assumption that the search using Google is highly correlated with real outcomes in the economy.

![Figure 3 about here](image)

The second variable of interest is the Google search for compulsory internships. Figure 4 Panel (a) illustrates a large level-difference before and after the minimum wage introduction. Excluding the anticipation period in-between the two vertical lines, the search does not seem to follow a pronounced time-trend before or after the minimum wage was introduced. When we include a quadratic time trend in Panel (b) of Figure 4 there remains a large increase in the search for voluntary internships.

![Figure 4 about here](image)

When we look at the Google search for voluntary internships, Figure 5 largely matches the search for compulsory internships. It illustrates an increase with and without a time trend suggesting an increase in the search for voluntary internships by about one standard deviation. But this congruence with the search for compulsory internship should not be interpreted as intensified search for such kinds of internships on the market. We rather believe that the significant increase in both variables suggests a more intensified acquisition of information about the distinction between compulsory and voluntary internships after the minimum wage was introduced. Hence, the minimum wage increased the importance of the distinction between

\(^6\) “Mini-jobs” which are characterized by a remuneration below 450 € a month are exempted from obligatory social security contributions.
internships that are part of an educational program and voluntary internships. This interpretation underlines the importance of the exemption clause from the minimum wage which explicitly distincts between compulsory and voluntary internships.

Looking at the phenomenon of a generation internship, Figure 6 suggests a reduction in Google search due to the minimum wage both when we look at level differences in Panel (a), but also when we inspect the difference after adjusting for a quadratic time trend in Panel (b). Panel (a) suggests a reduction by about 1.5 standard deviations and the trend-adjustment illustration indicates of a decrease still by about one standard deviation, suggesting a meaningful decrease in the importance of the societal phenomenon of the generation internship.

We use a simple before-and-after regression specification that mirrors the graphical analysis:

\[ y_t = \text{minimum wage}_t \times \delta + X_t \times \beta + \tau_t + \epsilon_t \]  

where \( y_t \) is the dependent Google search variable of interest with a subscript \( t \) that defines the search intensity in each week of the analysis sample, which is from 1 January 2011 till 1 April 2017. \( \text{minimum wage}_t \) indicates the post-minimum wage period, which comprises all weeks after 1 January 2015. The corresponding coefficient on the minimum wage dummy \( \delta \) measures the treatment effect of interest. \( X_t \) is a vector of time varying control variables, and in our baseline specification it only includes a set of dummies for months, which are included to capture seasonality. From a visual inspection, a seasonal pattern is prevalent in all variables. \( \tau_t \) captures a quadratic trend. Trends could arise from linguistic developments, developments in individuals’ online search (mobile, voice control, search directly in the address field of the browser), or changes in Google’s market share. Since there may also be a time trend in the number of internships in Germany, we want to control for an underlying trend that may be independent of the minimum wage introduction.

Panel (a) of Table 3 largely corroborates or graphical interpretations. We do not observe a changing search for internships after the introduction of the minimum wage in 2015, but the data reveal a decreasing descriptive relevance of the generation internship. Panel (a) also corroborates our finding of an increased importance in the distinction between compulsory and voluntary internships since both show a significantly positive change in Google search. The timing of these positive changes suggests that these increases imply an effect that is induced by the minimum wage introduction.
In Panel (b) of Table 3 we also control for the inflow of refugees to the German labor market. While the estimated effects of refugees are very imprecise, the changes in course of the minimum wage introduction remain robust. In Panel (c) we also check the robustness w.r.t. a different data frequency, using monthly instead of weekly data. The monthly data observations leave us with much fewer observations, but they average out large outliers. All our results remain unchanged in direction and size.

[Table 3 about here]

5. Identification strategy

In the empirical analysis, we apply a difference-in-differences specification to identify a treatment effect of the German minimum wage introduction. For reasons of data availability of Google search in some other countries, which constitute our control group, our difference-in-differences analyses are restricted to the time-period from 1 April 2012 till 12 March 2017. The regression specification of the difference-in-differences approach is as follows:

$$y_{ct} = \text{minimum wage}_t \times \text{Germany}_c \times \delta + \tau_t + \theta_c + \varepsilon_{ct}$$ (2),

where the subscript $c$ indicates one of the countries in our analysis sample. The treatment effect $\delta$ is now identified from the interaction of the treatment time and Germany. $\theta_c$ controls for country specific fixed effects capturing level-differences in a difference-in-differences specification. $\tau_t$ controls for time effects that are constant across all countries. We specify this time effect by separate fixed effects for each week in the data when we use a weekly data frequency and fixed effects for each month when we use monthly search data.

A crucial assumption of the difference-in-differences specification are parallel trends between Germany and the control countries. To relax this assumption, we follow Addison, Blackburn, and Cotti (2015), Allegretto, Dube, and Reich (2011), and Neumark, Salas, and Wascher (2014) and add country-specific time trends to the regression specification of interest. This controls for underlying trends in the respective countries that are most likely independent of the minimum wage introduction. The respective regression specification (3) adds a parameter $\varphi_{ct}$ that is meant to capture differences in trends:

$$y_{ct} = \text{minimum wage}_t \times \text{Germany}_c \times \delta + \tau_t + \theta_c + \varphi_{ct} + \varepsilon_{ct}$$ (3)

The parametric country specific trends are specified as $\varphi_{ct} = t_t \times \text{country}_c \times \gamma_1 + t_t \times t_t \times \text{country}_c \times \gamma_2$. This trend-adjusted specification strengthens our interpretation that the remaining treatment effect is solely due to the minimum wage introduction.
6. Empirical results

We apply the difference-in-differences approach as described in section 5. The control group comprises search data for “internship” in the local language of various European countries. Table 4 displays effects of the minimum wage introduction from two kinds of data. In Panel (a) we use the weekly search data and in Panel (b) we use the monthly data of Google search. For both kinds of data, the estimations show a significant negative effect which disappears as soon as country specific trends are added. We conduct placebo regressions in which we assign the treatment to all weeks of 2014 ahead of the treatment and anticipation periods, i.e., from 1 January 2014 to 16 March 2014. The placebo effects without controlling for country trends in column (2) are again negative reflecting the negative trend in the search for internship positions. After controlling for country trends, the placebo estimates turn insignificant in the weekly and the monthly search data (column 4), supporting the validity of the treatment effects which are virtually zero in this analysis of search for internships.

In Figure 7 we present the respective trend-adjusted graphical analysis which also illustrates that the minimum wage caused no level effect on the search for internship positions in Germany in comparison with other European countries. Therefore, we summarize that we do not observe an effect of the introduction of the minimum wage on the individuals’ search for internships.

[Figure 7 about here]

[Table 4 about here]

For the analysis of the German Google search for “generation internship” we present effects from a difference-in-differences comparison with Italy and Spain. We use Italy and Spain as a control group because we are aware of similar developments in the labor market, i.e., that graduates lack the chance of permanent positions when entering the labor market. The phenomenon is called “generazione 1000” in Italy and “mileurista” in Spain. In both countries, the phenomena are publicly discussed and prevalent in the political debate.

[Table 5 about here]

The results of our difference-in-differences comparison of Germany with Italy and Spain are presented in Table 5, where Panel (a) again presents the results from weekly search data and Panel (b) from monthly data. In column (1) both the treatment effects point at a decreasing relevance of the Google search for “generation internship” by about one standard deviation. This effect further increases to more than two standard deviations when we control for country
specific trends in column (3). Moreover, the estimated placebo effects are statistically insignificant which supports the validity of the difference-in-differences approach.

To draw correct statistical inference from the difference-in-differences estimation, we would want to calculate standard errors from a clustered variance-covariance matrix. As pointed out by Bertrand, Duflo, and Mullainathan (2004) conventional clustering methods of standard error implemented in Stata are biased and yield too optimistic rejection rates. Most of the recent literature that applies difference-in-differences estimation follows Cameron, Gelbach, and Miller (2008) who simulate rejection rates from several bootstrap refinements. Their results demonstrate that Wild-Cluster bootstrap procedures that simulate the t-statistic under the $H_0$ hypothesis show the most realistic rejection rates using data with as few as five clusters. We follow this Wild-Cluster bootstrap procedure and simulate the t-distribution under the $H_0$ by assuming absence of a minimum wage effect on the generation internship. Comparing the simulated t-distribution with our own t-statistic, we yield a p-value of 0.125 for our treatment effects in Table 5, which seems quite large from a first glance. However, the bootstrap t-distribution only yields $2^3=8$ distinct values when there are only three clusters in the data. Hence, a p-value of 0.125 is the highest precision we can potentially receive from data with only three clusters.

In line with these estimation results, the trend-adjusted graphs presented in Figure 8 also support the parallel trends assumption, i.e., there would not have been an effect on the generation internship in the absence of the minimum wage. This strongly supports our conclusion that the importance of the discourse around a generation internship was effectively limited by the introduction of the statutory minimum wage in Germany.

[Figure 8 about here]

7. Conclusions

We analyze the impact of the minimum wage introduction on internships in Germany. Since conventional data sources lack comprehensive information concerning internships, we use a rather innovative approach and analyze big data collected from Google’s search engine. Our analysis provides a perfect example where big data can help to answer policy relevant research questions when there is a lack of scientific observational data. The data is highly frequent user generated data that allow us to analyze relevant search queries during the time of the minimum wage introduction. The results do not reveal a changing search intensity for internship positions. We observe a downward trend in the search for internships, but this trend seems unrelated with
the timing of the minimum wage introduction. Moreover, this trend matches the decreasing number of internships reported in the IAB Establishment Panel and the decreasing number of compulsory internships reported in the administrative employment data.

While there is no effect on the search for internships, we observe large increases in the search for both compulsory and voluntary internships. We believe that these results reflect the increasing importance of this distinction between compulsory and voluntary internships rather than reflecting an intensified search. However, the increasing importance to discriminate between compulsory and voluntary internships can have real consequences. As companies are more likely to select students for internships from universities that require a compulsory internship for graduation, it increases the attractiveness of such study programs and in turn enhances universities to add compulsory internships as a requirement for graduation.

Most interestingly, we analyze the prevalence of the term “generation internship” in the German society. The generation internship is a latent variable describing a generation of graduates that conducts plenty of internships without a perspective for a permanent position. While conventional data would have to describe the generation internship from a set of variables, we can simply analyze the prevalence of the phenomenon in Google’s search data. We conduct a descriptive before-and-after analysis but we also use a difference-in-differences comparison with similar phenomena in Italy and Spain. The results from both approaches show a reduced prevalence of the generation internship in Germany induced by the minimum wage introduction. Therefore, the minimum wage successfully displaced the generation internship from the public discourse, which was an explicit political goal of the German Ministry of Labor and Social Affairs before the minimum wage was introduced (Borstel, Gaugele, and Wisdorff 2014).

While we cannot provide an ultimate conclusion on how the minimum wage affected the number and volume of internship positions, especially concerning effects on the demand side, we do not observe changes in the search for internship positions but an increasing importance in the distinction between compulsory and voluntary internships. From a policy perspective, the incentives imposed by the minimum wage law seem sufficiently balanced to achieve the political goal to limit the scope of a generation internship.
References


Figures and Tables

Figure 1: Time series of search for “minimum wage” and “minimum wage internship”

(a) Minimum wage  
(b) Minimum wage internship

Notes: Mean-standardized search for “Mindestlohn” and “Mindestlohn Praktikum”. The first vertical line indicates the date when internships entered the public minimum wage debate, i.e., 16 March 2014. The second vertical line indicates the introduction of the German minimum wage, i.e., 1 January 2015.

Data: Google search data, 1 Jan 2011 - 12 March 2017.

Figure 2: Time series of search for “internship position”

(a) Predicted baseline effect  
(b) Predicted trend-adjusted effect

Notes: Mean-standardized search for “Praktikantenstelle”. The first vertical line indicates the date when internships entered the public minimum wage debate, i.e., 16 March 2014. The second vertical line indicates the introduction of the German minimum wage, i.e., 1 January 2015.

Data: Google search data, 1 Jan 2011 - 12 March 2017.
Figure 3: Internship positions in Google search data and in firm-level data


Figure 4: Time series of search for “compulsory internship”

(a) Predicted baseline effect
(b) Predicted trend-adjusted effect

Notes: Mean-standardized search for “Pflichtpraktikum”. The first vertical line indicates the date when internships entered the public minimum wage debate, i.e., 16 March 2014. The second vertical line indicates the introduction of the German minimum wage, i.e., 1 January 2015.

Data: Google search data, 1 Jan 2011 - 12 March 2017.
Figure 5: Time series of search for “voluntary internship”

Notes: Mean-standardized search for “freiwilliges Praktikum”. The first vertical line indicates the date when internships entered the public minimum wage debate, i.e., 16 March 2014. The second vertical line indicates the introduction of the German minimum wage, i.e., 1 January 2015.

Data: Google search data, 1 Jan 2011 - 12 March 2017.

Figure 6: Time series of search for “generation internship”

Notes: Mean-standardized search for “Generation Praktikum”. The first vertical line indicates the date when internships entered the public minimum wage debate, i.e., 16 March 2014. The second vertical line indicates the introduction of the German minimum wage, i.e., 1 January 2015.

Data: Google search data, 1 Jan 2011 - 12 March 2017.
Figure 7: Trend-adjusted difference-in-differences graph of the search for “internship position”

(a) Weekly data  (b) Monthly data

Notes: Mean-standardized search for “Praktikantenstelle” in Germany and in the control group which is constructed from the mean of Czech Republic (“praxe”), Denmark (“praktik”), Hungary (“gyakorlat”), Italy (“tirocinio”), Netherlands (“stage”), Spain (“practicas”), Sweden (“praktik”), and Turkey (“staj”). The time series are adjusted by country-specific linear and quadratic time trends. The first vertical line indicates the date when internships entered the public minimum wage debate, i.e., 16 March 2014. The second vertical line indicates the introduction of the German minimum wage, i.e., 1 January 2015.

Data: Google search data, 1 April 2012 - 12 March 2017.

Figure 8: Trend-adjusted difference-in-differences graph of the search for “generation internship”

(a) Weekly data  (b) Monthly data

Notes: Mean-standardized search for “Generation Praktikum” in Germany and in the control group which is constructed from the mean of Italy (“generazione 1000”) and Spain (“muleurista”). The time series are adjusted by country-specific linear and quadratic time trends. The first vertical line indicates the date when internships entered the public minimum wage debate, i.e., 16 March 2014. The second vertical line indicates the introduction of the German minimum wage, i.e., 1 January 2015.

Data: Google search data, 1 April 2012 - 12 March 2017.
Table 1: Time line of the minimum wage introduction in Germany

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>22 September 2013</td>
<td>Federal election (“Bundestagswahl”)</td>
</tr>
<tr>
<td>14 December 2013</td>
<td>Signing of the coalition agreement. The agreement announces the introduction of the minimum wage on 1 January 2015 and the level of € 8.50.</td>
</tr>
<tr>
<td>18 March 2014</td>
<td>Debate on potential exemption clauses started with a meeting of the party leaders of the grand coalition. In this meeting, the schedule for a coordination between ministries of the government and the parliamentary ballot was terminated.</td>
</tr>
<tr>
<td>3 July 2014</td>
<td>Final decision of the parliament in favor of the minimum wage including all exemption clauses.</td>
</tr>
<tr>
<td>1 January 2015</td>
<td>The new regulation came into force, the minimum wage was set to € 8.50.</td>
</tr>
<tr>
<td>1 January 2017</td>
<td>The minimum wage was raised to € 8.84.</td>
</tr>
</tbody>
</table>

Table 2: Description of the Google search data

<table>
<thead>
<tr>
<th>Variable name</th>
<th>German wording</th>
<th>N</th>
<th>mean</th>
<th>sd</th>
<th>min</th>
<th>max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum wage</td>
<td>“Mindestlohn”</td>
<td>324</td>
<td>0</td>
<td>1</td>
<td>-1.10</td>
<td>5.48</td>
</tr>
<tr>
<td>Internship minimum wage</td>
<td>“Praktikum Mindestlohn”</td>
<td>324</td>
<td>0</td>
<td>1</td>
<td>-0.74</td>
<td>4.09</td>
</tr>
<tr>
<td>Internship position</td>
<td>“Praktikantenstelle”</td>
<td>324</td>
<td>0</td>
<td>1</td>
<td>-2.47</td>
<td>3.32</td>
</tr>
<tr>
<td>Compulsory internship</td>
<td>“Pflichtpraktikum”</td>
<td>324</td>
<td>0</td>
<td>1</td>
<td>-1.53</td>
<td>2.03</td>
</tr>
<tr>
<td>Voluntary internship</td>
<td>“Freiwilliges Praktikum”</td>
<td>324</td>
<td>0</td>
<td>1</td>
<td>-1.76</td>
<td>2.19</td>
</tr>
<tr>
<td>Generation internship</td>
<td>“Generation Praktikum”</td>
<td>324</td>
<td>0</td>
<td>1</td>
<td>-1.82</td>
<td>3.97</td>
</tr>
</tbody>
</table>

Notes: Summary statistics (mean, sd, min, max) of the weekly mean-standardized Google search queries.

Data: Google search data, 1 Jan 2011 - 12 March 2017.
Table 3: Descriptive before-and-after regressions

<table>
<thead>
<tr>
<th></th>
<th>Internship Position (1)</th>
<th>Compulsory Internship (2)</th>
<th>Voluntary Internship (3)</th>
<th>Generation Internship (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Panel (a) Before-and-after regressions controlling for a quadratic time trend:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment effect</td>
<td>0.042</td>
<td>1.499***</td>
<td>1.081***</td>
<td>-0.990***</td>
</tr>
<tr>
<td></td>
<td>(0.197)</td>
<td>(0.091)</td>
<td>(0.113)</td>
<td>(0.198)</td>
</tr>
<tr>
<td>N</td>
<td>282</td>
<td>282</td>
<td>282</td>
<td>282</td>
</tr>
<tr>
<td><strong>Panel (b) Controlling for refugees in the labor market:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment effect</td>
<td>-0.082</td>
<td>1.721***</td>
<td>1.218***</td>
<td>-1.330***</td>
</tr>
<tr>
<td></td>
<td>(0.339)</td>
<td>(0.125)</td>
<td>(0.158)</td>
<td>(0.326)</td>
</tr>
<tr>
<td>Log of number of refugees in Germany</td>
<td>-0.635</td>
<td>1.126*</td>
<td>0.696</td>
<td>-1.734</td>
</tr>
<tr>
<td></td>
<td>(1.277)</td>
<td>(0.495)</td>
<td>(0.572)</td>
<td>(1.192)</td>
</tr>
<tr>
<td>N</td>
<td>282</td>
<td>282</td>
<td>282</td>
<td>282</td>
</tr>
<tr>
<td><strong>Panel (c) Monthly search data:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment effect</td>
<td>-0.016</td>
<td>1.494***</td>
<td>1.064***</td>
<td>-1.120***</td>
</tr>
<tr>
<td></td>
<td>(0.233)</td>
<td>(0.115)</td>
<td>(0.121)</td>
<td>(0.316)</td>
</tr>
<tr>
<td>N</td>
<td>66</td>
<td>66</td>
<td>66</td>
<td>66</td>
</tr>
</tbody>
</table>

*Notes: Reported coefficients are marginal effects of linear regressions as specified in specification (1). Robust standard errors are in parentheses. Asterisks indicate significance levels: * p < 0.05, ** p < 0.01, *** p < 0.001.

*Data: Proportion of refugees in the labor force as reported by the Federal Employment Agency. Weekly and monthly Google search data 1 Jan 2011 - 12 March 2017, anticipation period excluded.*
Table 4: Effects on search for “internship position” from difference-in-differences

<table>
<thead>
<tr>
<th></th>
<th>Baseline (1)</th>
<th>Quadratic country trends (2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Panel (a) Weekly search data:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment effect</td>
<td>-1.324***</td>
<td>-0.235</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.111)</td>
<td>(0.256)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Placebo effect</td>
<td>-0.987***</td>
<td>0.293</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.178)</td>
<td>(0.362)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>1,953</td>
<td>918</td>
<td>1,953</td>
<td>918</td>
</tr>
</tbody>
</table>

| **Panel (b) Monthly search data:** |              |                               |     |     |
| Treatment effect                | -1.647***    | -0.192                        |     |     |
|                                | (0.206)      | (0.421)                       |     |     |
| Placebo effect                  | -1.125***    | 0.554                         |     |     |
|                                | (0.246)      | (0.722)                       |     |     |
| N                              | 459          | 216                           | 459 | 216 |

Notes: All regressions include fixed effects for countries and for each time period in the data. The treatment effect is an interaction term between Germany and the period after the introduction of the minimum wage as specified in equations (2) and (3). The control group consists of Czech Republic (“praxe”), Denmark (“praktik”), Hungary (“gyakorlat”), Italy (“tirocinio”), Netherlands (“stage”), Spain (“practicas”), Sweden (“praktik”), and Turkey (“staj”). Reported coefficients are marginal effects of linear regressions. Robust standard errors are in parentheses. Asterisks indicate significance levels: * p < 0.05, ** p < 0.01, *** p < 0.001.

Data: Weekly and monthly Google search data 1 April 2012 - 12 March 2017, anticipation period excluded.
Table 5: Effects on search for “generation internship” from difference-in-differences

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Quadratic country trends</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>Treatment effect</td>
<td>-1.066***</td>
<td>-2.347***</td>
</tr>
<tr>
<td></td>
<td>(0.148)</td>
<td>(0.381)</td>
</tr>
<tr>
<td>Placebo effect</td>
<td>-0.135</td>
<td>0.102</td>
</tr>
<tr>
<td></td>
<td>(0.249)</td>
<td>(0.442)</td>
</tr>
<tr>
<td>N</td>
<td>651</td>
<td>306</td>
</tr>
</tbody>
</table>

Panel (a) Weekly search data:

<table>
<thead>
<tr>
<th></th>
<th>Monthly search data:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(3)</td>
</tr>
<tr>
<td>Treatment effect</td>
<td>-1.420***</td>
</tr>
<tr>
<td></td>
<td>(0.212)</td>
</tr>
<tr>
<td>Placebo effect</td>
<td>-0.359</td>
</tr>
<tr>
<td></td>
<td>(0.252)</td>
</tr>
<tr>
<td>N</td>
<td>153</td>
</tr>
</tbody>
</table>

Notes: All regressions include fixed effects for countries and for each time period in the data. The treatment effect is an interaction term between Germany and the period after the introduction of the minimum wage as specified in equations (2) and (3). The control group consists of Italy (“generazione 1000”), and Spain (“mileurista”). Reported coefficients are marginal effects of linear regressions. Robust standard errors are in parentheses. Asterisks indicate significance levels: * p < 0.05, ** p < 0.01, *** p < 0.001.

Data: Weekly and monthly Google search data 1 April 2012 - 12 March 2017, anticipation period excluded.
Appendix A: Distribution of the examined variables

Figure A1: Kernel density graphs of the Google search variables

(a) Minimum wage internship  
(b) Minimum wage  
(c) Generation internship  
(d) Internship position  
(e) Compulsory internship  
(f) Voluntary internship

Data: Google search data, 1 Jan 2011 - 12 March 2017.
Appendix B: Robustness to similar search queries for “internship position”

Figure B1: Time Series for supply side variables

(a) Praktikantenstelle (baseline)  
(b) Praktikumsplatz  
(c) Praktikumsstelle  
(d) Praktikum Suche

Data: Google search data, 1 Jan 2011 - 12 March 2017, the data of the query in Panels (d) is only available from 1 April 2012 onwards.
Table B1: Regression results on further supply side variables

<table>
<thead>
<tr>
<th></th>
<th>Baseline (1)</th>
<th>Quadratic country trends (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Praktikantenstelle” (internship position):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment effect</td>
<td>-1.185***</td>
<td>0.042</td>
</tr>
<tr>
<td></td>
<td>(0.087)</td>
<td>(0.197)</td>
</tr>
<tr>
<td>“Praktikumsplatz” (searching internship, synonym):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment effect</td>
<td>-1.138***</td>
<td>-0.170</td>
</tr>
<tr>
<td></td>
<td>(0.057)</td>
<td>(0.133)</td>
</tr>
<tr>
<td>“Praktikumsstelle” (internship position, alternative wording):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment effect</td>
<td>-1.182***</td>
<td>0.025</td>
</tr>
<tr>
<td></td>
<td>(0.073)</td>
<td>(0.163)</td>
</tr>
<tr>
<td>“Praktikum Suche” (searching internship):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment effect</td>
<td>-0.581***</td>
<td>-0.083</td>
</tr>
<tr>
<td></td>
<td>(0.130)</td>
<td>(0.358)</td>
</tr>
</tbody>
</table>

Notes: Reported coefficients are marginal effects of linear regressions as in Panel (a) of Table 3 in the article. Robust standard errors are in parentheses. Asterisks indicate significance levels: * p < 0.05, ** p < 0.01, *** p < 0.001.

Data: Google search data, 1 April 2012 - 12 March 2017, anticipation period excluded.